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PROJECT PERFORMANCE AUDIT REPORT

**YUGOSLAVIA - MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)**

October 30, 1985

Operations Evaluation Department

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ABBREVIATIONS AND ACRONYMS

AFLD	=	Agriculture and Forestry Loans Department
BOAL	=	Basic Organization of Associated Labor
FAO	=	Food and Agriculture Organization of the United Nations
GMP	=	Gross Material Product
GRP	=	Glass Reinforced Plastic Pipe
ICB	=	International Competitive Bidding
LCB	=	Local Competitive Bidding
O&M	=	Operation and Maintenance
OED	=	Operations Evaluation Department
PCR	=	Project Completion Report
PPAM	=	Project Performance Audit Memorandum
SBS	=	Stopanska Banka Zdruzena Banka
SRM	=	Socialist Republic of Macedonia
ZIK	=	Agroindustrial Kombinat

PROJECT PERFORMANCE AUDIT REPORT

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PROJECT PERFORMANCE AUDIT REPORT

YUGOSLAVIA - MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)

PREFACE

This is a performance audit of the Macedonia Strezevo Irrigation Project in Yugoslavia for which Loan 1616-YU in the amount of US\$82.0 million was approved in August 1978. The Loan was closed as scheduled on September 30, 1982; an unused balance of US\$301,121 was cancelled. The date of final disbursement was September 19, 1983.

The audit report consists of an audit memorandum prepared by the Operations Evaluation Department (OED) and a project completion report (PCR) dated November 21, 1984. The PCR was prepared by the Bank's Europe, Middle East and North Africa Regional Office.

An OED mission visited Yugoslavia in April 1985. The mission held discussions with officials of the Commune of Bitola; the executing agency, Basic Organization of Labor (BOAL) Strezevo of Vodostopanstvo Pelagonija; Stopanska Banka; and with staff in the field. The information obtained during the mission was used to test the validity of the analysis and conclusions of the PCR.

The audit memorandum is based on these discussions, on interviews with Bank staff associated with the project, and on a review of the PCR, the Staff Appraisal Report (No. 1934a-YU) dated July 14, 1978, the President's Report (No. P-2269a-YU) dated July 26, 1978, the Loan Agreement of August 23, 1978, correspondence with the Borrower, and internal Bank memoranda on project issues as contained in relevant Bank files.

A copy of the draft report was sent to the Borrower on July 17, 1985 for comments. Comments received from the project implementing agency and from the Borrower have been incorporated and are attached as Annexes I and II, respectively.

The audit finds the PCR comprehensive and accurate with respect to the project's principal achievements and shortcomings and has no reason to question its conclusions. The audit memorandum briefly dwells on some of the project's innovative features, deals with the investor's debt service problems and staff training experience under the project, and highlights aspects related to project effects on agricultural production, water management, and the project's economic performance.

The valuable assistance provided by Stopanska Banka and by project officials and staff is gratefully acknowledged.

PROJECT PERFORMANCE AUDIT REPORT
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BASIC DATA SHEET

KEY PROJECT DATA

	<u>Appraisal Estimate</u>	<u>Actual or Estimated Actual</u>	<u>Actual as % of Appraisal Estimate</u>
Total Project Costs (US\$ million)	175.9/a	138.0/a	78/b
Loan Amount (US\$ million)	82.0	82.0	100
Disbursed (US\$ million)	82.0	81.7	-
Cancelled (US\$ million)	-	0.3	-
Date Board Approval	-	08/08/78	-
Loan Agreement Date	-	08/23/78	-
Date Effectiveness	12/29/78	02/14/79	150/c
Date Physical Components Completed	12/81	07/83	148/c
Proportion Then Completed (%)	100	100	100
Closing Date	09/30/82	09/30/82	100/c
Economic Rate of Return (%)	15	13	87
Institutional Performance (Irrigation)	-	Good	-
Technical Performance (Irrigation)	-	Good	-
Number of Direct Beneficiaries	50,000	50,000	100

CUMULATIVE DISBURSEMENTS

	<u>FY79</u>	<u>FY80</u>	<u>FY81</u>	<u>FY82</u>	<u>FY83</u>	<u>FY84</u>
Appraisal Estimate (US\$ million)	14.5	34.5	62.5	80.5	82.0	-
Actual (US\$ million)	-	12.3	29.1	68.4	81.6	81.7
Actual as % of Estimate	0	32.8	46.5	85.0	99.8	99.9
Date of Final Disbursement	September 19, 1983					

MISSION DATA

<u>Mission</u>	<u>Date (mo./yr)</u>	<u>No. of Persons</u>	<u>Mandays in Field</u>	<u>Specializations Represented /d</u>	<u>Performance Rating /e</u>	<u>Trend/f</u>	<u>Types of Problems/g</u>
Iden./preparation	04/76	5	95	30,2B	-	-	-
Preparation	06/76	3	21	2D,B	-	-	-
Preparation	09/76	1	10	B	-	-	-
Preparation	11/76	1	7	D	-	-	-
Preparation	02/77	2	14	2D	-	-	-
Preparation	04/77	1	7	D	-	-	-
Preparation	05/77	5	100	2D,B,2A	-	-	-
Preparation	08/77	3	15	2D,C	-	-	-
Appraisal	10/77	5	75	2D,2C,A	-	-	-
Subtotal			<u>346</u>				
Supervision 1	04/79	1	6	D	1	2	M
Supervision 2	06/79	2	12	2D	1	2	M
Supervision 3	11/79	1	2	D	1	2	M
Supervision 4	02/80	2	10	D,B	1	2	M
Supervision 5	08/80	1	3	D	1	1	-
Supervision 6	04/81	2	16	2D,B	1	2	-
Supervision 7	04/82	2	12	D,B	1	2	-
Supervision 8	10/82	2	10	2D	1	2	-
Subtotal			<u>71</u>				
Total			<u>415</u>				

OTHER PROJECT DATA

<u>Borrower:</u>	Udrzenska Banka
<u>Guarantor:</u>	Socialist Federal Republic of Yugoslavia
<u>Executing Agency:</u>	Pelagonija Water Economy Enterprise (Vodostopanstvo)
<u>Fiscal Year of Borrower:</u>	January 1 to December 31
<u>Name of Currency (Abbreviation)</u>	Dinar (Din)
<u>Currency Exchange Rate:</u>	
Appraisal Year Average	US\$1.00 = Din18.00
Intervening Years Average	US\$1.00 = Din26.00
Completion Year Average	US\$1.00 = Din52.15
<u>Follow-on Project:</u>	None in the irrigation subsector in Macedonia

- /a Excludes interest during construction, estimated at appraisal at US\$12.9 million.
 /b The cost overrun in terms of local currency, including interest during construction, was 76%.
 /c Calculated in terms of months from date of Board approval.
 /d A = Agriculturist; B = Agricultural Economist; C = Financial Analyst; D = Engineer or Irrigation Engineer.
 /e 1 = Problem-free or minor problems; 2 = Moderate problems; and 3 = Major problems.
 /f 1 = Improving; 2 = Stationary; and 3 = Deteriorating.
 /g M = Managerial.

PROJECT PERFORMANCE AUDIT REPORT

YUGOSLAVIA - MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)

EVALUATION SUMMARY

Introduction

The project represented the eighth Bank operation principally involved with the agriculture sector in Yugoslavia. Agriculture is the only major sector other than personal services in which social ownership is not predominant. About 85% of agricultural land in Yugoslavia is privately owned, employing about 90% of the farm population. The project was consistent with the country's strategy, supported by the Bank, of focussing particular attention on increasing the flow of resources to the less developed regions and to the individual farming sector.

Objectives

The main objectives of this project were to increase crop production on 20,300 ha, create employment and raise labor productivity and farm incomes. The project also was expected to improve the local municipal water supply and to provide cooling water for a thermal power plant. Project investments were planned for the construction of a dam, of canals, a sprinkler irrigation network, drains, roads, office buildings, a pipeline and water diversion structures. Studies on three future irrigation schemes in Macedonia also were included.

Implementation Experience

Project implementation was successful. Actual implementation of the dam was close to the appraisal time estimate, but for construction of the main canal and irrigation network there was a 48% time overrun. Devaluation of the dinar resulted in project cost of US\$138.0 million, or 22% below appraisal estimates. However, in terms of local currency, project cost exceeded appraisal estimates by 76%. A number of design improvements, ranging from redesign of Strezevo dam, regulation of the main canal, optimization of the underground pressure pipe network, including pressure regulation, were effected.

Results

The irrigation and non-agricultural water supply systems were established essentially as planned. However, while the systems for supplying water to the town of Bitola and the power plant have been used expeditiously, utilization of the irrigation system is slower than expected. The development of agricultural production could not keep pace with the development of

irrigation infrastructure due to financial and other constraints (PPAM, paras. 22-24), and a suitable water management system remains to be implemented (PPAM, paras. 25-27). Partly due to unfavorable changes in exchange rates, the investor encountered serious financial difficulties and had to obtain assistance to overcome debt service problems (PPAM, paras. 18-21). The project's re-estimated economic rate of return is 13%, compared with 15% estimated at appraisal. The investment and operation and maintenance costs of the project are expected to be recovered through levy of water charges, after taking into account the ability of the individual sector farmers to pay. Any deficits are to be financed by the Macedonian Government.

Sustainability

The main uncertainty facing the project concerns the pace of agricultural development over the next 5-6 years and the yield levels at which production will stabilize. Financial, technical and marketing risks exist, and the probability of a shortfall in aggregate incremental production, hence in economic performance, is relatively high. These risks will be partially compensated by increased design efficiency of the water conveyance system, expected to result in expanded irrigated area with a positive effect on incremental production. Additional water conservation measures are in future expected to become necessary (PPAM, para. 30; PCR, paras. 4.03 and 8.09).

Findings and Lessons

Adequate technical, financial and institutional resources contributed to the successful design and implementation of this large project (PCR, paras. 8.02 and 8.05). Successful implementation was related to thorough preparation in which the Bank and the executing agency were able to carefully examine all the proposed design improvements, including redesign of the dam, regulation of the main canal and optimization of the underground pressure pipe network (PPAM, para. 13; PCR, paras. 2.03-2.04 and 7.01). Project management was suitably organized and contributed substantially to the project's success (PPAM, para. 12; PCR, para. 6.02), and project authorities were sensitive to environmental (dam safety) and social (resettlement) concerns (PPAM, paras. 14-15).

Although the executing agency and, to some extent, the Bank supervision missions tended to concentrate on engineering matters, the Commune of Bitola, as a co-signatory of the Project Agreement, provided balance by taking an active interest in the operation of the system, the preparation of annual agricultural development plans and the provision of supporting services for associated individual sector farmers (PCR, paras. 6.03 and 8.06). Among the unresolved issues is the organization of irrigation on smallholder plots, although experience to date has shown that land consolidation is not the only solution to the rationalization of land use in Yugoslavia, particularly in areas where farmers have a history of cooperation (PCR, para. 8.07).

Implementation of the project's staff training component was unduly delayed. The conflicting objectives of maintaining full staff strength during implementation and of improving operating staff skills through training away from the project should be reconciled more effectively in future projects than was the case in this project (PPAM, paras. 16-17; PCR, para. 6.12).

The project is an example of irrigated agriculture in the low rainfall areas of southeastern Yugoslavia; however, future investments in irrigation should be considered within the framework of regional economic development plans, and in relation to national investment priorities, financial constraints and stabilization objectives (PCR, para. 8.03).

PROJECT PERFORMANCE AUDIT MEMORANDUM

YUGOSLAVIA - MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)

I. PROJECT SUMMARY^{1/}

1. The Socialist Republic of Macedonia (SRM) is one of the less developed republics in Yugoslavia. Agriculture, which grew at an average annual rate of about 3.6% during the 1970s, is still an important sector in Macedonia. Its structure follows the general Yugoslav pattern, with the social sector comprising agricultural kombinats, state farms, agricultural cooperatives and other organizations co-existing with the so-called individual sector consisting of about 160,000 private farms with an average size of 3.1 ha of cultivated land. The individual sector accounts for nearly 80% of the republic's cultivated land and 90% of the agricultural labor force. The objectives of recent Macedonian Agricultural Development Plans included development of both the social and individual sectors. The main feature of the individual sector program has been to provide incentives for private farmers to be in some form associated with social sector entities, and the channeling of resources for private farmers through the social sector. Although, as a matter of policy, private farmers have access to credit and inputs without being required to associate, limited availability of inputs has in practice limited the non-associated farmers from direct access. Within the country's overall strategy the Bank has been focussing particular attention on increasing the flow of resources to the less developed regions and to the individual farming sector.

2. This was the eighth Bank operation to assist agricultural development in Yugoslavia. Possibilities for irrigation in Macedonia were identified as part of a series of broader studies undertaken by Yugoslavian consulting firms roughly over the period 1969-72. Preparation of irrigation schemes also was carried out by local staff, assisted by the Bank and the FAO/IBRD Cooperative Program. The project's scope was determined by the selection of the Strezevo irrigation scheme from a group of such schemes contained in the 1976-80 5-year plan for Macedonia. Appraisal took place in late 1977, and a loan (1616-YU) in the amount of US\$82.0 million was approved in August 1978. The estimated project cost was US\$188.8 million, including US\$12.9 million interest during construction, with a foreign exchange component of 44%. The loan became effective in February 1979 and was closed in September 1982, as expected. Final disbursement took place on September 19, 1983, and US\$301,121 of the loan amount was cancelled.

3. The main objectives of the project were to increase crop production on 20,300 ha and raise labor productivity and farm incomes, and to create employment in an area where unemployment and emigration were among the highest in Yugoslavia. The project also was to meet important requirements with

1/ Adapted from the PCR.

regard to municipal water supply and the cooling of a thermal power plant. To these ends, investments were to be made for the construction of a dam to create water storage capacity of 112 Mm³, a feeder canal to collect water from seven mountain streams, a main irrigation canal, a gravity-fed sprinkler irrigation network for 20,300 ha, surface drains, roads, office buildings, a pipeline to provide cooling water for the power plant, and diversion structures for the supply of water to the town of Bitola. Studies on three future irrigation schemes in Macedonia also were included. Construction of the irrigation infrastructure was expected to be completed by late 1981. Full production was to be achieved by 1987 for annual crops and by 1991 for orchards and vineyards.

4. The project was successfully implemented. Two important components, the diversion tunnel for the Strezevo dam and provision of bulk water for the power plant, were completed with a delay of less than a year. The dam, 84 m high and made of rockfill with a claycore, also was completed approximately within a year of the target date. However, construction of the over 60 km long feeder canal, the 45 km main irrigation canal and the pressure pipe network, completed in 1983, took about two years longer than expected.^{2/} Road construction was adjusted to the altered pace of implementation of the irrigation works, and the communal water supply was provided as expected. Feasibility studies also were undertaken. Project cost in terms of local currency exceeded appraisal estimates by 76%, largely due to rapid general inflation in Yugoslavia. However, devaluation of the dinar caused the cost in dollar terms to amount to only US\$138.0 million (excluding interest during construction), or 22% below appraisal estimates.

5. Problems were encountered in laying irrigation pressure pipes due to high groundwater levels. Also, project staff had no experience with the transport and handling of glass reinforced plastic (GRP) pipe, an otherwise well-performing product, and some damage and installation delays occurred before appropriate remedial measures could be devised.

6. Innovative design features in this project include a special water intake tower, which permits the drawing of warm surface water from the reservoir which is more suitable than the cooler water below the surface for the irrigation of crops. Another special feature are ten duck-bill weirs equipped with electronically regulated gates which are installed in the main canal. By avoiding operational wastage of water and introducing a more efficient water regulation through this special feature, it is estimated that substantial water savings, as compared to the original water requirements, would result. Use of GRP pipe, for a part of the pressure pipe network, for irrigation also constitutes an innovative step.

7. Actual experience with irrigation in the project area having been very limited to date, the PCR estimates that projections for incremental agricultural production would be roughly as expected at appraisal. Increases

^{2/} Comments by the project implementing agency concerning the effect of bidding problems on canal construction are in Annex I.

in the value of production would be attributable to a change in the cropping pattern and to improvements in yields. While the technical assumptions underlying these projections are valid, the audit is concerned about the practical feasibility of realizing the potential within the assumed time frame. Operational and financial constraints already have slowed the expansion of the irrigated area and could also affect cropping performance.

8. Stopanska Banka Zdruzena Banka, experienced in dealings with the World Bank, was the borrower for this project. Implementation was the responsibility of a specially created Basic Organization of Associated Labor (BOAL), BOAL Strezevo, which developed into a competent agency and contributed substantially to the project's accomplishments. Social sector agricultural activities, and cooperation with the individual sector, were the responsibilities of the agro-industrial kombinat (ZIK) Pelagonija. Utilization of irrigation water, and therefore the degree of ultimate success of the project, to a large extent depends on ZIK Pelagonija. A number of weaknesses will have to be overcome, both within the social sector enterprises and in the kombinat's support role towards the individual sector. The latter includes the supply of agricultural credit and of extension advice, and the development of a system of irrigation suitable for fragmented smallholder plots. A significant step towards rationalizing land use and regulating the relations between the social and individual sectors is seen in a legal requirement for annual land use plans to be prepared by the kombinat.

9. A major concern is the project's financial performance. The investor has been unable to meet debt service obligations for two reasons. First, due to late completion of irrigation facilities and slow development of irrigated agricultural production, cost recovery from agricultural water users has been far behind expectations. Second, as the investor carries the foreign exchange risk and the value of the U.S. dollar has risen steadily since disbursement of loan funds began, debt service obligations in dinar terms have skyrocketed.^{3/}

10. The economic outcome of the project is somewhat uncertain. With the irrigation system in place, the economic rate of return (ERR) of 15% estimated at appraisal would be realizable. However, a number of adverse factors are likely to depress the ERR, and the audit estimates that the outcome is unlikely to exceed 13%.

^{3/} The project implementing agency informs that a law pertaining to the sharing of foreign exchange risks has been passed by the Government of Yugoslavia (Annex I). Audit findings on this subject are in paras. 18-21.

II. AUDIT FINDINGS

A. General

11. This project offers a number of interesting features and provides the key to an impressive economic potential, which, however, may be difficult to fully realize. The phasing of project activities reflects distinct stages, and degrees of success. The identification phase, spanning the period 1969-76, was comparatively long, while preparation and appraisal, completed during 1976-78, was accomplished in a reasonable period for such a complex project. Implementation got a fairly good start in 1979 and proceeded well until 1981. Thereafter, civil works construction, especially for the main canal and irrigation network, slowed and continued well into 1983, i.e., about 18 months longer than expected. Compared with the relatively successful construction of irrigation infrastructure, the pace of agricultural activities related to irrigation to date has been disappointing.

12. Among the attractive features of the project has been its management, both in terms of organization, staffing and operation. A special BOAL was created for this purpose, which is a larger body than the customary project unit in other countries. BOAL Strezovo was suitably placed within its Work Organization (i.e., had sufficient autonomy), well staffed, well motivated, and had ready access to political and financial authorities. Early on management prepared a detailed implementation plan, which, because it was comprehensive, written in the local language and widely distributed, proved useful. Such a plan could constitute a significant ingredient of success in projects in other parts of the world and deserves closer attention by the Bank.

13. Close cooperation between project and Bank staff was beneficial to the project, both with respect to facilitating construction progress and improving project design. This cooperation, and consultation with French engineers, resulted in an improved water intake structure at the dam. An intake tower was designed which permits skimming warmer surface water from the reservoir for irrigation purposes. There can be a temperature differential of more than ten degrees centigrade between water at the surface and at lower layers, and vegetative growth is significantly accelerated by application of warmer water. Another feature introduced during appraisal was the provision of automatic regulators in the main canal. During implementation, this feature was further modified into "duck-bill" type weirs equipped with electronically operated gates. This provision avoids operational wastages of water, permits storage in the canal and allows a more efficient water management. It is estimated that this provision will result in a saving of about 10% of total irrigation requirement of the original project area; this permits an extension of the irrigation network over an additional 2,000 ha. A decision has already been taken by SRM to implement this extension during 1985-86 through domestic resources.

14. The audit mission also was informed of elaborate safety measures at the Strezovo dam. Precision seismic measurement devices have been installed

to keep track of movements of the dam. Periodically, test boreholes already sunk and installed with measurement devices to check for leaks would monitor the behavior of the dam by means of simulated quakes. The test results to date have been satisfactory. Although the mission could not assess the technical aspects related to dam safety, it gained a positive impression of local officials' concern in this regard. That concern is well justified, given the storage capacity of 112 Mm³ created under the project and the fact that Macedonia experiences severe earthquakes from time to time. To avoid or mitigate disaster, it is of utmost importance that established procedures to monitor dam safety are meticulously followed.

15. Another aspect related to the project's environmental impact is the resettlement of displaced villagers. Two villages had to be evacuated as a result of construction of the dam; one (Strezevo) was inundated and the other one isolated and threatened by landslides triggered by the reservoir. All villagers have been resettled near the town of Bitola, some of them becoming direct beneficiaries of irrigation. Project officials report that the resettlement program has been successful, and satisfactory to evacuees.

B. Problems and Constraints

16. Irrigation Staff Training. Part H of the project, as described in the Loan Agreement, consisted of a specialized training program for the personnel of Vodostopanstvo to be carried out through a succession of annual plans. Section 2.08 of the Strezevo Project Agreement states "Vodostopanstvo shall, on or before July 31, 1979...submit to the Bank, for its review and approval, the terms and conditions under which the training program included in Part H of the project shall be carried out." Implementation of this part of the project was not satisfactory. Training proposals were submitted to the Bank, only to be subsequently withdrawn, and an agreement with a French consultant firm was signed as late as September 1982. Under that agreement, the training was to take place in France and in the United States and cover the fields of organization and management, operation and maintenance of the irrigation system, operation of the sprinkler system, agricultural economics, and agronomy.

17. In early 1983, project management decided to postpone the training program because candidates for training were needed to complete construction of irrigation infrastructure, and because training was considered premature as the system was not expected to be operational for some time.^{4/} Faced with the imminent closing of the loan, arrangements were made to have US\$200,000 of loan funds transferred to a special account in favor of the contracted French firm. These funds were to be drawn as the training program was executed. However, for a variety of reasons, execution of the program has been postponed successively, and as of April 1985 had not yet

^{4/} Regional staff comment that "One of the principle reasons for the delay in training has been due to lack of decision in selecting the proper candidates for training. With a large number of agencies involved in project implementation, each one has been advocating its own candidates resulting in an impasse."

occurred.^{5/} The situation is unsatisfactory insofar as (a) the project is being deprived of upgraded manpower skills, and (b) loan funds have been disbursed although they had not been applied to the designated purpose 18 months after disbursement, and a firm date for that to happen could not be obtained.

C. Main Issues

18. Debt Service Problems. Arrangements between the various parties under this project provide that the ultimate borrower of loan funds in the social sector assumes the risk of losses resulting from changes in the rates of exchange between currencies borrowed for purposes of the project. The investor, Vodostopanstvo, is thus obliged to repay the current dinar equivalent of the amount of foreign currencies to be repaid under the semi-annual repayment schedule. This aspect has aggravated the investor's already difficult financial situation. Basic financial difficulties stem from the country's recessionary economic situation, and from the fact that project investment has not yet become productive (para. 22). Dinar profitability of its operations thus has not improved under the project. However, dinar debt service obligations, roughly amounting to US\$3.0-3.5 million equivalent semi-annually, have skyrocketed due to dinar devaluation. The exchange rate averaged din. 18 per U.S. dollar during the appraisal year and din. 52 per U.S. dollar during the completion year, compared with about din. 260 per U.S. dollar at the time of the audit mission.^{6/}

19. The investor has, in fact, not been able to comply with the financial obligations to the borrower (Stopanska Banka) under the project. Past project-related revenues have consisted almost entirely of collection of water charges from the power plant and the Commune of Bitola. These users not only have consummated and paid for water supplied from project facilities, but they have been assessed significantly higher volume charges than agricultural users. Nevertheless, the revenue shortfall is large, and concerted efforts, involving the Yugoslavian and Macedonian governments as well as Stopanska Banka and the Commune of Bitola, had to be made to provide

^{5/} The project implementing agency and the Borrower advise that training has been scheduled to take place during the period September-November 1985 (Annexes I and II).

^{6/} In the Region's view, "Clearly, the largest constraint facing the project is the exposure of the social sector to the foreign currency exchange risk. Measures to offset this constraint are being actively debated in Yugoslavia and the Bank." Additional regional comments advise as follows: "...the Region intends, in the context of its sector work program, to analyze in greater detail the mechanics by which the exchange risk is being borne, since despite the established law concerning the role of the end-user, there is no uniform application of it. In our most recent loans to agriculture (e.g. Montenegro RDP (2467-YU) and the Fertilizer Sector Loan (2410-YU)), therefore we have defined a specific mechanism in the loan agreements."

financial relief to Vodostopanstvo.^{7/} Borrower representatives expressed regret and disappointment about the World Bank's inability to participate in such efforts through debt rescheduling, especially since the magnitude of the foreign currency risk implications in this case is so large that it overshadows any gains/savings that might have accrued to the investor on account of the Bank's traditional emphasis on efficiency in the use of project resources. The implications of course transcend the debt service question, as a general liquidity crisis affects current and future project operations, and casts a shadow on the generation and sustainability of benefits (para. 30).

20. Since a major part of the dinar devaluation is related to high domestic inflation, this case illustrates the importance of adequate national economic management for the success of investment projects. External shocks can, and do, of course occur from time to time against which individual countries can hardly protect themselves. But available policy tools within the discretion of a national government, particularly those affecting the price structure and factor productivity, must be fully exhausted to alleviate those shocks. The fact that the loan guarantor has had to provide extensive financial assistance to the borrower/investor, albeit outside Loan Agreement terms, points to a calamitous situation.^{8/}

21. The Bank's country economic work and general lending framework should be focussed even more sharply than has been the case to assess, and guard against, the type of risks that could be jeopardizing the success of this project. Of paramount importance are the mechanisms for absorbing foreign exchange risks. Pertinent questions are whether end-users of foreign currency loan funds should be exposed to the full currency exchange risk, as was the case under this project, whether such risks should be passed on by the borrower to the end-user in the form of a fixed fee (e.g., an adequate interest rate margin), or whether risk sharing or some other forms of risk assumption would be more appropriate. An end-user's capacity to earn foreign exchange as a result of project activities, and the degree of discretion granted by the central bank at which the earned foreign exchange can be managed by the enterprise, greatly influence the magnitude of the exchange risk. There are no guidelines concerning acceptable risk levels for foreign borrowings by agro-kombinats in Yugoslavia. Recent events in this and other projects have shown that practices have been inadequate, i.e., investors would have failed without extraordinary help, the economically controversial

^{7/} Federal legislation is evolving in Yugoslavia to assist domestic borrowers suffering foreign exchange losses nationwide.

^{8/} The same problem is even more pronounced in another Yugoslavian project, i.e., the Montenegro Agriculture and Agricultural Industries Project (Loan 1370-YU) (PPAR forthcoming).

implications of which are fully recognized by this audit; having to resort to extraordinary measures on a broad scale is not a desirable situation.^{9/}

22. Agricultural Production. Irrigation is only a means, and not an end in itself; agricultural primary production is an intermediary goal (generation of incomes and final consumption constituting final goals). To the same extent that creation of an irrigation potential for 20,300 ha under this project can be considered a substantial achievement, the failure to realize that potential to date must be noted as a disappointment. There was sequential physical development from the source of water under the project, i.e., the feeder canal, dam and main irrigation canal were completed about in that order. Hence, irrigated production could have started in the upper reaches of the command area and followed progress in network construction towards the tailend. However, production has not developed in that fashion. In 1982, about 4,000 ha were irrigated, primarily on a test basis. No supplementary irrigation was reported necessary in 1983 as rainfall was adequate.^{10/} In

9/ Bank efforts to cope with the problem of foreign exchange risks facing users of World Bank funds in Yugoslavia are evident from the following regional comment: "...the Bank has on numerous occasions made clear to the Yugoslavs, that if the investor, as end-user of Bank funds, is willing to bear the foreign exchange risk (and the National Bank is willing) it must then pay the interest rate on dinar funds established by the Yugoslav banks in accordance with [the first World Bank Structural Adjustment Loan]. This would, in most instances, provide the investor with a more stable basis for financial planning than afforded by unpredictable fluctuations in the dinar exchange rate. Under no circumstances, however, should the Bank consider subsidizing such investors in a manner which would run contrary to the intent of the Yugoslav law. There is large excess capacity in the sector with numerous examples of duplicated investments by region, many of which could, under no circumstances, be rendered economically or financially efficient. In the past, such investments were often made without due regard to financial accountability, in a policy context in which the economic cost of capital was not fully considered...Reforms now being formulated to the foreign exchange law, however, should...provide an extra margin for those investors which have the potential to produce efficiently, but because of lack of access to foreign exchange are producing at a loss. In conclusion, the solution to the "calamitous situation" does not lie in sheltering investors, as end-users, from the foreign exchange risk...but rather in ensuring that the economic policy framework requires that, in the future, the cost of such risks are fully considered by the investors when making investment decisions."

10/ Regional staff point out that "It was anticipated that in this area with a rainfall of about 550 mm/year, irrigation would at best be supplemental. It has also been anticipated that two consecutive years can occur with good rainfall and consequently with no irrigation requirements. The measure, therefore, should be to assess the level of crop production rather than the area."

1984, only 3,700 ha were irrigated - 2,200 ha in the social sector and 1,500 ha in the individual sector. The pace of actual development clearly is below appraisal expectations (para. 28). As one of the consequences, it is too early to assess at this point the agricultural performance of the project, especially the irrigation impact on crop yields.

23. Formidable obstacles to full development of irrigated agriculture in the Strezevo project exist in the social as well as the individual sectors. There are institutional constraints, but these are basically those inherent in any of the agro-kombinats. There clearly are managerial constraints which, however, cannot be assessed within the context of this audit because of the large and multi-faceted nature of the agro-kombinat, lack of sufficient field experience with irrigation, and lack of adequate indicators. The weak response to irrigation opportunities so far is perceived as a reflection of management weaknesses. The individual sector, being tied so closely to the social sector, is necessarily constrained by certain aspects of this association, but it is also handicapped by other factors. Support services, especially credit and extension, have been inadequate, and the fragmented farm structure is posing serious problems (para. 26). A growing bottleneck in both sectors is expected to be the availability of mechanized services. Mechanization is considered increasingly necessary as cropping intensity and output expand - or, contrariwise, as a prerequisite for such an expansion. However, the required funds, estimated in the PCR at US\$30.0 million over the next 3-5 years (para. 6.08), may not be obtainable.

24. It is pertinent to note that the project did not include any direct intervention in support of agricultural production, other than providing irrigation infrastructure. Supervision missions also did not include an agriculturist. This case, as well as examples elsewhere in the region,^{11/} indicates that the development of irrigated agriculture requires a balanced approach, with all components, not just irrigation engineering, receiving adequate attention.

25. Water Management. An essential ingredient of a successful irrigation project is an effective water management system. Such a system has not yet been established in the present project. In the social sector, where the land is consolidated, it is primarily a matter of deciding on an appropriate system and making it operational. Such a system must allow rotational water applications based on the estimated moisture deficit. The capability to be created thus must include establishing crop-specific water requirements, devising procedures for periodically measuring soil moisture and computing water application rates, and implementing operating procedures for timely and efficient application of the prescribed volume of water for specific crops and plots. Various adequate systems are already in operation around the world, and it should be possible to install and successfully test one over a period of two cropping seasons. But valuable time has already been lost.

^{11/} Audits in Romania reached similar conclusions; see Rasova-Vederoasa Irrigation and Agricultural Development Project (Loan 1247-RO) and Ialomita-Calmatui Irrigation Project (Loan 1368-RO), OED Report No. 5386, dated December 28, 1984.

26. By comparison, a potentially far greater water management problem exists in the individual sector because of extensive land fragmentation and small farmers' unfamiliarity with irrigated agriculture. The need for establishing a water management system is identical to that in the social sector, but the prerequisites are more complicated. Of crucial importance is the cropping pattern within the service area of each hydrant. One possibility for achieving reasonable irrigation efficiencies would be to introduce monocropping in individual hydrant command areas. There are agronomic problems with such a system, however, which have to be investigated, although solutions do not seem too remote. But the main complicating factors are organizational, social and financial. Cropping decisions would have to be removed from individual farmers, and compliance obtained, possibly creating pressures for granting subsidies and establishing product price guarantees. Traditional cropping preferences reflecting subsistence needs and marketing practices would have to be modified. The financial risks tend to be greatly increased with monoculture as yield and price fluctuation cannot be averaged out over a basket of products, and the generally rigid family labor supply cannot be easily matched with differing labor requirements associated with single crops rotated on an annual or bi-annual basis.

27. The impression gained by the audit mission is that problems with water management in the individual sector have been underestimated, by Macedonian as well as Bank officials. The combination of such problems with the general constraints facing private agriculture in the project area could easily retard the project's agricultural performance. More preparatory work should therefore have been undertaken parallel to project implementation. The sequential approach that has been followed is bound to be costly to the economy.

28. Economic Performance. With only investment costs known but not the benefits, judgement on the project's economic performance can be little more than conjecture. But adverse factors such as implementation delays, late introduction of an adequate water management system, slow in-phasing of the use of irrigation water and the consequent delayed build-up of agricultural production would normally be expected to depress economic performance. As far as investments are concerned, 100% were expected to be made by 1981. In retrospect, while expenditures were delayed, two-thirds were nevertheless made by end-1981. With respect to utilization, the appraisal report states (para. 3.06) that irrigation was expected to commence in 1982 on the full 20,300 ha area. In contrast, actual achievement to date has been 4,000 ha in 1982 and 3,700 ha in 1984, and irrigation of the full area probably will not be reached before 1990. Concerning crop yields, with the experience at hand, it is not possible to test the assumptions made at appraisal.

29. In view of the above, the audit feels that the original economic rate of return (ERR) expectations cannot be met. Based on a phased reduction in benefits over the next 15 years, averaging 14% per year compared with PCR estimates and most of it occurring before 1990, the audit estimates an ERR for this project of 13%. This re-estimate does not imply any reduction in projected yields, hence full-development benefits are assumed to be as shown in PCR Annex 2, Table 6.

D. Sustainability

30. Future prospects with this project are not so much a question of maintaining the level of benefits once they have been achieved. Of course, factors such as natural disasters and changing government policies, among other problems, could disrupt project utilization, but these are not predictable. Rather, the main uncertainty is about the pace of agricultural development over the next 5-6 years and the yield levels at which production will stabilize. Serious constraints exist and the risk of a shortfall in aggregate incremental production, hence in economic performance, is considerable. Seen from this angle, the project presents itself as an interesting candidate for an impact evaluation study around the turn of the decade.

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Comments Received from the Project Implementing Agency

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WE REPEAT OUR TELEX NO.134 WITH SOME CORRECTIONS:

THE WORLD BANK
WASHINGTON D.C. U.S.A.
OPERATIONS EVALUATION DEPARTMENT
MR.Y.NATANARE

SUBJECT: PROJECT PERFORMANCE AUDIT REPORT
FOR STREZEVO IRRIGATION PROJECT MACEDONIA-YUGOSLAVIA
LOAN 1616-YU

WE RECEIVED THE REPORT PREPARED BY THE OPERATIONS EVOLUTION DEPARTMENT (OED) AND A PROJECT COMPLETION REPORT (PCR) PREPARED BY THE BANK'S EUROPE, MIDDLE EAST AND NORTH AFRICA REGIONAL - AGRICULTURAL III AND WE ARE GRATEFUL FOR YOUR GOOD JUDGEMENT ON THE IRRIGATION PROJECT COMPLETION.

WE HAVE COMPLETELY ACCEPTED THE REPORTS WITH SOME NOTES FOR SOME SECTIONS THAT WE BELIEVE SHALL HELP REALISTICALLY FOR COMPLETELY EXPLANATION FOR THE CONCRETE SITUATIONS:

IN THE SECTION I, PROJECT SUMMARY

-SHORT SUMMARY FOR THE PROJECT UNDER ITEM 4 CONCERNING THE TIME COMPLETION OF THE STRUCTURES, AND WE CONSIDER TO BE NECESSARY TO POINT OUT THAT DUE TO THE BIDDING WHICH WAS ANNOUNCED AGAIN, AND BECAUSE OF OBTAINING WARRANTIES, THE WORKS OF THE DETAILED CANAL NETWORK STARTED IN THE MID OF 1980, WHILE THE WORKS ON THE MAIN CANAL STARTED AT THE END OF 1979, SO THAT THE TIME FOR CONSTRUCTION HAS NOT BEEN EXCEEDED.

- IN THE SAME SECTION UNDER ITEM 9 CONCERNING THE ABOVE MATTER, AND AT THE SAME TIME WE LIKE TO INFORM YOU THAT SFYR HAS PASS A LAW BY WHICH A PART OF THE CURRENCY EXCHANGE RATE WILL BE CARRIED BY THE NATIONAL BANK OF YUGOSLAVIJA, BNS, STREZEVO, ACCORDING TO THE LAW BELONGS IN THE ORGANISATIONS TO WHOM THE CURRENCY EXCHANGE UP TO 50 0/0 IS CARRIED BY THAT BANK.

IN THE SECTION II, AUDIT FINDINGS

-WE ARE POINTING OUT PART I, ITEM 4

IN THE SAME SECTION UNDER B ITEM 17 WHERE IS THE TRAINING PROGRAM DISCUSSED, WE HAVE TO POINT OUT THAT THE ONLY PROBLEM FOR DELAY OF THE TRAINING WAS THE NECESSITY OF THE PERSONS INTENDED FOR TRAINING WHO NEEDED HERE TO PREPARE THE SYSTEM FOR EXPLOITATION (TESTING OF THE NETWORK).

THE TRAINING STARTED IN OCTOBER 1984 (ONE OF EACH: CIVIL ENGINEER, ONE ELECTRO ENGINEER AND MECHANICAL ENGINEER) WHILE THE REMAINING ARE ATTENDING IN SEPTEMBER-NOVEMBER OF THIS YEAR, 1985.

-IN THE SAME SECTION UNDER B, MAIN ISSUES ITEM 18, WHERE THE DEPT AND BENEFIT FROM THE PROJECT ARE DISCUSSED, WE ARE POINTING OUT THAT IN 1984 AND 1985 THE SYSTEM WAS AND IS IN EXPLOITATION AND FINANCIAL EFFECTS WERE GAINED.

- IN THE FINAL REPORT PREPARED BY THE REGIONAL EVALUATION DEPARTMENT FOR EUROPE, MIDDLE EAST AND NORTH AFRICA (MR. FIRMAZI AND MR. BROOK) IN THE SECTION I UNDER B ITEM 1.04 WE POINT OUT THAT THE BANKS APPROVE LOANS, WHILE THE ORGANISATIONS (WORKING MANUFACTURING CAPACITY) ARE GIVING ADVANCE, EVERY INDIVIDUAL PRODUCER IN NEED OF LOAN FOR WORKING CAPITAL CAN OBTAIN A LOAN FROM THE BANK.

- IN THE SAME REPORT UNDER D, AGRICULTURAL CREDIT, ITEM 6.08 WE ARE POINTING OUT THAT IN THE INDIVIDUAL SECTOR ON THE AREA UNDER THE SYSTEM, FOR CULTIVATION OF THE LAND ALMOST ARE NOT USING DRAFT ANIMALS, WHILE ON EVERY 10 HA IS ONE TRACTOR.

WE WILL BE GRATEFUL IF MENTION POINTS BE ACCEPTED WELL-INTENTIONALLY.

BEST REGARDS,

HMS, STREZEVO,
BITOLA, YU
WORK MANAGEMENT ORGAN
TOKE BELOV, GRAD. CIV. ENG.

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Annex II

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Comments Received from the Borrower

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51140 SBANK YU

WORLD BANK
WASHINGTON D.C.

- FOR MR. YUKIYORI WATANABE, DIRECTOR
OPERATIONS EVALUATION DEPARTMENT -

SKOPJE, 25.09.1985. NH-CR RPT.22.169

REF: PERFORMANCE AUDIT REPORT ON MACEDONIA IRRIGATION
PROJECT ,,STREZEVO" (LOAN 1615-YU)

WE HAVE CAREFULLY REVIEWED YOUR SUBMITTED REPORT WHICH IS
VERY COMPREHENSIVE AND ALL-INCLUSIVE AND HAVE NO COMMENTS
THEREON.

TAKING INTO ACCOUNT THAT CURRENTLY NO EVALUATION COULD BE
DONE UPON EFFECTS FROM IRRIGATION, WE PROPOSE TO PERFORM
SUCH ONE MUTUALLY THIS LATE DECADE.

AT THE SAME TIME, WE USE THIS OPPORTUNITY TO INFORM YOU
THAT PRESENTLY THREE EXPERTS FROM ,,STREZEVO" ARE BEING
TRAINED IN FRANCE ACCORDING TO LOAN AGREEMENT.

REGARDS,

STOPANSKA BANKA-ZDRUZENA BANKA
MILAN HROVAT
PRESIDENT

===

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YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT (LOAN 1616-YU)

PROJECT COMPLETION REPORT

November 21, 1984

Prepared by: Messrs. M. Tirmazi and E. Brook
Regional Projects Department
Europe, Middle East and North Africa
Agriculture III

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YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT (LOAN 1616-YU)

PROJECT COMPLETION REPORT

I. INTRODUCTION

A. Agriculture in Macedonia

1.01 Agriculture contributes 23% to the total GMP of the Socialist Republic of Macedonia, and absorbs 32% of the active working population. During the 1970's agricultural production expanded at an average annual rate of about 3.6%. Fruit and vegetable production grew most rapidly, encouraged by the rising relative prices and increased availability of irrigation facilities. In Macedonia, unemployment and underemployment remain high, relative to national averages. Lack of employment and income opportunities in the rural sector has caused widespread migration by the rural population to the cities or as workers outside Yugoslavia. The migrating population consisted mostly of young able-bodied persons and this has acted as a drain on skilled human resources for agriculture. Recently there is a trend for migrant workers to return to Yugoslavia, mainly because of economic difficulties in the countries to which they emigrated.

B. Organization of Macedonia's Agricultural Sector

1.02 Agriculture in Macedonia, like that of the rest of Yugoslavia, is characterized by the parallel existence of two sectors - social and individual. The social sector consists of agricultural kombinats, state farms and agricultural cooperatives and other organizations such as veterinary and research stations which operate under the principles of social ownership of the means of production and workers' self management. The social sector operates more than 20% of the cultivated land; employs 8% of the agricultural labor force; produces 30% of the agricultural product; and contributes 45% of the marketed agricultural production in the Republic. The individual sector in Macedonia occupies by far the larger part of the cultivated land and employs more than 90% of the total agricultural labor force. It consists of about 160,000 farms with an average size of 3.1 ha of cultivated land. The individual and social sectors are to a large extent complementary to each other; however, the social sector is the one which controls credit, output processing industries, input distribution and marketing, which in most cases yield a certain priority to the social sector concerning access to credit and inputs. In addition, at present, in delivery of both credits and inputs, preference or priority is given to those individual farmers who are associated with the social sector through production and marketing contracts. The terms and conditions of these contracts do not generally encourage farmers to associate with the social sector (paras 1.03 and 1.05). It is also typical that the individual sector engages in cultivation of more labor intensive crops than the social sector, which balances their disadvantage in smaller scale production and access to credit compared to the social sector. Consequently, vegetables and tobacco are almost exclusively produced in the individual sector, which also has more than 90% of the cattle and sheep.

domestic consumption and some export demand by emphasizing increased development of the social sector through modernization of production techniques, expansion of processing facilities, better utilization of available resources and the adjustment of production to changes in demand; and the development of individual farms primarily through cooperation with the social sector to achieve further socialization of agriculture and rural areas. Measures outlined for the promotion of the individual sector are: (a) increased cooperation between the two sectors and greater individual sector access to extension services in order to achieve a more rapid transfer of modern technology; and (b) provision of credit for on-farm investments. These measures address the most tractable bottlenecks in the development of the social and individual sectors. However, the support measures for the individual sector are practically limited to farmers that either form an association or cooperate with the social sector on a contractual basis. There is an ever widening gap in incomes between the two sectors which will reinforce the emerging trend for farmers in the individual sector to seek additional sources of outside income.

1.04 The Government's efforts to stimulate production have included price policies such as subsidies on inputs, e.g., fertilizer, and on interest rates. However, low interest rates have discouraged the holding of financial assets, while encouraging the use of debt, leading to problems of liquidity. Investment policy has also been used to stimulate agricultural production, and large investments have been made in social sector agriculture. However, few individual farmers have had access to credit for agricultural investments other than farm inputs for crops grown under contract. Liquidity shortages in social sector agro-kombinats making loans to individual farmers have also contributed to individual farmers' severely restricted access to credit.

D. Bank's Lending Strategy

1.05 In Yugoslavia, the Bank's investment objectives have been to support the less developed regions, promote agriculture, carry out institutional reforms, and reduce the external resource gap. Agriculture is a priority sector from the point of view of both the Government and the Bank, and its development will contribute to the realization of other objectives related to reducing regional income disparities, and generating employment. Agriculture is the only major sector other than personal services in which social ownership is not predominant. About 85% of the agricultural land in Yugoslavia is privately owned. However, the future of the individual farmer is very closely bound up with the role of the social sector in agriculture and particularly in the food chain. The official Yugoslav attitude toward the role of the individual farmer has changed during the 1970's and the 1980's and it is now realized that the individual sector contains many unexploited and attractive opportunities which should be realized by provision of inputs and greater market orientation. Improvement in the conditions of production in individual sector agriculture is consistent with the national goals of more efficient resource use, employment generation, self-sufficiency in basic foodstuffs, reduction of income disparities for disadvantaged rural groups, and more rapid agricultural development. Government policy to borrow for agriculture only in the lesser developed republics coincides with Bank's concern for lending to benefit the poor. In addition, attention to the

productive potential of individual sector agriculture was consistent with the Bank's overall interest in increasing agricultural production.

II. PROJECT FORMULATION

A. Project Origin

2.01 In the agricultural setting described above, the Macedonia Irrigation Project was proposed by the SRM with the main objectives of increasing crop production on 20,300 ha, raising labor productivity in an area where unemployment and emigration were among the highest in Yugoslavia and substituting for food imports. In addition to irrigation, the project included supplying bulk water to the municipal use and cooling system makeup water for a thermal power plant then under construction. Institutional objectives included expanding and upgrading the operations of the project authority and strengthening the Associated Bank's (Stopanska Banka) involvement with the agricultural sector. Detailed project features included:

- (a) the Strezevo dam, (storage capacity 112 Mm³, height 84 m) located on the Semnica River 15 km northeast of Bitola (see map 13405);
- (b) a 62 km alimentation canal tapping peak season flow (October to May) from seven streams in the Baba Mountains;
- (c) a 45 km main irrigation canal, with 30 km covered section along steep mountain slopes, equipped with gates for upstream regulation;
- (d) a gravity fed sprinkler irrigation network to supply an average annual volume of 86 Mm³ of water for 20,300 ha, sized to meet July/August peak demand;
- (e) administration buildings for each of the operating sections in the project area, office space for the central project management, equipment and maintenance buildings, and all vehicles and other equipment required for operation and maintenance;
- (f) 63 km of 5 m wide asphalt access roads, and farm dirt roads 4 m wide parallel to the secondary pipes;
- (g) a pipeline to provide 12 Mm³ bulk water annually to the thermal power plant intake on the Crna River;
- (h) diversion structures from the alimentation and main canals for the delivery of 22 Mm³ bulk water annually for domestic and industrial consumption on the town of Bitola;
- (i) preparation of feasibility and preparation studies for three possible irrigation projects in Macedonia; and
- (j) a specialized training program for key personnel.

2.02 In 1969, Vodostopanstvo Pelagonia, the investor for the project, employed a Yugoslav consulting firm to prepare a feasibility study for the proposed multipurpose Strezevo-Bucin irrigation/water supply/hydropower/flood control project, located in the Pelagonia Valley of the SRM. Subsequently, in 1972 another Yugoslav consulting firm was employed to update the study to include the economic and financial analysis and to translate it into English.

B. Project Preparation

2.03 Project preparation was taken up during 1976 and assisted by Bank missions and by staff of the FAO/IBRD Cooperative Program through four missions to Yugoslavia. In March 1976, the Government of SRM communicated to the Bank its 5-year plan for 1976-80, in which the priority irrigation projects recommended for Bank financing were: (i) Pelagonia - Scheme "Strezevo" (area 20,300 ha); (ii) Scheme "Gevgelisko Polje" (area 8,800 ha); and (iii) Scheme "Skopsko Polje" (area 15,700 ha). Subsequent identification/preparation missions selected Strezevo irrigation as a priority project which ranked above the other two projects in terms of technical, economic and financial viability. Updated feasibility studies for Macedonia Strezevo Irrigation were completed in March 1977 with the participation of three Yugoslav consulting firms covering:

- (a) Main Canal and Irrigation Network;
- (b) Alimentation Canal and Strezevo Dam; and
- (c) Agriculture, Economic and Financial Analysis.

2.04 The Government of SRM accepted modifications in the project design, cost estimates, institutions and organizations which were suggested by the Bank missions. Some of the important recommendations ensuing from Bank reviews of the feasibility studies are summarized as follows:

Technical

- (a) A downstream protective berm, based on seismic and stability analysis of the Strezevo dam;
- (b) Upstream regulation of the main canal to ensure proper operation of the system and to increase efficiency of water use through canal storage;
- (c) Optimization of the sizes of the underground pressure pipe network and provision of anti-water hammer and pressure regulation devices;
- (d) A study for preparing a plan for the operation of the sprinkler system;
- (e) A second study for selecting the most economical and technically suitable irrigation equipment.

- (c) Optimization of the sizes of the underground pressure pipe network and provision of anti-water hammer and pressure regulation devices;
- (d) A study for preparing a plan for the operation of the sprinkler system;
- (e) A second study for selecting the most economical and technically suitable irrigation equipment.

Institutional and Financial

- (f) Implementation of the project through a single investor, after entering into suitable legal arrangements with the other investors (self-management agreements, contracts, etc.);
- (g) Creation of a new Basic Organization of Associated Labor (BOAL) solely for the purpose of implementing the project;
- (h) Participation by the SRM and the social sector organizations in the project area;
- (i) Innovative means of financing the project through early completion of the thermal power water supply; and
- (j) Cost recovery mechanism for recovery of investment cost and operation and maintenance cost, based on ability to pay with guarantees by the SRM to make up the deficits.

C. Appraisal

2.05 The appraisal of the project was carried out in October 1977. The appraisal mission carried out a comprehensive review of the feasibility study, giving special attention to the financing plan, the institutional arrangements, the rate of implementation, and to the increases in crop yields anticipated with the project. Project design and cost were also analysed and special reports were prepared on: (a) stability analysis of Strezevo Dam under active seismic conditions; (b) hydrology of the system; (c) alternative alignments of the main canal including upstream and downstream regulation; (d) optimization of the pressure pipe distribution network--sizing and provision of pressure regulation/anti-water hammer devices; (e) estimate of cost and unit rates; and (f) international water rights.

2.06 Following appraisal, issues attendant on the scope of the project, its timing, cost recovery arrangements, land use rationalization and the selection of Stopanska Banka Zdruzena Banka (SBS) as the borrower were discussed in the Bank. The mission had also recommended advance contracting and retroactive financing for the diversion tunnel for the dam, access road and a pipeline to the thermal power station (US\$0.7 million). The project as recommended by the mission was accepted with a cost of about US\$202 million and a Bank loan of about US\$80 million. The mission's recommendations on the remaining issues were also accepted.

D. Project Cost

2.07 The initial cost estimate prepared by the consulting engineers was about dinar 2,660 million. This estimate was revised by the pre-appraisal mission to reflect: (i) increased prices of foreign equipment and materials required for the project, (ii) increased unit prices of goods and services in conformity with similar contemporary contracts in Yugoslavia, (iii) additional work items such as a downstream stabilizing berm for Strezevo Dam, upstream regulation gates for the main canal, and pressure regulation and anti-water hammer devices for the underground pressure pipe network, and (iv) estimated physical and price contingencies. The pre-appraisal mission established the revised cost of the project works at dinar 3,340 million (25.6% more). This increase was not acceptable to the Government of the SRM, because it meant increased financing requirements for the project. Later, in September 1977, the Executive Council of the Assembly of the SRM decided to accept the revised concept of the project design and the increased cost, only after the Bank had indicated that it would not finance the project unless this revised design concept and the increased cost were accepted by the Government, and the increased financing for the project was arranged. Following project appraisal, more realistic unit prices were adopted, additional works due to revised design concept were costed, physical and price contingencies were added, and a provision for carrying out irrigation feasibility studies for future irrigation projects was added. As a result, the following appraisal cost was established:

	Appraisal Cost Estimate						Foreign Exchange %
	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	
	Dinar million	Dinar million	Dinar million	US\$ million	US\$ million	US\$ million	
Irrigation Works	1,102.9	759.4	1,862.3	61.3	42.2	103.5	41
Equipment	86.4	172.2	258.6	4.8	9.6	14.4	67
Land Compensation	133.4	-	133.4	7.4	-	7.4	-
Engineering & Administration	<u>111.3</u>	<u>2.2</u>	<u>113.5</u>	<u>6.2</u>	<u>0.1</u>	<u>6.3</u>	<u>1</u>
Base Cost	1,434.0	933.8	2,367.8	79.7	51.9	131.6	
Physical Contingencies	127.8	101.8	229.6	7.1	5.7	12.8	44
Price Contingencies	<u>332.6</u>	<u>208.4</u>	<u>541.0</u>	<u>18.5</u>	<u>11.5</u>	<u>30.0</u>	<u>39</u>
Total (Strezevo Irrig.)	1,894.4	1,244.0	3,138.4	105.3	69.1	174.4	40
Feasibility Studies	16.2	10.8	27.0	-	1.5	1.5)
Interest during Construction	-	<u>233.0</u>	<u>233.0</u>	-	<u>12.9</u>	<u>12.9</u>)
GRAND TOTAL	<u>1,910.6</u>	<u>1,487.8</u>	<u>3,398.4</u>	<u>105.3</u>	<u>83.5</u>	<u>188.8</u>	<u>100</u>

The dollar equivalent cost at the then prevailing exchange rate (US\$1 equals din 18) was US\$174.4 million with a foreign exchange component of US\$69.1 million equivalent. Interest and other charges on Bank Loan during construction were assessed at US\$12.9 million, bringing the total foreign exchange cost to US\$83.5 million.

2.08 Project construction progressed over a period of four years and was substantially completed by the end of 1983. The following table shows the details of actual annual expenditures:

<u>Details of Actual Annual Expenditures</u>							
<u>ITEM</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>TOTAL</u>
	----- current dinar million -----						
Civil Works	-	385.5	876.0	1,450.1	1,002.7	927.8	4,642.1
Equipment	-	-	-	4.1	84.3	164.3	252.7
Land Compensation	-	-	-	54.5	21.5	40.2	134.2
Engineering and Administration	15.0	13.6	45.4	44.8	52.3	64.2	235.3
Total	15.0	401.9	936.6	1,553.5	1,169.9	1,187.4	5,264.3
Exchange Rate Dollar (Equivalent)	(18.0)	(19.1)	(24.9)	(35.6)	(52.2)	(94.0)	
Expenditure	0.8	21.0	37.6	43.6	22.4	12.6	138.0

The appraisal cost and actual project expenditure in dinars and dollar equivalent are summarized and compared below:

	<u>Dinar</u> (million)	<u>Dollar Equivalent</u> (million)
Appraisal Cost	3,138.4	174.4
Actual Expenditures	5,264.3	138.0

E. Negotiations

2.09 Negotiations were conducted in Washington from April 10 to 21, 1978 between the Yugoslav delegation led by the Vice President of the Executive Council of the Assembly of SRM and Bank representatives. Principal issues evolved on the project cost and financing plan and were resolved. The documents negotiated included a Loan Agreement with Stopanska Banka; a Project Agreement with Vodostopanstvo and the Commune of Bitola; an Agreement of Obligations of the SRM; and a Guarantee Agreement. There were also nine side letters (para 3.09). The Agreement of Obligations of the SRM constituted a milestone in the Bank's lending operations in Yugoslavia. It was for the first time that a republic agreed to participate in financing a project and guaranteed to make available funds to meet any shortfalls in the operating costs and the debt service for the project. The Yugoslav delegation requested financing of feasibility studies for three future irrigation projects to be carried under the Macedonia Strezevo loan. The Bank agreed with the request. The principal outstanding issue was the question of riparian water rights, in connection with which the Bank required either a letter from the joint commission established between Greece and Yugoslavia or assurance from the Greek Government—that it had no objections to the works undertaken under the proposed project, which are located in Yugoslavia on a tributary of the Axios-Vardar, which is an international river. Assurances from the Greek Government were subsequently received. Other principal issues agreed upon during negotiations were in relation to on-lending interest rates, panel of experts to look after the safety of the Strezevo Dam, and an annual review of water charges.

F. Board Presentation and Approval

2.10 A Loan (1616-YU) of US \$82 million to assist in financing the foreign exchange cost of the project was approved by the Board on August 8, 1978 and the loan documents were signed on August 23, 1978. Presentation made to the Board laid special emphasis on the suitability of the project as a vehicle for addressing the problems of rural poverty which underlie the income disparities in Yugoslavia. It was further noted that the project would provide opportunities for increasing productivity and employment of the rural population and reduce reliance on imports.

G. Loan Effectiveness

2.11 Special conditions of effectiveness included the execution and ratification of the Macedonia and Project Agreements and the subsidiary loan agreement, the execution of self management agreements, creation of the required institutions, appointing of experts, and the coming into effect of water users agreements. After receipt of evidence of fulfillment of these conditions precedent to effectiveness of the Loan, which was delayed by about a month and a half, the Loan was declared effective on February 14, 1979.

III. PROJECT IMPLEMENTATION

A. Procurement

3.01 The procurement and construction arrangements at appraisal provided for ten contracts. Of these, five contracts totalling about 96% of the total project cost, were to be tendered for international competitive bidding, while for the remaining five, local competitive bidding procedures, which were acceptable to the Bank, were considered appropriate. Various contracts as actually awarded, under which project implementation was achieved, are listed below:

<u>Name of Contract</u>	<u>Type</u>	<u>Contract Amount</u>	
		<u>Appraisal</u> <u>(1978)</u>	<u>Actual /1</u> <u>(1983)</u>
-- Dinar Million --			
<u>Contracts Arranged Prior to Board Presentation</u>			
Diversion Tunnel and Access			
Road to Strezevo Dam	LCB	45.0	45.0
Thermal Power Plant Pipeline	LCB	42.7	58.3

/1 Including escalation based on standard formulae.

Contracts awarded subsequent to Board Presentation

Dam Strezevo	ICB	835.8	1,342.2
Alimentation Canal	ICB	326.3	540.3
Main Canal	ICB	519.0	1,068.3
Irrigation Network	ICB	855.4	1,514.4
Onfarm Sprinkler Equipment	ICB	204.5	207.9
O and M Buildings	LCB	13.3	52.7
Telecommunication and Vehicles	LCB	10.6	9.1

3.02 The timely construction of two specific components of the project, namely the diversion tunnel for the dam including the access road and the bulk water pipeline to the Bitola thermal power plant, were important to financing, viability, and justification of the project. Construction of the project could be achieved in four years only if full use was made of the limited construction season resulting from severe winter conditions, complicated by high river flow early in the year. Therefore, the contracts for the diversion tunnel works and access road were advance contracted prior to Board presentation and construction was initiated in June 1978 to take advantage of the 1978 construction season. A one year delay in its construction would have resulted in a significant increase (about dinar 360 million) in total project costs, adversely affecting both the financing plan and the economic justification. The timely completion of the pipeline to the thermal power plant was equally crucial. If there had been a delay in the completion of this project component, the power plant would have been forced to develop alternative sources of water, and the project agency would have been deprived of an important financing source (estimated dinar 176 million in water revenues), leaving a gap in the financing plan.

B. Physical Work Schedule

3.03 Work on project construction was initiated in 1978 by the newly created BOAL Strezevo (see para 6.02), which was responsible for the implementation of the project. The diversion tunnel was completed and the Semnica River was diverted thereto during early 1979. The principal works actually carried out during the years 1978 to 1983 as compared to the planned targets are summarized below; details are at Annex 1, pages 1-4.

		<u>Diversion Tunnel</u>	<u>Strezevo Dam</u>	<u>Alimentation Canal</u>	<u>Main Canal</u>	<u>Pressure Pipe Network</u>
		%				
1978	Planned	100	-	-	-	-
	Realized	90	-	-	-	-
1979	Planned	-	10	10	-	-
	Realized	10	6	6	-	-
1980	Planned	-	46	45	29	25
	Realized	-	24	21	32	15
1981	Planned	-	44	45	71	75
	Realized	-	47	28	34	33
1982	Planned	-	-	-	-	-
	Realized	-	23	31	7	42
1983	Planned	-	-	-	-	-
	Realized	-	-	14	7	10
Total	Planned	100	100	100	100	100
	Realized	100	100	100	100	100

With the exception of the pressure pipe network which was delayed due to high groundwater levels, the works progressed very closely in accordance with the construction schedule proposed at the time of appraisal. The Strezevo Dam and the first 20 km of the main canal were completed by June 1982 and water was delivered that year to approximately 4,000 ha of project land. The remaining features were completed by September 1983, except for some minor works on the distribution network. Because the distribution network was not completed until September 1983, various features of the dam, the two canals and the pipelines were tested under full working conditions and pressures. The delay in completion of the distribution network also provided a valuable opportunity to test the sprinkler irrigation equipment, and to train the farmers in its use and the movement of laterals.

C. Quality and Performance of Project Structures

3.04 The BOAL in charge of construction carried out strict quality control measures, and the quality of construction on the project is good. The completed facilities are operating in a satisfactory manner without any problems. The dam embankment, canals and other civil works, as well as the electrical and mechanical works, were constructed and installed in accordance with the approved technical specifications of the contract documents. For the first time in Yugoslavia, an innovative design of water intake tower was implemented at the dam; this has a number of intakes, at different elevations, feeding the dam outlet so that surface water (warmer than the lower layers in summer) can be withdrawn from the reservoir at all times. The temperature differential between the surface and deeper water ranges from 10°C to 15°C; the application of the warmer water to the fields is expected to

assist early maturing of the crops, ahead of the onset of winter rains. The main canal was provided with ten duck-bill type weirs equipped with electronically regulated gates. This type of regulation has resulted in about 10% savings in water utilization over the system, which has enabled the project area to be extended by 2,000 ha (from 20,300 to 22,300 ha) without increasing the storage requirement or the carrier canal capacities.

D. Glass Reinforced Plastic Pipe (GRP pipe)

3.05 Considering its superior hydraulic properties, longer life, and the advantage in handling, the GRP pipe was introduced over about 29 km of pressure pipe network, particularly in the larger diameters. This type of pipe is not manufactured in Yugoslavia and was imported from Austria. During transportation and installation of the GRP pipe, a number of problems were encountered. This is the first time this pipe was used in Yugoslavia and the lessons learned from this experience are:

- great care required in the pipe's transportation, loading and unloading;
- mechanical hammering of the pipe to be avoided in order not to cause its delamination and failure;
- careful preparation of trenches and proper sand layer spreading at the trench bottom;
- increased width of pipe couplings (from 20 cm (Standard) to 30 cm) are more satisfactory;
- replacement of pipe damaged during installation usually required special (Straube) couplings;
- vertical and horizontal deformation limitations of the pipe required careful compaction of the trench;
- pipe manufactured with fiberglass reinforcement wrapped around the pipe is inferior as the layers are liable to separate under shear, while the pipe manufactured with compressor sprayed fiber glass, as used for the project works, yields a homogenous and structurally sound product.

E. Irrigation Water Supply and Efficiency

3.06 During appraisal, the net irrigation water requirement for the proposed cropping pattern was estimated to average 2,696 m³/ha, or allowing for an estimated 75% system efficiency, about 3,594 m³/ha at Strezevo Dam. For the one in four dry year, the net irrigation water requirement increased to 3,145 m³/ha and the gross requirement rose to 4,193 m³/ha. The annual gross quantity of water required to be released from Strezevo Dam, therefore, varied from 72.6 Mm³ for the average year to 84.7 Mm³ for the one in four dry year. The month of August was considered critical as rainfall is negligible and by that time all soil moisture is depleted. For the entire project area,

a hydromodule of 0.55 l/sec/ha was derived for August. The design of the laterals was based on the assumption that a contiguous area of about 300 ha may be under a crop with the maximum irrigation demand (sugar beet) requiring 0.89 l/sec/ha. As all laterals in one sub-area were not expected to be under crops with maximum water requirements, the pipes of higher order were gradually reduced in capacity to deliver 0.55 l/sec/ha.

3.07 At pre-appraisal the aggregate multiple water requirement was calculated as below:

Irrigation requirements	-	72.6 Mm ³	(84.7 Mm ³)/ ¹
Domestic Water Supply	-	22.0 Mm ³	
Thermal Power Supply	-	12.0 Mm ³	
<hr/>			
TOTAL		106.6 Mm ³	(118.7 Mm ³)/ ¹

The estimates of water availability to the dam had in the past been frequently revised upwards by the project consultants. As a result, the Bank arranged for a specialized consulting firm to review the hydrological data on all available water resources, and establish a firm base for the proposed allocations to various water users. Although this review, which was supervised by Bank staff, indicated approximately 10% more availability than that assessed by the project consultants, it was concluded to accept the basic hydrologic work carried out by the project consultants and to make it the basis for water allocations.

3.08 The Strezevo Irrigation system has been completed but has not yet operated to full capacity. It is anticipated that, when full demand has developed, water shortages during the months of August in drier years would be acceptable. Nevertheless, some technical solutions for water conservation are being studied that would alleviate the shortage in the summertime and expected increase of water demand over time.

F. Compliance with Loan Covenants

3.09 The Borrower fully complied with all loan covenants and with the provisions of the nine side letters. The principal covenants dealt with on-lending interest rates, panel of experts to look after the safety of Strezevo Dam, annual implementation plan pertaining to land and water use, and an annual review of water charges. The side letters referring to the submission of quarterly and annual reports and the goods to be financed out of the loan proceeds have been complied with satisfactorily.

G. Disbursements

3.10 During the first year, actual disbursements lagged substantially behind the original appraisal estimate. This was largely due to delays in the preparation of final design and bid documents, and to some extent caused by the time taken in the selection of contractors. As soon as contracts were

¹ Figure in parenthesis for one in four dry year.

awarded, beginning July 1979, disbursements accelerated. A comparison of actual and estimated disbursements is shown in the following table:

Actual and Appraisal Cumulative Disbursements

<u>IBRD Fiscal Year and Quarter</u>	<u>Actual Disbursements</u> ----- US \$ Million -----	<u>Appraisal Estimate</u> -----
<u>1978/79</u>		
September 30, 1978	-	2.0
December 31, 1978	-	6.0
March 31, 1979	-	9.5
June 30, 1979	1.0	14.5
<u>1979/80</u>		
September 30, 1979	2.9	18.0
December 31, 1979	7.1	22.5
March 31, 1980	12.0	29.0
June 30, 1980	12.3	37.5
<u>1980/81</u>		
September 30, 1980	14.1	42.5
December 31, 1980	19.5	48.5
March 31, 1981	23.0	54.5
June 30, 1981	28.1	62.5
<u>1981/82</u>		
September 30, 1981	34.2	67.0
December 31, 1981	50.0	71.5
March 31, 1982	64.5	76.3
June 30, 1982	68.4	80.5
<u>1982/83</u>		
September 30, 1982	71.2	81.5
December 31, 1982	81.1	82.0
March 31, 1983	81.3	-
June 30, 1983	81.6	-
<u>1983/84</u>		
September 30, 1983	81.7	-
December 31, 1983	-	-

The loan was disbursed to the extent of \$81,698,879.73 and the balance of \$301,121.27 was cancelled on November 3, 1983.

H. Financing

3.11 Funding requirements for the project, based on the project appraisal, were as follows:

	<u>Dinar Million</u>	<u>US\$ Million</u>
- Project Investment Cost including Contingencies	3,138	174.4
- Interest/Commitment Fee on Bank Loan	233	12.9
- Interest during Construction on Local Loan	135	7.5
- First Repayment of Principal on Bank Loan	62	3.4
- O & M Costs during construction	70	3.9
- Incremental Working Capital	10	0.6
- Irrigation Feasibility Studies	<u>27</u>	<u>1.5</u>
TOTAL	3,675	204.2

The financing plan established during appraisal and finalized during negotiations was:

<u>Bank Loans</u>	<u>Dinar Million</u>	<u>US\$ Million</u>
IBRD	1,476	82.0
SBS	1,543	85.7
 <u>Grants</u>		
SRM	200	11.1
 <u>Equity Contribution</u>		
Social Sector Enterprises in Bitola	280	15.6
 <u>Project Cost Generation</u>		
Thermal Power Station		
Water Supply	<u>176</u>	<u>9.8</u>
Total	3,675	204.2

The actual financing followed the general pattern agreed during negotiations.

I. International Water Rights

3.12 In June 1970, an Agreement was concluded between Yugoslavia and Greece to coordinate their efforts with the assistance of the United Nations in the preparation of an integrated development plan for the Vardar/Axios River Basin (see map 13405). A part of that agreement concerned the establishment of certain minimum monthly flows at the border between the two countries.

3.13 The Bank requested the Yugoslav Government to provide a letter to the effect that the proposed project meets with the approval of the Greek Government. The two Governments negotiated the issue and on July 5, 1978 a 'note verbale' was issued by the Greek Government which signified to the Bank the consent of the Greek Government for the construction of the Strezevo Project. In the same 'note verbale' the Greek Government pointed out that it had agreed to the project only on the basis of assurance from the Yugoslav Government and the contents of the project documents, that the Strezevo dam would not affect the border flows of the Axios-Vardar river. Nevertheless, the Greek Government expected that the Yugoslav Government would notify them promptly of any further project planned for this system, given that any future developments in Yugoslavia would have a detrimental effect on the border flows of the river if such a development were not combined with other projects for development of the river basin flows.

3.14 The repercussions of this reservation were felt subsequently during the processing of the Macedonia III Project (Loan 2039-YU) when strenuous efforts had to be made by the Yugoslav Government to convince the Greek Government that the 8 irrigation subprojects financed under that loan would not have any detrimental effect on the border flows.

J. Feasibility Studies for Future Irrigation Projects in Macedonia

3.15 During the negotiations, the Government of SRM requested Bank assistance in financing the preparation of three future irrigation projects: Gevgelisko Polje, Pepelisko Polje, and Skopsko Polje. The Bank agreed and included the estimated foreign exchange cost as a part of the loan. Yugoslavian consultants carried the lead responsibility for preparation with review assistance provided by an outside foreign firm. The feasibility study report for the Gevgelisko Polje Irrigation Project was received by SRM in October. Based on a number of field visits and examination of the draft report, the reviewing firm prepared a supplementary report. The documents were reviewed by a Bank mission which visited Macedonia in December 1981. The Bank's comments on the feasibility study were conveyed to the Republican Committee for Water Economy, an adjunct to the Secretariat of Agriculture, SRM. The principal thrust of these comments was to highlight the lack of variant designs and the extremely high cost per hectare. The remaining two studies for Pepelisko Polje and Skopsko Polje have also been completed and are now being translated. In the meantime, all the review reports prepared by the reviewing firm have been received in the Bank.

3.15 The feasibility studies and the review reports are of an acceptable quality and cover all aspects of project preparation. The Government of SRM is considering utilizing the studies to obtain financial assistance from international financing organizations, including the Bank. However, the priority of these projects is questioned by the Bank at this stage, in view of the financial constraints and stabilization goals.

IV AGRICULTURAL IMPACT

A. Yields and Productivity

4.01 About 4,000 ha were irrigated during 1982 for the first time with water from the dam, but no record of results was available at the time of the Bank project completion mission. In 1983, due to higher than average precipitation, no irrigation was necessary. Depending on the intensity and frequency of rainfall the first time when the irrigation water from the dam would be used to irrigate the entire project area is in 1985. Hence, experience in irrigation of the project area remains limited and, consequently, the crop yields under irrigated conditions remain estimates. Nevertheless, on the basis of similar climatic regions in Yugoslavia, and other similar irrigation projects in Macedonia, the future estimated yields (para 4.02) are definitely within reach. Both the individual and the social sector farmers are industrious and skilled enough to be capable of adapting to irrigated agriculture, and achieve the results estimated during appraisal and reconfirmed by the completion mission.

4.02 Agricultural impact was assessed by comparing the future situation without and with the project at full development. In the absence of any evaluation of yields without the project, it is assumed that present yields and area (1981-83 average) would prevail in future without the project. Details are presented in Annex 2, Tables 1a and 1b. It is expected that future yields with the project in the social sector would be higher than those in the individual sector, reflecting the advantages which the social sector possesses, such as potentials for economies of scale, more mechanization, and better access to credit (para 1.04), inputs and organization of labor. It is likely that eventually the yields in the individual sector would reach the level of the social sector. However, by the time of full development, in 1989 or 1990, it is more realistic to assume that some gap would remain. Average yields of principal crops are estimated to rise as follows:

Crops	Social Sector		%	Individual Sector		%
	Without Project	Full Development		Without Project	Full Development	
	tons/ha		increase	tons/ha		increase
Wheat	3.8	5.5	45	2.9	4.0	38
Barley	2.3	3.4	48	1.3	2.6	100
Maize	4.0	7.0	75	2.1	5.5	162
Soybean	-	2.5	-	-	2.2	-
Sunflower	1.5	3.5	133	1.4	2.8	100
Sugarbeet	32.0	60.0	87	25.0	50.0	100
Tobacco	-	-	-	1.2	2.2	83
Vegetables ^{/1}	-	36.0	-	12.5	27.5	120
Alfalfa	5.0	14.0	180	4.0	12.0	200
Fruits ^{/2}	9.0	20.0	122	5.0	20.0	300
Maize silage and Fodder	-	35	-	-	30.0	-

B. Cropping Pattern and Intensity

4.03 During appraisal the project area was envisaged to include about 20,300 ha. Due to water saving devices installed during construction, the project irrigated area would be able to expand by about 2,000 ha. However, construction of the water distribution system on the additional 2,000 ha would commence only in 1985 and be completed in 1987. Of the 22,300 ha on which the irrigation system is and would be completed, 10,400 ha are cultivated by the individual sector, and about 11,907 ha by the social sector. The present cropped area is about 9,600 ha in the individual sector and 11,600 ha in the social sector. With the project at full development, because more than one crop would be grown each year, the cropped area of the individual sector would reach about 13,400 ha in the individual sector and about 15,300 ha in the social sector (Annex 2; Tables 2a, 2b, and 2c), yielding a cropping intensity of about 1.3 in both sectors. The main changes in the cropping pattern compared to the present situation are likely to be in reduction of areas under wheat, barley, sunflower, and pasture, while increasing areas mainly of vegetables and sugar beet. The trend would be toward increasing the share of high value crops while reducing the share of grains to the minimum required for purposes of crop rotation. The individual sector, which is typically labor intensive, is likely to concentrate, more than the social sector, on cultivation of vegetables, fruits and silage crops while the social sector is likely to be the main producer of grains and sugar beet, reflecting its advantages in farm mechanization and economies of scale.

C. Incremental Output

4.04 At full development, incremental annual production in the project area would amount to some 520,000 tons (Annex 2, Tables 3a, 3b, and 3c). Although production of wheat, barley, and sunflower would decline, incremental

^{/1} Include tomatoes, peppers, potatoes, onion, cabbage, and other.

^{/2} Include deciduous fruits and grapes.

production of maize would be about 16,000 tons; soybeans, 1,500 tons; sugarbeet, 207,000 tons; tobacco, 2,400 tons; vegetables, 75,000 tons; alfalfa, 44,000 tons; fruits 10,000 tons; and maize for silage and fodder, 184,000 tons. The social sector would be the main contributor to incremental production of maize, soybeans, fruits and maize for silage and fodder. The individual sector would be the main contributor to production of tobacco, vegetables, and alfalfa. Incremental production of sugarbeet would be approximately equal in each sector. Typically, the social sector would produce crops that would require a higher degree of mechanization.

D. Marketing and Markets

4.05 The increase of production of maize and soybeans would be compatible with the projected increase in demand for coarse grains and protein sources for livestock in Macedonia due to population and income growth. Soybean is currently imported in Yugoslavia and the incremental production of this crop would contribute to import substitution. Yugoslavia is also a net importer of sugar and an increase in production of sugarbeet would contribute toward import substitution of about 30,000 tons of sugar. The ex-factory price of sugar in the project area at present is slightly below the prices projected by the Bank. Production of vegetables and fruits would, to a large extent, be used for industrial processing, and could be easily absorbed by the local agroindustries; a significant proportion of this production is expected to be exported. In fact, some of the agroindustries within close proximity to the project area operate substantially below capacity, and an increase in production of primary products would allow them to increase capacity utilization and enhance their profitability. The balance of fruits and vegetables which would not be processed would be needed for the expanding local fresh market. The increase in production of alfalfa and fodder would be needed for existing and expanding livestock farms in Macedonia. Demand for dairy products is rapidly increasing and the increased production of alfalfa, silage and fodder would be compatible with the estimated expansion of livestock herds.

E. Producer Returns

4.06 Based on financial analysis, using actual farm gate prices in dinars, the project would contribute to a substantial increase in family income, though both in the individual and the social sector, income from off-farm work would remain an important and growing source of family income. The main factors contributing to increase in farm income would be: increase of yields, increase of cropping intensity, increase of project area, and switch of cultivation from low to high value crops. Altogether, about 5,500 families derive income from farming in the individual sector and about 3,000 families from work in the social sector. Approximately 75 percent of the families in the individual sector possess on the average about 1.5 ha per family and the rest about 3 ha per family. Before the project average net income of a family cultivating about 1.5 ha was about Dinars 52,200 per annum (about US\$550).^{1/} At full development net income of these families would

^{1/} 1983 constant prices.

rise to about Dinars 316,700 (US\$3,370) per annum. Families cultivating about 3 ha netted about Dinars 104,400 (US\$1,100) per annum. At full development net income of these families would rise to about Dinars 633,000 (US\$6,740) per annum. In the social sector average net income per family before the project was about Dinars 292,000 (US\$3,100) per annum. After full development average net income per family would increase to about Dinars 692,700 (US\$7,400) per annum.

V. ECONOMIC ANALYSIS

A. Input and Output Prices

5.01 There is no free market for inputs in Yugoslavia, however, efforts are being made to bring them in line with world market prices. In January 1983, sale prices for fertilizers were raised by 53 percent, bringing them to world market levels. Other inputs are also not subsidized and reflect world market prices. In regard to main output prices, authority to determine their level is vested with Communities of Interest for Prices at the Federal, Republic, and Provincial levels. Floor prices are established for farm gate purchases of a number of key products, based on a cost plus formula. The economic price of wheat derived from border price is above the price paid to farmers; economic prices of maize and soybeans, on the other hand, are significantly lower than the corresponding actual prices paid to farmers. Economic prices for wheat, maize, soybeans, sugarbeet, and tobacco were calculated on the basis of the Bank projections adjusted to farm gate level. Prices of other crops were derived on the basis of actual prices paid to farmers in 1983 (Annex 2, Table 4).

B Benefits

5.02 Incremental benefits derived from the project cannot yet be measured on the basis of actual experience (para 4.01), but at this time the estimates, which are based on the project appraisal report and some updated information and recent prices, are considered valid. Experience in similar projects has confirmed the potential incremental output and productivity.

5.03 Direct economic benefits from the project would come from:
(a) increased net value of production and income of farmers compared to the without project situation (for details on net benefits see Annex 2, Tables 5a, 5b and 5c); and, (b) increased employment and works on the farm which would create approximately 3500 new permanent jobs as well as numerous seasonal ones. The project has already created an increase in employment opportunities for auxiliary services, related to supporting services. The main indirect benefits include the development of access roads, which would have both social and economic benefits around the project area, and the expected improvement in food supply resulting from increased production. Other indirect benefits may arise from an increase in commercial and banking activities which would result when more produce and crops would be marketed and more financial resources would be demanded.

5.04 Finally, the project area is one of the underdeveloped regions in Macedonia, targeted by the Government for priority in regard to regional development. To that extent the project has achieved one of its most important objectives, that of increasing real income of rural families. It would also contribute to increasing production of exportable crops, such as tobacco and vegetables, which are partially processed for export, and to increasing production of import substitution crops such as soybeans and sugarbeet. As a result the project would contribute to increased foreign exchange earnings and savings, estimated at about US\$17 million per annum. In addition, the project would help decrease income disparities between rural and urban areas through increasing rural incomes, thereby reducing, to some extent, rural-urban migration which is considered as a serious problem in Yugoslavia and in Macedonia in particular.

C. Economic Rate of Return

5.05 The economic rate of return for the project has been estimated at 15% which equals the appraisal estimate (Annex 2, Table 6). The economic rate of return calculations are based on the following assumptions: (a) agricultural production figures were derived from estimates that the irrigated areas in the individual sectors would reach full development by 1989, and in the social sector by 1990; (b) that the social sector would complete irrigation infrastructure on an additional 2,000 ha between 1985 and 1987 and the quantifiable costs and benefits from the project would account for the 2,000 ha accordingly; (c) all investments and benefits are based on constant 1983 prices. Foreign costs have been adjusted by the World Bank's international inflation estimates (for price index and exchange rate movements see Annex 2, Table 7); (d) economic prices for wheat, maize, soybeans, sugarbeet, and tobacco, are derived from estimates of border prices and Bank projections, adjusted to farmgate level, while prevailing farm gate prices were used for other non tradable products; (e) the life of the project is assumed to be 50 years; and (f) operation and maintenance costs are calculated as pro rata share of irrigation in total water usage, which is about 72 percent. Analysis of the switching values indicates that a 14 percent decrease of incremental net value of production would still yield a 13.5 percent economic rate of return (the estimated opportunity cost of capital).

VI. INSTITUTIONAL PERFORMANCE

A. Institutional Design and Performance

6.01 Stopanska Banka Zdruzena Banka of Skopje (SBS) was the borrower under the guarantee of the Socialist Federal Republic of Yugoslavia. SBS was responsible for mobilizing funds from local banks and Government for on-lending to Vodostopanstvo, for loan administration, and for financial coordination. The Agricultural and Forestry Loans Department (AFLD) of SBS was responsible for the project. The AFLD staff, headed by a director, are well qualified in loan appraisal and supervision procedures, and demonstrated a thorough knowledge of technical and financial analysis.

6.02 A separate BOAL, BOAL Strezevo, established within Vodostopanstvo, has as its sole and exclusive responsibility the implementation of the project and the operation of the system after it is completed. Creation of this new BOAL was consistent with Yugoslav self-management practices, and was necessary because Vodostopanstvo's current operations are diversified; BOAL Strezevo operated in a financially autonomous manner so that its cash flow was not available to support the operation of the other Vodostopanstvo activities and units. BOAL Strezevo is headed by a director and has four separate divisions; exploitation, financial, technical and general and legal affairs. The technical division has been subdivided into three sub-units: Strezevo dam, the canals and distribution network. The staff of BOAL Strezevo are highly skilled in their professions, and are well motivated. Presently, the direction of their work is being reoriented from construction to fulfill the needs of O&M and system exploitation.

B. Agricultural Supporting Services

6.03 ZIK Pelagonija with 12 different BOAL's is the principal existing organization set up for agricultural development of 24,000 ha in the social sector in the Strezevo (of which 11,907 ha are in the project area) and Bucin areas. ZIK's Cooperation Center BOAL, which purchases inputs for ZIK, also assists individual farmers through six cooperative units in the project area. Each unit has a specific geographic responsibility, is equipped with stores for inputs, and provides seeds, fertilizers, pesticides and herbicides and other inputs to farmers. The Center assists individual sector land preparation and harvesting with equipment belonging to the social sector. ZIK Pelagonija also includes an Agricultural Development Center serving a research and advisory role to improve agricultural efficiency in the social sector. This Center also serves the individual sector through demonstrations and also through direct assistance. Another organization, ZIK Lozar, engaged in wine production, deals with orchard and vineyard production in the Project Area. In addition to the assistance provided by the Agricultural Development Center and the Cooperative Units of ZIK, two other organizations assist individual farmers. The Center for Individual Farmers, financed 50% by the Republic and 50% by the Commune of Bitola, has extension agents belonging to the Department of Agriculture who advise individual farmers. Processing factories assist farmers working under contracts, through extension agents specialized in the crop the factory buys. ZIK Pelagonija has reorganized itself to increase the number of extension agents in the field from 60 to 89, while the Center for Individual Farmers has enhanced its strength from 4 to 9. From a past average of one extension agent for 140 ha in the individual sector, the increase would provide one extension agent for about 100 ha.

C. Land and Water Use Rationalization (Annual Plan)

6.04 Efficient land use with irrigation in the social sector will not pose any unusual problems beyond the managerial capability of ZIK Pelagonija. Its land is consolidated, in the sense that it is not fragmented at various locations, and cropping patterns are already the subject of considerable planning and attention. Efficient land use with irrigation in the individual sector will be a complex process because of institutional and social factors. Wholesale land consolidation would not be attempted because of likely strong

farmer resistance, and therefore land ownership patterns will not be changed to accommodate the introduction of irrigation. The expected increase of labor demand over time would also have implications on irrigation in the individual sector and the subject of the appropriate irrigation technology is already the subject of concern of the project management.

6.05 Because of the extensive existing fragmentation of holdings, farmers have devised methods of cooperation to ensure that land use is rationalized to the extent required for the effective use of farm machinery and to ensure access to plots for machinery, to exclude animals from land where they could destroy crops, to facilitate mutual assistance and to take advantage of economies in marketing. Such cooperation is encouraged by the arrangements under which farmers voluntarily enter into contracts with social sector produce buyers. Land use rationalization under irrigation is planned to be based on this strong local institution of voluntary cooperation among farmers with respect to land use decision making.

6.06 Land use rationalization with irrigation in both the social and individual sectors is being devised within the legal framework of land tenure in Macedonia. In 1976, the SRM passed legislation covering land use rationalization for the production of industrial crops and to take advantage of mechanization, drainage, and irrigation. The SRM Law has been implemented through a Commune decision, which requires Vodostopanstvo to prepare an annual plan. This plan would provide for the rational use of land taking into consideration the layout of the irrigation network, the cropping pattern, crop rotation, water use, labor availability and requirements, mechanization and arrangements for the disposition of agriculture products, considering the capacities of processing facilities and local and external markets. The first annual plan for 1982 for the individual and social sectors was completed by August 31, 1981 and was received and reviewed by the Bank in early 1982. The preparation of these annual plans represents a major institutional improvement, both in terms of land use rationalization and in terms of regulating the relations between the social and the individual sector.

D. Agricultural Credit

6.07 Almost all agricultural credit has been provided in the project area by SBS, which is headquartered in Skopje. About 85% of the credit is being lent to the social sector and only 15% is being lent to the individual sector. About 50% of the credit is normally lent for short term and the rest for medium and long term. Part of the credit received by the individual sector, however, is through the social sector itself. Loans were approved for individual producers who concluded contracts for supply to processing plants in the social sector. With the completion of the project works it will be necessary to intensify credit delivery to the individual sector in order for farmers to acquire the necessary means for on farm capital investment associated with irrigated agriculture. Both the agricultural technical assistance and the credit institutions, are working toward achieving that purpose.

6.08 The project provided funds for an on-farm irrigation network, but with the project the higher cropping intensity would require more farm

machinery. Very small project farms, which have been using draft animals, would be mechanized within the first five years of the project. Dairy production and larger private farms would receive harvesting machines. In the social sector, additional harvesting machines would be necessary as well. About US\$30 million would be needed altogether for on-farm and permanent working capital in the project area during the next three to five years. SBS would finance about 40 to 50% of the above required investment and the rest would come from savings generated by the project.

E. Cost Recovery

6.09 The Strezevo Project Agreement provided that (a) water users would pay water charges to cover the full cost of investment (without interest) as well as operation and maintenance of the project; and (b) water charges would be set at levels which would provide farmers in the individual sector an incentive to irrigate and would take into consideration the farmers' ability to pay (section 3.06 of the Project Agreement). The Project Agreement also indicates that the water charges would increase only gradually, and that the full charges would not apply before 1986 (section 3.06(iv) in the Project Agreement). However, since irrigation was supposed to start in 1982, and will not start effectively until 1984, the target date for full cost recovery charges might be postponed. The Strezevo project management is fully prepared to enforce cost recovery charges for the project which would comply with the Project Agreement. Collection of water charges would start in 1984 with a fee of about 2 dinars per m^3 for agricultural users and about 4 dinars to other users, which would in effect subsidize agricultural users (see calculation of charges in para 6.09).

6.10 In addition to irrigation, other users of the Strezevo Water Project are the Bitola Water Authority (Vodovod), which supplies potable water and the thermal power plant (Electrostopanstvo). According to the Project Agreement, water for irrigation would constitute only about $86 Mm^3$ per annum, (equivalent to about $67 Mm^3$ net irrigation requirement) or about 72% of the total water used. The thermal power plant would use about $12 Mm^3$ (about 10%) and Bitola water authority about $22 m^3$ million (about 18%). Assuming a project life of 50 years, the charges which would cover investment, operation and maintenance costs would be as follows:

	<u>Cost Recovery Charges</u> ^{/1}		
	<u>Investment</u>	<u>O&M</u>	<u>Total</u>
	-----Dinars/M ³ -----		
Irrigation	2.4	1.4	3.8
Bitola Water Authority	1.8	1.1	2.9
Thermal Power Plant	1.8	1.1	2.9

6.11 Water charges for irrigation would be based on water requirements calculated for crops. This is a common practice in Yugoslavia, and provides an equitable mechanism of cost sharing to enable volumetric pricing, when individual meters are not available. Annex 2, Table 8, provides an illustration of the water charges according to crop requirements. The guideline used by the Strezevo Water Authority is that the collection of water charges should not exceed 30% of the net value of production. The law in Yugoslavia provides that no more than 30% of the net value of production ought to be used against payments of water charges. On the basis of the farm income analysis (para 4.06), net farm incomes with the project would be sufficient, on average, to permit water charges which satisfy the above criteria (Annex 2, Table 8).

F. Training

6.12 On September 29, 1982, BOAL Strezevo signed an agreement with a French consulting firm to train key personnel responsible for the operation and maintenance of the system. The training would cover project administration, operation and maintenance of the irrigation system, operation of the sprinkler system, agricultural economics, and agronomy. Training would be carried out both in France and in the United States, and would be arranged and supervised by the firm. The program has already commenced is expected to be completed by December 31, 1985. The scope of the training as contained in the agreement is sufficiently broad to cover the requirement of the project.

^{/1} The cost recovery charges are calculated as follows: investment costs in terms of 1983 constant prices are Dinars 11077.6 millions; and the project life is estimated at 50 years. Accordingly:

$$\text{Irrigation charges for Investment} = \frac{11,077,600 \times 0.72}{50} / 67,000 = 2.4 \text{ Dinars.}$$

$$\text{Bitola Water Authority Charges for investment} = \frac{11,077,600 \times 0.18}{50} / 22,000 = 1.8 \text{ Dinars.}$$

$$\text{Thermal Power Plant Charges for Investment} = \frac{11,077,600 \times 0.10}{50} / 12,000 = 1.8 \text{ Dinars}$$

$$\text{O+M Charges for irrigation} = \frac{130,000 \times 0.72}{67,000} = 1.4 \text{ Dinars.}$$

$$\text{O+M charges for Bitola Water Authority} = \frac{130,000 \times 0.18}{22,000} = 1.1 \text{ Dinars.}$$

$$\text{O+M Charges for Thermal Power Plant} = \frac{130,000 \times 0.1}{12,000} = 1.1 \text{ Dinars}$$

G. Reporting, Accounting, and Auditing

6.13 The Strezevo Water Project has regularly prepared quarterly progress reports in an agreed format which have been submitted to the Bank through SBS. These reports contain information on quantities, prices, costs, development of operations, costs per structure and costs for the project as a whole. Bank supervision missions consider that accounts have been adequately maintained so as to reflect financial operations, resources and expenditures of the project. These accounts are subject to a series of internal control procedures through the Social Accounting Service, whose audit reports have been submitted to the Bank within six months of each calendar year, in accordance with the Loan Agreement.

VII. Performance of the Bank

7.01 The involvement of the Bank dates back to 1972 when the first feasibility study for the project was received and reviewed. The principal issues raised by the Bank were the rationale for project selection and feasibility of using sprinkler irrigation in the Bucin-Strezevo area. The selection of an appropriate project, based on sound technical and economic criteria remained the foremost concern of the Bank. The Bank maintained a continuous dialogue with the Government and during 1976-77 reviewed the entire irrigation program in Macedonia (para 2.03). Bank involvement intensified and was at its peak during the preparation stages. Prior to appraisal, Bank missions reviewed the project design, cost estimates, institutions and organization and other related matters on project financing and cost recovery. The Bank's involvement resulted in intensive dialogue with the project consultants concerning the project concept and design. Eventually, the Bank's recommendations were by and large accepted by the Yugoslav project authorities (see para 2.04).

7.02 Nine supervision missions visited the project between Board approval in 1978 and the closing date in 1982, averaging about two missions per year. The Bank missions imparted substantial training to the BOAL management, through discussions, particularly on procurement procedures, contract documents, and contract awards. Despite the Bank's contribution to the design and implementation, Bank missions were to some extent biased toward engineering aspects of the project implementation and there was somewhat less attention paid to agricultural development plans, agricultural credit, agricultural extension and supporting services. Only in three out of the eight missions was an economist a member of the supervision mission, and no agriculturist ever visited the project through a supervision.

VIII. CONCLUSIONS

8.01 Macedonia Strezevo Irrigation project has been satisfactorily completed. During 1982, part of the project facilities were operated and the performance was satisfactory. Projected production increases demonstrate the value of the project to the national economy, and with realistic estimates of benefits at full development, an ERR of 15% is expected to be realized.

8.02 The project was planned, designed and implemented with speed and efficiency and with cost savings in dollar terms. The advance contracting for the diversion tunnel and the access road contributed considerably to the timely completion. Control and coordination between numerous financing agencies was efficiently carried out.

8.03 The project demonstrates the economic viability of irrigation in the low rainfall areas of southeastern Yugoslavia. The increase in primary production due to the project will help relieve the problems of overcapacity in the agroindustry subsector and promote exports of primary and processed goods. Employment opportunities will be generated through direct utilization of labor and through the increased activity in agroindustries, thereby helping to reduce rural/urban and regional income disparities.

8.04 The project has created conditions favorable to the development of both the social and the individual sectors. The social sector will benefit from increased production from its own land, and by obtaining increased quantities of primary production from the individual farmers. The individual sector would be assured of irrigation supplies during the critical summer months, and would also receive adequate fertilizer and other inputs and credit through the system of association with the social sector which would be regulated through the annual agricultural development plans. The increased availability of irrigation water would permit the use of optimum quantities of fertilizer.

8.05 Important to the success of the project was the flexibility applied by all parties concerned, including the Bank, the Government of SRM, and the investors, in modifying the project concept and design features, provided such features were in line with the basic project objectives and were economically justified.

8.06 The project management, including the project's supervisory agency (BOAL Strezevo), had during project implementation a clear engineering orientation, which resulted in certain imbalance between attention paid to construction and attention paid to annual agricultural development plans, individual farmers' associations, and supporting services, notably agricultural extension and credit. To some extent, the Bank's supervision missions were biased toward construction as well (see para 7.02). The imbalance in attention was not critical and was remedied to a large extent by the Commune of Bitola which, being a co-signatory of the Project Agreement, took active interest in all issues concerning the project implementation and exercised a direct influence on implementation and operation of the system.

8.07 The project has also established that the sole approach to the land rationalization does not lie in land consolidation. In areas where the sum total of each individual holding is small, the value of land consolidation is questionable. Land consolidation cannot assist or improve irrigation practices as the plot sizes still remain too small to be irrigated by a single hydrant, or permit use of large farm machinery. The farmers in Macedonia have a history of cooperation, and irrigation application in the project area would be realized through enforcement of mono-culture on areas served by each sprinkler farm hydrant, coupled with a 3-year program of crop rotation.

8.08 Care would be necessary in selecting the type of irrigation sprinklers in the individual sector after the presently available quick coupling pipes have served their useful life, i.e. about 8 years. Labor shortages in the future would preclude the use of such pipes, and more sophisticated and mechanized types of sprinklers should be selected (para 6.04).

8.09 Demand for water in the project area is bound to increase with time, and water conservation measures would be necessary (para 3.08). Side channel storages in the form of small reservoirs are technically feasible and should be studied for their economic merit in the future.

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YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT (LOAN 1616-YU)PROJECT COMPLETION REPORTPROGRESS ON IMPLEMENTATION OF THE PROJECT - PLANNED vs. REALIZEDAccess Road and Diversion Tunnel

ITEM	UNIT	1978			1979			TOTAL		
		PLANNED	REALIZED	%	PLANNED	REALIZED	%	PLANNED	REALIZED	%
<u>ACCESS ROAD-DAM STREZEVO</u>										
SOIL EXCAVATION	m ³	26,139	33,439	128	-	-		26,139	33,439	128
EARTHWORK FOR EMBANKMENT	m ³	24,941	19,345	76	-	16,825		24,941	36,264	145
SUB-BASE LAYER	m ³	20,108	16,500	82	-	8,488		20,108	24,968	124
ASPHALT COURSE	m ²	61,698	43,101	68	-	22,989		61,698	65,090	105
<u>DIVERSION TUNNEL - DAM STEZEVO</u>										
TUNNEL EXCAVATION	m ³	4,470	3,836	86	8,306	8,699	104	12,776	12,535	98
CONCRETE	m ³	1,530	-	-	5,148	6,482	126	6,678	6,482	97
REINFORCEMENT	kg	-	-	-	173,786	194,537	112	173,786	194,537	112

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT (LOAN 1616-YU)PROJECT COMPLETION REPORTPROGRESS ON IMPLEMENTATION OF THE PROJECT - PLANNED vs. REALIZEDMain Dam Body

<u>%</u>	<u>ITEM</u>	<u>UNIT</u>	<u>1979</u>			<u>1980</u>			<u>1981</u>			<u>1982</u>			<u>TOTAL</u>		
			<u>PLANNED</u>	<u>REALIZED</u>	<u>%</u>	<u>PLANNED</u>	<u>REALIZED</u>										
	<u>MAIN DAM BODY - STREZEVO DAM</u>																
	CLAY CORE	m ³	51,550	10,508	20	213,500	152,592	71	183,500	142,938	78	-	131,850	-	448,550	437,880	98
	FILTER	m ³	6,385	16,782	263	97,200	26,918	28	132,000	86,870	77	-	130,217	-	235,585	243,787	103
	GRAVEL FILL	m ³	376,700	228,839	61	1,506,777	849,131	56	1,241,000	1,618,430	130	-	430,674	-	3,124,447	3,127,074	100
	ROCKFILL FILL	m ³	-	-	-	60,000	-	-	208,771	124,802	60	-	99,250	-	268,771	214,052	83
	BALLAST (RANDOM)	m ³	-	-	-	100,000	-	-	140,580	39,052	128	-	198,040	-	240,580	237,092	99
	TOTAL	m ³	434,635	256,129	59	1,977,477	1,028,641	52	1,905,851	2,012,092	106	-	990,031	-	4,317,963	4,269,885	98

YUGOSLAVIA

MACEDONIA SIREZEVO IRRIGATION PROJECT (LOAN 1616-YU)PROJECT COMPLETION REPORTPROGRESS ON IMPLEMENTATION OF THE PROJECT - PLANNED vs. REALIZEDAlimentation Land and Main Canal

ITEM	UNIT	1979			1980			1981			1982			1983			TOTAL		
		PLANNED	REALIZED	%	PLANNED	REALIZED	%	PLANNED	REALIZED	%	PLANNED	REALIZED	%	PLANNED	REALIZED	%	PLANNED	REALIZED	%
<u>ALIMENTATION CANAL</u>																			
Wide Excavation	m ³	33,309	15,614	47	60,191	50,218	83	45,737	43,543	95	-	25,496	-	-	12,747	-	139,237	147,619	106
Canal Excavation	m ³	35,894	31,473	88	45,142	32,280	71	85,067	56,941	67	-	33,321	-	-	16,661	-	166,103	170,682	103
Canal Concreting	m ³	38,894	2,643	68	18,575	20,916	59	31,990	17,801	56	-	16,339	-	-	8,170	-	54,448	55,869	103
Completed Canal	m ³	5,234	3,983	76	28,060	13,012	46	27,440	17,255	63	-	18,949	-	-	8,535	-	60,734	61,734	100
<u>MAIN CANAL</u>																			
Wide Excavation	m ³	-	-	-	53,046	91,192	172	55,629	55,567	100	-	44,246	-	-	14,748	-	108,675	205,753	189
Canal Excavation	m ³	-	-	-	124,484	133,067	107	195,610	161,996	83	-	35,573	-	-	11,858	-	320,094	342,494	107
Canal Concreting	m ³	-	-	-	38,525	29,402	76	56,289	39,749	71	-	19,239	-	-	6,413	-	94,814	94,803	100
Completed Canal	m ³	-	-	-	12,880	14,289	115	31,198	14,769	47	-	2,963	-	-	2,963	-	44,078	44,078	100

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT (LOAN 1616-YU)

PROJECT COMPLETION REPORT

PROGRESS ON IMPLEMENTATION OF THE PROJECT - PLANNED vs. REALIZED

UNDERGROUND PRESSURE PIPE NETWORK

PIPE LINE NUMBER	MATERIAL	1980			1981			1982			1983		
		PLAN	WELD EXE	%	PLAN	WELD EXE	%	PLAN	WELD EXE	%	PLAN	WELD EXE	%
2C	STEEL	9,745	2,650			9,745							
	PVC	42,422	31,367			11,055							
3C	STEEL	8,675	8,695										
	PVC	41,057	23,000			18,057							
4C	HDPE	7,834	7,100			734							
	PVC	33,854	11,422			22,432							
5C	STEEL				17,663	6,800			6,250			4,613	
	PVC				67,742	52,042			15,670				
6C	HDPE				9,606	6,400			3,206				
	PVC				61,532	18,876			42,652				
7C	STEEL				9,472	3,172			2,800			3,500	
	PVC				50,521	17,280			33,249				
8C	STEEL				11,750	5,200			3,600			2,950	
	PVC				52,683	5,864			40,095			6,724	
9C	HDPE				12,188	1,200			10,988				
	PVC				50,203	7,216			35,527			7,460	
10C	STEEL				11,269				7,423			3,840	
	PVC				45,318				29,420			14,898	
11C	-												
	PVC				6,746							6,746	
TOTAL:	STEEL	13,420	8,675	47	50,154	24,917	50		20,073			19,903	
	HDPE	7,834	7,100	91	21,794	7,600	35		14,194			-	
	PVC	117,335	65,289	56	334,715	142,024	42		186,605			35,828	

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LOAN 1616-YU)

ANNEX 2
Table 1a

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

YIELD/SOCIAL SECTOR

(Tons/Ha)

	1984	1985	1986	1987	1988-2033
WITHOUT PROJECT					
WHEAT	3.8	3.8	3.8	3.8	3.8
BARLEY	2.3	2.3	2.3	2.3	2.3
MAIZE	4.0	4.0	4.0	4.0	4.0
SOYBEAN	-	-	-	-	-
SUNFLOWER	1.5	1.5	1.5	1.5	1.5
SUGARBEET	32.0	32.0	32.0	32.0	32.0
TOBACCO	-	-	-	-	-
VEGETABLES	-	-	-	-	-
ALFALFA	5.0	5.0	5.0	5.0	5.0
FRUIT	9.0	9.0	9.0	9.0	9.0
MAIZE SIL/FODDER	-	-	-	-	-
PASTURE	3.0	3.0	3.0	3.0	3.0
WITH PROJECT					
WHEAT	4.0	4.3	4.6	5.0	5.5
BARLEY	2.5	2.9	3.2	3.3	3.4
MAIZE	5.5	6.0	7.0	7.0	7.0
SOYBEAN	2.0	2.2	2.3	2.5	2.5
SUNFLOWER	1.8	2.2	2.7	3.0	3.5
SUGAR BEET	38.0	47.0	55.0	60.0	60.0
TOBACCO	-	-	-	-	-
VEGETABLES	22.0	25.0	29.0	33.0	36.0
ALFALFA	8.0	9.5	11.5	13.0	14.0
FRUIT	12.5	15.5	18.5	20.0	20.0
MAIZE SIL/FODDER	25.0	28.0	30.0	32.0	35.0
PASTURE	3.0	3.0	3.0	3.0	3.0
INCR. YIELD					
WHEAT	0.2	0.5	0.8	1.2	1.7
BARLEY	0.2	0.6	0.9	1.0	1.1
MAIZE	1.5	2.0	3.0	3.0	3.0
SOYBEAN	2.0	2.2	2.3	2.5	2.5
SUNFLOWER	0.3	0.7	1.2	1.5	2.0
SUGAR BEET	6.0	15.0	23.0	28.0	28.0
TOBACCO	-	-	-	-	-
VEGETABLE	22.0	25.0	29.0	33.0	36.0
ALFALFA	3.0	4.5	6.5	8.0	9.0
FRUIT	3.5	6.5	9.5	11.0	11.0
MAIZE SIL/FODDER	25.0	28.0	30.0	32.0	35.0
PASTURE	-	-	-	-	-

June 5, 1984 00:17

*** Running Subfile AREA/SOC/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LDAN 1616-YU)

ANNEX 2
Table 1b

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

YIELD/INDIVIDUAL SECTOR

(Tons/Ha)

	1984	1985	1986	1987	1988	1989-2033
WITHOUT PROJECT						
WHEAT	2.9	2.9	2.9	2.9	2.9	2.9
BARLEY	1.3	1.3	1.3	1.3	1.3	1.3
MAIZE	2.1	2.1	2.1	2.1	2.1	2.1
SOYBEAN	-	-	-	-	-	-
SUNFLOWER	1.4	1.4	1.4	1.4	1.4	1.4
SUGARBEET	25.0	25.0	25.0	25.0	25.0	25.0
TOBACCO	1.2	1.2	1.2	1.2	1.2	1.2
VEGETABLES	12.5	12.5	12.5	12.5	12.5	12.5
ALFALFA	4.0	4.0	4.0	4.0	4.0	4.0
FRUIT	5.0	5.0	5.0	5.0	5.0	5.0
MAIZE SIL/FODDER	-	-	-	-	-	-
PASTURE	3.0	3.0	3.0	3.0	3.0	3.0
WITH PROJECT						
WHEAT	3.1	3.4	3.5	3.7	3.8	4.0
BARLEY	1.8	2.0	2.2	2.3	2.5	2.6
MAIZE	4.2	4.5	4.8	5.5	5.5	5.5
SOYBEAN	1.7	2.0	2.1	2.2	2.2	2.2
SUNFLOWER	1.9	2.0	2.3	2.5	2.6	2.8
SUGAR BEET	32.0	36.0	40.0	45.0	50.0	50.0
TOBACCO	1.3	1.5	1.7	1.9	2.1	2.2
VEGETABLES	15.0	18.5	22.0	24.5	26.0	27.5
ALFALFA	5.5	6.5	8.0	10.0	12.0	12.0
FRUIT	6.5	8.0	12.0	15.0	18.0	20.0
MAIZE SIL/FODDER	18.0	24.0	27.5	28.0	29.0	30.0
PASTURE	3.0	3.0	3.0	3.0	3.0	3.0
INCR. YIELD						
WHEAT	0.2	0.5	0.6	0.8	0.9	1.1
BARLEY	0.5	0.7	0.9	1.0	1.2	1.3
MAIZE	2.1	2.4	2.7	3.4	3.4	3.4
SOYBEAN	1.7	2.0	2.1	2.2	2.2	2.2
SUNFLOWER	0.5	0.6	0.9	1.1	1.2	1.4
SUGAR BEET	7.0	11.0	15.0	20.0	25.0	25.0
TOBACCO	0.1	0.3	0.5	0.7	0.9	1.0
TOBACCO	2.5	6.0	9.5	12.0	13.5	15.0
ALFALFA	1.5	2.5	4.0	6.0	8.0	8.0
FRUIT	1.5	3.0	7.0	10.0	13.0	15.0
MAIZE SIL/FODDER	18.0	24.0	27.5	28.0	29.0	30.0
PASTURE	-	-	-	-	-	-

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*** Running Subfile AREA/IND/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LOAN 1616-YU)

ANNEX 2
Table 2a

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

AREA/SOCIAL SECTOR

(Hectares)

	1984	1985	1986	1987	1988-2033
WITHOUT PROJECT					
WHEAT	5820.0	5820.0	5820.0	5820.0	5820.0
BARLEY	466.0	466.0	466.0	466.0	466.0
MAIZE	466.0	466.0	466.0	466.0	466.0
SOYBEAN	-	-	-	-	-
SUNFLOWER	3026.0	3026.0	3026.0	3026.0	3026.0
SUGARBEET	931.0	931.0	931.0	931.0	931.0
TOBACCO	-	-	-	-	-
VEGETABLES	-	-	-	-	-
ALFALFA	931.0	931.0	931.0	931.0	931.0
FRUIT	232.0	232.0	232.0	232.0	232.0
MAIZE SIL/FODDER	-	-	-	-	-
PASTURE	166.0	166.0	166.0	166.0	166.0
TOTAL CROPPED AREA	12038.0	12038.0	12038.0	12038.0	12038.0
WITH PROJECT					
WHEAT	5461.0	4934.0	4557.0	4223.0	3041.0
BARLEY	355.0	270.0	205.0	156.0	119.0
MAIZE	1002.0	1362.0	1627.0	1987.0	2501.0
SOYBEAN	350.0	380.0	410.0	440.0	464.0
SUNFLOWER	1956.0	1565.0	1018.0	529.0	342.0
SUGAR BEET	1108.0	1319.0	1770.0	1970.0	2226.0
TOBACCO	-	-	-	-	-
VEGETABLES	250.0	350.0	450.0	550.0	696.0
ALFALFA	1044.0	1270.0	1412.0	1571.0	1850.0
FRUIT	278.0	333.0	400.0	479.0	575.0
MAIZE SIL/FODDER	1570.0	1839.0	2453.0	2822.0	3459.0
PASTURE	153.0	140.0	130.0	100.0	-
TOTAL CROPPED AREA	13527.0	13762.0	14432.0	14827.0	15273.0
INCR. AREA					
WHEAT	-359.0	-886.0	-1263.0	-1597.0	-2779.0
BARLEY	-111.0	-196.0	-261.0	-310.0	-347.0
MAIZE	536.0	896.0	1161.0	1521.0	2035.0
SOYBEAN	350.0	380.0	410.0	440.0	464.0
SUNFLOWER	-1070.0	-1461.0	-2008.0	-2497.0	-2684.0
SUGAR BEET	177.0	388.0	839.0	1039.0	1295.0
TOBACCO	-	-	-	-	-
VEGETABLES	250.0	350.0	450.0	550.0	696.0
ALFALFA	113.0	339.0	481.0	640.0	919.0
FRUIT	46.0	101.0	168.0	247.0	343.0
MAIZE SIL/FODDER	1570.0	1839.0	2453.0	2822.0	3459.0
PASTURE	-13.0	-26.0	-36.0	-66.0	-166.0
TOTAL CROPPED AREA	1489.0	1724.0	2394.0	2789.0	3235.0

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*** Running Subfile QUAN/SOC/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LOAN 1616-YU)

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

AREA/INDIVIDUAL SECTOR

(Hectares)

ANNEX 2
Table 2b

	1984	1985	1986	1987	1988	1989-2033
WITHOUT PROJECT						
WHEAT	3236.0	3236.0	3236.0	3236.0	3236.0	3236.0
BARLEY	629.0	629.0	629.0	629.0	629.0	629.0
MAIZE	629.0	629.0	629.0	629.0	629.0	629.0
SOYBEAN	-	-	-	-	-	-
SUNFLOWER	1259.0	1259.0	1259.0	1259.0	1259.0	1259.0
SUGARBEET	180.0	180.0	180.0	180.0	180.0	180.0
TOBACCO	270.0	270.0	270.0	270.0	270.0	270.0
VEGETABLES	945.0	945.0	945.0	945.0	945.0	945.0
ALFALFA	315.0	315.0	315.0	315.0	315.0	315.0
FRUIT	700.0	700.0	700.0	700.0	700.0	700.0
MAIZE SIL/FODDER	-	-	-	-	-	-
PASTURE	1460.0	1460.0	1460.0	1460.0	1460.0	1460.0
TOTAL CROPPED AREA	9623.0	9623.0	9623.0	9623.0	9623.0	9623.0
WITH PROJECT						
WHEAT	3102.0	3071.0	2952.0	2891.0	2627.0	2252.0
BARLEY	502.0	450.0	350.0	220.0	130.0	101.0
MAIZE	942.0	650.0	510.0	400.0	350.0	317.0
SOYBEAN	-	20.0	50.0	120.0	139.0	139.0
SUNFLOWER	1459.0	1240.0	1080.0	950.0	760.0	716.0
SUGAR BEET	665.0	985.0	1420.0	1540.0	1960.0	2148.0
TOBACCO	832.0	867.0	905.0	1035.0	1190.0	1242.0
VEGETABLES	1352.0	1455.0	1591.0	1732.0	2057.0	2238.0
ALFALFA	466.0	680.0	850.0	1200.0	1630.0	1961.0
FRUIT	645.0	630.0	540.0	400.0	310.0	201.0
MAIZE SIL/FODDER	50.0	440.0	815.0	1215.0	1750.0	2082.0
PASTURE	530.0	450.0	200.0	-	-	-
TOTAL CROPPED AREA	10545.0	10938.0	11263.0	11703.0	12903.0	13397.0
INCR. AREA						
WHEAT	-134.0	-165.0	-284.0	-345.0	-609.0	-984.0
BARLEY	-127.0	-178.0	-279.0	-409.0	-499.0	-528.0
MAIZE	313.0	21.0	-119.0	-229.0	-279.0	-312.0
SOYBEAN	-	20.0	50.0	120.0	139.0	139.0
SUNFLOWER	200.0	-19.0	-179.0	-309.0	-499.0	-543.0
SUGAR BEET	485.0	805.0	1240.0	1360.0	1780.0	1968.0
TOBACCO	562.0	597.0	635.0	765.0	920.0	972.0
TOBACCO	407.0	510.0	646.0	787.0	1112.0	1293.0
ALFALFA	151.0	365.0	535.0	885.0	1315.0	1646.0
FRUIT	-55.0	-70.0	-160.0	-300.0	-390.0	-499.0
MAIZE SIL/FODDER	50.0	440.0	815.0	1215.0	1750.0	2082.0
PASTURE	-930.0	-1010.0	-1260.0	-1460.0	-1460.0	-1460.0
TOTAL CROPPED AREA	922.0	1315.0	1640.0	2080.0	3280.0	3774.0

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*** Running Subfile QUAN/IND/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

ANNEX 2
Table 2c

(LOAN 1616-YU)

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

TOTAL AREA

(Hectares)

	1984	1985	1986	1987	1988	1989-2033
WITHOUT PROJECT						
TOTAL WHEAT	9056.0	9056.0	9056.0	9056.0	9056.0	9056.0
TOTAL BARLEY	1095.0	1095.0	1095.0	1095.0	1095.0	1095.0
TOTAL MAIZE	1095.0	1095.0	1095.0	1095.0	1095.0	1095.0
TOTAL SOYBEAN	-	-	-	-	-	-
TOTAL SUNFLOWER	4285.0	4285.0	4285.0	4285.0	4285.0	4285.0
TOTAL SUGARBEET	1111.0	1111.0	1111.0	1111.0	1111.0	1111.0
TOTAL TOBACCO	270.0	270.0	270.0	270.0	270.0	270.0
TOTAL VEGETABLES	945.0	945.0	945.0	945.0	945.0	945.0
TOTAL ALFALFA	1246.0	1246.0	1246.0	1246.0	1246.0	1246.0
TOTAL FRUIT	932.0	932.0	932.0	932.0	932.0	932.0
TOTAL MAIZE SIL/FODDER	-	-	-	-	-	-
TOTAL PASTURE	1626.0	1626.0	1626.0	1626.0	1626.0	1626.0
TOTAL CROPPED AREA	21661.0	21661.0	21661.0	21661.0	21661.0	21661.0
WITH PROJECT						
TOTAL WHEAT	8563.0	8005.0	7509.0	7114.0	5668.0	5293.0
TOTAL BARLEY	857.0	720.0	555.0	376.0	249.0	220.0
TOTAL MAIZE	1944.0	2012.0	2137.0	2387.0	2851.0	2818.0
TOTAL SOYBEAN	350.0	400.0	460.0	560.0	603.0	603.0
TOTAL SUNFLOWER	3415.0	2805.0	2098.0	1479.0	1102.0	1058.0
TOTAL SUGARBEET	1773.0	2304.0	3190.0	3510.0	4186.0	4374.0
TOTAL TOBACCO	832.0	867.0	905.0	1035.0	1190.0	1242.0
TOTAL VEGETABLES	1602.0	1805.0	2041.0	2282.0	2753.0	2934.0
TOTAL ALFALFA	1510.0	1950.0	2262.0	2771.0	3480.0	3811.0
TOTAL FRUIT	923.0	963.0	940.0	879.0	885.0	776.0
TOTAL MAIZE SIL/FODDER	1620.0	2279.0	3268.0	4037.0	5209.0	5541.0
TOTAL PASTURE	683.0	590.0	330.0	100.0	-	-
TOTAL CROPPED AREA	24072.0	24700.0	25695.0	26530.0	28176.0	28670.0
INCREMENTAL						
TOTAL WHEAT	-493.0	-1051.0	-1547.0	-1942.0	-3388.0	-3763.0
TOTAL BARLEY	-238.0	-375.0	-540.0	-719.0	-846.0	-875.0
TOTAL MAIZE	849.0	917.0	1042.0	1292.0	1756.0	1723.0
TOTAL SOYBEAN	350.0	400.0	460.0	560.0	603.0	603.0
TOTAL SUNFLOWER	-870.0	-1480.0	-2187.0	-2806.0	-3183.0	-3227.0
TOTAL SUGARBEET	662.0	1193.0	2079.0	2399.0	3075.0	3263.0
TOTAL TOBACCO	562.0	597.0	635.0	765.0	920.0	972.0
TOTAL VEGETABLES	657.0	860.0	1096.0	1337.0	1808.0	1989.0
TOTAL ALFALFA	264.0	704.0	1016.0	1525.0	2234.0	2565.0
TOTAL FRUIT	-9.0	31.0	8.0	-53.0	-47.0	-156.0
TOTAL MAIZE SIL/FODDER	1620.0	2279.0	3268.0	4037.0	5209.0	5541.0
TOTAL PASTURE	-943.0	-1036.0	-1296.0	-1526.0	-1626.0	-1626.0
TOTAL CROPPED AREA	2411.0	3039.0	4034.0	4869.0	6515.0	7009.0

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*** Running Subfile TOT/QUAN Called by Subfile MASTER/ECON

YUGOSLAVIA

 MACEDONIA STREZEVO IRRIGATION PROJECT

 (LOAN 1616-YU)

 PROJECT COMPLETION REPORT

 ECONOMIC ANALYSIS

 QUANTITY

 (Tons)

ANNEX 2
 Table 3a

	1984	1985	1986	1987	1988-2033
SOCIAL SECTOR					
WITHOUT PROJECT					
WHEAT	22116.0	22116.0	22116.0	22116.0	22116.0
BARLEY	1071.8	1071.8	1071.8	1071.8	1071.8
MAIZE	1864.0	1864.0	1864.0	1864.0	1864.0
SOYBEAN	-	-	-	-	-
SUNFLOWER	4539.0	4539.0	4539.0	4539.0	4539.0
SUGARBEET	29792.0	29792.0	29792.0	29792.0	29792.0
TOBACCO	-	-	-	-	-
VEGETABLES	-	-	-	-	-
ALFALFA	4655.0	4655.0	4655.0	4655.0	4655.0
FRUITS	2088.0	2088.0	2088.0	2088.0	2088.0
MAIZE SIL/FODDER	-	-	-	-	-
PASTURE	498.0	498.0	498.0	498.0	498.0
TOTAL QUANTITY	66623.8	66623.8	66623.8	66623.8	66623.8
SOCIAL SECTOR					
WITH PROJECT					
WHEAT	21844.0	21216.2	20862.2	21115.0	16725.5
BARLEY	887.5	783.0	656.0	514.8	404.6
MAIZE	5511.0	8172.0	11389.0	13909.0	17507.0
SOYBEAN	700.0	836.0	943.0	1100.0	1160.0
SUNFLOWER	3520.8	3443.0	2748.6	1587.0	1197.0
SUGARBEET	42104.0	61983.0	97350.0	118200.0	133560.0
TOBACCO	-	-	-	-	-
VEGETABLES	5500.0	8750.0	13050.0	18150.0	25056.0
ALFALFA	8352.0	12065.0	16238.0	20423.0	25900.0
FRUITS	3475.0	5161.5	7400.0	9580.0	11500.0
MAIZE SIL/FODDER	39250.0	51492.0	73590.0	90304.0	121065.0
PASTURE	459.0	420.0	390.0	300.0	-
TOTAL QUANTITY	131603.3	174331.7	244716.8	295182.8	354075.1
SOCIAL SECTOR					
INCREMENTAL					
WHEAT	-272.0	-899.8	-1153.8	-1001.0	-5390.5
BARLEY	-184.3	-288.8	-415.8	-557.0	-667.2
MAIZE	3647.0	6308.0	9525.0	12045.0	15643.0
SOYBEAN	700.0	836.0	943.0	1100.0	1160.0
SUNFLOWER	-1018.2	-1096.0	-1790.4	-2952.0	-3342.0
SUGARBEET	12312.0	32201.0	67558.0	88408.0	103768.0
TOBACCO	-	-	-	-	-
VEGETABLES	5500.0	8750.0	13050.0	18150.0	25056.0
ALFALFA	3687.0	7410.0	11583.0	15768.0	21245.0
FRUITS	1387.0	3073.5	5312.0	7492.0	9412.0
MAIZE SIL/FODDER	39250.0	51492.0	73590.0	90304.0	121065.0
PASTURE	-39.0	-78.0	-108.0	-198.0	-498.0
TOTAL INC. QUANTITY	64879.5	107707.9	178093.0	228559.0	287451.3

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*** Running Subfile VAL/SOC/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LOAN 1616-YU)

ANNEX 2
Table 3b

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

QUANTITY

(Tons)

	1984	1985	1986	1987	1988	1989-2033
INDIVIDUAL SECTOR						
WITHOUT PROJECT						
WHEAT	9384.4	9384.4	9384.4	9384.4	9384.4	9384.4
BARLEY	817.7	817.7	817.7	817.7	817.7	817.7
MAIZE	1320.9	1320.9	1320.9	1320.9	1320.9	1320.9
SOYBEAN	-	-	-	-	-	-
SUNFLOWER	1762.6	1762.6	1762.6	1762.6	1762.6	1762.6
SUGARBEET	4500.0	4500.0	4500.0	4500.0	4500.0	4500.0
TOBACCO	324.0	324.0	324.0	324.0	324.0	324.0
VEGETABLES	11812.5	11812.5	11812.5	11812.5	11812.5	11812.5
ALFALFA	1260.0	1260.0	1260.0	1260.0	1260.0	1260.0
FRUITS	3500.0	3500.0	3500.0	3500.0	3500.0	3500.0
MAIZE SIL/FODDER	-	-	-	-	-	-
PASTURE	4380.0	4380.0	4380.0	4380.0	4380.0	4380.0
TOTAL QUANTITY	39062.1	39062.1	39062.1	39062.1	39062.1	39062.1
INDIVIDUAL SECTOR						
WITH PROJECT						
WHEAT	9616.2	10441.4	10332.0	10696.7	9982.6	9008.0
BARLEY	903.6	900.0	770.0	506.0	325.0	262.6
MAIZE	3956.4	2925.0	2448.0	2200.0	1925.0	1743.5
SOYBEAN	-	40.0	105.0	264.0	305.8	305.8
SUNFLOWER	2772.1	2480.0	2484.0	2375.0	1976.0	2004.8
SUGARBEET	21280.0	35460.0	56800.0	69300.0	98000.0	107400.0
TOBACCO	1081.6	1300.5	1538.5	1966.5	2499.0	2732.4
VEGETABLES	20280.0	26917.5	35002.0	42434.0	53482.0	61545.0
ALFALFA	2563.0	4420.0	6800.0	12000.0	19560.0	23532.0
FRUITS	4192.5	5040.0	6480.0	6000.0	5580.0	4020.0
MAIZE SIL/FODDER	900.0	10560.0	22412.5	34020.0	50750.0	62460.0
PASTURE	1590.0	1350.0	600.0	-	-	-
TOTAL QUANTITY	69135.4	101834.4	145772.0	181762.2	244385.4	275014.1
INDIVIDUAL SECTOR						
INCREMENTAL						
WHEAT	231.8	1057.0	947.6	1312.3	598.2	-376.4
BARLEY	85.9	82.3	-47.7	-311.7	-492.7	-555.1
MAIZE	2635.5	1604.1	1127.1	879.1	604.1	422.6
SOYBEAN	-	40.0	105.0	264.0	305.8	305.8
SUNFLOWER	1009.5	717.4	721.4	612.4	213.4	242.2
SUGARBEET	16780.0	30860.0	52300.0	64800.0	93500.0	102900.0
TOBACCO	757.6	976.5	1214.5	1642.5	2175.0	2408.4
VEGETABLES	8467.5	15105.0	23189.5	30621.5	41669.5	49732.5
ALFALFA	1303.0	3160.0	5540.0	10740.0	18300.0	22272.0
FRUITS	692.5	1540.0	2980.0	2500.0	2080.0	520.0
MAIZE SIL/FODDER	900.0	10560.0	22412.5	34020.0	50750.0	62460.0
PASTURE	-2790.0	-3030.0	-3780.0	-4380.0	-4380.0	-4380.0
TOTAL INC. QUANTITY	30073.3	62772.3	106709.9	142700.1	205323.3	235952.0

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*** Running Subfile VAL/IND/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LOAN 1616-YU)

ANNEX 2
Table 3c

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

TOTAL QUANTITY

(Tons)

	1984	1985	1986	1987	1988	1989-2033
WITHOUT PROJECT						
TOTAL WHEAT	31500.4	31500.4	31500.4	31500.4	31500.4	31500.4
TOTAL BARLEY	1889.5	1889.5	1889.5	1889.5	1889.5	1889.5
TOTAL MAIZE	3184.9	3184.9	3184.9	3184.9	3184.9	3184.9
TOTAL SOYBEAN	-	-	-	-	-	-
TOTAL SUNFLOWER	6301.6	6301.6	6301.6	6301.6	6301.6	6301.6
TOTAL SUGARBEET	34292.0	34292.0	34292.0	34292.0	34292.0	34292.0
TOTAL TOBACCO	324.0	324.0	324.0	324.0	324.0	324.0
TOTAL VEGETABLES	11812.5	11812.5	11812.5	11812.5	11812.5	11812.5
TOTAL ALFALFA	5915.0	5915.0	5915.0	5915.0	5915.0	5915.0
TOTAL FRUIT	5588.0	5588.0	5588.0	5588.0	5588.0	5588.0
TOTAL MAIZE SIL/FOODER	-	-	-	-	-	-
TOTAL PASTURE	4878.0	4878.0	4878.0	4878.0	4878.0	4878.0
TOTAL QUANTITY	105685.9	105685.9	105685.9	105685.9	105685.9	105685.9
WITH PROJECT						
TOTAL WHEAT	31460.2	31657.6	31294.2	31811.7	26708.1	25733.5
TOTAL BARLEY	1791.1	1683.0	1426.0	1020.8	729.6	667.2
TOTAL MAIZE	9467.4	11097.0	13837.0	16109.0	19432.0	19250.5
TOTAL SOYBEAN	700.0	876.0	1048.0	1364.0	1465.8	1465.8
TOTAL SUNFLOWER	6292.9	5923.0	5232.6	3962.0	3173.0	3201.8
TOTAL SUGARBEET	63384.0	97453.0	154150.0	187500.0	231560.0	240960.0
TOTAL TOBACCO	1081.6	1300.5	1538.5	1966.5	2499.0	2732.4
TOTAL VEGETABLES	25780.0	35667.5	48052.0	60584.0	78538.0	86601.0
TOTAL ALFALFA	10915.0	16485.0	23038.0	32423.0	45460.0	49432.0
TOTAL FRUIT	7667.5	10201.5	13880.0	15580.0	17080.0	15520.0
TOTAL MAIZE SIL/FOODER	40150.0	62052.0	96002.5	124324.0	171815.0	183525.0
TOTAL PASTURE	2049.0	1770.0	990.0	300.0	-	-
TOTAL QUANTITY	200738.7	276166.1	390488.8	476945.0	598460.5	629089.2
INCREMENTAL						
TOTAL WHEAT	-40.2	157.2	-206.2	311.3	-4792.3	-5766.9
TOTAL BARLEY	-98.4	-206.5	-463.5	-868.7	-1159.9	-1222.3
TOTAL MAIZE	6282.5	7912.1	10652.1	12924.1	16247.1	16065.6
TOTAL SOYBEAN	700.0	876.0	1048.0	1364.0	1465.8	1465.8
TOTAL SUNFLOWER	-8.7	-378.6	-1069.0	-2339.6	-3128.6	-3099.8
TOTAL SUGARBEET	29082.0	63161.0	119858.0	153208.0	197268.0	206668.0
TOTAL TOBACCO	757.6	976.5	1214.5	1642.5	2175.0	2408.4
TOTAL VEGETABLES	13967.5	23855.0	36239.5	48771.5	66725.5	74788.5
TOTAL ALFALFA	5000.0	10570.0	17123.0	26508.0	39545.0	43517.0
TOTAL FRUIT	2079.5	4613.5	8292.0	9992.0	11492.0	9932.0
TOTAL MAIZE SIL/FOODER	40150.0	62052.0	96002.5	124324.0	171815.0	183525.0
TOTAL PASTURE	-2829.0	-3108.0	-3888.0	-4578.0	-4878.0	-4878.0
TOTAL QUANTITY	95052.8	170480.2	284802.9	371259.1	492774.6	523403.3

June 5, 1984 00:18

*** Running Subfile TOT/VAL Called by Subfile MASTER/ECON

YUGOSLAVIA
MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)
PROJECT COMPLETION REPORT
ECONOMIC ANALYSIS
PRODUCER PRICES AT FARMGATE LEVEL
(Dinars per kg)

 1984-1985 1986-1988 1989-1993 1994-2033

ECONOMIC PRICES

In constant 1983 prices

WHEAT	22.3	21.2	32.2	31.7
BARLEY	22.0	22.0	22.0	22.0
MAIZE	12.8	10.8	12.7	12.7
SOYBEAN	26.5	24.4	30.3	30.1
SUNFLOWER	33.5	33.5	33.5	33.5
SUGARBEET	3.4	3.4	3.4	3.4
TOBACCO	190.3	170.7	192.5	192.8
VEGETABLES /a	19.0	19.0	19.0	19.0
ALFALFA	19.0	19.0	19.0	19.0
FRUITS	15.0	15.0	15.0	15.0
MAIZE SIL/FODDER	3.0	3.0	3.0	3.0
PASTURE	3.0	3.0	3.0	3.0

/a Average price of tomatoes, peppers, potatoes, onions, cabbage and other

June 5, 1984 00:17

*** Running Subfile YIELD/SOC/SEC Called by Subfile MASTER/ECON

ANNEX 2
 Table 4

YUGOSLAVIA
MACEDONIA STREZEVO IRRIGATION PROJECT

ANNEX 2
Table 5a

(LOAN 1616-YU)

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

NET VALUE

('000 Dinars)

	1984	1985	1986	1987	1988	1989-1993	1994-2033
SOCIAL SECTOR							
WITH PROJECT							
WHEAT	288886.9	294017.1	278979.5	294343.1	244192.3	428172.8	419810.1
BARLEY	8094.0	8532.0	7831.0	6302.4	5069.4	5069.4	5069.4
MAIZE	4809.6	15254.4	16270.0	19870.0	25010.0	58273.3	58273.3
SOYBEAN	8715.0	11476.0	11488.2	14476.0	15265.6	22109.6	21877.6
SUNFLOWER	45966.0	57748.5	54615.7	33697.3	27513.9	27513.9	27513.9
SUGARBEET	64042.4	116599.6	204612.0	261222.0	295167.6	295167.6	295167.6
TOBACCO	-	-	-	-	-	-	-
VEGETABLES	78750.0	130200.0	201600.0	288200.0	404376.0	404376.0	404376.0
ALFALFA	123192.0	186055.0	260514.0	334623.0	429200.0	429200.0	429200.0
FRUITS	15985.0	34132.5	59000.0	81430.0	97750.0	97750.0	97750.0
MAIZE SIL/FODDER	7850.0	25746.0	49060.0	73372.0	121065.0	121065.0	121065.0
PASTURE	-918.0	-840.0	-780.0	-600.0	-	-	-
TOTAL NET VALUE	645372.9	878921.1	1143190.4	1406935.8	1664609.8	1888697.6	1880102.9
SOCIAL SECTOR							
WITHOUT PROJECT							
WHEAT	318586.8	318586.8	294259.2	294259.2	294259.2	537535.2	526477.2
BARLEY	10438.4	10438.4	10438.4	10438.4	10438.4	10438.4	10438.4
MAIZE	-1864.0	-1864.0	-5592.0	-5592.0	-5592.0	-2050.4	-2050.4
SOYBEAN	-	-	-	-	-	-	-
SUNFLOWER	50988.1	50988.1	50988.1	50988.1	50988.1	50988.1	50988.1
SUGARBEET	25323.2	25323.2	25323.2	25323.2	25323.2	25323.2	25323.2
TOBACCO	-	-	-	-	-	-	-
VEGETABLES	-	-	-	-	-	-	-
ALFALFA	62004.6	62004.6	62004.6	62004.6	62004.6	62004.6	62004.6
FRUITS	8120.0	8120.0	8120.0	8120.0	8120.0	8120.0	8120.0
MAIZE SIL/FODDER	-	-	-	-	-	-	-
PASTURE	-996.0	-996.0	-996.0	-996.0	-996.0	-996.0	-996.0
TOTAL NET VALUE	472601.1	472601.1	444545.5	444545.5	444545.5	691363.1	680305.1
SOCIAL SECTOR							
INCREMENTAL							
WHEAT	-29699.9	-24569.7	-15279.7	83.9	-50066.9	-109362.4	-106667.2
BARLEY	-2344.4	-1906.4	-2607.4	-4136.0	-5369.0	-5369.0	-5369.0
MAIZE	6673.6	17118.4	21862.0	25462.0	30602.0	60323.7	60323.7
SOYBEAN	8715.0	11476.0	11488.2	14476.0	15265.6	22109.6	21877.6
SUNFLOWER	-5022.1	6760.4	3627.6	-17290.8	-23474.2	-23474.2	-23474.2
SUGARBEET	38719.2	91276.4	179288.8	235898.8	269844.4	269844.4	269844.4
TOBACCO	-	-	-	-	-	-	-
VEGETABLES	78750.0	130200.0	201600.0	288200.0	404376.0	404376.0	404376.0
ALFALFA	61187.4	124050.4	198509.4	272618.4	367195.4	367195.4	367195.4
FRUITS	7865.0	26012.5	50880.0	73310.0	89630.0	89630.0	89630.0
MAIZE SIL/FODDER	7850.0	25746.0	49060.0	73372.0	121065.0	121065.0	121065.0
PASTURE	78.0	156.0	216.0	396.0	996.0	996.0	996.0
TOTAL NET VALUE	172771.8	406320.0	698644.9	962390.3	1220064.3	1197334.5	1199797.8

June 5, 1984 00:17

*** Running Subfile YIELD/IND/SEC Called by Subfile MASTER/ECON

YUGOSLAVIA
MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)

ANNEX 2
Table 5b

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

NET VALUE

('000 Dinars)

	1984	1985	1986	1987	1988	1989-1993	1994-2033
INDIVIDUAL SECTOR							
WITH PROJECT							
WHEAT	117348.7	136720.9	126640.8	136281.7	129406.0	219570.0	215066.0
BARLEY	5471.8	6885.0	6895.0	4818.0	3419.0	2878.5	2878.5
MAIZE	-5407.1	-1235.0	-3906.6	-40.0	-35.0	3280.9	3280.9
SOYBEAN	-	678.0	1607.0	4149.6	4806.6	6610.8	6549.7
SUNFLOWER	49970.8	46624.0	51462.0	51632.5	43852.0	46110.4	46110.4
SUGARBEET	58121.0	99485.0	162732.0	202664.0	291256.0	319192.8	319192.8
TOBACCO	139268.5	178125.2	190222.0	252881.6	331379.3	426627.0	427446.7
VEGETABLES	304200.0	424132.5	569578.0	702326.0	892738.0	1035075.0	1035075.0
ALFALFA	36487.8	66164.0	106930.0	196560.0	328934.0	395729.8	395729.8
FRUITS	23607.0	37233.0	64314.0	65640.0	64821.0	48059.1	48059.1
MAIZE SIL/FODDER	650.0	13640.0	33822.5	52245.0	80500.0	102018.0	102018.0
PASTURE	2120.0	1800.0	800.0	-	-	-	-
TOTAL NET VALUE	731838.4	1010252.6	1311096.7	1669158.4	2171076.9	2605152.4	2601407.0
INDIVIDUAL SECTOR							
WITHOUT PROJECT							
WHEAT	130313.7	130313.7	119990.9	119990.9	119990.9	223219.3	218527.1
BARLEY	4403.0	4403.0	4403.0	4403.0	4403.0	4403.0	4403.0
MAIZE	-3094.7	-3094.7	-5736.5	-5736.5	-5736.5	-3226.8	-3226.8
SOYBEAN	-	-	-	-	-	-	-
SUNFLOWER	32608.1	32608.1	32608.1	32608.1	32608.1	32608.1	32608.1
SUGARBEET	6462.0	6462.0	6462.0	6462.0	6462.0	6462.0	6462.0
TOBACCO	48319.2	48319.2	41968.8	41968.8	41968.8	49032.0	49129.2
VEGETABLES	180400.5	180400.5	180400.5	180400.5	180400.5	180400.5	180400.5
ALFALFA	17167.5	17167.5	17167.5	17167.5	17167.5	17167.5	17167.5
FRUITS	20020.0	20020.0	20020.0	20020.0	20020.0	20020.0	20020.0
MAIZE SIL/FODDER	-	-	-	-	-	-	-
PASTURE	5840.0	5840.0	5840.0	5840.0	5840.0	5840.0	5840.0
TOTAL NET VALUE	442439.3	442439.3	423124.3	423124.3	423124.3	535925.6	531330.6
INDIVIDUAL SECTOR							
INCREMENTAL							
WHEAT	-12965.1	6407.2	6649.9	16290.9	9415.1	-3649.3	-3461.1
BARLEY	1068.8	2482.0	2492.0	415.0	-984.0	-1524.5	-1524.5
MAIZE	-2312.4	1859.7	1829.9	5696.5	5701.5	6507.7	6507.7
SOYBEAN	-	678.0	1607.0	4149.6	4806.6	6610.8	6549.7
SUNFLOWER	17362.7	14015.9	18853.9	19024.4	11243.9	13502.3	13502.3
SUGARBEET	51659.0	93023.0	156270.0	186202.0	284794.0	312730.8	312730.8
TOBACCO	90949.3	129806.0	148253.2	210912.8	289410.5	377595.0	378317.5
VEGETABLES	123799.5	243732.0	389177.5	521925.5	712337.5	854674.5	854674.5
ALFALFA	19320.3	48996.5	89762.5	179392.5	311766.5	378562.3	378562.3
FRUITS	3587.0	17213.0	44294.0	45620.0	44801.0	28039.1	28039.1
MAIZE SIL/FODDER	650.0	13640.0	33822.5	52245.0	80500.0	102018.0	102018.0
PASTURE	-3720.0	-4040.0	-5040.0	-5840.0	-5840.0	-5840.0	-5840.0
TOTAL INC. NET VALUE	289399.1	567813.2	887972.4	1246034.1	1747952.6	2069226.8	2070076.3

June 5, 1984 00:17

*** Running Subfile TOT/YIELD Called by Subfile MASTER/ECON

*** Running Subfile TOT/AREA Called by Subfile MASTER/ECON

YUGOSLAVIA

MACEDONIA STREZEVO IRRIGATION PROJECT

(LOAN 1616-YU)

ANNEX 2
Table 5c

PROJECT COMPLETION REPORT

ECONOMIC ANALYSIS

TOTAL NET VALUE

('000 Dinars)

	1984	1985	1986	1987	1988	1989-1993	1994-2033
WITHOUT PROJECT							
TOTAL WHEAT	448900.5	448900.5	414250.1	414250.1	414250.1	760754.5	745004.3
TOTAL BARLEY	14841.4	14841.4	14841.4	14841.4	14841.4	14841.4	14841.4
TOTAL MAIZE	-4958.7	-4958.7	-11328.5	-11328.5	-11328.5	-5277.2	-5277.2
TOTAL SOYBEAN	-	-	-	-	-	-	-
TOTAL SUNFLOWER	83596.2	83596.2	83596.2	83596.2	83596.2	83596.2	83596.2
TOTAL SUGARBEET	31785.2	31785.2	31785.2	31785.2	31785.2	31785.2	31785.2
TOTAL TOBACCO	48319.2	48319.2	41968.8	41968.8	41968.8	49032.0	49129.2
TOTAL VEGETABLES	180400.5	180400.5	180400.5	180400.5	180400.5	180400.5	180400.5
TOTAL ALFALFA	79172.1	79172.1	79172.1	79172.1	79172.1	79172.1	79172.1
TOTAL FRUIT	28140.0	28140.0	28140.0	28140.0	28140.0	28140.0	28140.0
TOTAL MAIZE SIL/FODDER	-	-	-	-	-	-	-
TOTAL PASTURE	4844.0	4844.0	4844.0	4844.0	4844.0	4844.0	4844.0
TOTAL NET VALUE	915040.4	915040.4	867669.8	867669.8	867669.8	1227288.7	1211635.7
WITH PROJECT							
TOTAL WHEAT	406235.6	430738.0	405620.3	430624.8	373598.3	647742.8	634876.1
TOTAL BARLEY	13565.8	15417.0	14726.0	11120.4	8488.4	7947.9	7947.9
TOTAL MAIZE	-597.5	14019.4	12363.4	19830.0	24975.0	61554.3	61554.3
TOTAL SOYBEAN	8715.0	12154.0	13095.2	18625.6	20072.2	28720.4	28427.3
TOTAL SUNFLOWER	95936.8	104372.5	106077.7	85329.8	71365.9	73624.3	73624.3
TOTAL SUGARBEET	122163.4	216084.6	367344.0	463886.0	586423.6	614360.4	614360.4
TOTAL TOBACCO	139268.5	178125.2	190222.0	252881.6	331379.3	426627.0	427446.7
TOTAL VEGETABLES	382950.0	554332.5	771178.0	990526.0	1297114.0	1439451.0	1439451.0
TOTAL ALFALFA	159679.8	252219.0	367444.0	531183.0	729134.0	824929.8	824929.8
TOTAL FRUIT	39592.0	71365.5	123314.0	147070.0	20111.0	145809.1	145809.1
TOTAL MAIZE SIL/FODDER	8500.0	39386.0	82882.5	125617.0	20111.0	223083.0	223083.0
TOTAL PASTURE	1202.0	860.0	20.0	-600.0	-	-	-
TOTAL NET VALUE	1377211.3	1889173.6	2454287.1	3076094.2	3835686.7	4493850.0	4481509.8
INCREMENTAL							
TOTAL WHEAT	-42665.0	-18162.5	-8629.7	16374.8	-40651.8	-113011.7	-110128.2
TOTAL BARLEY	-1275.6	575.6	-115.4	-3721.0	-6353.0	-6893.5	-6893.5
TOTAL MAIZE	4361.2	18978.1	23681.9	31158.5	36303.5	66831.4	66831.4
TOTAL SOYBEAN	8715.0	12154.0	13095.2	18625.6	20072.2	28720.4	28427.3
TOTAL SUNFLOWER	12340.6	20776.3	22481.5	1733.6	-12230.3	-9971.9	-9971.9
TOTAL SUGARBEET	90378.2	184299.4	335558.8	432100.8	554638.4	582575.2	582575.2
TOTAL TOBACCO	90949.3	129806.0	148253.2	210812.8	289410.5	377595.0	378317.5
TOTAL VEGETABLES	202549.5	373932.0	590777.5	816125.5	1116713.5	1259050.5	1259050.5
TOTAL ALFALFA	80507.7	173046.9	288271.9	452010.9	678961.9	747757.7	745757.7
TOTAL FRUIT	11452.0	43225.5	95174.0	118930.0	134431.0	117669.1	117669.1
TOTAL MAIZE SIL/FODDER	8500.0	39386.0	82882.5	125617.0	201565.0	223083.0	223083.0
TOTAL PASTURE	-3642.0	-3884.0	-4824.0	-5444.0	-4844.0	-4844.0	-4844.0
TOTAL NET VALUE	462170.9	974133.2	1586617.3	2208424.4	2968016.9	3266561.3	3269874.1

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*** Compiling Subfile ANALYSIS Called by Subfile MASTER/ECON

YUGOSLAVIA

 MACEDONIA STREZEVO IRRIGATION PROJECT

 (LOAN 1616-YII)

 PROJECT COMPLETION REPORT

 ECONOMIC ANALYSIS

 RATE OF RETURN

 ('000 Dinars)

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989-1993	1994-2027
COSTS													
INVESTMENT COSTS	60200.0	1440500.0	2685800.0	3180700.0	1925400.0	1526900.0	-	71000.0	82700.0	102400.0	-	-	-
OPERATION & MAINTENANCE	-	-	-	-	-	-	130100.0	130100.0	130100.0	130100.0	130100.0	130100.0	130100.0
TOTAL COSTS	60200.0	1440500.0	2685800.0	3180700.0	1925400.0	1526900.0	130100.0	203100.0	212800.0	232500.0	130100.0	130100.0	130100.0
BENEFITS													
TOTAL NET VALUE							462170.9	974133.2	1586617.3	2208474.4	2968016.9	3266561.3	3269874.1
NET BENEFITS													
NET INCREMENTAL BENEFIT	-60200.0	-1440500.0	-2685800.0	-3180700.0	-1925400.0	-1526900.0	332070.9	771033.2	1373817.3	1975924.4	2837916.9	3136461.3	3139774.1

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Internal Rates of Return of Net Streams

N. TOTAL78 15.00%

SWITCHING VALUES AT 13.5%

STREAM	APPRAISAL VALUE	SWITCHING VALUE	PERCENTAGE CHANGE
B. NETVAL78	8,380,472.17	7,192,117.06	-14.18%
C. TOT78	7,192,117.06	8,380,472.17	16.52%

NPV @ 13.5% = 1,188,355.1
 IRR = 15%
 CERR = 15.7%

YUGOSLAVIA
PROJECT COMPLETION REPORT
MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)

Deflators, Inflaters, and Exchange Rate

<u>Year</u>	<u>Domestic Inflation</u> %	<u>International Inflation</u> %	<u>Exchange Rate</u> (Din/\$)	<u>Adjusted Exchange Rate</u> /1
1984	n.a.	103.5 /2	125.00	120.80
1983	100.0	100.0	94.02	94.02
1982	64.5	103.3	52.15	53.87
1981	50.4	105.4	35.56	57.48
1980	35.2	110.5	24.91	27.52
1979	28.4	102.2	19.10	19.52
1978	24.9	91.6	18.61	17.05

/1 Adjusted to reflect international inflation.

/2 Estimated.

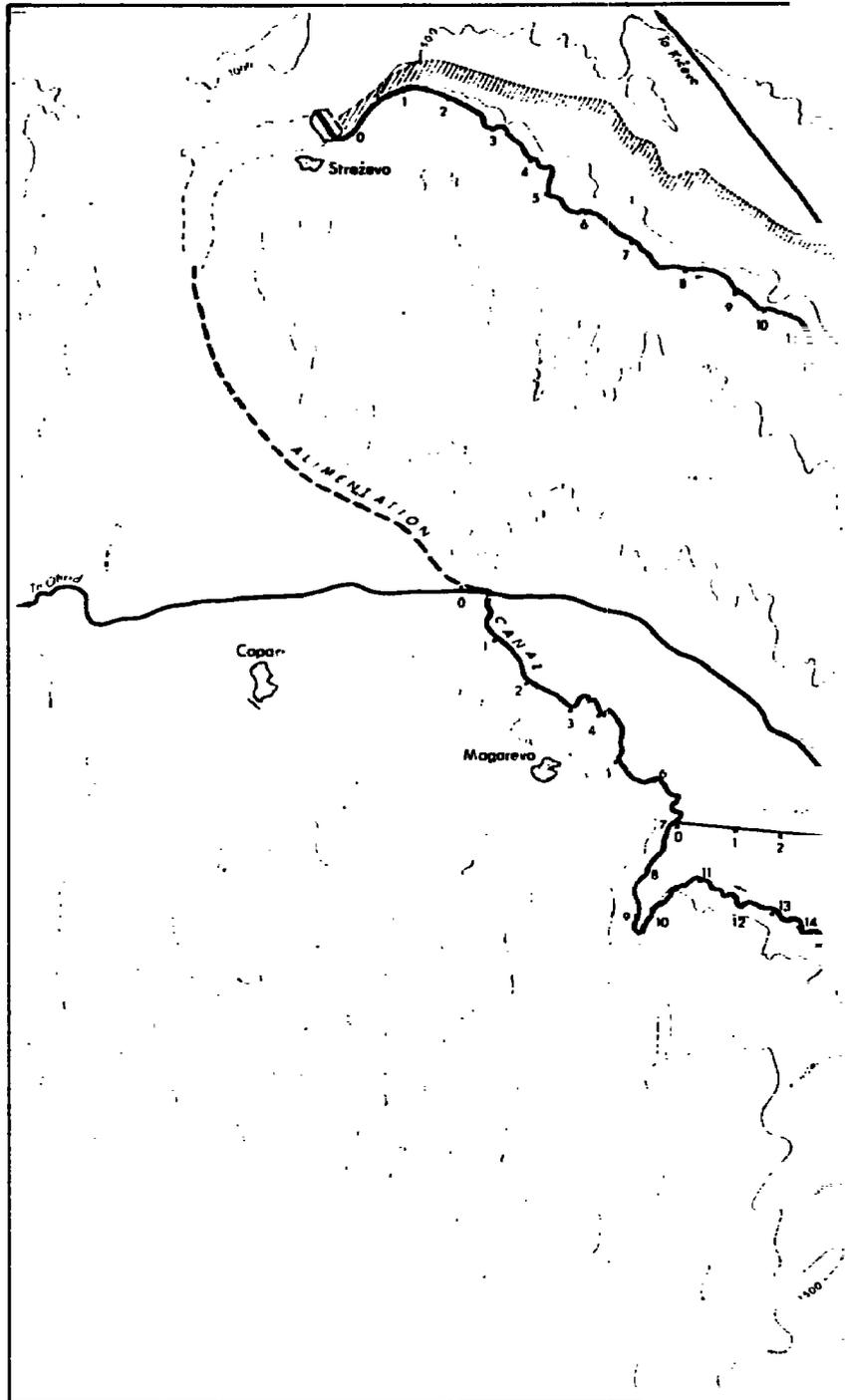
YUGOSLAVIA
PROJECT COMPLETION REPORT
MACEDONIA STREZEVO IRRIGATION PROJECT
(LOAN 1616-YU)

Estimated Cost Recovery Charges to Cover Investment and O&M

	<u>Water Requirement</u> <u>Per Hectare</u> (units)	<u>Investment /2</u> <u>Cost</u> <u>Per Hectare</u> (units)	<u>O&M Cost /2</u> <u>Per Hectare</u>	<u>Total</u> <u>Water Cost</u> <u>Per Hectare</u> Dinars	<u>30% of</u> <u>Net Income</u> <u>Per Hectare</u>
Wheat	324	778	454	1,232	12,644
Barley	324	778	454	1,232	10,838
Maize	602	1,445	843	2,288	15,365
Soybean	462	1,109	647	1,756	18,445
Sunflower	502	1,205	703	1,908	20,876
Sugar beet	638	1,531	893	2,424	42,137
Tobacco	352	845	493	1,338	94,800
Vegetables	613	1,471	853	2,324	147,183
Alfalfa	648	1,555	907	2,462	64,938
Fruits	543	1,303	760	2,063	56,369
Maize Silage and Fodder	332	1,797	465	1,262	12,078
Pasture	-	-	-	-	-

/1 Based cost is about Dinar 2.4/m³ per annum, calculated on the basis of 50 years project life, about about 67 Mm³ net irrigation requirement.

/2 Based on about Dinar 1.4/m³ per annum.



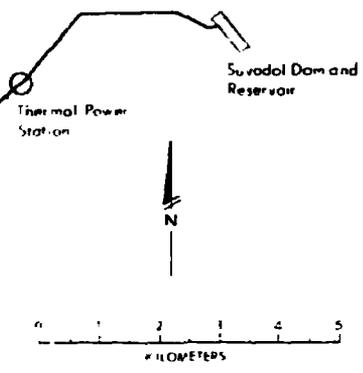
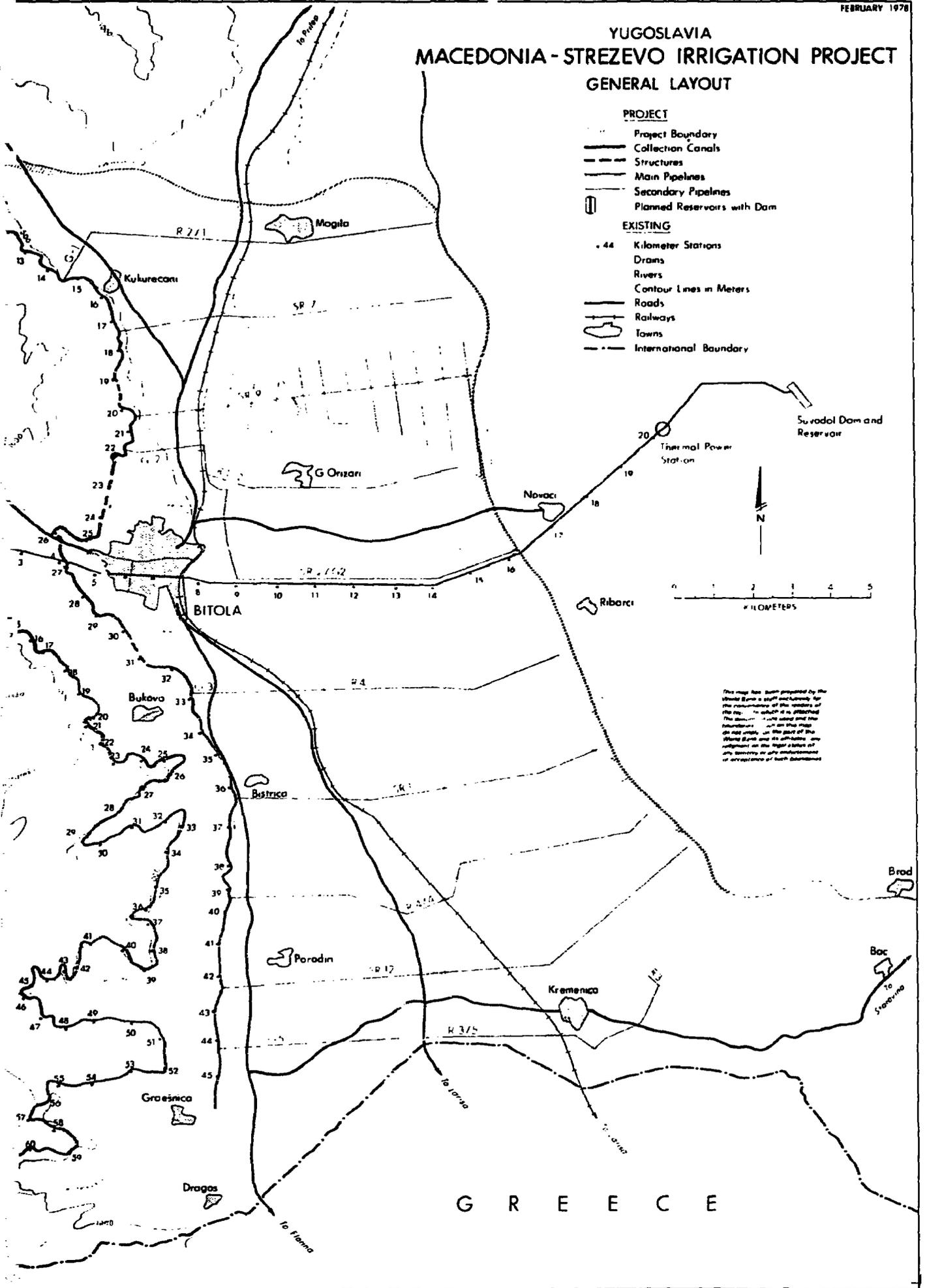
YUGOSLAVIA MACEDONIA - STREZEVO IRRIGATION PROJECT GENERAL LAYOUT

PROJECT

- Project Boundary
- Collection Canals
- Structures
- Main Pipelines
- Secondary Pipelines
- Planned Reservoirs with Dam

EXISTING

- 44 Kilometer Stations
- Drains
- Rivers
- Contour Lines in Meters
- Roads
- Railways
- Towns
- International Boundary



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