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COMPARISON OF THE BASIC PROCEDURES FOR MWP DESIGN, EVALUATION: OPERATION, AND FINANCING WITH WORLD BANK PROCEDURES:

Two Case Studies

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Section I: Purposes of the Case Studies

The ultimate objective of this study project is the development of a proven handbook of procedures for the identification, design, and evaluation of multiple-purpose water projects (MWP's) for use in the field and within the Bank. The first stage of the study project was a statement of the theory underlying the socially optimal design, operation, and financing of MWP's. The second stage was to translate these theoretical principles plus practical insights gained through water planning around the world into "an Action Plan" for project identification, design, evaluation, financing, operation, and ex-post monitoring. This Action Plan consists of an idealized sequence of Basic Procedures to be taken within a river basin setting, starting with the preliminary identification of a water-related problem or opportunity and ending with a monitoring program for project control and feedback.

These two stages are found in the paper "On the Theory and Practice of Multiple-Purpose Water Project Identification, Design, Evaluation, Financing, and Operation: Derivation of Basic Procedures" (Howe, Dec. 1980).

There are several objectives in proceeding to case studies based on published secondary sources:

1. To determine the extent to which relatively standard and adequate procedures for project evaluation are
being followed by the Bank and cooperating agencies in the host countries. This objective can be attained by the comparison of available Bank project reports with the Basic Procedures of the Action Plan. Two such case studies are provided in this report.

2. To estimate the extent to which the Basic Procedures of the Action Plan can be carried out under actual "field" conditions. This can partly be accomplished through case studies based on secondary sources, but the ultimate test must be in new field studies, carried out in close and extended cooperation with host countries.

3. To compare the differences in project identification, design, and selection that would result from the application of the Basic Procedures of the Action Plan in contrast to continued application of current Bank procedures. This objective appears impossible to attain from published secondary sources because of the paucity of data on host country water planning procedures, costs and benefits of alternative designs, and social weights to be assigned different benefit and cost categories.

4. Utilizing the partial achievement of objectives (1) to (3) above to modify the Basic Procedures so they are operational and capable of being presented in handbook form, with illustrations, for use in the field and in the Bank.
As noted above, the extent to which these case study objectives can be attained is limited by the very incomplete information provided by the typical project report. First, few real-world planning programs incorporate all the steps of the idealized Action Plan. Thus, when the Bank's attention is first called to a project idea, it is unlikely that a wider framework of project alternatives has been developed. Even marginal cost and benefit data for changes from the initial project design are unlikely to be available.

Secondly, much of the information regarding the project identification and design procedures actually used is typically not recorded in forms conducive to inclusion in formal project reports. "Trial and error" design changes representing alternative project sizes and tacit operating rules such as "maximize the utilization of the physical potential of the site" are frequently not recorded at all.

These features of existing planning procedures and resultant project reports naturally mean there will be little correlation between the Basic Procedures of the Action Plan and the actions recorded in the reports, at least if the Basic Procedures are interpreted literally as a temporal sequence of identifiable steps. The comparison most likely will have to take the form of evaluating the spirit with which project evaluations appear to have been carried out and the major points of agreement or disagreement. Indeed, a change in attitude within a planning agency from a narrow agency-special
interest purview to a national purview may result in much higher social payoffs than adoption of strict planning procedures or refinements in economic or engineering calculations.

The motivation of a broader vision of the planning process depends heavily on the institutional setting. Only if this legal-agency-rewards structure is designed correctly will (a) broad river basin interdependencies be taken into account, (b) an imaginative range of project alternatives be considered, (c) a meaningful continuing dialog be set up between the technical planning team and decision makers, etc. Thus, evaluation of the institutional structure should also comprise part of a case study.

II. Procedures for the Case Studies

The question remains how best to utilize available case study materials both to test the applicability of the procedures derived in the initial paper and to critique existing Bank procedures. Two case studies were selected from a large number of available project reports: the Metohija Multipurpose Project in Yugoslavia (World Bank, December 23, 1976) and the Sido-Cheho-Al Massira Hydro Project in Morocco (World Bank, June 11, 1976.) These cases were selected for three reasons: (1) they were multipurpose projects; (2) the data presented on the projects appeared to be more extensive than in other project reports; and (3) these projects had, in addition to the usual economic objectives, clearly stated social goals.
The procedure selected for presentations of the case studies consists of a description of the project and its physical setting, followed by observations on the project identification, design, evaluation, and financing procedures arranged according to the major steps of the Basic Procedures of the Action Plan. That is, we have arranged the materials as follows for each case study:

1. Project Description and Setting

2. Major Steps in Project Evaluation
   a. preliminary screening of water problems and opportunities
   b. preliminary identification, design, and evaluation of project alternatives
   c. detailed design and evaluation of near-term projects (i.e. the project in question)
   d. programming project operation and ex-post monitoring and feedback

Since the project procedures actually followed in the projects reviewed were nowhere as detailed or as systematic as the Basic Procedures of the Action Plan, we have utilized only the major steps of those Procedures as an organizing principle.

A. The Metohija Multipurpose Project

1. Project Description and Setting.

Regional income disparities in Yugoslavia are wide, with
most of the post-war growth occurring in the north while the south has per capita incomes of only about one-third the national average. The Federal Government has given high priority to raising incomes in the south. The Metohija Project is in Kosovo Province where the peasant agricultural sector has largely been by-passed, suffering from severe over-population. The Project would contribute to the national objectives of better income distribution, increased agricultural production, and improved peasant living conditions.

The proposed project would provide irrigation to a net area of about 10,250 hectares, of which 68% would be farmed by 2200 private small farmers, the remaining lands being farmed by large social cooperative farms. The project would also provide potable water for 65,000 regional inhabitants and for industry in the project area.

Total project cost was estimated in 1976 to be US $ 110.3 million, with a total foreign exchange component of US $ 54 million proposed for World Bank financing.

2. **Major Steps in Project Evaluation.**

a. **Preliminary Screening of Water Problems and Opportunities.** It seems quite clear from the project report, that the Project has emerged from a continuing national and regional review of water-related problems and development opportunities. The Project would be the first phase of a two-phase development, Hydro System Radenic, which is a part of the master plan for
water development in the Metohija Region of Kosovo Province. The master plan calls for ultimate irrigation service to about 93,000 ha, the promotion of industrial growth in the region, and health standard improvement through potable water supply.

b. Preliminary Identification, Design, and Evaluation of Project Alternatives. Kosovo Province has historically been agricultural and is over-populated relative to existing agricultural productivity. The rainfall is low and erratic, reducing agricultural productivity and increasing risks. It is natural, therefore, to look first at the agricultural sector for development prospects.

However, there appears to have been little consideration of alternative ways of achieving the stated economic and social objectives. Given the extremely high cost for irrigation of US $5250 per hectare, both alternative agricultural programs and broader non-agricultural programs should have been evaluated.

For example, a smaller project that would omit the 3000 ha that require drainage should have been considered because the drainage costs are nearly as high as the water service costs. The possibility of a reservoir at lower elevation that would serve only the first stage of the project should have been more thoroughly evaluated.

Regarding non-agricultural alternatives, the possibility of increased groundwater use for potable supplies was mentioned but was determined to be less economical than the surface water alternative. Alternative programs for assisting regional
out-migration and labor retraining may have a major role to plan in a region like Kosovo, but such alternatives were not mentioned.

The use of irrigation at US $5250 per hectare and the provision of potable water at approximately US $1 per thousand gallons (very high by any standards) as vehicles for regional subsidy should have been questioned more carefully.

c. **Detailed Design and Evaluation of Near-Term Alternatives.** For current purposes, near-term alternatives refers to Metohija I, although a more complete planning process would be dealing with several projects simultaneously, including two or more final candidate alternatives for each particular project. The various steps of the detailed design and evaluation of Metohija I are discussed below.

(i) **Design of Project.** Several important phases of the design process are discussed in the project report, indicating a serious if not explicit attempt to optimize the design. For example, land preparation and harvesting in the project would be mechanized, in spite of a labor surplus in the region. The explicit reason for this was to insure that double-cropping could be undertaken. Fertilizer doses appear to have been carefully selected, although the basis of choice may not have been economic.

Supplemental inputs and complementary services have correctly been included in the project definition and planned along with the direct water input. Included among these vital services are a program to instruct peasant farmers in new cropping
technologies, a credit program to facilitate input purchases, and marketing plans for new crops and to provide necessary marketing support services.

(ii) Measurement of Project Benefits. Direct project benefits in agriculture and from potable water supply are used in this evaluation. It can be argued that, in regions that suffer from chronic underemployment of human and other resources, indirect benefits of a genuine economic efficiency type will be induced by the project and should be counted. These indirect benefits take the form of incremental incomes generated outside the agricultural sector in both input-supplying and output-servicing sectors. Consideration should be given to this issue.

Direct agricultural benefits have been counted as incremental farm incomes, with shadow price adjustments being made to both output and input prices. In particular, the shadow prices of additional family labor and family-supplied inputs were valued at zero, reflecting the extensive unused labor and other farm resources. Another way of saying this is that the additional incomes imputed to family labor and other inputs were counted as project benefits. These are quite appropriate practices.

Output prices in Yugoslavia are very close to world prices, with the exception of modest price premia given on maize, wheat, sunflower, and sugar beets. Quite correctly, outputs were evaluated at world prices for project evaluation, but subsidies were included in "ability-to-pay" calculations for the farmers.
Regarding input prices, an elaborate system of shadow pricing factors for different input sets was developed by the Bank team evaluating the project (Annex 15, Table 1). These appear to be reasonable in magnitude and include the following interesting examples:

- **domestic investment goods** 0.91
- **construction, domestic** 0.80
- **operation and maintenance** 0.93
- **fertilizers (imported)** 1.12
- **value of public income** 1.65
- **wage rates for unskilled rural labor** 0.42 - 0.80
- **wage rates for skilled labor** 0.93

The direct benefits from potable water were counted as the cost of the next best alternative supply for the various sub-areas. In general, the alternative was ground water development that was found to be uniformly more costly than project water.

(iii) The Demand for Water and Project Pricing. The demands for irrigation and potable water were projected on a "requirements" basis, i.e. on the basis of agronomic information and some standards derived from town use patterns respectively. No attempt was made to relate these projections to the price charged for water. Farmers typically pay a land tax and will be expected to pay a water price sufficient to cover operating and maintenance costs, although actual tax and water price levels were based on an "ability-to-pay" computation. Like
the constraint (equation 2, Howe 1980) of the theoretical model, the Government and the Bank did not want to extract all of the farm "rent" created by the project.

It should be noted at this point that Yugoslavia has set administrative priorities for water use, assertedly (according to the project report) to maximize water generated benefits. The order of priorities is (1) potable uses, (2) industrial uses, (3) irrigation uses, and (4) hydroelectric power. In general, the setting of a priori priorities that permit one class of uses to override others makes no economic sense and frequently stand in the way of economically rational water allocation.

(iv) Treatment of Labor Costs. As noted earlier, family labor costs were counted at zero, including returns to entrepreneurship and for risk, in calculating project benefits. While the family labor opportunity costs probably are zero, there is a real question about returns to entrepreneurship and risk. Entrepreneurship and a willingness to bear risk of new crops and technologies are scarce factors in all societies and they do have, under almost all circumstances, positive opportunity costs.

The Bank has followed the old U.S. custom of deducting costs imputed to family labor, entrepreneurship, and risk-bearing from gross incomes in deriving "ability to pay." This leads to very low water charges and to the puzzling result that the overall project can show an 11.1% internal rate of return,
while overall cost recovery from beneficiaries amounts only to 30% in present value terms. These practices must be considered carefully and made more consistent with one-another.

(v) The Internal Rate of Return and the Rate of Discount. While the internal rate of return may provide the financial community with a summary measure of prospective project success that it can understand, it in no way substitutes for or avoids the problem of calculating the opportunity cost of capital. When the internal rate is used to accept or reject a project, or to help determine the allocation of expenditures between the public and private sectors, an implicit opportunity cost of capital is always being used. Is 11.1% an acceptable internal rate? It depends on the objectives being sought and on the opportunity cost of capital. The use of sensitivity analysis in calculating alternative rates as done in the project report is an excellent practice.

(vi) Repayment Policy and Cost Sharing. This topic was largely covered above in items (iii) and (iv).

(vii) Social Aspects of Project Analysis. One of the major social issues is peasant adaptation to the new practices proposed in the project. A major issue--not dealt with sufficiently--is the possibility of land consolidation. The present fractionalized holdings are small and scattered. These conditions are quite unsuitable for efficient irrigation. Since previous attempts at land consolidation have met with resistance, the project design has assumed only very minor
boundary adjustments. More substantive revisions probably would lead to much higher benefits.

(viii) Environmental Impact Analysis. The major impact here is expected to be in the form of long-term health improvements. The project report says nothing about fish life, wildlife, increasing salinity in the rivers, and possible effects on groundwater systems.

d. Programming Project Operation, Ex-Post Monitoring, and Feedback. All functions from project design to construction, operation, and monitoring are placed with one organization. While this arrangement has disadvantages outlined in the theory paper, the responsibility is clearly placed (with VOM.) This contrasts with arrangements found elsewhere (e.g. Sidi Cheho), that leave elements of operation, maintenance, and the provision of complementary inputs (e.g. roads, health centers, etc.) on quite uncertain ground.

Regarding monitoring, VOM has agreed to carry out a base survey of all agricultural and population conditions. Thereafter, it will furnish the Bank periodic reports on programs toward project goals. The data to be provided in these reviews are quite detailed and, if estimated with reasonable accuracy, should provide a sensitive feedback system.
References

