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Water Resources Planning in the United States and Some Lessons for Canada in U.S. Experience

by

Irving K. Fox

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Summary of the IWD Seminar on Water Resources Planning Policy

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WATER RESOURCES PLANNING IN THE UNITED STATES AND SOME LESSONS FOR CANADA IN U.S. EXPERIENCE

by

Irving K. Fox

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I. Background

Water resources planning and management has attracted an unusual amount of attention in North America for well over a century. Initially this attention was no doubt attributable to the importance of waterways in the transportation system of the continent. Later flood problems, the potentials of irrigation development and the recognition that water power could be a major source of energy, maintained and expanded the interest in water development. By the turn of the 20th century it had become recognized that hydrologic units - expecially the river basins - must be viewed as systems and managed in light of the interrelationships within each system if society was to profit fully from the continent's water resources potentials. Since that time both the United States and Canada (as well as many other countries) have been engaged in a continuing effort to design institutional arrangements and planning practices especially suited to the physical and economic characteristics of water resources.

As regional planning attracted the attention of conservationists in the 1920's and 1930's, the conception evolved that a "best" plan for a region could be technically determined. This was the message of Benton MacKaye in his book The New Exploration published in the 1920's and his view guided thinking about water resources planning and management into the post-World War II period, especially in the United States. This concept combined with a congressional enactment in the U.S. which established the policy that water projects would be eligible for federal support "if the benefits to whomsoever they accrue shall exceed the costs" led to benefit-cost analysis as the technique for determining what constitutes a "best" plan. Through the 1950's and 1960's public agencies and research groups devoted a great deal of attention to the refinement of the methodologies for benefit-cost analysis. While the lead to apply techniques of benefit cost-analysis to

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water projects was taken in the United States where water development was proceeding at a tremendous rate, Canada utilized similar techniques as its own water development programs expanded.

Paralleling this evolution of evaluation practices, the river basin became increasingly recognized as the physical unit for water resources planning and management in the United States. This concept was advanced by the evident effectivenss of the Tennessee Valley Authority and led in turn to the undertaking of a substantial number of planning efforts for major river basin regions in the United States. By 1960 it was widely assumed in the United States that water resources development and management plans should be developed and continually up-dated for each major river basin and this concept was endorsed by the Kennedy administration when it came to power in 1961.

Yet, no sooner had the concepts of benefit-cost analysis and multiple purpose river basin development become well established than conditions began to change. During the 1960's the enchantment with benefit-cost analysis in terms of national economic efficiency diminished rapidly and eventually was replaced by the concept of multi-objective planning. This change was accompanied by a decline in the confidence that "best" plans can be technically determined and by a growing demand for greater public participation in decision-making. At the same time it is evident that the objective of the Kennedy administration to develop and maintain plans for each of the major river basins was not being realized.

Water resource development in Canada has followed a somewhat parallel course to that of the United States. With its smaller population and less pressure upon its water resources, there has been less emphasis upon developing plans for each and every major river basin. Yet, it has undertaken a number of river basin planning endeavours and such an approach was legitimatized in the Canada Water Act. The decline in emphasis upon benefit-cost analysis also took place in Canada as basin planning proceeded but without a national effort to replace it as has been the case in the U.S. In the Okanagan Basin study, for example, three objectives were considered.

Today both countries are considering ways of rationalizing their water resources planning and evaluation practice in light of experience and the

evolution of thinking about such matters over the past decade. The U.S. has taken formal action to initiate a major change in its planning and evaluation practices after devoting a great deal of time and energy to arrive at a new approach. It is only logical that Canada should seek to assess the relevance of what the U.S. government agencies have decided to do to the water planning and evaluation problems Canada faces.

II. General Purpose and Specific Objectives

The general purpose of this report is to assess water resources planning and evaluation practices in the United States and identify what Canada can learn from U.S. experience that is of value in designing Canadian planning procedures and evaluation practices.

The specific objectives of this report are:

1. To describe briefly water resources planning practices in the United States with particular reference to the way they have evolved over the last ten years.

2. To describe briefly current water resources evaluation practices of U.S. federal agencies.

3. To identify the strengths and weaknesses in U.S. water resources planning and evaluation practices.

4. To analyse the foregoing information for the purpose of indicating its implications for the design of effective planning arrangements and useful evaluation practices by the Canadian federal government.

III. Water Resources Planning and Evaluation Practices in the United States

A. A Comparison of U.S. and Canadian Institutions

In assessing U.S. experience it is important to keep in mind the similarities and differences between the Canadian and U.S. institutional environments. The major similarities lie in the commitment of both countries to what we call democratic processes and in the values of the two societies which stem from comparable standards of living, a common language and a great deal of inter-communicaiton. Governmental institutions differ significantly. These relate to differences in the role of the provinces in resource management compared with the states in the United States, to differences between a presidential-congressional system and a parliamentary system, and to differences in the way in which major water resources projects are funded. While this is not the place to elaborate on these differences,

a few observations with regard to them are in order.

1. The role of the states in comparison with the provinces

Since the canal development era, in the mid-nineteenth century the state level of government in the United States has played a very small part in water resources development. Except for the allocation of water supplies, the regulation of pollution and small developments, particularly for municipal and industrial uses, the federal government has dominated water resources development. This does not mean that state governments have not wielded influence. The political support of state governments for federal programs is sought, but not as a party that shares in the decision but more as one of the major interest groups concerned with what is done. There are exceptions to this generalization but these are few and do not alter the basic practice.* In Canada decisions with regard to water development are more nearly shared by the federal and provincial levels of government. Thus decisions are usually the consequence of negotiations between the two levels rather than the province acting to influence decisions made by federal authorities. This difference has important implications for the way water resources planning is conducted in the two countries.

2. The Presidential-Congressional System in Comparison with the Parliamentary System

Under a parliamentary system the cabinet, which is the executive, is supreme and career civil servants have a single loyalty namely to their minister and through the minister to the cabinet. The hierarchy is clear and adherence to the hierarchy is well disciplined.

Under the presidential-congressional system the lines of authority and loyalty are much less clear. In theory bureau heads are accountable to individual cabinet members who in turn are accountable

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* California, for example. has undertaken a major water development programme.

to the president. In practice, bureau heads have dual lines of authority and loyalty. In addition to being accountable to a cabinet member, a bureau head is also in practice accountable to Congress which controls his appropriation and the authorization for his program. Thus the astute bureau head seeks to remain in the good graces of the executive while at the same time he is exercising influence upon the Congress with regard to the budget and program he would like to have.

The role of the Congress has been important in one other respect. The Congressional system, with the legislative body having a direct voice in appropriations and program authorizations, has led to a trading of support among congressmen for water projects. The astute bureau head has been able to capitalize upon such "log rolling" to aggrandize his own program.

3. The Funding of Water Resources Projects in the U.S.

The motivation to engage in "log rolling" has been accentuated by the way the funding of water resources projects is handled. Without going into the details major projects including urban sewage treatment works are largely funded by the federal treasury with little repayment from project revenues except in the case of hydroelectric power and municipal and industrial water supply projects. This has provided a powerful motivation for Congressmen to seek the authorization of federal projects in their own districts which in turn has tended to strengthen the relationship between Congressmen and the heads of water resources agencies.

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The foregoing factors have led to a strong feeling that procedures must be developed for planning and evaluating water resources projects in the United States which would obstruct the tendency for water resources programs to be a "pork barrel". The assumption has been that if planning and evaluating practices could be precisely enough defined, only those projects which were clearly in the public interest would be brought forward

for Congressional consideration. It is evident that under the parliamentary system and the Canadian federal structure the motivations to plan and construct projects that are largely of local significance are not as great as under the U.S. institutional structure.

B. Water Resources Planning Practices in the United States

Water resources planning in the United States is conducted in a wide variety of ways by a range of private organizations and public agencies. No effort will be made to characterize all aspects of such planning since our primary concern is with the planning practices of U.S. federal agencies. Before examining how planning is undertaken by U.S. federal agencies, it is, however, worthwhile to pause and note that municipalities may plan and develop municipal and industrial water supplies, that irrigation districts organized under state law plan and develop irrigation systems, and that private organizations and non-federal public agencies plan and develop hydroelectric power facilities. Yet, the federal government maintains a control over such practices because developments on navigable waterways must be licensed by the federal government. Power developments for example, must be licensed by the Federal Power Commission and each licensed facility must be "best adapted" to comprehensive development of the river basin in which it is located. While planning and development under non-federal auspices has been large, the practices examined will be limited to those of the federal developmental agencies.

1. Organization Structure

The major U.S. water resources planning and development agencies are the Corps of Engineers of the U.S. Army, the Bureau of Reclamation of the Department of the Interior, the Soil Conservation Service of the Department of Agriculture, the Tennessee Valley Authority and the Environmental Protection Administration.

The Corps of Engineers became involved in water resources activities in 1823 to improve the navigability of rivers. As water development has evolved it has become concerned with virtually all aspects of water resources planning and management. It has the largest program of the federal agencies, with an annual budget of over two billion dollars.

The Bureau of Reclamation was established in 1902, primarily for

the purpose of developing water supplies to irrigate arid lands. It too has become a multipurpose water development agency but its activities have been largely restricted to the 17 western continental states and Alaska. Its budget is about 750 million dollars each year.

The Soil Conservation Service was established in the 1930's but its current water resources activities did not really get underway until the 1950's. It plans programs for small watersheds - usually less than 600 square miles. While its projects are presumably multi-purpose most of the benefits attributable to them have been for flood control. Instead of building projects directly, it assists local jurisdictions organized under state law. Its budget is under 200 million dollars a year.

The responsibilities of the Environmental Protection Administration are limited to the control of water pollution. Under current legislation this agency sponsors the development of detailed water pollution control plans through a coordinated effort of local, state, and federal water agencies. An enormous amount of money has been made available for this purpose because of the aim of the pollution control legislation to eliminate all discharges to water bodies over the next couple of decades.

The Tennessee Valley Authority is limited in its jurisdiction to the Tennessee River system. It is a special case and need not concern us in this analysis.

The activities of the foregoing agencies are coordinated by the U.S. Water Resources Council. This Council is composed of the heads of departments having important responsibilities in the water resources field. While not required by law, the Council has always been chaired by the Secretary of the Interior. The Council has a full time staff for carrying out its coordinating responsibilities. In a number of the major river basin regions it has established river basin commissions composed of representatives of the federal water agencies and representatives of the states. The Commissions are chaired by representatives of the Council. In general, the major responsibility of a Commission is to coordinate water resources planning within the river basin with which it is concerned.

2. Types of Planning Activities

The water resources planning activities of U.S. federal agencies generally falls into five categories. These merit separate attention.

a. The Periodic National Assessment

In the early 1960's it was concluded that in view of the pressures upon the water resources of the United States an assessment of the supply-demand outlook by regions was needed. The first such assessment was made for a U.S. Senate Select Committee on National Water Resources in 1961. In 1968 the Water Resources Council completed its first national assessment and the Council representative, Mr. Gary Cobb, indicated in January, 1976 that the Council proposed to complete another assessment in the near future. The Council envisages the completion of such national assessments at fairly regular intervals.

The assessment completed in 1968 was not made in accord with a carefully prescribed methodology. The impression given by Mr. Cobb was that in the next assessment, more exact procedures would be followed. He estimates that the national assessment currently underway will cost about $6.75 million.

Presumably the national assessment is intended to provide guidance to the federal government in deciding upon problem areas that demand attention. Also, it is viewed as providing one basis for understanding the significance of a particular project proposal.

b. Coordinated Comprehensive Joint Plans for Major River Basins

The U.S. has undertaken a number of relatively detailed comprehensive river basin planning efforts which have sought to integrate the investigation and planning activities of the federal water resources agencies and the state governments. Four of these antedated the establishment of the U.S. Water Resources Council (Arkansas-White-Red, New York-New England, Southeast, and Texas) but with the establishment of the Council it was assumed that comprehensive plans would be developed for all major river basins. A number were launched and several have been completed or are approaching completion including plans for the Ohio River Basin, the Great Lakes and the Pacific Northwest.

In our conversation with Mr. Gary Cobb we learned that these investigations are regarded as too costly when costs are compared with what is gained from them. Thus it appears that similar investigations in other basins will not be launched. Instead emphasis will be placed upon the tributary basin plans and an effort to get each state to develop a state plan for water resources which will be fully coordinated with the federal agencies.

c. Tributary Basin Plans

The term "tributary" is a bit misleading since such plans may deal with any portion of a major river basin which can be conveniently treated as a unit, such as a section of the main stem of a river.

The plans for such sub-divisions may be characterized as of a reconnaissance nature since they are based entirely upon readily available data. Costs run in the neighborhood of $1,000,000 each. The purpose of this type of planning activity evidently is to provide a basis for proceeding with detailed planning of individual projects on an intelligent basis. They permit the sub-division of basin problems and opportunities into suitable projects for detailed study as well as indicating the priorities that should be observed. While such plans are evaluated in accord with the "Principles and Standards" issued by the Water Resources Council no decisions are required except with regard to the detailed investigations which are to follow.

d. Project Plans

This terminology applies only to projects of the Corps of Engineers, the Bureau of Reclamation and the Soil Conservation Service. It does not apply to the activities of the Environmental Protection Administration.

This type of planning is designed to lead to the "authorization" by the Congress of a project for development and eventual appropriation of funds to implement it. Thus, these studies are in sufficient detail to determine the "feasibility" of a project. While "authorization" procedures vary somewhat from agency to agency the important point is that once a project is authorized funds can be appropriated for its implementation and when such funds become available design studies can be undertaken. It appears that in the future the three water development agencies will concentrate their planning on this type of activity.

e. Planning Under Section 208 of the Federal Water Pollution Control Act

The foregoing legislation contemplated a massive effort to control water pollution from all sources with the aid of enormous federal subsidies to local jurisdictions for the construction of sewage treatment facilities.

In order to coordinate pollution control endeavours it was decided that each state should have a pollution control plan and that a coordinated state-federal interagency effort should be undertaken for tributaries and reaches where waste discharges were highly inter-related. Federal funds have been provided to finance this planning activity. It is noteworthy that to date such planning has not been integrated into the planning structure of the U.S. Water Resources Council even though the Administrator of EPA is a member of the Council.

f. In Summary

Several significant conclusions have been reached by U.S. government representatives with regard to water resources planning and arrangements as the result of experience over the past 15 years. These conclusions may be summarized as follows:

1. The so-called national assessment of the water supply and demand outlook by major regions is of value. Evidently it is the intention of the U.S. Water Resources Council to try to improve the methodologies for making such assessments and to produce assessment reports at periodic intervals (5 to 10 years).
2. The development of comprehensive plans for the major rivers basins (The Missouri, the Columbia, the Ohio, etc.) on the basis of relatively detailed studies is now viewed as an expensive luxury. At one time it was assumed that a detailed comprehensive plan should be prepared for each major river basin and then updated periodically. The conclusion appears to have been reached that these are notworth the cost.
3. It is of value to sketch plans for major tributaries (such as the Yellowstone tributary of the Missouri River) so as to provide a basis for selecting projects for detailed investigation. These sketch plans for major tributaries are to be based largely upon readily available data and thus would not ential additional field investigations. Their purpose is to provide an over all assessment of development potentials, the demand outlook, and alternative projects that might merit detailed investigation.

4. The major emphasis in planning should be upon the individual project, on the assumption that the national assessment and the tributary basin sketch plan provide the overall context within which to view the project.

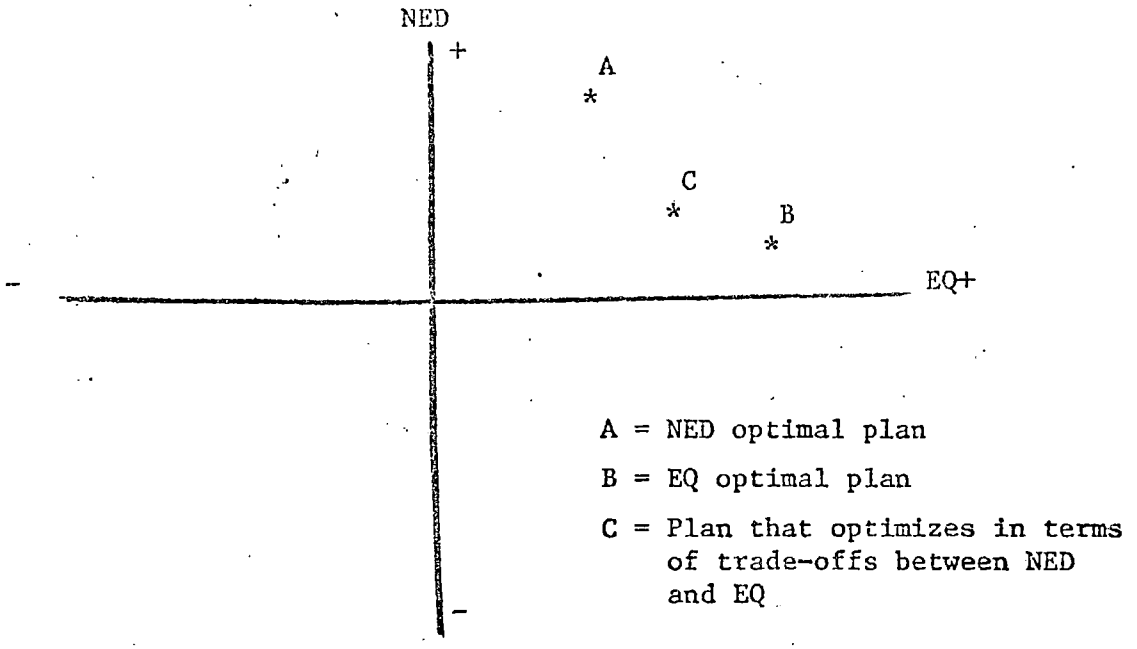
It is noteworthy that water pollution control planning is proceeding outside of the framework for planning so far developed by the U.S. Water Resources Council. The amounts available for pollution control planning are several times as great as for all other water resources planning. The Council is endeavouring to get water pollution control planning into its total framework but this has not been accomplished yet.

C. Evaluation Practices of U.S. Water Resources Agencies

Senate Document 97, published in 1962, announced new planning and evaluation practices for water resources projects to be followed by the Kennedy Administration. This statement which interpreted benefits and costs more broadly that previous pronouncements was the first official break with traditional benefit-cost analysis in terms of a national economic development criterion. This break led to what is now referred to as multi-objective planning. After several years of negotiation and study, including several case studies made by university based research teams, the so-called "Principles and Standards" were promulgated in September 1973. Since project investigations launched prior to September 1973 were not required to be planned in accord with the new procedures, no planning reports have been completed which accord with the "Principles and Standards".

In the initial version of the "Principles and Standards" planning was to be undertaken in terms of four objectives but these were eventually reduced to two, namely national economic development (NED) and Environmental Quality (EQ). Evaluations, however, are to be made in terms of four accounts; national economic development, environmental quality, social well being, and regional development.

The procedure involves the identification of two alternatives at the outset, one that optimizes in terms of NED the other that optimizes in terms of EQ. Then trade-offs are made between these two alternatives to arrive at the optimal plan (See Figure I).



There are several significant points that should be kept in mind with regard to these evaluation practices. First, plans recommended must meet criteria of (1) acceptability, (2) effectiveness, (3) completeness, and (4) efficiency. It is not entirely clear what these terms mean. Second, views seem to differ as to how the NED alternative is defined. Some seem to view it as the plan that maximizes net benefits in terms of NED. The operating agencies view it as one that favours NED and that meets or approaches the four criteria listed above. Third, it is not clear how an optimal EQ plan is defined. This is a recognized problem which they expect to deal with through public participation procedures. Fourth, it is evident that the optimal plan in terms of the trade-offs between EQ and NED cannot be technically determined. Therefore, it appears that these trade-offs will be determined by the planning agency in consultation with those who take part in the public participation process.

It is not within the scope of this report to describe how data for each of the four accounts are generated.

The practices sketched above suggest that the U.S. government has reached the following important conclusions with regard to the evaluation practices to be applied in planning water resources projects:

1. Water resources projects cannot be planned and evaluated on the basis of a single objective function such as national

economic development.

2. Decision-makers should be presented with a range of alternatives, (usually at least three) rather than a single plan to consider. The planning agency may recommend one alternative but evaluative data would be presented on all alternatives.
3. The identification of the relevant alternatives should involve consideration of the preferences expressed by members of the public.
4. Evaluative data should cover a broad range of project effects. Under the procedures prescribed by the U.S. Water Resources Council such data are presented in four accounts, namely (1) the natural economic development account (2) the environmental quality account (3) the regional development account and (4) the social well being account.

IV. A Critique of U.S. Water Resources Planning Procedures and Evaluation Practices

The major problem area confronting the U.S. water resources agencies revolves around the selection of the relevant alternatives for evaluation. While it has been agreed that planning should focus upon two objectives - national economic development (NED) and environmental quality (EQ) - it is not entirely clear how these objectives guide the planning process. Questions centre upon the following points.

1. It is generally agreed that one alternative presented and evaluated should favour the NED objective. However, it is not clear whether this alternative should maximize net benefits in terms of NED. It appears that the operating agencies view the NED alternatives as being a "reasonably acceptable" one and not necessarily one that maximizes net national economic benefits. On the other hand, Mr. Dickey of the Office of the Deputy Assistant Secretary of the Army for Civil Works insisted that the NED alternative should maximize net benefits. His argument was that this is necessary in order to understand what the trade-offs are between environmental quality and national economic development that are reflected in the recommended alternative.

2. It is generally agreed that one alternative presented and evaluated should favour the EQ objective. Since EQ cannot be defined in an objective fashion, it is not clear what constitutes an optimal EQ plan. It appears that as a practical matter the optimal EQ plan will reflect views expressed as the result of the public participation process.

3. No technical procedure exists for making trade-offs between environmental quality and national economic development to arrive at the recommended plan. It appears that the selection of the recommended plan will be based upon negotiations among the planners and the interested groups during the course of the public participation process.

One final point emerges from the discussions with U.S. government agency personnel on planning and evaluation practices being utilized by U.S. agencies. This relates to the effect of cost sharing practices and agency objectives upon the nature of the projects recommended. It has been recognized for many years that these two factors have had a profound influence on water resources planning in the United States. Since the planning agencies also construct projects, they have tended to measure their success in terms of the size of their construction programme. There is substantial evidence that this has made it very difficult for these agencies to evaluate projects in an objective fashion. Inasmuch as a very large proportion of all of the costs of water development projects has been borne by the federal tax payer, virtually every project has had substantial regional economic benefits. Thus regional groups that benefited from such projects at little or no cost to themselves had a powerful motivation to support the development of federally funded water projects. Quite naturally the water development agencies with their interest in construction of projects tended to ally themselves with regional groups to secure authorization for new projects.

It is generally accepted that this has had two effects upon the planning practices of U.S. government agencies. One was the tendency to select projects that maximized regional economic returns - particularly the returns to well organized regional groups. Although agencies were expected to maximize NED, they tended instead to maximize regional returns within the constraint that each project had to meet at least a 1:1 benefit-cost ratio.

The second effect, was a tendency for agencies to exaggerate benefits and underestimate costs in order to meet the 1:1 benefit-cost constraint. Let us emphasize that with few exceptions these effects were not the result of dishonest behaviour on the part of agency personnel. By and large they were a natural and unconscious response to the policy environment in which agency personnel found themselves. The foregoing history, no doubt, prompted the representative of the Office of Management and Budget, Mr. Tom Barry, to comment that the greatest hopes for improvement in water resource project evaluation practices lies in a change in cost sharing policies whereby the federal taxpayer would bear a much smaller share of the total cost. This has been said again and again for many years. Mr. Barry seemed to imply that President Ford will be recommending such a change in the near future.

The foregoing background provides a basis for making a general overall estimate of emerging water resources planning and evaluation practices in the United States. A full assessment cannot be made until there is more experience with the principles and standards issued in 1973.

First, while it is recognized that there is a need for types of studies that provide a context within which individual projects can be considered (the national assessment and the tributary basin studies) there are powerful pressures to limit investment in large scale, relatively detailed basin-wide plans. Thus the major investments being made are in the develoment of project plans. The exception in the area of water pollution control where a great deal is being invested in planning programs for small regional as opposed to major river basins.

It appears likely that these developments are basically sound although there appear to be substantial problems yet to be worked out with regard to pollution control planning. It seems doubtful that the large scale basin plans were worth the cost. If pollution control planning is organized by regions within which the externalities are significant, it will not be inconsistent with the general practice being followed.

Second, U.S. agencies have come to recognize that it is not practicable to establish what constitutes an optimal plan, through technical analysis. The new procedures place heavy reliance upon the evaluation of alternatives and public participation procedures as a means of informing the decision-maker. This too appears to be a sound conclusion.

Third, it seems likely that the requirement that the consequences of alternative projects be evaluated in terms of four accounts will have an important influence on the nature of the projects recommended. For example, it seems reasonable to expect that alternatives which are adverse in terms of "social well being" will not be recommended because a project with demonstrated adverse social effects would be politically unacceptable. The necessity of considering a wide range of effects of a project seems likely to influence the behaviour of the planners. They will certainly be more cognizant of effects which in the past they had little or no need to consider. This too appears commendable.

Fourth, in view of the powerful motivation for a construction bias and the pressures created by cost sharing policies to build projects that benefit the region or locality, together with the motivation to capitalize on the "log rolling" propensities of Congress, it seems likely that the traditional tendency to recommend projects that serve the region at the expense of the national taxpayer will continue. Specifically, one should expect that the NED alternative prescribed will be one that tends to be most acceptable to regional interests rather than one that maximizes net national economic development beneifts. Thus, it is doubtful that the trade-offs between NED and EQ will ever be seriously considered in the negotiating process because the data will tend not to be generated which will permit such a comparison.

Fifth, the major question with regard to U.S. planning and evaluation practices lies in what might be called the "balancing of the interests" in arriving at the plan to be implemented. Since projects are funded largely by the federal government there is a major national interest in the selection of the projects which are implemented. The nation as a whole, no doubt, has an interest in the effects of a given project upon all four categories of specified effects (NED, EQ, Social Well Being and Regional Development). Since no one represents the national taxpayer in the public participation process except the planning agency, and since, as previously noted, the planning agency has a powerful motivation to ally itself with regional development interests, some doubt remains about the likelihood of the planning process balancing all interests in the nation reasonably well. In view of the structure of the U.S. government and its cost sharing policies the serious consideration of the overall national interest must be provided by the President and his staff instead of the planning agencies. However,

their assessment of projects is dependent upon the information generated by the agencies which have a powerful motivation to develop biased analyses. The extent to which various regional and other special interests are adequately represented depends upon (1) public participation (2) the representation of state and local jurisdictions in the decision-making process and the capability of these several interests to critique the analyses of the planning agencies. Since these processes were not examined no judgement can be made on this aspect, but in the past, interests opposed to specific water development projects have not been well equipped to critique the evaluations of the planning agencies.

V. Some Implications of U.S. Planning and Evaluation Practices for Canadian Federal Practices

A. Introduction

The U.S. experience alerts us to a number of issues that merit careful consideration in the design of planning and evaluation practices in Canada. These may be stated as questions as follows:

1. How should Canada proceed in the conduct of its water resources planning from the identification of water problems to the design of specific measures to deal with these problems?

   The U.S. appears to be moving in the direction of a progression from national assessment, to tributary studies of a reconnaissance nature, to project feasibility studies, to design studies.

   It appears to be abandoning expensive basin-wide planning endeavours. What constitutes an appropriate staging of planning in Canada?

2. Should planning be undertaken in terms of specified objectives (such as NED or EQ as in the U.S.) or should some other approach be adopted?

   While the evidence is not entirely clear it seems doubtful

that the U.S. agencies do in fact plan in terms of NED or a precisely defined EQ. It would appear that instead the practice is to define an acceptable alternative that favours NED and an acceptable alternative that favours an interpretation of EQ based upon public involvement. Further public involvement provides the basis for recommending an alternative for adoption. As previously noted it seems doubtful that other objectives of particular groups will be neglected. In view of this experience is it meaningful to speak of planning in terms of specified objectives?

3. How should planning be undertaken so as to assure that there is an appropriate "balancing of the interests" in selecting the alternative that "best" serves the public interest?

Since a "best plan" cannot be technically determined the U.S. government is relying heavily upon public participation procedures to achieve this result. In view of the structure of the U.S. government and cost sharing policies for water projects the available evidence suggests that the "balancing of the interests" gives little weight to the interest of the federal taxpayer. What procedures will best serve the needs of Canada, especially in view of its different governmental structure?

4. In view of the recognition that a simple benefit-cost ratio is inadequate, what kind of accounting system will assure presentation of evaluative data required to aid the various interests in society in deciding which alternative it prefers?

The U.S. is using four systems of accounts. Should this same system be applied in Canada or should a different accounting system be utilized?

B. Studies to Provide a Context for Establishing National Policies and Planning Individual Projects

There are two questions here that need to be addressed: Are there nationwide studies of water development demands that should be undertaken? What types of basin or regional studies are needed to permit sound water resources planning and management?

1. Nationwide studies

It is difficult to see what purpose a national assessment of water supply and demand of the nature that has been undertaken or the one now being completed in the United States would serve Canada. On the other hand there are two types of examinations that may be useful for national planning purposes.

One of these would be a periodic review of existing and emerging water problems and issues in Canada to provide a basis for deciding upon areas where national leadership should be exercised and the nature of the problems to be addressed. A reasonably systematic national overview would be helpful in deciding upon priorities among regions as well as in keeping the federal government alert to emerging problem areas. Supply-demand studies would be made for areas in which deficencies appear likely or possible. This would be a much less ambitious and costly effort than the U.S. national assessment which entails regional supply-demand estimates based upon a national projection framework.

A second type of nationwide study might be desirable for national policy planning purposes. For example, the federal government might wish to understand what a specified cost sharing policy for flood protection might eventually obligate the federal government to spend. This might lead to the identification of flood prone areas, estimation of

their damage potentials, and the development of approximate estimates of the costs of protection. Similarily the federal government might wish to undertake a study designed to determine what its obligations might be under a specified subsidy policy for pollution control. Apart from considering what its obligations might be, the federal government might wish an assessment of the likely results of adopting a specific national policy, eg. flood insurance.

In brief, it appears, that to meet the planning needs of the Inland Waters Directorate, a periodic identification and appraisal of existing and emerging problem areas nation-wide would appear useful in establishing programme priorities. These studies should not, however, be costly detailed analyses. No doubt something of this nature is being done at the present time.

2. Basin or regional studies

As previously noted it is instructive that the U.S. is moving away from expensive basin-wide studies. This development together with some personal experience lead to the conclusion that basin or regional studies need only be in sufficient detail to provide the context for what might be called project planning. Here it must be recognized that where a highly inter-related system of structures or structural and non-structural measures is involved a relatively detailed study over a substantial region may be required. This is particularly true of a reservoir system and a combined system of storage and dykes for flood control. It also applies to pollution control but it is important to recognize that planning need embrace only the area of significant externalities.

For example, a water quality management program must include all point and non-point sources that influence water quality in a given body of water. This does not mean, however, that water quality needs to be studied and managed on a

basin-wide basis. On this point it is noteworthy that at the present time the drainage area above Hope in the Fraser River has little influence on water quality (except for sediment) in the Lower Fraser, that the tributaries of the Lower Fraser have very little effect on the mainstem, and discharges to the mainstem above the Greater Vancouver Regional District have marginal downstream influences. Thus water quality management in the mainstem of the Lower Fraser below Mission can be studied and managed as a "project". However, water quality cannot be planned for and managed in terms of a single treatment plant such as the Annacis Island plant. The Westwater staff did not understand these relationships at the outset of its research in the Lower Fraser but these facts could have been determined without very much investigation.

Where a system of reservoirs or an inter-related system of reservoirs and dykes is involved, the "project" will need to embrace the system because the size of one will influence the size of all others in the system. This does not mean that design studies for each reservoir or stretch of dyking must be undertaken at the outset but it does mean that studies must be in sufficient detail that the role of each element in the system is understood and can be taken into account in the deign and construction of any individual facility.

What does this imply for basin-wide or regional studies? It suggests that once a problem area is identified the following question must be addressed:

What does one need to know in order to sub-divide the problem for detailed study and analysis:

Answering this question would normally entail the following:

1. Gaining an understanding about how prospective changes in the economy of the region are likely to affect demands upon its water resources.
   In most areas sufficient insight can be secured by drawing together and evaluating the projections and analyses others have made. If none have been made, a reconnaissance type regional economic study may be necessary. The assumption is that seldom, if ever, will water development be the main engine of economic change.
2. Appraising in a preliminary fashion the potential of the water related land resources to meet prospective regional demands or any evident demands from outside of the region (such as for electric power).
   This step would provide an over-view of how a water development and management program might fit into the regional economy while emphasizing the issues that need to be addressed to determine how and to what extent the potential can be realized. Very little field investigation should be required but it may be necessary to secure certain key pieces of information.
3. Identifying the components of the water development and management program that might safely be studied individually in detail to determine what developmental or management measures should be undertaken, and what priorities should be adoped for making such individual studies.
   This really should be the major output of basin or regional studies, i.e. to provide the foundation for undertaking safely the detailed studies on which project decisions can be based.

3. In Summary

It is envisaged that the national water planning activity would involve four stages or levels of detail. First, periodically (once in three to five years) a review would be made of existing and emerging water problem areas (basins or regions) so as to identify areas requiring more detailed national attention and to establish priorities for their investigation. Second, in a given problem area (basin or region) a reconnaissance study would be undertaken for the primary purpose of sub-dividing the problems into suitable components for detailed investigation and to establish the priorities for such investigations. Third, more detailed investigations should be undertaken which will provide a basis for deciding upon the structural and non-structural measures that should in fact be undertaken. Fourth, after measures have been decided upon, design studies necessary for implementation purposes would be initiated.

C. The Identification of the Relevant Alternatives

What constitutes a best plan or project cannot be technically determined unless objectives are specified. Two factors stand in the way of precise specification of objectives. One is a natural and quite justifiable reluctance on the part of political leaders to specify objectives precisely (Braybrooke and Lindblom in The Strategy of Decision Making explain this well). The other is the great difficulty of specifying some types of objectives precisely. For example, what do we mean by environmental quality and social well-being? If arriving at a more equitable income distribution is desirable, what distribution is equitable and what trade-offs should be made between income redistribution and national economic development or environmental quality. For these reasons it seems unlikely that Canada can hope to be any more successful than the U.S. in defining the objectives of water resources programs in specific terms. How then can Canada arrive at projects and programs that best serve the public interest?

The answer must lie in the development of a process that reveals the range of choice and which generates information that can be utilized by those who are the accountable representatives of the people affected in making an intelligent selection from among alternatives. Let us try to delineate a little more precisely what such a process entails within the Canadian governmental framework.

A place at which to begin is with the "accountable representatives". At the federal and provincial levels these are the cabinets. At the local level the board of aldermen or some other legislative body may be the relevant accountable representatives. Decisions on individual projects are unlikely to be acted upon by cabinet, but someone in the federal and provincial hierarchies must be identified who can act with the confidence that he knows what cabinet would do if it were to act directly. In the federal government this may be the minister, the deputy minister, an assistant deputy minister, the Director-General of Inland Waters Directorate or a Regional Director of that organization. The point is that the "accountable representative" is not a spokesman for members of the public who become involved through a public participation process. The views of such spokemen are inputs for the "accountable representatives" to consider. To view the matter in any other light is to make a mockery of the Canadian governmental system.

In Canadian practice an intergovernmental board is usually established to guide planning, to make some decisions and to advise senior officials on others. An intergovernmental arrangement is necessary because the two levels of government may pursue different objectives. While in some cases one level can decide to proceed with a project on its own initiative, most major projects require agreement between the two levels. This means that in most cases the selection of projects to be undertaken will involve negotiation and probably compromise among representatives of the levels of government. The important point is that the planning and evaluation process should generate good information as a basis for these negotiations.

The two foregoing points help shape the question we are addressing a little more specifically: How can the process be designed so that the alternatives presented are ones that the, "accountable representatives" consider relevant and so they have the information they consider essential for purposes of negotiation with one another with regard to project decisions? The Inland Waters Directorate cannot answer this question for the provinces and the local jurisdictions but it must try to answer this question for the federal government. This may require discussions with other units of Environment Canada, possibly the Treasury Board and possibly other agencies. However, it is assumed that for such discussions to proceed in a constructive fashion the Inland Waters Directorate will need to suggest a framework and procedure to which others might respond.

In following through on the line of reasoning presented so far an appropriate procedure would of necessity involve two components. One would be a procedure and a set of rules for identifying the alternatives which the "accountable representatives" can consider in choosing the "Best" alternative. From a logical point of view, one cannot avoid the explicit examination of alternatives by the "accountable representative". The second component of an appropriate procedure is the presentation of evaluative information on which an informed choice can be based.*

The staff of the Inland Waters Directorate is in a much better position than we are to determine what values should guide the identification of relevant alternatives. We will, however suggest a concrete basis for selecting alternatives for evaluation:

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* As I have used the term here, the "accountable representative" is the person who decides. The member of an intergovernmental board is not the "accountable representative" if he is not able to select the alternative to be followed. The important point is that the procedure should be designed to generate the information required by the "accountable representative" to make an informed decision, whoever he may be.

1. The no-action alternative - this would be evaluated on the same basis as the action alternatives.
2. An alternative that would maximize economic returns to the nation (the NED alternative in U.S. parlance).
3. An alternative that would maximize economic returns to the province (PED), if this differs from the NED alternative.
4. A modification of the NED alternative that would do as much as practicable to minimize adverse aesthetic and cultural effects and adverse affects upon the long term supply of natural resources while dealing with the water problem or opportunity being addressed. Where there are significant uncertainties involved (as is usually the case with ecological effects) the risks and their significance would be appraised and measures for limiting risks would be outlined and evaluated.
5. Any other alternatives that would appear to command substantial regional and provincial support.
6. In the case of each alternative an assessment would be made of possible measures that might be initiated to minimize adverse effects of the alternative on social welfare.

A premise underlying the foregoing structure is that the no-action alternative, the NED alternative, and the PED alternative provide useful benchmarks for judging the other alternatives. It is to be emphasized that the alternatives selected for evaluation might be defined in some other way depending upon the federal perspective on values that are important. For example, it might be decided that an alternative that maximizes regional economic efficiency should be included.

The critical point is that since an optimal plan cannot be technically determined and since the "best" plan is to be determined through negotiation, information must be provided which will contribute as much as possible to helping the negotiators

understand what the consequences will be if they accept a given plan. If this is the goal, it is valuable to develop one or more alternatives on the basis of a single objective so as to help the negotiators in understanding what tradeoffs he is making if he accepts a specified alternative. At this stage it is not practicable to define environmental quality or social welfare precisely enough to say what would optimize in terms of these goals. It appears that the tradeoffs can best be understood when alternative plans are compared to (a) no-action (b) a plan that maximizes net benefits in terms of national economic development and possibly (c) a plan that maximizes net benefits in terms of provincial economic development.

D. Selecting the "Best" Alternative

The argument so far has emphasized the importance of presenting the "accountable representatives" with a set of alternatives. For each alternative, evaluative information will be provided. (The content of such evaluative information is discussed in Section E below). The issue that has not been addressed relates to the role of the affected general public in the planning process. No effort will be made to examine in detail how public participation should be organized and conducted but implicit in the planning process described are some assumptions about the role of public participation in the process by which the "best" alternative is eventually selected. These assumptions will be specified but they will not be defined at length in this report.

First, it is assumed that there should be a public input prior to the identification of alternatives for detailed investigation as an aid to deciding upon the relevant alternatives for study. This need not be an exact process because work is at a very preliminary stage. It might consist of no more than interviews with recognized "leaders and persuaders" among the affected population.

Second, it is assumed that specific alternatives to be examined will be determined on the basis of (a) guidelines of

the nature proposed in Section C above (b) a reconnaissance study of the physical, biological, economic and social aspects of the problem to be investigated and (c) a public input. This input would include a public reaction to a tentative set of alternatives based upon the guidelines, the reconnaissance study and the preliminary public input. In other words the tentative list of alternatives would be publicized and public reaction would be ascertained prior to launching the more detailed investigation of each alternative. We will not try to suggest how the public reaction should be ascertained. We stress, however, that the greatest emphasis should be placed upon communicating effectively with the public the alternatives that are being considered so that they can react if they wish to do so.

Third, it is assumed that the affected public should have an opportunity to react after the alternatives have been evaluated but prior to selection of the alternative to be implemented. Again we emphasize the importance of the educational process rather than any effort to measure public opinion. The measurement of public opinion is the task of the "accountable representative" who must weigh other factors besides the public preference within the region with regard to a water project in deciding what to do. To try to arrive at the "best" project by measuring public reaction within the region is contrary to the political theory on which Canadian government is based.

One final point emerges from the U.S. experience and that relates to the importance of the cost-sharing policy which governs the funding of the projects decided upon. The U.S. experience strongly suggests that if the project is "free" to the directly affected regional population, public participation will tend to be irresponsible and the planning process will be destroyed, no matter what rules or procedures are established at the national level.

E. The Type of Evaluative Data Required

It would not be practicable in a short paper to try to suggest

how evaluative data should be generated but a question does arise as to whether the Canadian Federal government should adopt the same accounting system as the one adopted by the U.S. Water Resources Council or whether a different one should be selected. The question we are trying to answer here is what kind of information does the public and its representatives require in order to make an informed choice. The answer depends largely upon what people value in establishing their preferences and priorities with regard to such matters as water development. From the literature we have examined the coverage outlined in Table 1 attached should meet the needs of the Canadian Federal government. However, it is emphasized that others with a deeper perception of Canadian values might arrive at a different classification.

It will be noted that the term "environmental quality" is not used. It has come to have such a wide variety of meanings that more specific terms relating to the kinds of effects one should try to measure are suggested.

VI. Summary Observations

Canada can learn from recent U.S. experience with the planning and evaluation of water resources projects but it should not copy the U.S. pattern. In brief the following conclusions are reached:

- A periodic national assessment of the water supply and demand of the nature undertaken by the United States government does not appear worth the cost for Canada. On the other hand a periodic national overview to identify areas in need of national attention and to aid in establishing priorities does appear desirable.
- The conclusion of the U.S. government to discontinue the large scale basin-wide investigations is significant. It seems doubtful that basin-wide investigations of the type that were in vogue in the U.S. during the 1950's and 1960's should be undertaken in Canada. Reconnaissance type

investigations of more limited areas with a view to identifying specific separable problems that merit study would appear desirable.

- The U.S. effort to plan in terms of two objectives is probably misleading in terms of what actually happens. Political pressures, no doubt, require planners to consider other objectives - particularly regional development. This departure is probably attributable in large part to the government structure and reimbursement policy governing water resources programmes in the United States. On the other hand the system of four accounts probably has a salutary influence upon the planning of projects.
- One concludes from the foregoing that Canada should focus upon a process that will result in the evaluation of a set of alternatives that will be of maximum value to the "accountable representatives" at each level of government in deciding upon the alternative he will find most satisfactory. To aid in this choice, it is proposed that a no-action alternative, an alternative that maximizes national economic development and one that maximizes provincial economic development be presented. These alternatives would aid in understanding the tradeoff's made if other alternatives are selected.
- The planning process can benefit from public input at several stages particularly in identifying the relevant alternatives to be examined and in informing the "accountable representative" of public reaction to the various alternatives. Major emphasis in the public participation program should be upon communicating findings to the public rather than in measuring public reaction, since that is the task of the "accountable representatives".
- A different system of accounts is proposed for the presentation of evaluative data than is used in the United States. The important point is that the evaluative data should cover factors that the public and its representatives

consider to be important in deciding upon water projects and programs.

It is believed that if the foregoing proposals are followed the Canadian system would be simplier and less costly than the U.S. system. Furthermore, it is believed that the selection of water projects would be based upon better information than one can expect to be generated by the U.S. system and the alternatives selected would reflect a better "balancing of the interests" in society than is achieved through U.S. procedures.

TABLE I

A PROPOSED CLASSIFICATION OF EVALUATIVE DATA

I. Effects Upon Economic Welfare of the Current Generation

- A. National economic efficiency
- B. Provincial economic efficiency

II. Effects upon Social Welfare

- A. Distribution of income among groups
- B. Effects upon Social organization
- C. Effects upon social stability

III. Aesthetic and Cultural Effects

- A. Visual effects
- B. Effects upon historic and archaelogical sites
- C. Effects upon other aspects of the social heritage e.g. wilderness, parks, etc.

IV. Effects upon the long term supply of natural resources

- A. Non-renewable resources
- B. Renewable resources
  - 1. Sustained yield over time
  - 2. Species diversity

(Since all evaluative data are estimates, confidence limits should be indicated)

SUMMARY OF THE SEMINAR ON WATER RESOURCES PLANNING POLICY

SEPTEMBER 9, 1976

Place Vincent Massey

The purpose of this seminar on water resources planning policy was to discuss:

1) the past I.W.D. activities in joint federal-provincial planning studies; and

2) the direction in which the Directorate should move in the future regarding planning studies.

Presentation by Mr. Irving K. Fox

To begin the seminar, Mr. Irving Fox of the Westwater Research Centre of the University of British Columbia presented a summary of the experience of the United States in multiple objective planning.

Mr. Fox discussed the changing approach of the U.S. The major emphasis of the American effort is now on periodic national assessments and project planning. Comprehensive basin planning as previously practised has been de-emphasized. This de-emphasis is a result of a conviction by U.S. officials that these investigations are too costly for the results obtained. They have been replaced by less detailed sketch plans of basins or parts of basins ("tributaries") to provide the background information for the project planning.

Mr. Fox then discussed the planning process pursued by the American agencies. This process is prescribed in the "Principles and Standards" of the Water Resources Council. Although this document took approximately

eight years and vast agency and consultant input to produce, no plans or projects have as yet been authorized under it. This is in part a reflection of the magnitude of the co-ordination problems in pursuing comprehensive basin planning studies. The "Principles and Standards" call for planning on the basis of two objectives - National Economic Development and Environmental Quality. There is little understanding or agreement among the agencies, however, as to how these objectives are to be defined or interpreted. Although this uncertainty applies to both objectives it is greater with the environmental objective. Environmental quality cannot be defined objectively and thus an "optimal" environmental quality plan cannot be formulated. It appears to Mr. Fox that the U.S. agencies rely heavily on the public participation process to assist in making judgements about desirable environmental conditions.

The second major area of the "Principles and Standards" discussed by Mr. Fox was the accounting system used for evaluation. Once plans have been formulated they are to be evaluated on the basis of four accounts. These are (1) National Economic Development, (2) Environmental Quality, (3) Regional Economic Development, and (4) Social Well-Being. The effects of each of the alternative plans on these four areas are estimated and recorded in a tabular, accounting format. Mr. Fox felt strongly that this was a very useful procedure as it drew attention to a wide range of impacts. In the American scene he felt that one of its major advantages would be in ameliorating the regional and agency self-interest which has affected the decision-making process in the past.

It was also stressed by Mr. Fox that there is no way of technically determining an optimum plan. The considerations and trade-offs are too numerous, too complex and involve too many incommensurables. It is thus necessary for the planner to base his recommendations on his judgement and the input of the public participation process and then to provide the decision-makers with as complete information as possible.

Subsequent Discussion

After a break the seminar resumed with Frank Forbes making a brief presentation listing past I.W.D. participation in joint studies and posing the question as to how we should proceed in the future. The discussion was initiated by remarks concerning the relevance of the U.S. experience to the Canadian scene.

It was pointed out that I.W.D. has not been engaged in studies that could be clearly classified into planning levels as the Americans have been. A more appropriate classification of I.W.D. joint studies would be by type - comprehensive basin studies, water quality studies, water quantity studies and environmental impact studies (see Table 1). Unlike the American situation, I.W.D. involvement in planning studies is determined by negotiations with the province or provinces involved. It is these negotiations which have largely determined the purpose and complexity of the studies.

The negotiations also lead to a general statement of objectives for the study concerned. These objectives reflect the nature of the problems which prompted the study and the goals and concerns of the parties involved. The objectives can therefore vary from study to study rather than being constant as required in the American "Principles and Standards".

TYPES OF STUDIES

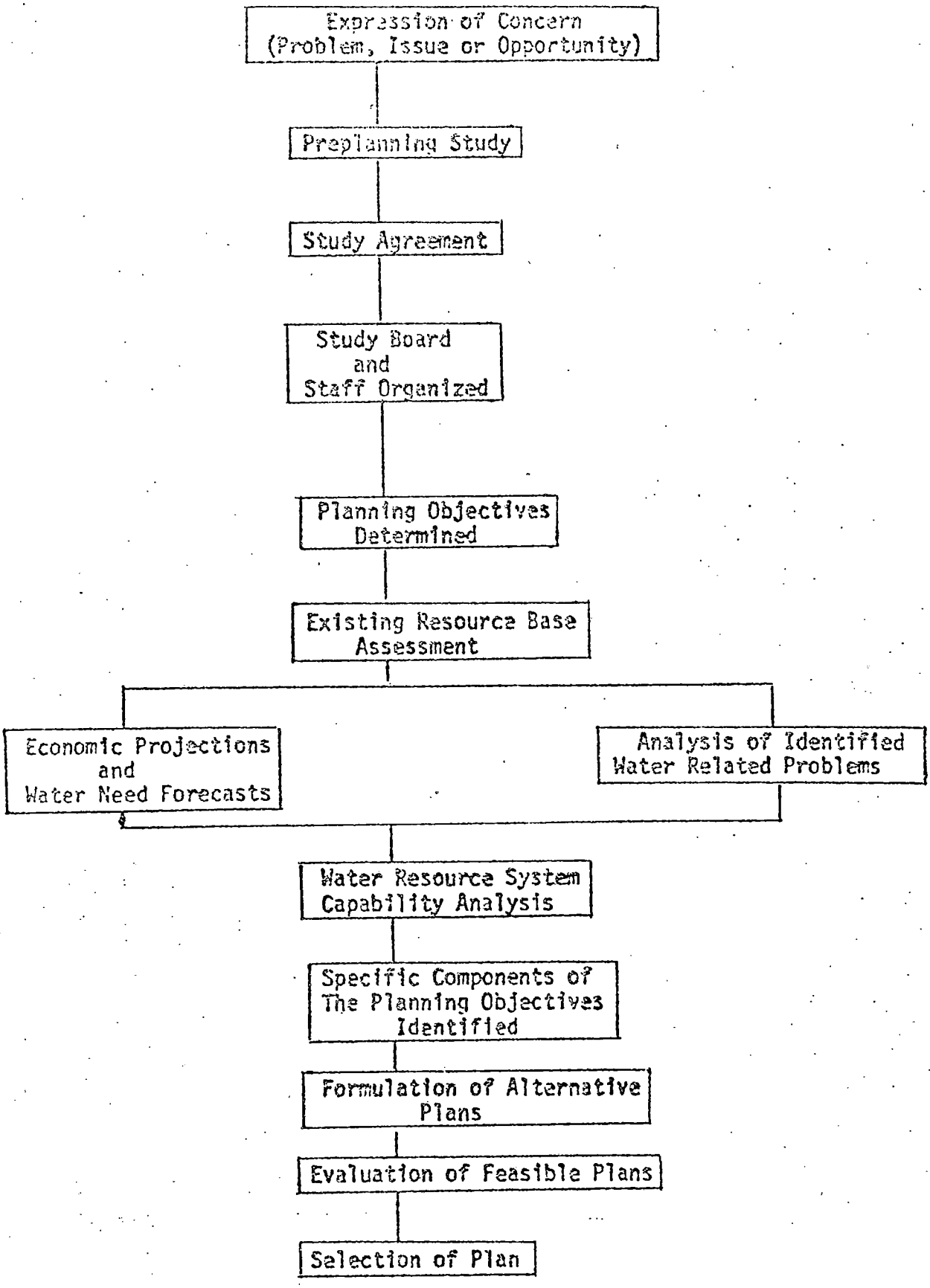
(and examples)

COMPREHENSIVE	WATER QUALITY	WATER QUANTITY	ENVIRONMENTAL IMPACT
Okanagan	Lake Winnipeg Water Quality Study	Saskatchewan-Nelson Water Supply Study	Lake Winnipeg, Churchill and Nelson Rivers
Qu'Appelle	St. Lawrence Water Quality Study	Great Lakes Levels	Churchill River
Saint John	Lower Great Lakes Water Quality	Flood Damage Reduction	Peace-Athabasca Delta
Shubenacadie	Great Lakes Water Quality		

The accounting procedure for evaluation described by Mr. Fox has been employed in two I.W.D. joint studies (the Okanagan study first and presently the Souris study). Here again, however, there is apparently scope for variation among studies as the Okanagan study used three accounts and the Souris study is using five accounts.

It is clear that the planning process as pursued by American agencies under the "Principles and Standards" of the U.S. Water Resources Council is quite different from that followed in the joint studies in which I.W.D. has participated. The planning process which has evolved in these studies begins with the expression of a water resource concern by one of the governments (see Figure 1). This may lead to the establishment of a preplanning group to investigate and report on the need for a study and to specify the requirements of any study recommended. The next stage is the negotiation of a study agreement stating the objectives of the study. After the organization of the study board and its staff, the major water resource problems which instigated the study are broken down into more manageable units and expressed as planning objectives. Alternative solutions to meet these planning objectives are devised and a series of such alternatives meeting a number of planning objectives are grouped together as an alternative plan.

In a comprehensive basin study it is usually advisable that one or more benchmark plans be formulated. One would be a no-action plan projecting how the basin is likely to develop during the planning period if no action is taken. A second benchmark plan would be one maximizing economic returns. This would allow the trade-offs involved in adopting any other alternative to be understood. Other "more realistic" plans would also be formulated based on the knowledge and judgement of the planners. (As Mr. Fox noted, there is no way of technically determining an optimum plan). In


Expression of Concern
(Problem, Issue or Opportunity)
Preplanning Study
Study Agreement
Study Board
and
Staff Organized
Planning Objectives
Determined
Existing Resource Base
Assessment
Economic Projections
and
Water Need Forecasts
Analysis of Identified
Water Related Problems
Water Resource System
Capability Analysis
Specific Components of
The Planning Objectives
Identified
Formulation of Alternative
Plans
Evaluation of Feasible Plans
Selection of Plan

other types of studies, the problem-solution chain may be more direct eliminating the need for this multiple plan formulation.

After a series of plans has been formulated, each of which meets the minimum planning objectives and has been verified for feasibility and acceptability, the plans are then evaluated and compared. This evaluation and comparison is based upon a series of criteria agreed upon by the study board. Normally these criteria would consist of the beneficial and adverse impacts on (1) national economic development, (2) regional economic development, (3) social well-being, and (4) environmental quality. There may well be other criteria deemed relevant by the Board such as in the Souris Study where effects on international relations are being accounted. These criteria are employed in an accounting proeedure similar to that of the American agencies described by Mr. Fox. The information regarding the beneficial and adverse impacts is then presented, along with the planners' recommendations, to the decision-makers.

The differences between the U.S. Water Resources Council planning process and that which has evolved in I.W.D. studies are mainly attributable to differences in constitutional, institutional and political structures and processes. It was generally concluded that because of these differences, the transferability of the American experience to the Canadian scene is restricted to technical matters such as evaluation procedures.

There was considerable discussion of the role of public participation in the planning process. This began with the concept of an "accountable representative" proposed by Mr. Fox. With this concept the "accountable representative" is the government official who, in representing the minister, is in effect the decision-maker for that study. Several questions were raised regarding how to determine the accountable representative. The initial reaction was that in most cases the study board members fulfill this role.

Chairman's Concluding Remarks

In summarizing the general consensus of the seminar Mr. Bruce make the following points:

1) The basic approach of the Directorate has consisted of a mix of studies - some comprehensive basin studies, some problem or single sector studies, etc. This approach has not been a bad one but could be improved by lessening the ad hoc nature of the approach and giving more structure and purpose to it.

2) There was general agreement that some kind of national overview of problems, aims and priorities is important and that the Directorate should put more time into it. This could probably be achieved by amalgamating the problems and priorities put forward from the regional offices. This overview would contribute to the lessening of the ad hoc approach referred to above.

3) The lack of interchange between our planning activities and our research program and activities is cause for concern.

4) It is worth giving further consideration to the purpose of public participation and the role of the "accountable representative" in the planning process.

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THE ENVIRONMENT
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