WATER MANAGEMENT IN CANADA ¹

By J. D. COLLINSON²

INTRODUCTION

I appreciate the opportunity of appearing here today to make a few remarks on water. Perhaps it is in order to outline, briefly, the role played by the Canadian Council of Resource Ministers and the work undertaken to date on water. Then, review some of the problems encountered in water management, and suggest some thoughts on where we might go from here in regard to our future needs.

The week-long "Resources for Tomorrow" conference of 1961 provided a recognition of the importance of resources in the Canadian economy. Equally important, realizing that all levels of government were intimately concerned, it recommended that some provision be made for a continuing review of resource problems and policies as part of a mechanism for liaison and consultation among all the resource sectors.

Acting on this recommendation, the Federal and Provincial governments reconstituted the conference national steering committee as a permanent Council. This was the birth of the Canadian Council of Resource Ministers.

Being unique in form and subject matter meant that there were few precedents to indicate how we should operate and what functions we should assume. Our terms of reference, therefore, have been both general and open-ended; to advise, to study, to coordinate information, to maintain constant liaison with our member governments, to bring them together for discussion, to promote the preparation of inventories of resources and of resource projects. In short, to act as a catalytic force, a focus for crystallization of concepts, as a component of progress toward a comprehensive resource policy structure. Our approach is systematic and strategic. We deal in problem definition; the recognition of what is significant and fundamental, the description of problem inter-relations.

We attempt to evolve generic systems for classification of problems and their parameters, as a first step toward establishing a comprehensive information system to maintain a continuous overview of Canadian resource projects, policies, and administration.

We seek to create a set of methodologies; tools for analysis, planning, implementation, and management, to serve the needs of our member governments, municipalities and other groups. In all of this we strive to maintain our overall perspective, so that a coherent set of classification and planning tools

¹ Paper presented at the Annual Meeting of the Canadian Institute of Forestry, held in Banff, Alberta, October 3 - 6, 1966.

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will emerge, to better enable our pragmatic structure of overlapping jurisdiction to operate knowledgeably and efficiently to a common purpose.

However, we are not a research agency. We do not become involved in detailed technological investigation. With our limited time and resources we can only advise on isolated projects, when requested to do so, and then only to ensure that the master plan is in accord with the larger problem context. Our concern is with the framework of problem-solving rather than with the specific occurrence of the problem.

There you have in broad outline, the nature and functions of the Canadian Council of Resource Ministers, and of its permanent secretariat. I stress again the uniqueness of this body in Canadian public administration. It represents an experimental attempt to create a framework for permanent or regular consultation among the eleven governments. It is too early to say that this novel experiment in public administration in a federal system is a proven success, but it certainly appears to be fulfilling a useful role in providing a permanent link among governments.

I repeat what is implied above: The Council does not formulate policy. Each member government retains full responsibility for formulating its own policy, but it will have had the benefit of the views of the other ten governments as it drafts future programs.

WATER

The awareness, concern and activities relating to water resources in Canada have made it the fastest developing resource field in the past decade and especially during the past three or four years; this, in spite of the fact that perhaps no other country is as well endowed with fresh water resources. All of a sudden, it seems, we have to "think big" about water resources and can no longer just take them for granted.

This change has been brought about in recent years by concern, for example, over the fluctuating levels of the Great Lakes, decisions fixing the pattern of development of the Columbia River system, growing inter-provincial tensions over the development and use of the Saskatchewan River system, pollution (Canada-wide, but especially the concern for Lake Erie), grandiose diversion schemes put forward to "solve" water problems, and talk of "continentalism".

A clear understanding of water problems and some effective approaches for managing water are hampered by the conventional attitudes with which many of us have grown up. Consider, for example, the widely held notion that because water is essential for life, almost no expense is too great to have it where we want it, when we want it, and how we want it. Certainly, water is necessary for life, but so is food, shelter, etc. Therefore, one should contemplate water problems much as one would consider problems encountered in the management of any other resource. In short, water should not be placed on a pedestal with other "gods" like motherhood and the family farm.

Water, conventionally, has been considered to be a free good. The only costs attached to water do not derive from the water itself but from the management or the "processing" of it. For example: the rates paid by households reflect distribution and treatment costs, not a charge for the water itself; charges for electricity pay for the cost of the dam, power plant and transmission

lines, not water. Because of these conventional attitudes to water (sacred, free good, etc.), when conflicts of use arise, we try as hard as possible to resolve them by providing more water rather than allocating use. When allocations have to be made, they are done on the discretion of regulatory agencies often without the test of economic efficiency entering into the decision.

As a resource, water is perhaps unique in that it is a flowing resource and subject to re-use; but, land and minerals are also subject to re-use. However, although water can be re-used many times, the supply is relatively fixed and each use made of it may cause undesirable changes in quality. The lack of restrictions on the number of users relegates water to the category of a common property resource; apart from this feature, however, water cannot and should not be considered more important than many other resources.

The value of water, like other resources, is a result of its being desired, used or appreciated by people. Community desires are simply an aggregation of individual desires; therefore, water may be desired for many different uses, some of which may be competitive. Priorities for use, where uses compete, vary between individuals, interest groups, communities and regions, and often change over time; and, because all development and management programs have both positive and negative effects, the balance between these will vary between individuals.

The general public has become increasingly aware of the situation discussed above. The concern is now at the national level as well as regional, provincial and local levels. True, local problems are just as frequent as ever, but these are being lumped together to provide generalizations capable of causing widespread concern. Long-range planning is required consisting of sorting out priorities, recognizing regional differences in values and needs and designing flexible programs that will permit efficient and equitable management of water to satisfy local and regional needs but remain consistent with the national interest. Without this, wastage and inefficiency in the management of a fixed supply relative to increasing demands could result in severe bottlenecks in the economy.

Water programs are carried out by all levels of government as well as private industry, each with interests that often conflict. So far, it is safe to say that most of our larger water management programs developed as a crisis-response, and the planning for them was not as broad-based or comprehensive as could be desired. For example, Prairie droughts in the Depression lead to PFRA; Hurricane Hazel in 1954 gave rise to the \$46 million Metropolitan Toronto recreation and flood control program; the 1948 flood in the Fraser River Basin lead to studies by the Fraser River Board; and the 1950 Red River flood lead eventually to the \$64 million Floodway. All precipitated remedial programs after considerable damage had already occurred. Some recent hydro-power developments, such as the Nelson River project, provide examples of long range planning (rather than crisis) for huge outputs of power. Long range planning is necessary but difficult because both priorities and technologies change over time. Many research programs have been of a traditional and restricted nature: for example, how to build better dams as opposed to finding alternative ways to achieve the same ends, thus permitting a choice.

SUPPLY

Within its boundaries, Canada has some 292,000 square miles of fresh water lakes and streams plus vast underground aquifers. The possibility of an overall water shortage is unlikely. Local and regional shortages, however, may cause concern, especially if comprehensive planning for a steady supply of water of adequate quality and rational use is lacking. As our economy becomes more and more urbanized and industrialized, the costs of future droughts or floods increase in magnitude. A year ago New York City faced a water crisis: the small lakes and reservoirs, which are its source of supply, almost dried up; yet, ironically, the mighty but heavily polluted Hudson River flowed right past its door-step. Was this shortage of water or lack of planning and search for alternative solutions such as overhauling the city's antiquated water mains and plumbing or extensive metering of water?

The real shortages are in knowledge about what we want with respect to water, as well as shortages of new (to Canada) ideas. New technologies in waste treatment, desalination, weather modification, improved processing techniques in industry, and reduced evaporation may serve to counteract supply depletion from withdrawals and wastage. Water research groups being organized at the University of Manitoba, Saskatchewan and Waterloo may provide some of the investments in research which have become necessary.

DEMAND

Future demand for water be summarized under the following headings:

- 1) *Municipal use*
Large increases expected: population is increasing at about 1.7 percent per year and at same time per capita consumption of water is rising.
- 2) *Industrial use*
Rapid expansion in water-using industries: although much of this water is returned to the streams, the quality may be considerably changed, thus inhibiting further use.
- 3) *Power*
Increasing demand for electric power to be filled by hydro and stream generating plants. In the long run, atomic power may become economical, but even this requires water for cooling.
- 4) *Fish and wildlife*
High quality required: increased pressure for preservation of these amenities.
- 5) *Recreation*
Exploding demand, especially in Central Canada: the conventional wisdom requires water of relatively high quality as the essential core for many recreation opportunities.
- 6) *Agriculture*
Demand for irrigation water may be expected to increase although very low returns often accrue.
- 7) *Navigation*
Restricted use in Canada (St. Lawrence, Mackenzie, etc.): effect on water supply and quality generally will be small.

8) *Waste dilution*

An increasingly significant use of water: demand will be affected by the cost of alternatives (e.g. treatment and storage) and willingness to consider these alternatives.

Summary: Based on supply inventories and demand extrapolations, (we need to know more about the differential rates of increase by use and the inherent incompatibilities) water needs will be met at the national level in the foreseeable future. Regional shortages, however, will appear and place increasing pressure for management to optimize returns from water use and allocation. The problems will be more or less acute depending on the quality of management and, eventually, on the usefulness, encouragement and application of new technologies to the broad field of water conservation.

WATER MANAGEMENT IN CANADA

The "public" feature of water involves government, the "flow" feature often involves several governments and the BNA Act requires government involvement at all levels. Further, the many uses of water involve numerous government agencies, most of which see or have their responsibilities limited to certain aspects of water.

Recently, the Canadian Council of Resource Ministers prepared a report on "The Administration of Water Resources in Canada". From this report it is possible to get an overview of water management in Canada. While the information presented here has been taken from this Report, I wish to stress that the comments made are my own, and in no way reflect the views of the Council.

At the provincial level, control over water management and use is in the hands of one or two key agencies which "call the shots", i.e. make decisions governing the management and use of water, (if two, one is a separate pollution control organization). Administrative provisions for regulating water availability, quality and use vary (this is most highly developed in the west which has water permit systems). Seven provinces have elevated their key agencies to the level of a separate department or special commission, board, or authority—Newfoundland and Manitoba may well have the same within a year. While "key" agencies have legal powers and additional functions, these additional activities are oriented towards promoting effective pollution control and improving the availability of water supplies. Several organizational patterns have developed in terms of the major bulk of activities. For example, the OWRC places stress on domestic and industrial water supply and pollution control; Quebec and B.C. stress studies and support work for hydro power development; Alberta and Manitoba stress water conservation for agriculture; and Saskatchewan places emphasis on broad overall planning and coordination. Much of this can be attributed to the differences in geography and history of different regions of the country, but at least a certain amount is attributable to differences in perception by those involved about what the problems really are and what has to be done about them.

The Federal Government has constitutional jurisdiction over navigation, international waters and commercial fisheries in B.C. and the Atlantic provinces. As well, the Federal Government administers all aspects of water management

in the Yukon and Northwest Territories. Major support is provided to the work of provincial governments. For example, basic data collection and analysis, specialized technical assistance, and financial assistance (grants under ARDA, loans through CMHC, and special projects such as the Nelson River Programming Board and the South Saskatchewan Dam). Research, particularly on pollution, is also carried out.

Although the important decision-making and control powers over water resources in the provinces have been assigned to one or two selected agencies, many other agencies participate in the range of activities concerning water management and use (at least 100 federal and provincial agencies are involved, and if sub-provincial special water management districts are included, then at least 200 government organizations are doing something in water resources). There is a need for coordination within agencies, among agencies at the same level of government and among agencies at different levels of government. The need is to coordinate the various aspects involved in the management and use of water and to coordinate the management of water with the management of other resources in terms of requirements for regional and economic growth.

WATER RESOURCES PLANNING

One feature of the organization for water management which was of interest was provision for long-range, more comprehensive planning for water resource development. This, obviously, is becoming of increased importance as problems associated with water management become more complex and as capital investments in them increase in magnitude. The planning process, as I see it, includes economic appraisals, not simply technical design and cost estimates.

At the provincial level, almost all the major water agencies have greatly increased their programs for data collection and analysis and have increased the number of special investigations to assist development proposals or potentials. We look to Western Canada for examples of province-wide water project planning activities.

For the 1963 Report of the Committee on Manitoba's Economic Future, the Water Control and Conservation Branch, Manitoba Hydro and others designed the broad outline of a long-run water development plan for the Province. The need now is to establish priorities for investing in the various elements of this plan and to evaluate component projects for manpower potentials or external effects that may have arisen with changing social and economic conditions, or for investing in non-water alternatives to achieve the same basic goals. This, now, is the role of the Manitoba Development Authority.

Alberta, in December of 1965, announced the Prairie Rivers and Management Evaluation Program (PRIME). This again, is a physical plan of works.

The Saskatchewan Water Resources Commission, 1964, grew out of the experience of the old South Saskatchewan River Development Commission which had to coordinate provincial contributions to the South Saskatchewan Dam project. The formal responsibilities of this Commission are to develop river basin plans and to supervise their implementation (after Cabinet approval).

As well, they are responsible for coordinating any multiple-purpose development project, developing and implementing land use plans around reservoirs, administering water rights and pollution control.

Most provinces have innumerable problems of a local nature involving the necessity for local flood control, drainage, provision of water supply and correction of local sources of pollution. Our organization and energies are being directed mainly to these. Conflicts among uses are emerging, however, and we may need more than administrative fiat or resort to litigation to solve them.

Some problems are best viewed in a broader context since they involve complex interdependent or overlapping interests and require interagency or inter-jurisdictional cooperation and coordination. The Prairie Provinces Water Board, at present, is the only agency assigned a continuous role regarding regional problems.

Historically, water management in the U.S. has progressed from *ad hoc* single-purpose water services through multiple-purpose water services to river basin perspective and the idea of comprehensive development. Britain and France have also adopted the river basin perspective for water development. Water management in Canada is still interpreted mainly in *ad hoc* single-purpose projects, although, with projects like the South Saskatchewan Dam, we are moving into the multiple-purpose field. We have just begun to recognize the need for comprehensive planning. The comprehensive planning idea implies economic evaluation of various possibilities for development to get a balanced set of projects giving the highest net return. This means a search for alternatives to obtain specified goals, coordination with other resource planning agencies and planning in the context of broader regional development. We will need economic studies to help formulate proposals, not merely to rationalize those already decided upon on technical grounds. In many cases, water projects may not be the answer.

FUTURE MANAGEMENT NEEDS

Recent talk about continental water resources has precipitated discussion on the need for a single national water policy. In my opinion, as a citizen concerned with such issues, we know too little in Canada about our future needs to be able to come up with a rational and adequate overall national policy at this time. Only when we are fully aware of our needs and supplies can we come up with a meaningful water management program. In the meantime, perhaps the best we could strive for would be agreement to support necessary studies and research on water supply and demand problems (particularly demand problems) on meaningful regional units. This could involve the universities, I feel, in research as well as personnel training. Here, it seems to me, the federal role could be one of providing financial assistance, undertaking basic and applied research and providing technical assistance to provinces upon request. Major development and export decisions could be based on the results of such studies.

In my mind, there are a number of points that must be considered in the formulation of national water programs. To begin with, the settled areas of Canada do not have huge surpluses at present; and as we have seen, we have many water policies. Water is a resource to be developed and utilized for

man's benefit and well-being. Water is one of many resources which affect our total social and economic environment. Therefore, it is the total environment that must be considered before we sort the planning down to water itself. Only when we have achieved a full appreciation and understanding of this environment and our water needs to achieve it, can we be expected to look at the possibility for export. If we want to continue to grow in terms of industry, commerce and social well-being, the need for a "water export program" may be rejected in favour of an "internal growth program"—other things being equal, use the water at home to produce the same goods it would be used for if exported; then, export these goods which represent water, capital, labour and technologies. If, as has been implied, some regions of Canada have a comparative advantage in terms of water supply, it would be folly to pass this on to someone else when the multiplier effect of producing a semi-finished or finished product is significantly greater.

All levels of government have a role to play and efforts must be made to ensure coordination in planning and programs to avoid duplication, competition and, in some cases, destruction. This coordination of planning, however, does not imply centralization. Programs must be flexible enough to meet needs and priorities that will vary between regions and areas. There are many methods available for financing programs (for example, taxes, bonds, fees, loans, etc.) and each project must be carefully considered. We must recognize that water development and management are only one of many uses for public funds; therefore, trade-offs in favour of other programs may be warranted.

Specifically, I feel there is a need to encourage the development of new technologies; encourage increased consideration of alternative means for achieving the same ends when projects are being planned; consider incentives for conservation practices (as has been done in the past) and/or fines or charges for wastages, inefficiencies and pollution (much more study is required here); encourage efficient use of existing developments for allocating water over time; encourage efficient use of new developments; and, because development funds are limited, establish criteria for budget allocation.

Perhaps the most often neglected aspect of resource planning to date has been demand trend analysis, and yet, demand extrapolations are perhaps the most important requirement in terms of a rationale for water management. As mentioned earlier, resources are of little value unless desired, used or appreciated by people. Perhaps the best example of the importance of a knowledge of demand occurred several years ago when the Ford Motor Company found out to their dismay that the production of Edsel cars was a rather costly undertaking when no one wanted to buy them. Hopefully, in evaluating future water needs for Canada, we will be careful not to fall into the trap of assuming that Canada's growth will continue to be parallel to that of the U.S. In the past, Canada's population and GNP have been approximately one-tenth that of the U.S. With great areas of undeveloped resources, there is little justification for assuming this trend will continue. Clearly, if we formulate water management programs based on a continuing one to ten relationship with the U.S., we could easily find ourselves short of water and unable to revoke export agreements if we were to enter into them at this stage. Besides, before the U.S. can reasonably consider importing water from Canada, it must

set its own house in order. They may well be surprised at the huge supply of water that, in the past, has been swept under the carpet of pollution. The Hudson River is just one of many examples here.

Besides the work being carried out by federal and provincial agencies, the Canadian Council of Resource Ministers has embarked upon three projects which may have some bearing on water management in Canada. The first is the national pollution conference ("Pollution and our Environment") to be held the first week in November this year; the second is a workshop which is being organized to bring together a group of highly qualified expertise in the field of water management to discuss water problems, potentials and programs in Canada; the third project underway relates to resource management personnel. This project entails an evaluation of the future needs for resource specialists and an appraisal of present resource graduate programs at Canadian universities. Initially, as a pilot project, we hope to arrange discussions between resource management personnel in the Ontario government with teachers in resource fields from Ontario universities. As well, the Canadian Committee for the International Hydrologic Decade is looking into the problems of training hydrologists. Hopefully, these projects will provide us with some further insights into the needs of water management programs in Canada.