

EVALUATION OF THE  
PRAIRIE PROVINCES WATER BOARD  
WATER DEMAND DATA BASE

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## A. IMPORTANCE OF WATER USE DATA

Historically, water managers have spent their efforts collecting and interpreting water quantity data and to a lesser extent water quality data with little, if any, consideration to water use information. In recent years with the growing recognition of the importance of demand management, increased efforts have been made in many jurisdictions to improve the knowledge about water demand and, in turn, the required data base. For example, the USGS recognizing that decisions can't be made without good data has expanded its data base from traditional hydrologic data to now include both water quality and water use.

Water use data by itself is not useful. However, it is important in that it satisfies a demand for water use information which is required for a variety of purposes including policy analysis, decision making and simply for a better understanding of the effect of man's behaviour on the hydrologic cycle or his behaviour in the allocation and use of water.

With ever increasing competition for water, the importance of water use information and therefore water use data is likewise growing. Water use information can assist water managers in the efficient management of water resources by providing:

- estimates on the opportunity cost of water. This is important if the resource is to be managed so as to maximize economic efficiency (i.e. net benefits from) the use of water.
- information on the determinants of water use and the effect of changes in them on water use. If it is desired to influence water use by mechanisms other than administrative fiat made in the absence of knowledge then information on the determinants of water use and their interrelationships is essential.
- knowledge of demand determinants and the ability to forecast changes in them which reduces errors in the design of projects and allocation decisions so as to facilitate efficient least cost management of water resources.
- information on the distribution consequences of alternative decisions in order to determine politically as well as economic best solutions.

Of all the data used by water managers, water use is the most difficult to describe the extent of because it is scattered throughout public agencies at the local, provincial and federal level as well as throughout the private sector. This dispersion makes it difficult for managers to identify and assemble necessary data. Once established, the adequacy of the data base can only be addressed in the context of a specific problem or study.

## B. BACKGROUND ON THE PPWB WATER DEMAND DATA BASE

In January 1972, the PPWB Task Force on a Water Demand Study recommended a study which in addition to cataloguing historical uses would provide estimates of current and future demands for water by various user categories and the development of a mechanism for forecasting demands in the future.

The Task Force concluded that coordinated planning and development of our water resources requires knowledge of the entire supply - demand picture. The (then) recently completed Saskatchewan-Nelson Basin Board investigation provided information as to the engineering feasibility and costs of providing various levels of supply at many locations throughout the region. However, the other essential element in the planning process, water demands, was lacking.

The Task Force recognized an importance of water demand data to the future work of the Board.

"The Board must gear its action to inevitable changes in use patterns, technology, social value systems and economic growth. A water demand study will provide some of the answers needed in the comprehensive planning of the coordinated development and use of this major resource."

More specifically, the Task Force identified five areas in which water demand data would assist the PPWB in the discharge of its responsibilities.

- 1) The review and preparation of reports and recommendations on apportionment.
- 2) The review of water quality problems and the recommendation of appropriate management approaches to their resolution.
- 3) The preparation of factual reports and the development of recommendations on disputes arising out of apportionment.
- 4) The identification of further studies which may be required to resolve Board problems.
- 5) The coordination of technical programs, such as water quantity and water quality monitoring and streamflow forecasting required for the effective apportionment of water.

Subsequently, in 1973 a decision was made to split the proposed study into two parts. The first part would be done under the auspices of the PPWB and consist of collecting current and historical water use data which could be used in demand projections and establishing trends in water use. The second part would consist of forecasting future water demands and would be done by the provinces "to ensure adequate considerations of provincial policies."

The PPWB Water Demand Study was initiated in 1976 and completed in 1982 at a cost of \$945,000. The report covered the period 1951-1978 and documented factors affecting water use in six sectors: municipal, industrial, agriculture, power generation, recreation, and environmental enhancement. The report showed water use for the period of study grew at a faster rate than population.

One of the study recommendations was for establishment of a data base which should be kept up to date.

"Member agencies should supply available updated information to the Prairie Provinces Water Board in the format established during the Water Demand Study. The Board should assume responsibility for the storage and retrieval of this information."

In retrospect, it is interesting to note that despite the recognition of the importance of water use information:

- 1) the forecasting component of the Water Demand Study has never been completed.
- 2) there has never been a comprehensive attempt to combine water supply-demand information as originally envisioned by the Task Force.
- 3) the Board has made little use of the study results to date. Agency access to the data base, as will be discussed later, has been limited.

### C. PAST USE OF THE DATA BASE

Following the completion of the Water Demand Study, the Secretariat established a data base as recommended in the report. In creating the data base it was decided that the data should be preserved in the same manner in which it had been received during the course the study. There was no further consideration as to the needs of potential users or of consolidating the data into a format where all parameters would be consistently defined. Instead, the data base was to be simply a repository of raw data.

The above decision resulted in the creation of a large data base comprised of six sectors (Regional Economic Base, Municipal and Industrial, Agriculture, Power Generation, Recreation, Environmental Considerations) which are sub-divided into 30 files requiring approximately 25 megabits of computer storage. Because of the variety of input information, the data does not lend itself to easy access and manipulating to determine for example what, if any, trends exist.

As a result of the time required to gather information, updating has been sporadic resulting in a variability of completeness. Furthermore, an extensive amount of time is required to enter and verify the data after it has been received from the provinces. For example, the present update has required the Secretariat to spend over four person-months to enter and verify the data.

Information from the Water Demand Study can be obtained from either the Study report or from the data base maintained by the Secretariat. With respect to use of the report, while there are no statistics available, discussions with users of that report in both the private and public sector indicate that it has been used extensively.

The data base maintained by the Secretariat has been accessed primarily by federal government agencies. Since the data base was first established, only approximately twelve requests have been made by Saskatchewan and none by either Manitoba or Alberta. In 1988, there were approximately 12 requests made by PFRA and Environment Canada, a significant increase from previous years. Only a few requests have ever been made from non-government agencies.

The data primarily requested has been;

- Population by community,
- Municipal monthly pumpage,

- Irrigation water use and acreage irrigated,
- Industrial water use,
- Power generation and water use for power generation.

Some of the reasons for the nominal use of the data base appear to be:

- the recent establishment of provincial data bases and the industrial water use data base in Ottawa provide alternative sources of information.
- the availability of the Water Demand Study report provides an adequate general overview of trends. More detailed information required for project evaluation must come from field work. However, with time the value of the 1982 report will diminish, making the updated data base more important for trend information, if the report is not updated.
- lack of awareness that a data base exists.

#### D. FUTURE NEEDS

Users of the water demand data bank indicate that while there is continued support for the data base, its value is somewhat limited, especially as it is currently structured. The concerns expressed are summarized as follows:

- 1) The provinces have or are in the process of developing their own data banks to meet their specific needs. Environment Canada is also in the process of developing a national water use data bank (it has already developed an industrial water use data bank). Therefore, there is a potential of the PPWB data base duplicating these other data bases.
- 2) Effort to collect data for the PPWB updates is time consuming and difficult to justify with today's tight budgets.
- 3) Information requests to the Secretariat must be very specific due to the format in which the data is stored. As well, direct access by potential users is difficult unless the user is familiar with SAS computer language, which is not well known.

It was generally agreed that a PPWB water demand data base be maintained but that it be modified to the extent possible to address the above noted concerns. It was felt that the data base should be limited to the most frequently used parameters as the user can go to provincial sources if additional information is required. The provinces would have to cooperate by agreeing to respond to data requests. Data should be easily retrieved and in a user-friendly format for general analysis.

#### E. CONCLUSIONS

1. The concept of establishing a water use data base was commendable, as it filled a gap in the information need by water managers to compliment water quantity and quality data already available. It helped further the recognition of the importance that water demand can and should play in water management decisions.

2. The usefulness of the data bank is somewhat diminished due to definition inconsistencies of some parameters, expense to update and ease of accessibility.
3. To date, the Board has not utilized water use data to carry out its responsibilities to the extent envisioned by the PPWB Water Demand Task Force.
4. Both the Board and its agencies have not made as significant advances in developing and using supply - demand information models in their planning work as anticipated when the study was designed. Development and use of forecasting water demand models has also been minimal.
5. Water use information will become more important in the future. The provincial data bases which are being established should be the primary location of detailed data.
6. Generally, the potential uses of water demand data identified by the Task Force in 1972 remain valid. However, the Board's needs can be met with a reduced PPWB Water Demand data base and utilizing, if and when necessary, supplementary information from the provincial or federal governments' data bases.
7. While the usefulness of the PPWB data bank to both the Provinces and the Federal Government will decline as their own data banks become established, there is still a need for a central data base to provide selected regional information to both the public and private sectors.
8. The availability of data in report format (i.e. hard copy) is a convenient and useful way to provide information.
9. There is a need to ensure a continuing awareness of the availability of the data base and assure easy accessibility.

#### F. RECOMMENDATIONS

The following recommendations would be carried out in cooperation with the PPWB Water Use Coordinators.

1. The PPWB water use data base be capsulized to include only those parameters most frequently requested. The recommended data base is shown in the Appendix. The objective of the data base would be to supply consistent and current water use estimates by Province and sub-basin.
2. The existing PPWB data base be retained on computer tape for possible future reference.

3. A summary report using information from the current update be prepared, and distributed to users of the data base.
4. The next updating using the simplified data list in the Appendix be done in 1992 to allow for use of 1991 Census data and then updated every five years. An evaluation of the data base should be done at the completion of each update.
5. The Provinces supply data in a consistent format to ensure accuracy and expedience of data entry. Where necessary, missing data would be estimated by the provinces.
6. Data be stored in a standard spreadsheet.
7. Prepare an information program to ensure potential users are aware of the data base.
8. Conduct an evaluation of the benefits and costs of putting the new data base into a GIS (Geographic Information System) format. The evaluation should be done by a consultant or someone from one of the Board agencies familiar with GIS.

APPENDIX  
PROPOSED WATER USE DATA BASE

A. MUNICIPAL WATER USE

1. Large Communities<sup>1</sup>
  - population
  - monthly pumpage (where actual data is unavailable estimates would be provided)
  - total annual pumpage
  - source (i.e. ground or surface).
  
2. Small Communities
  - population
  - rural population not located on census farm
  - annual water use (pumpage).

B. INDUSTRIAL WATER USE<sup>2</sup>

(by sub-basin)

- source of water (i.e. ground or surface)
- monthly intake pumpage
- annual intake pumpage.
- % of pumpage for oil injection
- SIC code
- water discharged.

C. AGRICULTURAL

1. Non-irrigation information:

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<sup>1</sup> Communities which have ever had a census population of 1,000 or more since 1951.

<sup>2</sup> Self supplied (private) water systems only.

- farm population by sub-basin
- livestock population by sub-basin.

## 2. Irrigation:

### a) district irrigation (by sub-basin)

- irrigable area
- net water used
- water transferred between sub-basins.

### b) private (by sub-basin)

- irrigated area
- net water used.

## D. POWER

### (by sub-basin)

- monthly generation data
- annual generation data
- type of power station (i.e. hydro, thermal)
- name of station
- flow data.