

upon which precipitation falls, and, consequently, care should be taken to conserve vegetal cover; more especially is this necessary for rocky areas which have but scanty soil covering.

"Third, subsoil waters are by no means inexhaustible. Plant growth is dependent upon having available an adequate amount of soil moisture. Nothing should be done to deplete, unduly, the ground-water storage. Effective legislation and administration should be provided governing the tapping of underground water supplies.

"Fourth, the use of water for irrigation tends materially to increase the permanent settlement of the country. Consequently, in most instances, when irrigation requirements and power requirements conflict, the former are entitled to precedence. Hydro-electric power developed on somewhat distant streams may, by means of high tension transmission, be used for pumping water supplies where such are not available by gravity, and may thus facilitate irrigation development.

"Fifth, not infrequently navigation interests are regarded as of much greater importance than power development. Any works contemplated for the improvement of navigation should be considered in their relationship to river systems as a whole. Expenditures should be carefully watched and precautions taken to ensure that improvements, so called, are not undertaken ostensibly for navigation, when in reality they are sought for the sake of such water-power benefits as may incidentally be developed thereby.

"Sixth, the fishing industry in British Columbia is one which demands that the best possible methods be used for its conservation. Provision requires to be made for the upward migration of adult salmon for spawning purposes, and the downward passage of the young fish to the sea. Obstructions, such as dams, rock slides, log jams, etc., may have a disastrous effect upon this industry. Fishways should be provided. The whole question of fishways requires thorough investigation. Other fish besides salmon require conservation. It is not established that satisfactory means have been devised by which fish may successfully ascend over high dams—even over dams which do not exceed twenty to thirty feet in height.

"Seventh, the development of the mining industry during recent years has resulted largely through electrical energy being available through the development of provincial water powers, and the future offers bright prospects for the further application of hydro-electric power to the various branches of this industry.

"Eighth, the pollution of inland waters must be jealously guarded against. Mining, factory and industrial wastes and sewage must not be permitted to foul inland waters. Debris and other waste resulting from logging operations are apt to cause serious log jams, which are a menace to public highways, bridges and also to power development.

"Ninth, the tourist traffic is a valuable provincial asset, not only because of the money actually spent by travellers, but because of the opportunity afforded of drawing attention to the various natural resources of the province. Consequently, every reasonable care should be taken to guard against the spoiling of shorelands through submergence; and further, care should be exercised in the design and construction of power works, making them, where possible, monize with the general natural features of their surroundings.

"Tenth, in connection with the use of boundary waters, problems, from time to time, may arise necessitating consideration by the International Joint Commission. In this connection, therefore, it is especially desirable that physical data appertaining to such waters should be so collected as to be available for use in connection with such problems as may arise respecting waters which are classed in the Boundary Waters Treaty as boundary waters."

2. Water-Power Data

Chapter 2 states that "one of the chief objects in securing and publishing data respecting water powers, is to enable the owners of rights to determine the possibilities and limitations of their powers and thus arrive at sound judgment

respecting their possible uses and value. Another object is to enable prospective promoters to learn the general possibilities of various powers without the necessity of making costly independent, preliminary surveys. Certainly, if the Crown be the owner of water powers, it is of the utmost importance that it be informed beforehand upon essential facts connected with its water resources."

This chapter cautions investors against proceeding with developments without sufficient knowledge of physical and economic governing factors. The author cites a number of cases in the United States where financial losses have resulted from power developments. The summary of this chapter is as follows:—

"First—Governments have been bestowing increasing attention upon the investigation of inland water resources and, during recent years, Canada has made great advancement in this work. Such work is essential in order to acquaint interested parties with the possibilities of the powers with which they may be dealing.

"Second—A number of factors, such as character of use, uniformity of flow, the making of but partial development in a manner prejudicial to future complete utilization, failure rightly to differentiate between primary power and secondary power, etc., have been noted and attention drawn to the necessity for reckoning with such factors.

"Third—Hydrometric data extending over a sufficient period of time should be available, and conclusions involving important procedure should not be predicated upon scattered and insufficient records. Topographic maps should also be available.

"Fourth—Those interested from the standpoint of the investor may, by the expenditure of ordinary effort, place themselves in a position, independently, to check and form a judgment respecting some of the basic engineering factors involved in any power project under consideration.

"Fifth—Failure rightly to assemble or interpret essential physical data, has been responsible for many serious failures, and has resulted in great financial loss.

"Sixth—No reliance should be placed upon general statements setting forth the existence of vast undeveloped water powers. The total amount of water power capable of economic development is much less than popularly assumed and most of the valuable sites are already under development or control by various interests. Attention has been directed to the concentration of control of water powers as proceeding rapidly in the United States, and the need has been pointed out that those interested in the conservation of our water powers should be alert to see that the same menace to public welfare does not operate in Canada. Much of this concentration of control has taken place during a time when general statements representing the existence of large reserves of potential water power were being presented to the attention of the public and were receiving general acceptance.

"Seventh—The importance of storage has been pointed out, and the possibilities of storage causing damage to riparian owners has been emphasized. Government provision for a flowage easement along the shores of lakes and rivers, would to some extent protect settlers against loss, and would protect the government itself against claims for damage by overflow."

3. Water Legislation

British Columbia possesses one of the most comprehensive water codes in the world. This code has been a gradual evolution from the mining regulations, growing out of the first mining activities in the province. The whole water law of the province is reviewed in Chapter 3, where more than 80 separate enactments have been carefully analysed in order to show their contribution to the water code as it today exists.

The present law deals with the utilization of water for mining, municipal and industrial purposes; irrigation; lumbering operations; water power; and many other purposes. British Columbia is the owner of the water in its inland streams and lakes. This water is leased, under certain conditions of rental, etc., for a term of years. The present provincial Water Act is a voluminous document of some 300 sections. It is a noteworthy measure and vests in the gov-