

14 THE FUNCTION OF RESERVOIRS – THEIR MONITORING AND EVALUATION

Water acts in many countries state that the most economic use should be made of water resources according to the needs and interests of society. Capital must be invested rationally and therefore optimum water-management operation must be ensured.

An indispensable condition for the perfection of projects and the control of all operations is the systematic processing and assessment of technical and economic experience gained from existing water schemes and the verification of the project (design) parameters.

To verify and assess quantitatively the planned water-management function of a reservoir, a large sample of various technical and economic data must be studied. There are still certain shortcomings in the studies of the technical characteristics of reservoir operations; however, the greatest difficulty is in the assessment of the economic consequences of the water-management function of a reservoir, or other water resources.

The aim of the study and assessment of reservoir operations is

- to gain data for the comparison of the real and designed (planned) water-management functions of a reservoir, or a system of reservoirs;
- to obtain data for the improvement of operating rules and to improve the efficiency of a reservoir by effective operating schedules and guides;
- to facilitate decisions concerning changes in a reservoirs function or operations of already constructed multipurpose reservoirs or systems;
- to help improve the planning and design of new reservoirs;
- to gain information about the impact of a reservoir on its environment;
- to gain experience of operations during planned maintenance and repairs of hydrotechnical structures (e.g., the technological devices for the outlets and spillways);
- to obtain data to determine the compensation for the water released from a reservoir or river, where a reservoir makes this release possible;
- to obtain data for the economic assessment of the benefits from reservoirs, mainly to substantiate the designed reliability of storage and flood-control functions.

These sets of characteristics that should be studied can be divided into the following groups:

1. The basic sample which makes it possible to study, in chronological order, the quantitative relationships (basic reservoir tasks) and the water-quality indices related to the purpose of the reservoir. Indispensable for quantitative assessments are data on the inflow to a reservoir (including diversion), outflow to the stream channel downstream of the reservoir, and on the water volume in a reservoir, as well as on other components of the total balance such as the effect of precipitations on the water level, evaporation from the water level or losses by seepage. The water-quality indices must be watched carefully when deciding the way of release, the amount to be released and the time of release.

2. The supplementary sample, concerned with operative measures and the raising of the efficiency of a reservoir. These are mainly hydrological or meteorological characteristics which help to forecast the inflow to a reservoir, e.g., precipitations in a catchment area, temperature of the atmosphere, the change of the hydrological regime of the river upstream or downstream of a reservoir, discharge-travel time of different flows, etc.

3. Sample of economic effects resulting from reservoir functions. Most attention should be paid to exceptional situations, such as period of limited supply, profound water supply failures, occurrence of floods causing damage, etc.

Of great importance is

- the relation between the degree of water supply reduction and the economic damage resulting from this limitation (bearing in mind the duration and extent of the limited supply, occurrence in time, etc.),
- the determination of economic damage caused by extensive water supply limitations,
- the relation between the exceedance of a non-damaging discharge and the respective flood damages.

Besides the above-mentioned samples of characteristics to be studied, other specific investigations can also be important, e.g., the non-planned or intangible effects of reservoirs.

The processed and verified results of the investigation of reservoir operation then help to judge the reservoir function correctly from technical, economic and social points of view.