

Hydrological Sciences of the 20th Century – A Retrospective

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A brief look back at the hydrological sciences of the 20th century will be undertaken. The dual nature of hydrology, being an Earth science on the one hand, and the scientific basis of water management, on the other hand, has shaped the developments.

Sources of progress in hydrological sciences can be seen as:

- responding to essential gaps in knowledge and understanding (challenging cognitive research areas);
- responding to burning utilitarian needs, where new solutions may bring large tangible benefits.

One can forecast future developments (or explain past progress) of hydrological sciences by extrapolation of observed trends and anticipation of future (therein external) inputs. The latter refers to dynamic technological developments, and in particular computer (hardware and software) technology, and remote sensing.

Barriers to development will be examined, some of which are endemic and unavoidable, due to the data availability problems, complexity of processes and feedbacks, lack of general theories, irregular and heterogeneous environment, low signal-to-noise ratio, and very limited possibility of active experiments.

For most of the 20th century, a single-input single-output approach was dominating, which was found adequate in studying such problems as transformation of effective rainfall into river runoff, flood routing, infiltration, or sediment transport. Flood frequency analysis was a strong interest area, with the aim to guide selection of adequate distribution.

A feature dominating in the 20th century was the compartmentalization of hydrological sciences. There were infrequent attempts of coupling compartments, and inter-disciplinary studies. Now, interfaces with other disciplines are being increasingly sought, leading to better integration of sciences. Among strong growth avenues are: global hydrology, climate-water interface, and water-environment interface.

Brief review of milestones in hydrological sciences of the 20th century will be undertaken. Dissemination of results, including assessment of citations to hydrological literature will be discussed. In perspective, many publications reflect esoteric investigations, driven by “dissertability” concerns, “publish or perish” principle, or short-living fashions.

Hydrology has aided humans in solving water-related problems, which used to be less intense in the past, due to lower population and water demand. Now, water problems, such as. flood protection, water for food, water for environment, water quality, became more widespread and urgent. Hence importance of hydrological sciences is on the rise.