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PLANNING AND MANAGEMENT OF FIELD EXPERIMENTS IN ENVIRONMENTAL HYDRAULICS

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Abstract:

Environmental Hydraulics is an applied science that deals with the problems of water environment, such as of water quality, ecosystem etc., from a view point of fluid dynamics in terms of water motion and mixing, hydraulic force, heat and mass transport and so on. Because chemical and biological processes are also essential in environmental phenomena, Environmental Hydraulics must be to some extent "interdisciplinary", where the interaction of those processes with the process of fluid dynamics is discussed. Because Environmental Hydraulics is to offer solutions of existing environmental problems or possible measures for environmental conservation, the studies are essentially "practical", where the description of facts and their relations existing and functioning in the field is the most concerned.

For the reasons above mentioned, one of major means in researches of Environmental Hydraulics is field experiments that supply us the facts to find the mechanism of the interactive processes existing in the field. However, the experiments are not straightforward: First of all, it often includes the measurements of chemical and biological factors as well as hydraulic terms, and these measurements must be arranged properly in order to find the relation among them. In the design of experiments, you must take into account the unsteady and non-uniform aspects of the processes that are common in environmental phenomena. And finally, your plan must be practical under the condition of money, time, and manpower that you can employ

This keynote lecture presents the techniques, know-how, skills, theories or principles (now, terminology is indifferent) for planning and managing field experiments. The first half is about how to enlarge the world of measurements. In a field study, you should learn "what you want to know cannot always be measurable". Then, you must try to speculate what you want to know from what you can measure. The most fundamental and the most important tactics for the speculation is "use of correlation". The last half is devoted to describe how to compose individual measurements to realize an effective and economic field experiment. Here, two kinds of operations called "monitoring" and "maneuver" are introduced with some examples.