PREFACE

Efficient management of water and land resources is required to increase and sustain crop productivity in arid areas. The main sources of water to farmers are precipitation, canal water, and ground water. Surface and ground water resources must be managed to supplement erractic rainfall by coordinated (conjunctive) use of surface and ground water supplies. Through conjunctive use, additional water resources can be obtained from water storage, distribution, and treatment.

Integrated use of surface and ground water- commonly termed conjunctive use- is now recognised as a significant stategy for the optimum utilisation of regional water resources, especially when demands are increasing and available resources are limited. However, several physical, technical, economic, institutional, social, legal and environmental constraints usually exist when implementing an efficient and sustainable conjunctive use programme for a given situation. For instance, with reference to irrigated agriculture, it is difficult to devise satisfactory operational policies that recognise the interactions between surface and ground water use by farmers, irrigation canal diversion by system managers representing the government agency, and the physical response of the stream aquifer system. The task is made more complex by various uncertainties and risks involved in the process. There is a need to satisfy the basic objective of economic efficiency (e.g. maximise benefits or minimise costs) while controlling environmental quality (e.g. waterlogging, water quality degradation, land subsidence) and maintaining the required level of service to meet the water demand.

Systems approach and its framework of mathematical models, has long been used in analysing conjunctive use problems. Several modelling approcahes, such as linear programming, dynamic programming, simulation, hierarchial or multilevel optimisation, and combined optimisation-simulation have been used by various authors. Too often it is found that projects fail to achieve objectives because of inadequate planning, as a result of which ad-hoc decisions have to be made on many unanticipated problems during system management. A comprehensive approach to planning that is constant with the operational objectives would give an indication of the feasibility of achieving efficient and effective conjunctive-use management.

This issue of 'Jalvigyan Sameeksha' is devoted to main theme of "Conjunctive use of Surface and Ground Water" and invited papers have been contributed by the authors covering various aspects like Waterlogging, Modelling, Water Management and case studies. It is hoped that the views expressed by the authors would be useful and would also lead to better planning and management of available water resources.

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