Systems Thinking
In
Fair Water Resources Allocation

A Research Seminar by

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PLENARY TALK

Abstract—Systems thinking approaches are employed to construct a formal decision making methodology for equitably allocating water among competing users in a river basin when taking into account both the societal and physical systems aspects of the allocation problem. In particular, within the societal component of the decision problem, multiple participants, their multiple objectives, equity principles, and economic factors are considered, while the physical systems part reflects relevant hydrologic and environmental factors. The Cooperative Water Allocation Model (CWAM) incorporates these societal and physical systems concerns within the framework of a large-scale optimization program which is divided into two main steps. Firstly, water is allocated among users based on existing legal water rights regimes or agreements. Secondly, water and associated benefits are reallocated among stakeholders to maximize basin-wide welfare. CWAM is applied to the South Saskatchewan River Basin located in the Canadian province of Alberta to demonstrate how it can be conveniently applied to a water allocation system of systems problem.

REFERENCES

Keith W. Hipel is University Professor of Systems Design Engineering and Coordinator of the Conflict Analysis Group at the University of Waterloo. He is Senior Fellow at the Centre for International Governance Innovation, President-Elect of the Academy of Science (Royal Society of Canada), and Chair of the Board of Governors at Renison University College. His major research interests are the development and application of conflict resolution, multiple objective decision making and time series analysis techniques from a system of systems engineering perspective. Keith is the recipient of the Japan Society for the Promotion of Science (JSPS) Eminent Scientist Award, Joseph G. Wohl Outstanding Career Award from the IEEE Systems, Man and Cybernetics (SMC) Society, IEEE SMC Norbert Wiener Award, Docteur Honoris Causa (France), and Sir John William Dawson Medal (Royal Society of Canada).