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CHALLENGES IN USING DECISION SUPPORT TOOLS IN WATER MANAGEMENT

M. Dinesh Kumar, Ph. D

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CHALLENGE NO. 1: LIMITED UNDERSTANDING OF THE BEHAVIOUR OF COMPLEX WATER RESOURCE SYSTEMS

- Groundwater-surface water interaction: very little knowledge about the contribution of groundwater to lean season flows in rivers and how increased groundwater withdrawal affects the same in different geological settings
- Irrigation return flows: very little knowledge about the fraction of the water applied to irrigated fields that reaches the groundwater system under different geohydrological settings
- Land use hydrology: limited quantitative understanding of how land use changes would affect runoff generation and groundwater recharge in catchments
- Non-point pollution: limited understanding of the groundwater pollution effects of fertilizer and pesticide use
- All these mean, feeding incorrect data in the model and producing false results







CHALLENGE NO. 2: LIMITED EMPIRICAL DATA FOR MODELLING

- On the physical side, there is very little reliable data on a wide range of parameters that are commonly used as input variables in model algorithms
 - Evapotranspiration from forests, grass land and swamps
 - Evaporation from barren land
- On the socioeconomic side, very little data on the user behaviour
 - Price elasticity of water demand and income elasticity of water demand in the domestic sector
 - Water use behaviour in response to supply restrictions (volumetric rationing)
 - Actual water demand for irrigation Vs normative demand
- On the technology side, very little understanding of how various agricultural water management technologies (sprinklers, drips, mulching, etc.) alter water consumption by crops





CHALLENGE NO.3: LIMITED CAPABILITIES OF MODELS

- Often, models are too simplistic to simulate complex socioeconomic processes
 - For example, assuming a linear relationship between per capita income and per capita water demand
 - Assuming that current water use rates are a reflection of the demand for water, especially in crop production
- Models are built with too many assumptions to simplify complex system behaviour so as to make the problem-solving easy. For example:
 - The assumption that the entire (vertical) return flow from irrigated fields end up in the aquifer, with a conveyance efficiency of 100 per cent
 - The assumption that the entire runoff from the upper catchment reaches the last drainage point, without transmission losses irrespective of the soil and climatic conditions



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CHALLENGE NO. 4: POOR UNDERSTANDING OF THE WORKING OF THE MODEL

- Often the users have poor knowledge of the algorithms that the model uses, and end up putting too much faith in the model predictions, without putting caveats!
- It also means users feeding the wrong data in the model:
 - For example, increasing the reservoir capacity in response to increasing inflows, but without changing the carrying capacity of the conveyance system.
- Poor knowledge about the working of the model (model algorithms) also means limited ability to explain the model outputs and draw correct inferences



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