CHALLENGES IN USING DECISION SUPPORT TOOLS IN WATER MANAGEMENT

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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

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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

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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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