Neglecting hydrological errors can severely impact predictions of water resource system performance

Water resource modelling system that neglects errors (traditional approach)

Simulated climate and weather → Hydrological model (*Rainfall*, *ET*, *Flow*) → Deterministic predicted streamflow → Water resource system model → **Water resource decisions** based on predictions that **neglect** hydrological errors

Key Question
Does neglecting errors impact on water resource decisions?

Water resource modelling system that accounts for errors

Hydrological errors (predicted vs observed) → Error model to simulate predictive errors → Probabilistic predicted streamflow → Water resource system model → **Water resource decisions** based on predictions that **account** for hydrological errors

Study develops a framework to answer question for a wide range of water resource system properties

Results

Neglecting hydrological errors can significantly impact on water resource decisions, including:

- Over-estimating yield by 15%-55%
- Design risk under-estimating actual risk by ~2-30 times

Magnitude of impact of errors on water resource decisions

- Varies by catchment
- Increases for smaller water resource storage
- Increases for more extreme design risk

Practical Impacts

- Traditional approach of neglecting hydrological errors leads to over confidence in water resource decisions
- Risk-based water resource decisions need to account for errors to avoid over confidence
- Traditional streamflow-only performance metrics (e.g. NSE) provide little indication of impact of neglecting errors

Further Info:

Conference Presentation Video:
Thyer et al (2024): https://doi.org/mrg8

Open Access Journal Paper:
McInerney et al (2024): https://doi.org/mrdg

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