Representing Small- Scale Storage Interventions Across the Cauvery Basin

Background

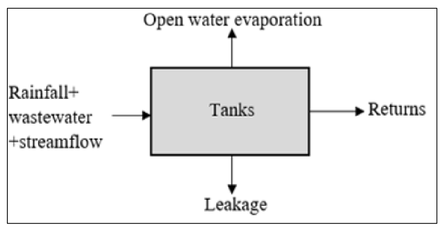
- In Peninsular India millions of small-scale water storage interventions have been built throughout the last century.
- Interventions are designed to retain surface runoff to increase soil moisture and enhance the recharge of groundwater.
- Although individually small, cumulatively these interventions may have large effects on basin hydrology.
- The effects of interventions on basin-wide hydrology is poorly understood.
- The Cauvery Basin lies across the states of Karnataka (KAR) and Tamil Nadu (TN).
- There are four main types of interventions in the Cauvery Basin (Fig 1).

Figure 1: Interventions in the Cauvery Basin

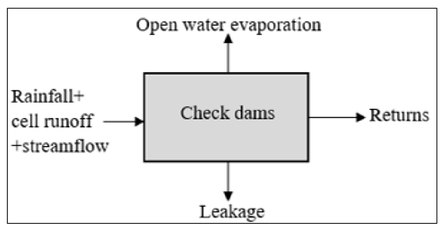
Methodology

- The GWAVA* Model was used to determine the effects of interventions on the streamflow and evaporation in the Cauvery basin.
- Four types of interventions (Fig 1), reservoirs and water transfer schemes were included in the model.
- A spatial dataset was available for the tanks in the states of KAR and TN.
- District- wise structural investment data was only available for KAR.

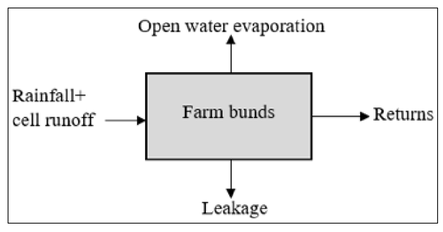
Urban and rural tanks → Cauvery waterbodies dataset** → Isolation and extraction of "tanks" → Application to modelling grid → Tanks within the bounds of urban areas were identified as urban tanks.



Check dams → District- wise Structural Investment Report for KAR → Estimation of the number of check dams constructed in KAR → Relationship drawn between the number of check dams in KAR and the stream density in each district → Extrapolation to TN using regression



Farm bunds → District- wise Structural Investment Report for KAR → Estimation of the area of farm bunds constructed in KAR → Relationship drawn between the area of farm bunds in KAR and the crop land in each district → Extrapolation to TN using regression



- The streamflow, evaporation and flow days were analysed in two catchments (1- Non perennial catchment in KAR and 2- a perennial catchment in TN) and the basin outlet for 2002 (Drought year) and 2005 (Wet year).

Results

- The interventions have a larger effect on the streamflow at the catchment scale (Fig 2).
- The interventions have a greater effect on the evaporation at the basin scale.
- The interventions have a greater effect in the non- perennial catchment.
- The change in streamflow and evaporation in drought and wet years at the catchment scale is similar.
- The interventions significantly effect the evaporation in the drought years at the basin scale.
- The interventions reduce the flow days most significantly in the non- perennial catchment in the drought year (Table 1).
- The large reservoirs in the basin absorb the intervention signal and thus the streamflow at the basin outlet is minimally effected by the interventions.

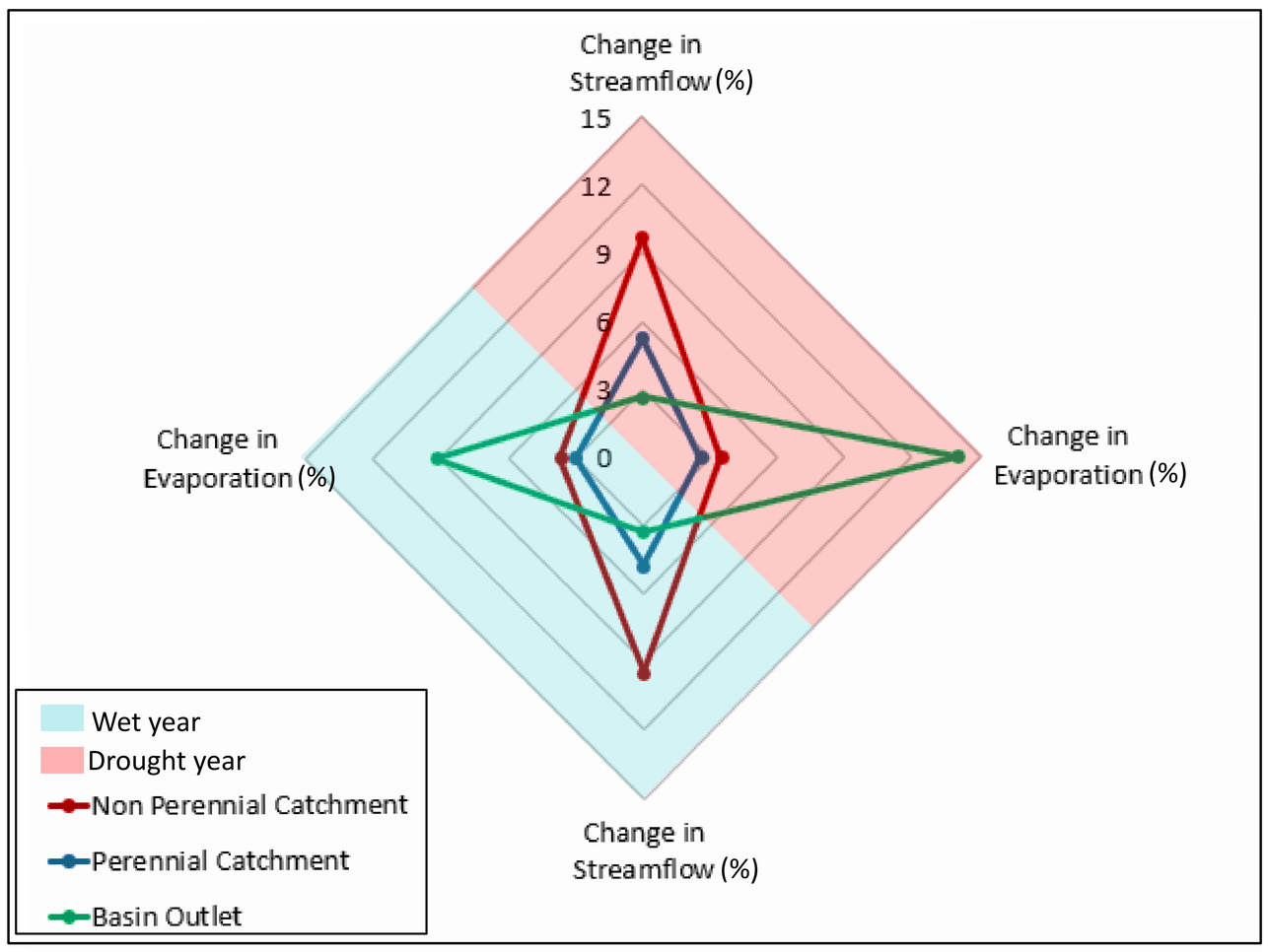


Figure 2: The percent (%) change in streamflow and evaporation with the inclusion of interventions.

Catchment	Drought year	Wet year
Non- perennial	25	3
Perennial	4	3
Outlet	0	0

Table 1: Reduction in flow days with inclusion of interventions

Robyn Horan[1] (rhoran@ceh.ac.uk), Pawan Wable[2], Veena Srinivasan[3], Helen Baron[1], Virginie Keller[1], Kaushal K Garg[2], Nathan Rickards[1], Gwyn Rees[1] and Helen Houghton-Carr[1].

[1] UK Centre for Ecology and Hydrology, Wallingford, United Kingdom.
[2] International Crops Research Institute for the Semi-Arid Tropics, Patancheru, India.
[3] Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, India

*Global Water AVailability Assessment

** provided by ATREE

UK Centre for Ecology & Hydrology
atree
Newton-Bhabha Fund
NERC SCIENCE OF THE ENVIRONMENT
ICRISAT INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS