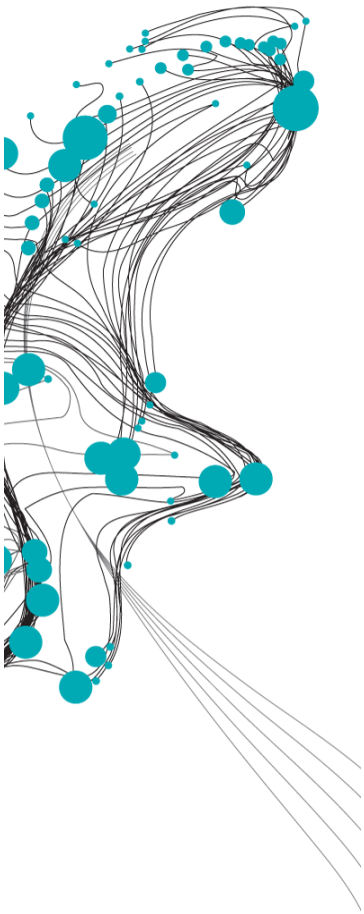
# SETTING BLUE WATER FOOTPRINT CAPS FOR IRAN'S WATER RESOURCES



Feeding the growing population mainly occurs at the cost of overexploiting limited water resources in many regions of the world which consequently results in intensifying water scarcity. Setting blue water footprint caps (BWCs) may help with limiting such an overexploitation. In this research, we carried out a water footprint assessment to set caps on Iran's surface and groundwater water resources.

In this regard, monthly/annual blue sustainability levels were first determined by assessing blue water scarcity (BWS) and EFR violations in order to see to what extent the current environment is violated in Iran. Thereafter twelve scenarios were formulated for setting cap options according to four demand fulfilment levels (DFLs = 100%,85%,75% or 60%) and three monthly surface water caps (SWC = maximum, average or minimum $BWA_{SW}$). BWC options were split into SWCs and groundwater caps (GWCs). To address spatial and temporal variability in BWAs, each cap option was established for each province at monthly scale. The trade-offs: [1]between satisfying blue water demand and preserving environmental flows; [2]between violating surface water resources and constraining groundwater resources were consequently quantified (figure1). Finally, a set of appropriate provincial caps were selected among twelve scenarios by assessing the quantified trade-offs.

The assessment showed that 53% of surface water runoff ($BWR_{SW}$) and 75% of groundwater recharge ($BWR_{GW}$) should be allocated as $EFR_{SW}$ and $EFR_{GW}$ respectively. Nevertheless, the results indicated that the hotspots of Iran increased from 9 to 20 provinces during the study period. Among three assessed consumption sectors (agriculture, industry and domestic), the agricultural sector was always the first contributor of total EFR violations, which accounts for more than 90%.

Applying 75% DFL is shown to be a BWC option with 95% annual demand being satisfied for most provinces in Iran. This BWC option also has been chosen as an appropriate BWC for most provinces except provinces that are facing quite severe BWS and quite moderate BWS. Water-scarce areas require a stricter cap, while water-rich areas can establish a relatively looser cap. Groundwater resources contribute more to the total blue water supply for most of the provinces under the chosen caps, and both surface water and groundwater resources can be largely preserved under such caps.

Uncertainties are inevitable because of the natural variability of blue water and the method variabilities. Applying local-fit EFR methods and establishing a more feasible cap-option system can be the main focus of future studies.

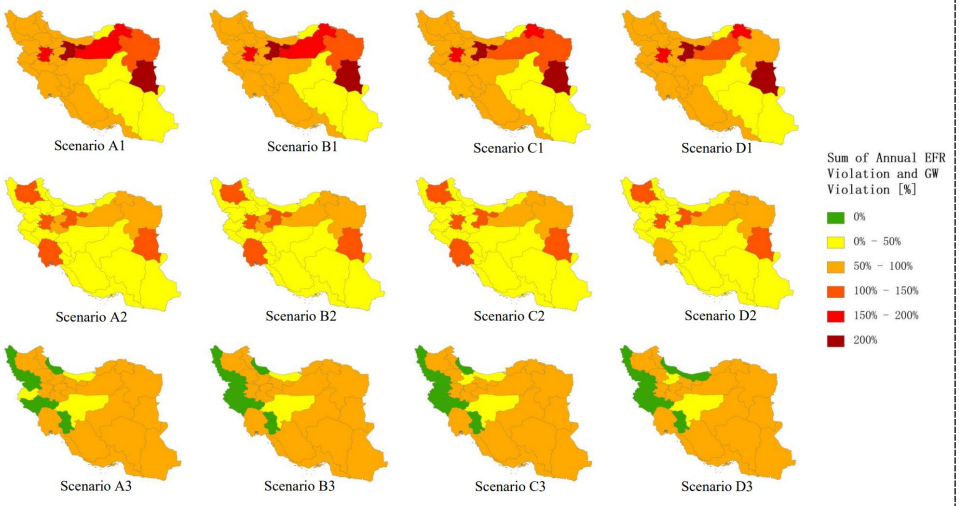



*Figure 1: Spatial distribution of the summation of annual $EFR_{SW}$ and $EFR_{GW}$ violation under 12 scenarios during the study period of 1981-2015*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