

India: Water Challenges Statement - Illustrative

		Scenario / Impact	Cause	Policy / Management? [√]
Supply/ Source side	Ground Water	Water Scarcity in North-western States	Indiscriminate extraction /decline in water tables; Inland salinity	Free/ Subsidised Power; No/ Poor regulation on GW extraction; Improved irrigation practices
		Water scarcity: Western states	Arid: Low recharge with low rainfall.	Water conservation- IWM; Crop diversification; Revival of traditional water structures; Artificial GW recharge; Community participation
		Water Stress/ scarcity in Central India States (Bundelkhand region).	Geo-morphology / Hard rock formation with meagre discharge/ High runoff.	Poor regulation of GW extraction; Artificial recharge of ground water; Rainwater harvesting; Improved demand management measures
		Water Stress/ Scarcity : Southern States	Hard rock formation/ Limited yields / Poor storage	Poor regulation of GW extraction; rainwater harvesting / artificial recharge/ watershed Mgt / rejuvenation of tanks /demand management through improved irrigation practices; Technology for aquifer identification.
		Shallow Water tables in Eastern States	Underutilisation, Poor crop intensification; Poor farmers; Small & fragmented landholdings; Poor (/no) power supply	Crop intensification; Solar energy; Conjunctive use of SW & GW
	Surface Water	Decline in base flow in non-monsoon in Peninsular rivers.	Over Extraction of GW Inadequate afforestation & Water conservation	Water conservation; Artificial Recharge; Afforestation
		Flow of large runoff into sea	Inadequate reservoir storage	Tank rejuvenation ; Small Water Harvesting; Aquifer storage & recovery (ASR) in flood plains; Induced recharge

	Coastal zone	Mixing of saline water; Sea water intrusion	Tidal fluctuations; Cyclone/ Storm Surge induced forced recharging	Forestry, soil, mangroves in coastal areas
	Tanks & Wetlands	Encroachment / ruin; Degradation of Watershed	Human factors / Socio-economic issues	Regulation; Conservation/ rejuvenation; Augmentation
	Springs	Drying ; obstructions	No inventory, Human factors and Climate change	Conservation; Revival Demand side management
	Wastewater	Underutilisation of Waste Water	lack of water treatment plants; underutilisation of capacity; Poor maintenance & poor enforcement	Enforcement of regulation; Recycling; ZLD, Use of treated sewage in Industry & Agriculture
	Precipitation	Droughts	Low rainfall, intense evaporation; Inadequate Storage	Resistant/ Tolerant crops; Conservation- Revival of Traditional Water bodies; Control of evaporation; Conjunctive use of SW & GW
		Floods and erosion	Uneven distribution of rainfall in time & space frame, inadequate capacity of drainage system, unregulated development of flood plains, Inadequate flood storages	Construction of Storages with Flood Cushion, Flood Plain Zoning legislation, Integrated Reservoir Operation for Flood Management, Extensive Flood Forecasting & Warning System, Contingency plan.
Demand side	Drinking Water	Less-availability of safe DW	Stress / Scarcity at source; Poor Measurement, capital intensive infrastructure for water treatment plant, Leakages, In efficient technology.	Investment for piped supply; Water saving /efficient Technology; Water Pricing;
	Farm Sector	Irrigated: Largest consumer; Poor WUE	Inadequate storage; Seasonal shortages Rice, Wheat, Sugarcane, Cotton are in 60 M.Ha against total irrigated area of 87 MHa.	Water efficient farm Management- Precision Irrigation
		Rainfed: Droughts	Extremes of Water availability	On farm Management- Less water consuming crops

	Industry	Poor WUE; Inadequacy in supply; Closure of Industries	Poor technology; Poor recycling Location in water scarce areas;	High WUE; Water Audits & Budget; Recycling
Quality	GW and SW	Pollution / Contamination:	Geo-genic & anthropogenic; Inadequacy-Measurement & Regulation	Strict Enforcement; Transparency; ex-situ treatment
	Drinking Water	Deteriorating Water Quality- Physical, Chemical and Biological	Geo-genic & anthropogenic contamination; Poor regulation	Strict Enforcement; Transparency
		Contamination: Sewage	Poor Water supply infrastructure and maintenance; Inadequate and ineffective treatment facility	Use in Agriculture/ Industry
	Farm Sector	Deteriorating Water Quality; Salinity	Irrational application of Fertilizers, Pesticides etc; poor farm management practices	Drainage policy, Soil test / Science based Chemical applications
	Industry	Contamination of Industrial effluents SW and GW	Poor monitoring, regulation and enforcement	Recycle, ZLD, Enforcement Wastewater treatment, Limiting use of fertilizers; Regulating discharge Support to MSME
Climate Change	Source	Glaciers, Springs- Melting/ Drying.	Raising temperature	Research & Inventory
		Salinisation of Coastal Areas; Making fertile agriculture fields unfit for cultivation	Raising sea level/ Sea water inundation / cyclones	Afforestation Sub surface water harvesting structures and bio-drainage
		Precipitation-Variability- Spatial and Temporal		
Institutional	Water Governance	No control on consumption exceeding availability	State Subject; GOI: only advisory role; No Single Agency for coordination	State Water Budgeting; Gender mainstreaming

	GW	Absence of ground water cell in most states and UTs. Hydrogeologists etc. are missing.	Inadequate appreciation of value of GW	Policy; Regulation; participatory management; adaptation measures
	Measurement/ Assessment	Poor monitoring of resource availability (supply) and consumption (demand)	Measurement is almost nil Except Reservoir, Rivers & Ground Water resources	Measurement-statute
	Regulation	Water Regulatory Authority- Ineffective / Do not exist	No measurement; Improper use of water in different sectors	River Basin Organisation (RBO)
Infrastructure	Dams & Reservoirs	Dams and CAD - Many are old; Safety Inadequate reservoir storage capacity Poor maintenance	Poor maintenance; Siltation Poor management etc.	Need for effective organisational structures; Investments
	Canal network	In efficient conveyance	Poor maintenance; Poor management etc.	
	Wells and Tube wells	Inefficient pumps	Small and marginal farmers & Households	
	Drinking Water	Universal Piped water supply- still far away, leakages, technology, STP etc		
Technology • Planning • Conservation • Augmentation • Use • Efficiency	Farm Sector	Poor distribution / canal conveyance	Mostly not piped, High ET losses	Policy and investment
		Precision irrigation area is very less	Mostly flood irrigation.	Promotion policy and incentivisation
		Mismatch of Cropping pattern for water availability	Social responsibility	Lack of empowerment with water status info. ; Optimal cropping pattern with low proportion of water guzzling crops;
		High Chemicals usage	Laissez faire approach	Regulated use of Fertilizers, Pesticides et
	Industry	Less WUE /Water saving / efficient	Weak Measurement; Water in-efficient technology	Water Audits Regulation on effluents

			No Water Audits	
	Drinking Water	Leakages; Less WUE /Water productivity	Water saving technology / containing leaks	investments
Economics	Value for resource	Not valued; Wastage	Not priced on measurement; Less research. Legislation: Easement Act?	Coordination with MHRD
Financing	Investments	Inadequate investments; No private instment	Non-completion of projects in time leading to cost and time overrun. Non pricing of water.	Policy; Water Budgeting
Transparency	Data Resources Funds	No data transparency in Supply, Demand and Quality	Poor measurement systems; No data transparency in Supply, Demand and Quality	Transparency in Water sector
Democracy	Public empowerment	No ownership; WUA –not much successful Lack of awareness	No real empowerment	Participatory Irrigation Management (PIM).
Conflicts		Between sectors; Between: urban and rural areas Between States Undermining wider social benefit	Absence of evidence based allocations	River Basin Organisation (RBO) & Integrated Water Resource Management (IWRM)
Benefits / Services		Wide gap in IPC & IPU (112.53-89.26 MHa)	Leakages in distribution/ conveyancing, Seepage, Method (Flood) of irrigation; Poor Management system / Scheduling; Low Investment	Incentivisation for piped network, Improvement in infrastructure, operational policies
		Sub-optimal Water Use Efficiency- Wastage	Inefficient (unlined/ unpipd) water distribution system	Improved Technology, /water distribution system, operation rules/policies
		In-equitable across the sectors	Laissez faire approach	No single agency

Note: Experts are invited to review and suggest improvements.