

## FACT SHEET – INDIA CASE STUDY

### Socio-economic context

#### Agriculture

The agricultural sector contributes significantly to the Indian GDP and employs about half the population, although its share has been declining over time. The sector is also responsible for 80% of India's groundwater use. {3.1}

#### Poverty

The overall poverty rate grew by 1 p.p., reaching 23% in the last ten years, with 30 million people falling below India's poverty line. Rural poverty rose 4 p.p. in 2012-2018 to 30%, while urban poverty decreased by 5 p.p. to 9%. {3.1}

#### Food insecurity

India is home to a quarter of the world's undernourished people. The issue is highly concentrated in certain states and districts. While per capita income tripled in the 21st century, the minimum dietary intake fell in average terms. {3.1}

### Climate change risks and impacts

#### Droughts

In the last 4 decades, India had a major drought at least once every 3 years. Drought-prone districts comprise 42% of cultivable lands. Almost half of the population suffer from high to extreme water stress. By 2030, 40% of Indians may lose access to drinking water. {4.1}

#### Precipitation

The southwest monsoon rainfall (75–90% of the total annual precipitation) has been decreasing, which led to severe water shortages and lost crop yields. The delayed monsoon in 2012 increased the energy demand for irrigation, resulting in hydropower shortages and blackouts. {4.1}

#### Migration

Between 2008-2021, 53.4 million were internally displaced by disasters. Farmlands all over India are becoming water-stressed climate change hotspots. Environmental factors act as a "threat multiplier" for pre-existing socio-economic issues, indirectly impacting migration decisions. {6.1}

### Water and irrigation sector

#### Governance

The integrated national program for water management Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has two objectives: to extend the irrigation coverage 'Har Khet ko pani' and improve water use efficiency 'More crop per drop'. PMKSY was launched in 2015 for ten years. The authorities overseeing water and irrigation collaborate at the central, regional, and local levels. {5.1}

#### Present state of irrigation

From 2005 to 2016, the country improved the national average of irrigation coverage from 50% to 64%. Still, there is vast regional heterogeneity. The increase is driven by Madhya Pradesh, Orissa, and Gujarat, while other states (Tamil Nadu, Kerala, West Bengal) are lagging behind. One reason for variation is that states with enough precipitation stick to rainfed cropping systems. Another one is the constraints imposed by groundwater endowments and availability of public funds.

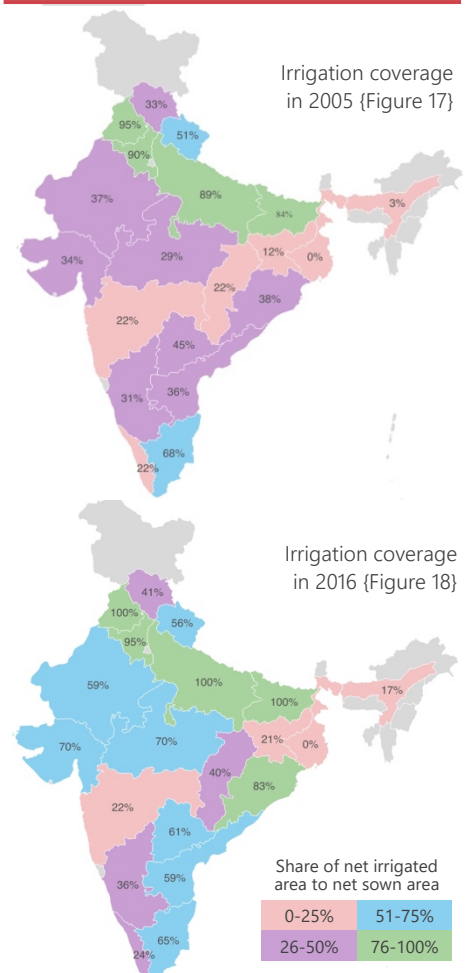
#### Micro-irrigation

Micro-irrigation entails the precise, low-pressure application of water on the root zone of plants. The PMKSY considers it as a central component for its positive impact on resource saving, cultivation cost, crop yield, and farms' profitability.

Only 93 Mha of the existing 112 Mha irrigation potential is utilized. Overall, the average irrigation efficiency was estimated at 38%. Irrigation structures are often neglected, which is in part attributed to insufficient funds generated from water, due to its low price, and the absence of control and monitoring structures.

So far, India has only realized 14.8% of its micro-irrigation potential. Across states, its implementation has been uneven, with Rajasthan, Andhra Pradesh, Maharashtra as leaders. Micro-irrigation systems are often too complex and/or expensive for farmers to build and maintain. {5.3}

For large irrigation projects, extreme cost escalations of up to 35 times from the original plan are common. Many projects remain under construction for decades but are never completed. {5.2}



**Irrigation as an Adaptation Strategy for Climate Change:  
A Comparative Case Study of India and Tajikistan**

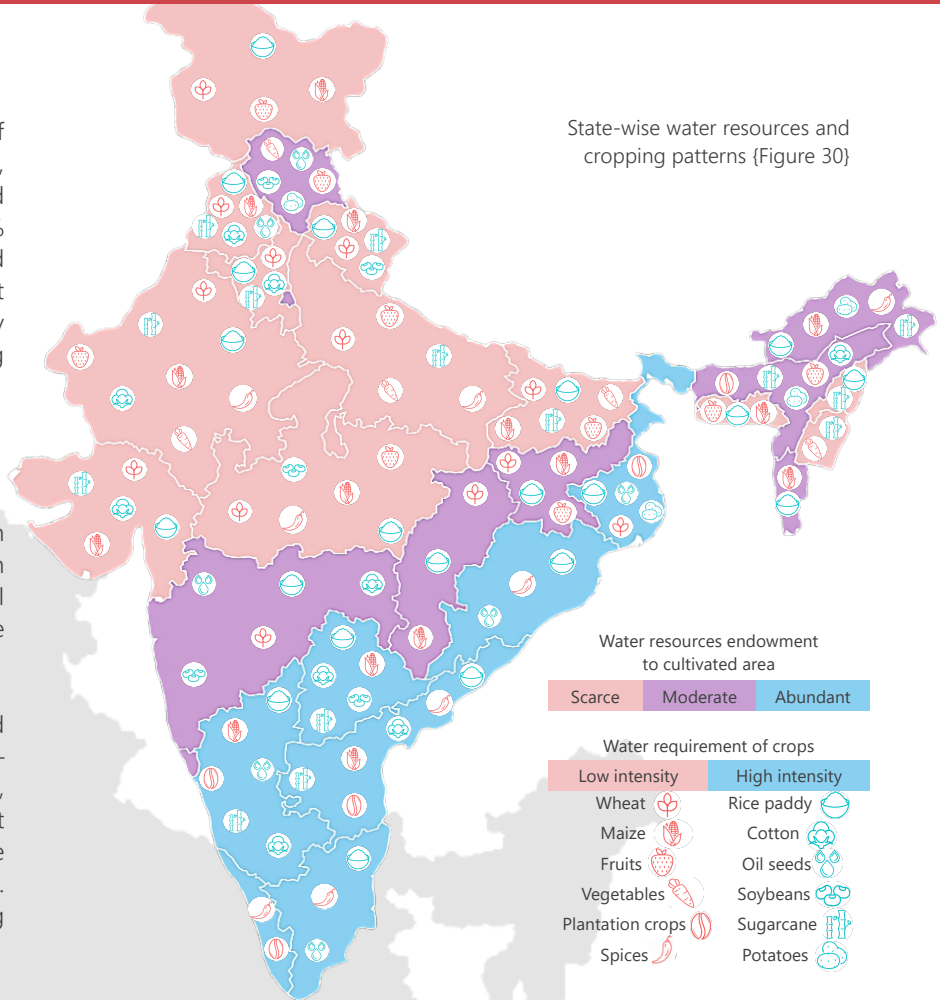
 **Groundwater depletion**

States with the most critical overexploitation of groundwater resources – Punjab, Rajasthan, Haryana, and Gujarat – belong to the most irrigated regions of India, with irrigation coverage above 70% as of 2017. Other states with highly overexploited groundwater are Tamil Nadu and Karnataka, that have lower irrigation coverage but still rapidly deplete their groundwater resources during prolonged severe droughts. {5.6}

 **Irrigation and cropping patterns**

Differences in irrigation development across Indian states are driven in part by climate-related variation in irrigation demand, and partly by regions’ financial and institutional capacities. Another reason is the structure of crop production.

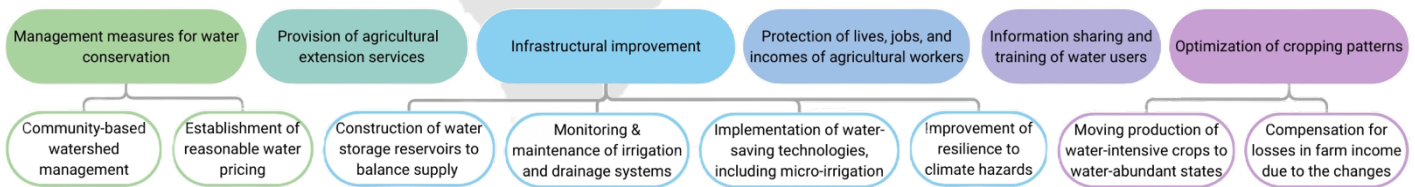
The most water-intensive crops – rice, wheat, and sugarcane (90% of India’s agricultural production) – are cultivated in water-stressed regions: Karnataka, Maharashtra, Tamil Nadu, Punjab. Water-abundant states (Odisha, Jharkhand, Chhattisgarh) produce spices and plantation crops with low water demand. The imbalance of water availability and cropping patterns contributes to water depletion. {5.6}



**Ways forward for irrigation management**

 **Balancing water supply and demand**

The main direction for sustainable irrigation management in India is to reconcile water supply and demand across the country’s regions. One of the ways is through consolidated efforts of all agencies concerned with water, land, and climate to encourage water conservation and effectively manage the financial performance of the sector. A financially sound and effectively managed irrigation sector can generate the funds required for infrastructural development and investment in irrigation efficiency, which is crucial, since many high-performing irrigation technologies – such as micro-irrigation and precision farming – are quite costly to implement. These funds can also be employed for the provision of agricultural extension services, as well as setting up information sharing and training schemes for water users. {7.1}



 **Participatory irrigation management**

While the Indian government has taken steps towards Integrated Water Resource Management, the water and irrigation sector still relies mainly on large-scale, centralized water management schemes. The establishment of financially stable and transparent water governance systems that involve stakeholders at all levels may be highly beneficial for balancing water supply and demand throughout the country, especially given that India’s limited water resources are already becoming depleted. Strengthening the performance of local water institutions and water users’ associations is a viable way of improving water delivery, increasing crop yield with greater crop diversification, increasing farmers’ income, and improving the financial sustainability of irrigation systems. {7.2}