

# Strategic Analysis Paper

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## Drought and Water Security in India

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### Key Points

- India faces national water scarcity by 2050 if current trends continue.
- States that usually have surplus water, such as Latur and Uttarakhan, currently experience acute water scarcity.
- Two consecutive drought years have served as a catalyst to long-standing water mismanagement issues.
- Poor infrastructure, a lack of legislation, inefficient farming and inadequate sanitation has contributed to the mismanagement of the country's water supply, which is arguably the main factor in India's water crisis.
- Falling water levels will adversely affect the agricultural industry, which is almost entirely cereal-based and therefore extremely water intensive.

### Summary

If current trends continue, India is set to become a water scarce country in the not too distant future. While drought addled farmers pray for a renewed monsoon season and a kinder summer, the problem goes beyond drought and immediate weather conditions. A rapidly increasing population and the expanding middle class have driven up demand, while years of pollution, inefficient farming, decentralised governance, groundwater exploitation and poor infrastructure have depleted the water supply. Indian officials are now tasked with the job of attempting to conserve a previously unregulated natural resource as it quickly becomes a politicised source of contention for different groups within society.

## Analysis

A population becomes “water stressed” when water levels fall to 1,700 cubic metres per capita, and “water scarce” when water levels fall to less than 1,000 cubic metres per capita. Two years of consecutive drought, an incidence that has only occurred four times in the last 150 years, has exacerbated India’s water stress. By 2050, it is forecast that India could come close to being water scarce. The issue of water security is double-sided. Firstly, India suffers from an absolute water shortage; there is simply not enough safe water to satisfy the rapidly increasing population and the rapidly increasing demand as a result of an expanding middle class. Secondly, India is mismanaging the way water is produced, consumed and distributed.

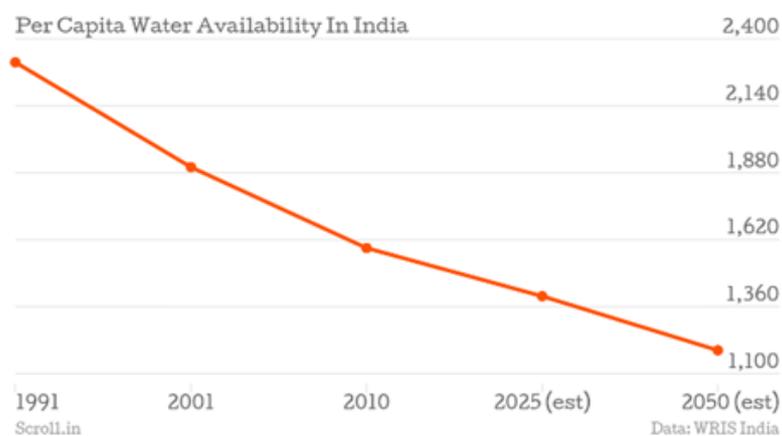


Figure 1: Per Capita Water Availability in India (Source: WRIS)

### Water Insecurity: Causes

#### Agriculture

Between 85 and 90 per cent of all water consumed in India is used by the agricultural sector. Farmers seeking alternative water sources to the seasonal monsoon have become reliant on groundwater, which has now become subject to a typical “tragedy of the commons” situation. There are now over 25 million groundwater blocks in India, but many of these are under threat. Legislation, or a lack thereof, has allowed farmers to extract groundwater at rates faster than the resource can replenish itself and approximately half of all groundwater blocks are now no longer “safe” (see Figure 2), meaning they have become too saline or polluted for human or agricultural consumption.

Renewed attempts to regulate the resource have largely failed. Farmers, who form a large portion of the voting population, have long been accustomed to subsidised energy and water pumps. Accordingly, governments have ignored the issue or introduced “toothless laws”. These laws maintain an illusion of groundwater governance by establishing regulations regarding the resource, but provide no avenue or method of enforcement.

The agricultural sector also contributes to rising water insecurity through its inefficiency. A lack of education and financial resources has prevented farmers from obtaining “[more crop per drop](#)”. Maharashtra is a good example of this as its sugar belt takes up only four per cent

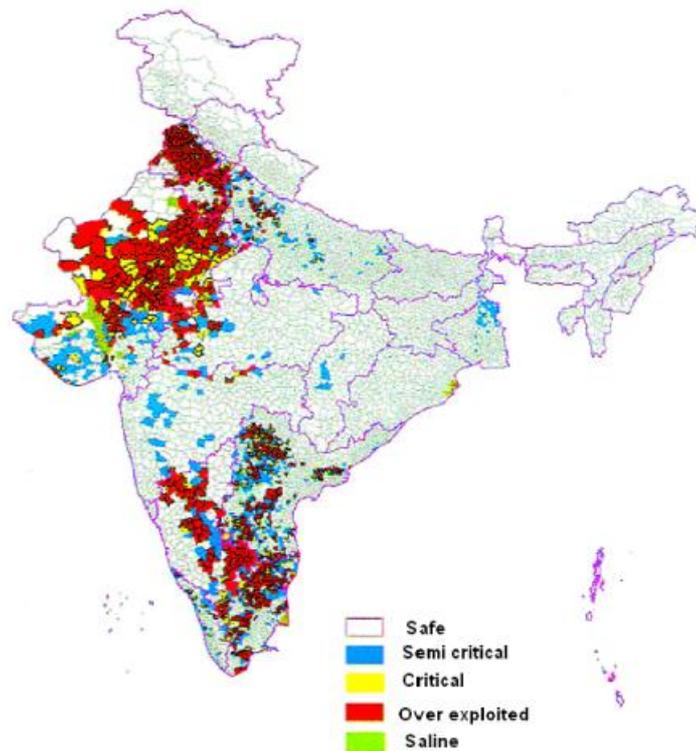


Figure 2: Groundwater Stressed Areas of India (Source: Planning Commission India)

of farmland but consumes over 70 per cent of the state's irrigation water. In general, India has a crop bias towards cereals that, more often than not, are extremely input intensive. An unwillingness to diversify farming, engage in more efficient forms of irrigation or farming (the use of fertilisers or drip irrigation systems) has left major irrigation networks in India operating at [38 per cent efficiency](#).

#### *Non-Revenue Water*

Non-Revenue Water (NRW) refers to the difference in the volume of water distributed to consumers and the volume of water that actually reaches consumers. Ultimately, NRW is the water that is physically lost (through leakages or poor infrastructure) or apparently lost (through incorrect metering and theft). The national NRW average for India is 20 per cent, although the figure is questionable due to limited data. In areas such as Delhi and Goa, the NRW average is more than double the national average. Ageing and poorly constructed infrastructure are no doubt the major causes of NRW in India, although theft and corruption are playing an increasingly bigger role in the issue. The majority of water sold on the black market in Delhi is suspected to be sourced from the public water grid, creating artificial water insecurity. This can be equally as dangerous as legitimate water insecurity, as it still results in acute thirst, with the only difference being that it is concentrated among the poor.

#### *Pollution*

Up to 80 per cent of all surface water in India is polluted. Poor sewage treatment facilities, little public sanitation, poverty, industrial runoff and a lack of government regulation are all

to blame. “Incredible India, drowning in its own excreta” has become a popular slogan among environmental activists, and is almost entirely fitting of the situation in India as untreated sewage is the major cause of water pollution. Water pollution has long been an issue, but soaring temperatures in the summer and sporadic monsoons have served as a catalyst to bacterial growth in water, further reducing the amount of safe water.

### **Water Insecurity: Impacts**

Water is the lifeblood of the agricultural industry in India; without it, farming cannot function. A struggling agricultural industry means the threat of unemployment for approximately 50 per cent of India’s workforce, as well as implications for food security and human security, which paves the way for a potentially disastrous downward spiral.

#### *Latur: A Case Study*

The above situation may have already begun to occur in drought stricken Latur. The region is currently experiencing an acute shortage of water, with less than ten per cent of water sources remaining. As a result, the local economy of many farming regions in the state have nearly collapsed and a health crisis has since ensued. With bore wells being dug deeper into the ground (where the risk of dangerous chemicals and poisons contaminating the water is high) and locals having no choice but to access sources of water known to be polluted, health levels have deteriorated. The past month has seen incidents of fever, infection, dehydration, vomiting and kidney ailments double in one of the state’s major hospitals. Without adequate water supplies, hospitals have been unable to perform surgery unless it is an emergency. Likewise, standard hygiene and sterilisation practises before, during and after surgery have been forgone while post-operative infections and complications are now on the rise. Without water, much of the farming industry has come to a halt, creating both food insecurity and mass unemployment, while citizens flock to cities in search of jobs, adding pressure to already stressed infrastructure.

#### *Violence, Conflict and Politics*

The relationship between environmental stress and conflict is complex, while not causative in their relationship, they are still inherently linked. The diminishing water supply is now a source of tension between rival groups; it can be used as a weapon, or as a tool of manipulation or coercion. Members of the Jat caste used water as a tool to further their political agenda, cutting off the water supply to Dehli in protest over job quotas that excluded their caste.

Water has been politicised in Dehli. Nangloi Jat, a rich town that supports a number of prominent Jats in the central government, receives 59 gallons of water per person a day, whereas poor villages nearby with little political affiliation receive less than a gallon of water per person a day.

The rise of the tanker mafia is more distressing. The tanker mafia refers to private tankers selling water to citizens at premium prices, which has most likely been sourced illegally. In Bhopal, located in the state of Madhya Pradesh, the tanker mafia has exhibited gang like characteristics, bullying locals who have contested their prices, refusing to service the poor

despite their willingness to pay, resulting in widespread fear, violence and occasionally death.

### Continued Drought

The people and government alike seem to have placed their hope in the next monsoon. The Indian Meteorological Department (IMD) has confirmed an “above normal” monsoon is likely for 2016, as rainfall is likely to be 106 per cent of the 89 centimetre per annum average. Chances of drought are one per cent this year, which is also particularly promising given that the chance of drought is normally 16 per cent. The onset of the La Niña period is also generally enabling for rains, with 70 per cent of all previous El Niño periods in India being followed by above normal monsoons.

The 5 category probability forecasts for the Seasonal (June to September) rainfall over the country as a whole is given below:

Category	Rainfall Range (% of LPA)	Forecast Probability (%)	Climatological Probability (%)
Deficient	< 90	1	16
Below Normal	90 - 96	5	17
Normal	96 -104	30	33
Above Normal	104 -110	34	16
Excess	> 110	30	17

Figure 3: Monsoon Forecast (Source: IMD)

While the upcoming monsoon will likely bring heavy and much needed rains, the amount of actual relief the monsoon will bring to the impending water crisis in India is questionable. Heavy rains, and even flooding, will assist in replenishing groundwater, rivers and dams, as well as allowing for successful crop yield. Madhavan Rajeevan, working for the Ministry of Earth Sciences, has warned otherwise, stating that ‘while poor monsoon affects agriculture severely, good monsoon don’t [sic] produce proportionate positive effect on agriculture’. Rajeevan sheds light on a growing reality in India; the people and farmers cannot become entirely reliant on the increasingly erratic monsoon season. Monsoonal rains are not distributed evenly across space and there is simply no way to predict or foresee whether monsoonal rainfall will disperse itself across farmland or flood specific areas while ignoring other regions. Furthermore, [multiple studies](#) have suggested that there is a possibility that monsoonal rainfalls may begin to exhibit declining rainfall over time.

Even if monsoonal periods were to remain consistent and display heavy rainfall, current data shows that water supplies have been consistently declining during normal monsoonal periods over the last two decades (see Figure 1). The root cause of the problem goes far beyond drought. Drought has exacerbated water stress in India, and has most definitely acted as a catalyst for a water crisis, but water mismanagement is arguably a more pronounced factor of the impending water crisis.

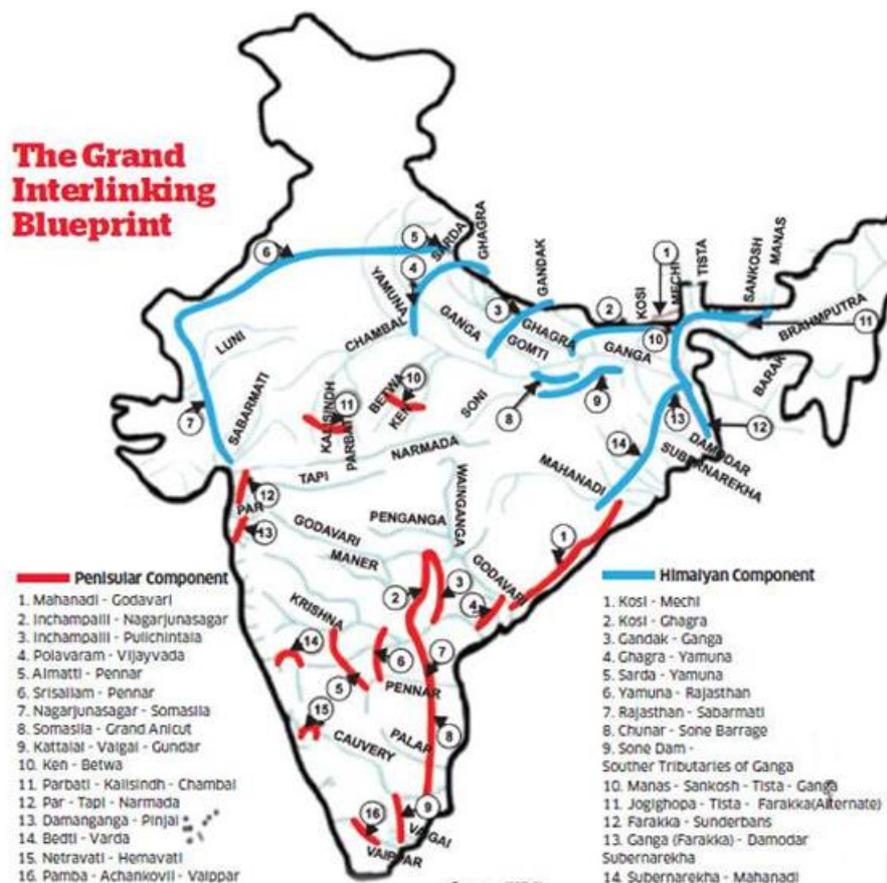


Figure 4: The National River Linking Project Blueprints  
(Source: Institute of Water Management India)

## Modi's Plan

### National River Linking Project

Introducing a project that has been rejected by parliament for the last three decades, Prime Minister Narendra Modi's response has been considered controversial. Announced by Modi in 2014, the National River Linking Project (NLRP) aims to equalise water flow by connecting surplus rivers in flood prone areas to deficient rivers in drought prone areas and thereby create a steady and consistent flow of water throughout the whole of India. The project will see over 30 river links created between Himalayan and Peninsula basin rivers (resulting in the construction of canals stretching approximately 15,000 kilometres), which will irrigate 35 million hectares of land through increased surface water and an additional 10 million hectares of land through recharged groundwater reserves, while also generating 34,000 megawatts of energy. The whole project is expected to cost at least US\$168 billion (\$244.5 billion) and take approximately 14 years to complete.

The concept of linking rivers is not uncommon, China introduced a similar project over a decade ago, which is now in its final phase, however, it has never been attempted on such a large scale before. At least 580,000 civilians are expected to be displaced as a result of the

Peninsula component alone, according to a submission published by the Consultative Group for International Agricultural Research. Furthermore, the project poses a threat to natural eco-systems spanning the Indian sub-continent; floods and droughts, while creating devastating human impact, still play a role in servicing their respective eco-systems. The physical construction of the canals and links also pose a threat, particularly the Ken-Betwa Link, which could compromise eight per cent of forestland in the Panna National Park, a protected tiger reserve and an environmental sanctuary.

The project's feasibility has attracted a great deal of criticism from scientists and activists alike, Dr Latha Anantha from the River Research Centre (India) has attacked the lack of scientific basis behind the project, arguing that mass human displacement and eco-system destruction will take place on the flawed basis that rivers are like "controllable pipes". Multiple scientists have reiterated this same sentiment - that there is simply no science to confirm such a huge river linking project will work in reality, be worth the environmental and human displacement it will cause, or the money it will cost.

Environmental and scientific issues are not the only potential barriers to the NLRP. Arguably, the biggest barrier will present itself in regionalism. The NLRP seeks to create a national river basin, when no national consensus has been sought. River disputes have long been present in India, and the NLRP has only exacerbated these issues. Punjabi landowners have used bulldozers to fill in an unfinished canal that would have taken water from the Sutlej River to the neighbouring state of Haryana, while Karnataka and Tamil Nadu remain locked in a bitter dispute over the Cauvery River, which will likely escalate when construction begins.

Furthermore, neighbouring countries that share river flow with India are beginning to express concern. Bangladeshi scientists, for instance, have estimated that even a 10–20 per cent decrease in water flow could induce mass drought and destruction in Bangladesh's farming region, where 80 per cent of farmers are dependent on water that flows through India. China, like Bangladesh, shares multiple rivers with India, but unlike Bangladesh, is not bound by a water treaty in any way. This is potentially problematic, as the Brahmaputra River is an important component in both China's and India's river linking projects. The river originates in the contested territory of Tibet, and both China and India have scarcely made attempts to discuss the river's future, an issue that could potentially intensify Sino-Indian border tensions.

Evidently, the NLRP faces many challenges. While the first completed link (the Mahandi–Godvari link) has so far been well received by locals, a likely outcome of this project cannot be predicted this early on, particularly as the project moves northward toward the Himalayas, where more environmental and political issues will be present.

The NLRP cannot be relied upon as a sole solution to the impending water crisis in India. Given the multi-faceted nature of the water crisis, perhaps it would be wise for Modi to ease the pace of the NLRP and distribute resources more equally in multiple concurrent programmes to counteract water scarcity in India.

Alternative Policies

While Modi’s major focus has been enlarging the nation’s water source, this is not to say he has entirely ignored the alternatives, such as conserving the nation’s water source through increased efficiency.

The Soil Health Card Scheme was introduced in the 2015 Budget. The scheme evaluates the soil of each farm involved and then produces a card that contains recommendations on which fertilisers to use to maximise crop output, which crops are best suited to the soil and how to improve the quality of the soil. Results have not yet been seen, as the scheme is still in its early stages, but the outcome so far looks promising.

In 2016, the Agriculture Ministry introduced a drip irrigation scheme in 64 farming districts, which increased water and energy efficiency significantly (see Figure 5). Little has been done, however, to expand or continue the scheme in other districts. Expanding the scheme would have increased water efficiency in agriculture, while simultaneously assisting with food security and easing the financial burden on farmers.

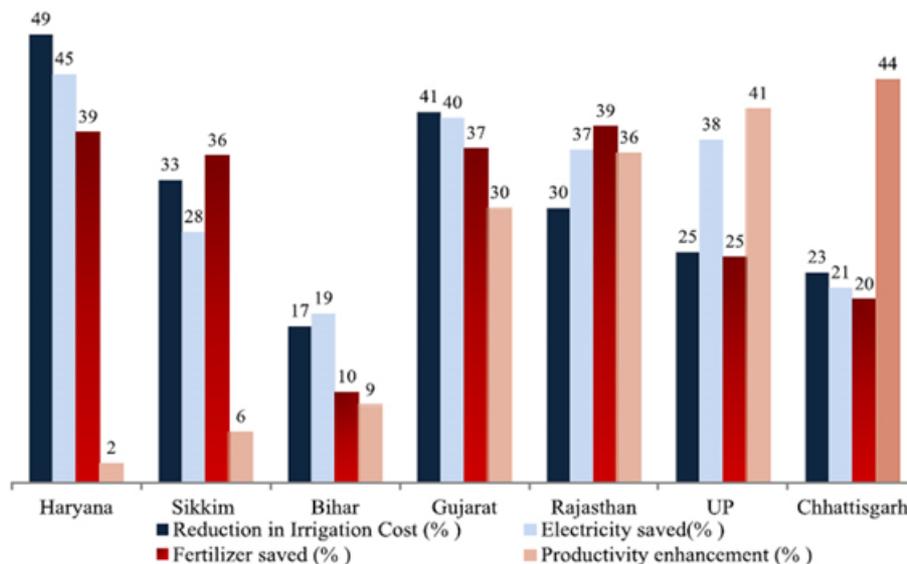


Figure 5: Drip Irrigation Results  
(Source: Department of Agricultural Research and Education)

The Modi Government has also tried to tackle the issue from a social perspective (as opposed to an agricultural perspective) through the *Swachh Bharat Abhiyan* (Clean India Mission). The mission involves the construction of close to 100,000 latrines in rural India, where only 14 per cent of households have access to latrines, in a bid to reduce sewage runoff into local water sources. While close to 80,000 latrines have been constructed, their usage has been limited, with many villagers still preferring to defecate publicly, due to a lack of education and social awareness programmes in rural communities.

Although not a major policy, it is also clear that Modi may be exploring water diplomacy and water business as an avenue of relief for India’s water crisis. The Modi Government has expressed interest in Israel’s water management systems and technologies, presenting India

as a potential investment option for the growing international water business. Denmark and Japan have also expressed interest in assisting India with its high level of NRW. Rajiv Mittal, CEO of VA Tech Wabag, has [predicted](#) that India could become one of the biggest markets for desalination and wastewater treatment companies in the near future.

## Conclusion

It is quite clear that India's water stress is a multi-faceted issue and can therefore be tackled from a number of different perspectives. Ultimately, the key lies in multiple synchronised solutions, equally funded, and operating at all levels of society. The Modi Government, while on the right track, has so far underestimated the value of alternative policies. The NLRP, at this point in time, remains an unpredictable and somewhat idealistic project. Long-term investment in educational programs, social awareness campaigns, improved infrastructure and facilities, and water diplomacy directly respond to the root causes of water stress in India and, therefore, are more reliable solutions. Unfortunately, resource stress can often escalate political pressures, often leaving governments grappling for quick fixes and easily palatable solutions. Only time will tell whether or not this becomes the situation in India.

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