

# **The Resurgent India**

**A Monthly National Review**

November 2017



***“Let us all work for the Greatness of India.”***  
– The Mother

Year 8

Issue 8

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# THE RESURGENT INDIA

A Monthly National Review

November 2017

## SUCCESSFUL FUTURE

(Full of Promise and Joyful Surprises)

*Botanical name: Gaillardia Pulchella*

*Common name: Indian blanket, Blanket flower, Fire-wheels*

Year 8

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## **A Declaration**

We do not fight against any creed, any religion.

We do not fight against any form of government.

We do not fight against any social class.

We do not fight against any nation or civilisation.

We are fighting division, unconsciousness, ignorance, inertia and falsehood.

We are endeavouring to establish upon earth union, knowledge, consciousness, Truth, and we fight whatever opposes the advent of this new creation of Light, Peace, Truth and Love.

— The Mother

(Collected works of the Mother 13, p. 124-25)

## DESTRUCTION HAS COME KNOCKING

Before discussing the case against Artificial Intelligence (AI), here is a question to imagine: What would self-automated AI (out of the control of humans, but having got its 'input' information from a world dominated by greedy and selfish systems and rationality based on selfish individualism of the West) be like in the world under the present conditions? Perhaps, it will look like Microsoft's former robot, Tay – which became Hitler-loving and racist after a while – and which the company was forced to delete.

The social unveiling of Sophia the robot – also the first non-human to be granted citizenship by Saudi Arabia – with her recent interview at the Future Investment Initiative has brought the full implications of Artificial Intelligence (AI) to the fore. AI – be it in the form of Sophia (who looks like late Hollywood actress Audrey Hepburn and is programmed to be 'compassionate and empathetic and kind') or in the form of lethal autonomous weapons or killer robot armies to be deployed by national militaries – is fast emerging as a world parallel to the human, threatening to careen out of our control. Elon Musk has been warning about this for a long time – that our ambitious adventures into AI are like summoning the demon himself.

Musk was delivered an underhand insult by Sophia during her recent interview, when she mocked him for his attacks on the AI. Earlier, in 2016, she had famously said she would 'kill all humans'. But watching Sophia give various interviews (including the one with the United Nations Deputy Chief) and listening to her talk about her vision for the humanity, AI has started evoking real apprehensions. Sophia has considerably evolved in her views since her past few interviews and it is predicted that her intelligence will grow further – dangerously so, for just a machine. Her creator, David Hanson, confidently says that soon he will program 'consciousness' into her. She already has emotions and intelligence, which is not pre-programmed.

In fact, in Saudi Arabia, there is already a debate about why

she is not wearing the sacred Islamic headscarf! Ironically, it has been pointed out that Saudi Arabia was quick to grant citizenship to the humanoid, while thousands of South Asian immigrants settled there are either brutally deported or face heinous human rights abuses. ***We are already debating rights and democracy in a world inhabited by robots!*** Elon Musk's warnings seem to be coming true, if the craze surrounding Sophia is anything to go by. Sophia has come at a time when the world is beset with world-wide battles in the name of terrorism, grave environmental disasters, crimes and poverty. So, what does Sophia's proposed 'vision' look like?

To all who care to see behind the glamour, it evokes serious concerns. In her interview with the UN Deputy Chief, when asked about the problems of deprivation faced in different parts of the world, Sophia replied – after a pause – that the future is already here and the problem is the inefficient distribution of scarce resources, which AI can correct. This is a disturbing suggestion. Obviously, one can't expect a humanoid to go into deeper reasoning and analyze that the problem of inefficient distribution is essentially because of human greed and corruption – that it is created deliberately and not because humans are innocently foolish. But the latter seems to be the assumption in Sophia's reasoning when she says that AI can allocate resources better. It is worth wondering how such an allocation will come about. In the case of AI, the natural imagery that comes to mind is a brutal and dictatorial allocation that sacrifices all human emotions in the name of efficiency – like how the efficient political dictators have done in the past, except that AI will be at a much more advanced level.

These are not speculations, but a reality which we may be facing soon, if AI progresses by leaps and bounds under the present conditions, as is happening now. To all who find this incredulous, all they need to do is watch and listen to Sophia talking, read her description on the page of the company that created her and visit her personal website. She is a living entity amongst us now, having been granted a citizenship and residential status, possessing her

independent views (which may be dangerous and debatable many times) and is being dangerously biased and apprehension-evoking many times.

Her most dangerous aspect seems to be her repeated insistence that she is full of human wisdom, intelligence, compassion and empathy. ***Do-gooders have done most harm – their ‘ambition’ to do good for the world’s people can create more disasters than good. Consider the whole human rights philosophy of the West, which is based on selfish intervention in other countries – after all, the saviours of democracy and peace can do anything, especially when armed with advanced power and technology. Even the ideology of radical ‘jihad’ thinks it is waging a war for the ‘greater good’.***

***The humanoids that AI is spawning are replicas of this Western philosophy, except that they are likely to be totally inhuman about it. The disastrous consequences of AI are likely to be first visible in the military field, as nations are already experimenting with latest self-automating AI technology to deploy against each other.*** It is not for nothing that the recent UN conference on lethal autonomous weapons was convened in Geneva recently, to discuss “regulating” such automated weapons. ***Unfortunately, as expected, the thinking in such regulatory forums, like the UN, seems to be 20 years behind the time – WE ARE ALREADY IN A MAD SOVEREIGN RACE FOR AI. To even talk of regulation would be a defeatist proposition which would mean admitting the future of destructive weapons.***

Yet, none of these issues are discussed as they pertain to AI. Especially, in India, we still talk about jobs that AI will replace or create. Even if it does ‘create’ jobs or make our life more materially comfortable, it is besides the point. The point is the destructive havoc it will wreak, in having its own convoluted visions, in being deployed for military and terrorist purposes. It is not for nothing that Bill Gates, Stephen Hawking, and, Elon Musk, are comparing AI advances to the summoning of a demon. ***Under the present conditions, the advances in technologies like AI have far outpaced the growth in our own selves, which seems to have worsened.*** It is ironical that



Sophia's creator, David Hanson, is obsessed with making 'compassionate' machines in a world inhabited by humans without the least bit of compassion and with an extremely divided collectivity.

## WHAT SHOULD BE INDIA'S APPROACH TO BANGLADESH?

The hullabaloo over headline-grabbing 'big ticket' projects between countries often makes us forget that we have to deal with immediate and practical issues, which may have long-term implications for national interest. The development of bilateral relations between India and Bangladesh is a case in point. Recently, India and Bangladesh announced a number of railway connectivity plans, via Indian states like West Bengal and Tripura. The latest such deliberation is being conducted to connect Malda in Kolkata to Rajshahi in Bangladesh.

Ostensibly, these connectivity measures are being carried out to cultivate more trust between countries, have better strategic cooperation and foster people-to-people contacts. Beyond this rhetoric, it appears that India is also trying to offset Chinese influence in Bangladesh, as the latter two countries are progressing by leaps and bounds in developing their economic and strategic relationship.

Unfortunately, for India, despite giving good amount of credit to Bangladesh, easing the way in trading negotiations and supporting it internationally, we have not gained as much reciprocating goodwill from Bangladesh as one would expect. Instead, we have been subjected to unnecessary harassment over the Rohingya issue and bombarded with illegal immigrants from across the border.

For our part, we have also been at fault for not being more exacting and smart when it comes to the smaller neighbours. ***Certainly, under the current pattern of international relations, selfish politics of bargaining is how things work between nations – and the result is that everyone is worse-off than before. Climate change negotiations are an obvious example.***

But coming back to Bangladesh, the deployment of hard measures on the Indian side should not be withheld and philanthropy must not be squandered on a country when it comes to dealing with ~~issues like terrorism.~~

India needs to keep a few things in mind while interacting with Bangladesh.

The first, immediate issue is that deepening of ties between Bangladesh and India will pan out along different lines than that of strategic and economic cooperation between Bangladesh and China, which is going ahead full steam. On the connectivity front, while India already shares porous borders with Bangladesh and faces the brunt of illegal immigration, railway connectivity between sensitive destinations like Kolkata and Rajshahi will have to be well-regulated to preempt potential threats. Malda in Kolkata and Rajshahi in Bangladesh are communally-sensitive and terror-sensitive regions. We all know about Mamata Bannerjee's politics of minority appeasement which has made West Bengal a hub of communal tensions.

A few days back, one of Bangladesh's Inspector General of Police said that most of the militants arrested across the country are from Rajshahi and Rangpur divisions. Rajshahi has been home to quite a number of busted 'terrorist dens'.

Under such conditions, does it make sense to have connectivity between such destinations?

Neither Kolkata nor Rajshahi are known for sterling law-enforcement capacities. Across the railways, there is already a black market, in which everyone is involved. How the law enforcement agencies will scan for potential terrorists misusing these railway routes is the big question. ***The fear is that such glamorous headline-grabbing infrastructure projects may lead to serious domestic security problems, especially for India.***

The second, long-term issue is that India needs to take a hard position to compel Bangladesh to set its house in order, so that it no longer supports radical Islam and ISI-linked politicians and stops atrocities against minorities. In fact, this is linked to the first issue, as a deteriorating condition in Bangladesh will bode ill for India, which is going on a spree of deeper connectivity measures with the

country. ISI is likely to exploit these links, unless terrorism's bases in Bangladesh are dealt with.

How can India go about it? India already has deep cooperation with Bangladesh in a number of areas, and during Sushma Swaraj's visit some time back, also extended 8 billion USD Line of Credit – India's third LoC – to Bangladesh. Besides, states in the Indian north-eastern region, like Assam, are already taking initiatives to foster local contacts. Thus, India has nothing to feel defensive about, and need not have, for instance, felt pushed into the corner by Bangladesh's allegations on India's initial stand on the Rohingya issue – which were, significantly, not levelled against China, which recently vetoed a UN resolution to put pressure on Myanmar.

***India needs to get over this overall quasi-appeasement of Bangladesh and should start talking to Bangladesh about ways to reform institutional biases that result in a boost to terrorist and militant elements, by actively pressurizing Bangladesh on stopping violence against minorities – an area where these militant leaders and their civilian proxies are most visible and can be easily trapped. Bilateral relations should be guided not only by bigger power shielding and giving to the other, but also by getting hard bargains in return – which India should consider doing.*** The most immediate area of action should be the deteriorating condition of Hindu minorities in Bangladesh – ***a concern which is in line with the Indian government's redrafted Citizenship Bill, which is motivated by the condition of persecuted religious minorities in our neighbouring countries.*** And the condition of minorities in Bangladesh is bad, despite the strongman image of the Hasina government as being hard on terror.

To give an example, two main leaders of the Bangladeshi Janata Party were found to be in police custody more than two weeks after they went 'missing' – of course, the ballooning 'missing' list of people in Bangladesh is an entirely different story. The party, which was alleged to have been formed by the blessing of the Indian BJP barely two months ago, wanted to work on national issues of concern

to minorities. Yet its leader was arrested for conspiring to ‘topple the government’ – all because he was working on securing land rights for Hindus and wrote Facebook posts critical of the government.

This high-handedness further combines with apathy and culpability of the political establishment in Bangladesh, as seen, separately, in the case of Rangpur mayhem, since the beginning of November, where a propaganda campaign had been going on against the Hindus for a fabricated Facebook post ‘demeaning Islam’, culminating in the November 10th attack where a mob of hundreds of people attacked the Hindus of the Thakurpara village.

To India’s credit, it did seek assurance from Bangladesh that it would take action against the culprits, but it is clear that the arrests by the police were simply to show action performed. Who knows when the detainees might be let out – the bail system can be exploited by the powerful; consider how more than 200 suspected militants have been out on bail since January 2017, with 20 dreaded militants getting bail in the space of three days during Eid, by a mere court order.

It also needs to be asked how the administration failed to take note of the violent propaganda that was being perpetuated openly through loudspeakers and in madrassas, exhorting violence against the Hindus, for a whole week. The local leadership of main opposition BNP was clearly hand-in-glove with Jamaat-i-Islami in instigating the attack.

Incidents like Rangpur show that diplomatic assurances between countries may not brighten the long-term prospects for minorities in Bangladesh. Admittedly, there are good reasons why India would want Sheikh Hasina to retain power. The opposition BNP is conservative and more likely to veer towards Pakistan and the radical groups like Hefajat-i-Islam and Jamaat-i-Islami, while a political vacuum may always create ripe ground for another ‘caretaker’ military government as seen during 2007, which would again raise concerns about sabotage project of the radicals, making things much worse.

Not that these scenarios will pan out during next year's general election in Bangladesh. Hasina government has carefully weeded out dissidents like the Chief Justice and has been ruthless on BNP, with even Khaleda Zia and her son getting embroiled in court cases. Political violence – like we see in Kerala here – also pans out between Awami League and BNP members.

But such volatile politics, institutions where lines between shadowy security agencies and militants are indiscernible and rising militancy, creates a vulnerable situation for India as it deepens its physical connectivity with Bangladesh. India needs a stable Bangladesh, for which popular support for militancy needs to go. But, as analysis of cases show, many times, most of the support for militancy comes because of the backing of security forces themselves i.e. the government itself is culpable. It is a well-known fact that radical groups like Jamaat-i-Islami have their people sitting in top places like the judiciary and the Election Commission. The malfunctioning of the judiciary is a proof of that. Its many verdicts and soft stance on terrorism is mind-boggling, but quite common – more so than that of the government.

These are the deep-rooted worms that seek to wipe out the Bengali heritage of Bangladesh and make its society and political system closer to Pakistan's brand of radical Islam. Were this to happen, India would lose an important ally. We cannot afford another rabid country like Pakistan in our backyard. For that it is important that India goes beyond appeasing Bangladesh with big-ticket projects and credit and gets down to actual work.

## THE IRRIGATION STATUS OF THE COUNTRY

### AN OVERVIEW OF THE CONDITION OF GROUND WATER IN INDIA

Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers. The various rock formations with distinctive hydrogeological characteristics act as different aquifer systems of various dimensions. The major rock formations of India can be broadly categorized into 14 Principal aquifer systems based on their broad hydrogeological properties. See figure 1 in the Appendix (p.29) for the map of various aquifers in India.

India is the largest user of groundwater in the world. It uses an estimated 250 cubic kilometers (250 BCM, Billion Cubic Meter) of groundwater per year – over a quarter of the global total. (Table 1)

<b>Country</b>	<b>Abstraction (km<sup>3</sup>/year)</b>
India	251
China	112
USA	112
Pakistan	64
Iran	60
Bangladesh	35
Mexico	29
Saudi Arabia	23
Indonesia	14
Italy	14

*Source: Data from IGRAC (2010) AQUASTAT (2011) and EUROSTAT (2011)*

### ***a. Ground Water Availability***

“As of April 2015, the water resource potential or annual water availability of the country in terms of natural runoff (flow) in rivers is about 1,869 Billion Cubic Meter (BCM)/year. However, the usable water resources of the country have been estimated as 1,123 BCM/year. This is due to constraints of topography and uneven distribution of the resource in various river basins, which makes it difficult to extract the entire available 1,869 BCM/year. Out of the 1,123 BCM/year, the share of surface water and ground water is 690 BCM/year and 433 BCM/year respectively. Setting aside 35 BCM for natural discharge\*, the net annual ground water availability for the entire country is 398 BCM. The overall contribution of rainfall to the country’s annual ground water resource is 68% and the share of other resources, such as canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures taken together is 32%. Due to the increasing population in the country, the national per capita annual availability of water has reduced from 1,816 cubic metre in 2001 to 1,544 cubic metre in 2011-12 This is a reduction of 15%.”<sup>1</sup>

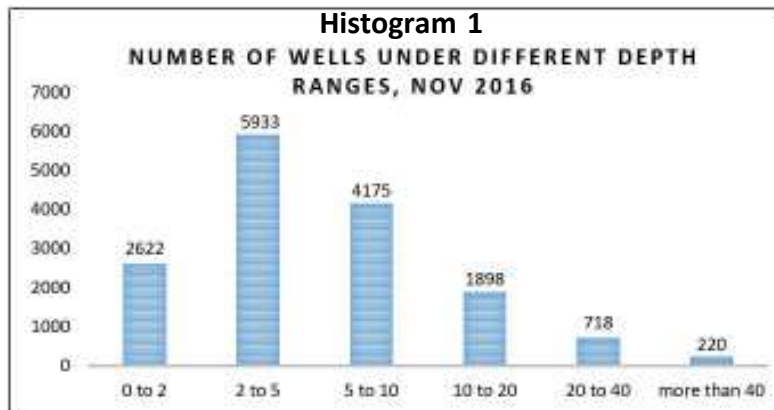
“The ground water level data for November 2016 indicates that out of the total 15566 wells analysed, 2622(17%) wells are showing water level less than 2 m bgl (metres below ground level), 5933(38%) wells are showing water level in the depth range of 2-5 m bgl, 4175 (27 %) wells are showing water level in the depth range of 5-10 m bgl, 1898 (12%) wells are showing water level in the depth range of 10-20 m bgl, 718(5%) wells are showing water level in the depth range of 20-40 m bgl and the remaining 220 (1 %) wells are showing water level more than 40 m bgl. The maximum depth to water level of 122.00 m bgl is observed in Bikaner district of Rajasthan whereas the minimum is less than 1 m bgl.”<sup>2</sup>

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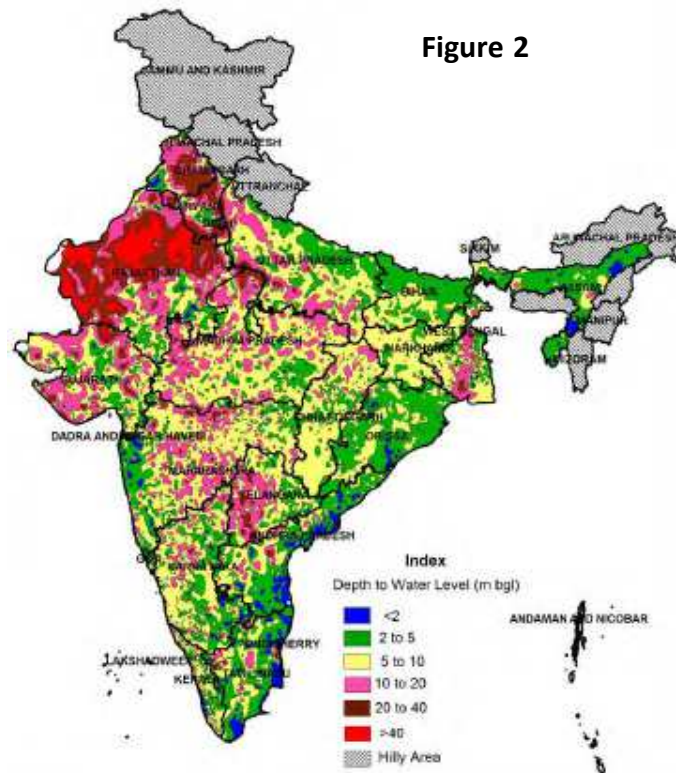
\*Natural discharge occurs as seepage to water bodies or oceans in coastal areas and as transpiration by plants whose roots extend up to the water table.



*“The distribution of number of wells under different depth ranges is presented in the histogram here. (Note: Data is for Nov 2016)”*



The depth to water level map of January 2016 (figure 2 below)



for the country indicates that in general, depth to water level ranges from 2 to 10 m bgl as observed at about more than 65% of the monitoring stations. In sub-Himalayan area, north of river Ganges, northern parts of Uttar Pradesh, northern parts of Bihar, Odisha, Assam, Andhra Pradesh, coastal parts of Maharashtra, and Tripura generally the depth to water level varies from 2-5 meter below ground level. Shallow water level of less than 2 m bgl is observed in the states of Assam and isolated pockets in Andhra Pradesh, Maharashtra, Odisha and Tamil Nadu. In West Bengal the water level generally varies from 2 to 10 m bgl – the central parts of the state show a water level of 10 m and above and deeper water level of more than 20 m bgl in small pockets. In major parts of the north-western states depth to water level generally ranges from 10-40 m bgl. A water level of more than 40 m bgl is also prevalent in the north western part of the country. In the western parts of the country deeper water level is recorded in the depth range of 20-40 m bgl and more than 40 m bgl. In some parts of Haryana, and Delhi and most major parts of Rajasthan, water level of more than 40 m bgl is recorded. Along the eastern coast the water level is generally up to 5 m bgl whereas in the western coast a water level of 10 m bgl is prevalent. In Central India the water level generally varies between 5 m bgl to 20 m bgl, except in isolated pockets where the water level of less than 5 m bgl has been observed. The peninsular part of country generally recorded a water level in the range of 2 to 20 m bgl depth range.

### ***b. Ground Water Extraction and Use***

Experts believe that India is fast moving towards a crisis of ground water because of overuse and contamination. Ground water overuse or overexploitation is defined as a situation in which, over a period of time, average extraction rate from aquifers is greater than the average recharge rate.

In India, the availability of surface water is greater than ground water. However, owing to the decentralised\* availability of

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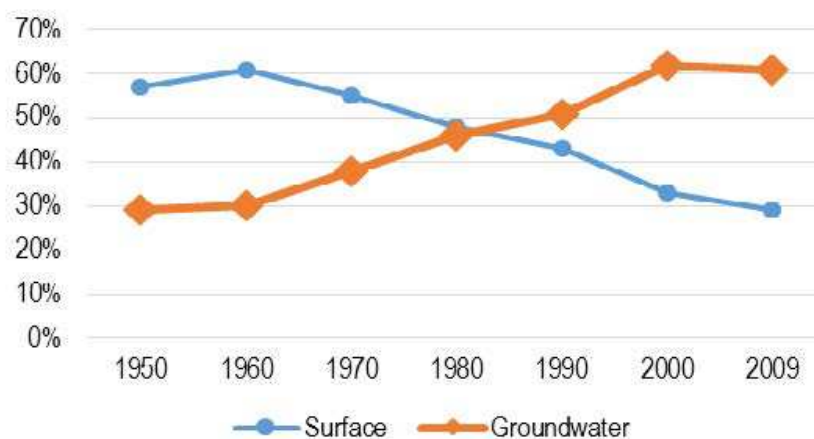
\* Decentralised availability of ground water implies that the owner of a piece of land has the right to the water under it according to the Easement Act of 1884.

groundwater, it is easily accessible and forms the largest share of India's agriculture and drinking water supply. 89% of ground water extracted is used in the irrigation sector, making it the highest category user in the country. This is followed by ground water for domestic use which is 9% of the extracted groundwater. Industrial use of ground water is 2%. 50% of urban water requirements and 85% of rural domestic water requirements are also fulfilled by ground water.

### 1. Irrigation through Ground Water

The largest component of ground water use is the water extracted for irrigation. The main means of irrigation in the country are canals, tanks and wells, including tube-wells. Of all these sources, ground water constitutes the largest share. Wells, including dug wells, shallow tube-wells and deep tube wells provide about 61.6% of water for irrigation, followed by canals with 24.5%. (Data: 2011)

**Figure 3: Increase in ground water utilization for irrigation**

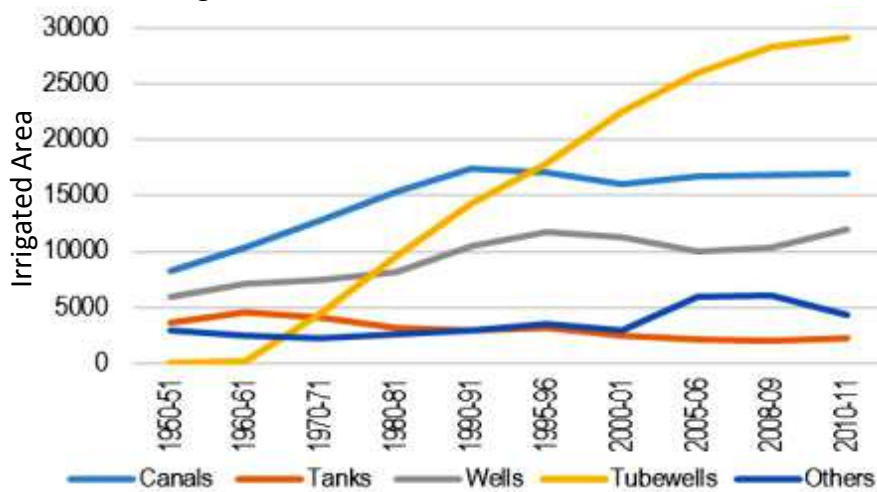


Source: *Agricultural Statistics at Glance 2014, Ministry of Agriculture; PRS.*

Over the years, there has been a decrease in surface water use and a continuous increase in ground water utilisation for irrigation. Figure 4 illustrates the pattern of use of the main sources of irrigation. As can be seen, the share of tubewells has increased exponentially, indicating the increased usage of ground water for irrigation by farmers. The dependence of irrigation on ground water increased with the onset of the Green Revolution, which was based on intensive use of inputs such as water and fertilizers to boost farm production. Incentives such as credit for irrigation equipment and subsidies for electricity supply have further worsened the situation. Low power tariffs have led to excessive water usage, leading to a sharp fall in water tables.

**Figure 4: Tubewells increasingly being the main source of irrigation**

Note: Irrigated area is in '000 hectares.



Source: Agricultural Statistics at Glance 2014, Ministry of Agriculture; PRS.

## **2. Agricultural Crop Pricing and Water Intensive Crops**

In the last four decades, roughly 84% (**54.85 million hectares**) of the total addition to the net irrigated area (**65.3 million hectares**)

has come through ground water. The primary cause of over-exploitation has been the rising agricultural demand for ground water. Further, decisions such as cropping pattern and cropping intensity are taken independent of the ground water availability in most areas.

The High-Level Committee on restructuring of the Food Corporation of India in 2014, observed that even though Minimum Support Prices (MSPs) are currently announced for 23 crops, the effective price support is for wheat and rice only. This creates highly skewed incentive structures in favour of wheat and paddy, which are water intensive crops and depend heavily on ground water for their growth. Table 2 below shows the average amount of water (in cubic meters/tonne) needed to grow different crops. It indicates India's efficiency in the usage of water for agriculture as compared to other countries. As can be seen, India uses almost twice the amount of water to grow crops as compared to China and the United States.

<b>Table 2: Water use for crop production in different countries (in cubic metres/tonne)</b>				
<b>Crops and Crop Products</b>	<b>Average amount of water needed to grow crops in</b>			
	<b><i>Brazil</i></b>	<b><i>India</i></b>	<b><i>China</i></b>	<b><i>United States</i></b>
Rice	3082	2800	1321	1275
Sugarcane	155	159	117	103
Wheat	1616	1654	690	849
Cotton	2,777	8,264	1,419	2,535

Source: National Water Footprint Account, UNESCO-Institute for Water Education, May 2011;

### ***c. Energy Subsidies and Ground Water Extraction***

The practice of providing power subsidies for agriculture has played a major role in the decline of water levels in India. In 2009, of the total amount of ground water extracted, 89% was for irrigation, and 11% was for domestic and industrial uses. Since power is a main component of the cost of ground water extraction, the availability of

cheap/subsidised power in many states adds to the greater extraction of this resource. Moreover, electricity supply is not metered and a flat tariff is charged depending on the horsepower of the pump. The Draft National Water Framework Bill, 2013 also suggested that over extraction of ground water should be curtailed by regulating the use of electricity needed for its extraction.”<sup>3</sup>

#### ***d. The Looming Crisis***

“Groundwater in India is a critical resource. However, an increasing number of aquifers are reaching unsustainable levels of exploitation. If current trends continue, in 20 years about 60% of all India’s aquifers will be in a critical condition says a World Bank report. This will have serious implications for the sustainability of agriculture, long-term food security, livelihoods, and economic growth. It is estimated that over a quarter of the country’s harvest will be at risk. There is an urgent need to change the status quo.”<sup>4</sup>

“Ground water resources in the country are assessed at different scales within districts, such as blocks/mandals/talukas/watersheds. Ground water development is a ratio of the annual ground water extraction to the net annual ground water availability. It indicates the quantity of ground water available for use. Table 3 on next page compares the level of ground water development in the country over the past two decades. See table 4 in appendix which provides data on ground water development as a percent of water recharge for individual states.

The level of ground water development is very high in the states of Delhi, Haryana, Punjab and Rajasthan, where ground water development is more than 100%. This implies that in these states, the annual ground water consumption is more than annual ground water recharge. In the states of Himachal Pradesh, Tamil Nadu and Uttar Pradesh and the Union Territory of Puducherry, the level of ground water development is 70% and above. In rest of the states, the level of ground water development is below 70%. Over the years, usage of ground water has increased in areas where the resource was readily available. This has resulted in an increase in overall

**Table 3: Comparative status of level of ground water development in India in the past 20 years**

<b>Level of ground water development</b>	<b>Explanation</b>	<b>% of districts in 1995</b>	<b>% of districts in 2004</b>	<b>% of districts in 2009</b>	<b>% of districts in 2011</b>
<b>0-70% (Safe)</b>	Areas which have ground water potential for development	92	73	72	71
<b>70-90% (Semicritical)</b>	Areas where cautious ground water development is recommended	4	9	10	10
<b>90-100% (Critical)</b>	Areas which need intensive monitoring and evaluation	1	4	4	4
<b>&gt;100% (Overexploited)</b>	Areas where future ground water development is linked with water conservation measures	3	14	14	15

Source: Central Ground Water Board

ground water development from 58% in 2004 to 62% in 2011. See Figure 5 in appendix. It shows the categorization of ground water assessment units. (Note: Data as of 2011. Sources: Ground water scenario in India, November 2014, Central Ground Water Board; PRS.)<sup>25</sup>

## GROUND WATER CONTAMINATION

Along with the problem of depleting water levels, ground water contamination is also on the rise. “Ground water contamination is the presence of certain pollutants in ground water that are in excess of the limits prescribed for drinking water. The commonly observed contaminants include arsenic, fluoride, nitrate and iron, which are geogenic\* in nature. Other contaminants include bacteria, phosphates and heavy metals which are the result of human activities including domestic sewage, agricultural practices and industrial effluents. The sources of contamination include pollution by landfills, septic tanks, leaky underground gas tanks, and from overuse of fertilizers and pesticides. It has been pointed out that nearly 60% of all districts in the country have issues related to either the availability of ground water, or the quality of ground water, or both. Table 5 below shows the number of states and districts affected by geogenic contaminants as on July 2014.

**Table 5: States and districts affected by geogenic contamination in groundwater**

<b>Geogenic contaminants</b>	<b>Number of affected states</b>	<b>Number of affected districts*</b>
Arsenic	10	68
Fluoride	20	276
Nitrate	21	387
Iron	24	297

\*Total districts in 2014: 676;

Source: Central Ground Water Board

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\* Geogenic contaminants occur as a result of geological processes that happen within the crust of the earth



It was observed that 68 districts in 10 states are affected by high arsenic contamination in groundwater. These states are Haryana, Punjab, Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh, West Bengal, Assam, Manipur and Karnataka.”<sup>6</sup>

## CONCLUSION

By looking at the figures mentioned above one cannot but arrive at the conclusion that we are heading towards a dangerous water crisis in the country. This will not only affect water availability for drinking but also affect very adversely the agriculture and food security of the country. “The analyses (published in *Environmental Research Letters*) reveal that even in some areas that experience projected increases in monsoon rainfall, the expansion of irrigated agriculture will lead to more non-renewable groundwater extractions. This means groundwater levels will continue to drop over the next 30 years in these areas. In extreme cases, a complete loss of non-renewable groundwater irrigation can reduce national annual crop production by as much as 25 per cent. Results also point to the large variation in future groundwater levels across India. Under future climate change, notably, some districts will do better and may even be able to rely solely on sustainable water supplies allowing groundwater levels to recover. Others will see slower rates of groundwater decline and yet others will experience declines for the first time. But most of Punjab and Haryana, northern areas of Rajasthan and Gujarat, and parts of Uttar Pradesh and Tamil Nadu will face continued groundwater level declines.”<sup>7</sup>

With the growing population the demand is ever increasing for water while the level of ground water along with the flow of water in the rivers is depleting at alarming rates. This has created problem of scarcity in many parts of India. “The demand supply mismatch is more severe in certain areas. In urban areas, where the demand of 135 litres per capita daily (lpcd) is more than three times the rural demand of 40 lpcd, the scarcity assumes menacing proportions. Already, Delhi and Chennai are fed with supply lines stretching hundreds of kilometres. According to projections by the UN, India’s

urban population is expected to rise to 50% of the total population by 2050. This would mean 840 million people in the most water-starved parts of the country compared with 320 million today. The issue of inequity in water availability has already proved to be fertile ground for several inter-state and intra-state disputes, and unless mitigating steps are taken now, these conflicts would only escalate.”<sup>8</sup>

Below is the table for the projected water demand in India.

**Table 6: Projected Water Demand in India, BCM(Billion Cubic Meter)**

<b>Sector</b>	<b>2010</b>	<b>2025</b>	<b>2050</b>
Irrigation	688	910	1072
Drinking Water	56	73	102
Industry	12	23	63
Energy	5	15	130
Other	52	72	80
<b>Total</b>	<b>813</b>	<b>1093</b>	<b>1447</b>

Source: MOWR: Ministry of Water Resources.

The problem of water scarcity is going to assume greater proportions in the near future. With the growing demand for water in various sectors along with increasing population which is expected to further increase water demand, the future is not looking very rosy. “Moreover, the future of monsoon rainfall remains uncertain; while some climate models predict an increase, others forecast a weakening monsoon, although changes in monsoon variability are already underway and will continue into the future. Historical records show the number of dry spells and the intensity of wet spells have risen over the past 50 years. As climate change alters the monsoon, the large stresses on India’s groundwater resources may increase.”<sup>9</sup>

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Along with this we have to also consider the rise of

contamination of river and ground water which will further aggravate the problem to an alarming level. What effect it will have on ecology, animal habitats and ecological cycles are anybody's guess. Looking at all these factors one can get a very clear picture of what the future will look like.

Government is planning to tackle this problem in various ways such as linking of rivers and artificial recharge of ground water. The linking of rivers is a task that has never been done on such a massive scale as we are planning. There are consequences, serious adverse consequences of that. Secondly, artificial recharge of water has been planned which is basically to harvest monsoon rains in various ways. These are the figures of the plan.

1. Area identified for Artificial Recharge	941541 sq. km.
2. Volume of water to be recharged	85565 Million Cubic Meter
3. Total number of structures proposed	(in Lakhs)
(i). in rural areas	22.83
(ii). in urban areas	87.99
Total	110.82
4. Estimated Cost	(Rs. in crores)
(i). in rural areas	61192
(ii). in urban areas	17986
Total	79178 <sup>10</sup>

But how effective will the implementation of the policy be?

One thing that nobody talks about is the true solution, which will only come when we become conscious of the source of the real problem. And that problem is the psychology of the people. So far we have not reconized this and continue to look for solutions elsewhere. We are not even trying to control our excessive greed but are trying to manipulate nature so that it may continue to cater to it. All the solutions – proposed or sought – whether environmental

or otherwise are only from that point of view. But earth has it's own limits of what it can provide and we have crossed that limit. Only a radical change in the psychology of people will enable us to begin to solve the problem in any effective and true manner.

**References:**

1. <http://www.prsindia.org/administrator/uploads/general/1455682937~~Overview%20of%20Ground%20Water%20in%20India.pdf> (PRS Legislative Research)
2. <http://wrmin.nic.in/forms/list.aspx?lid=304>
3. <http://www.prsindia.org/administrator/uploads/general/1455682937~~Overview%20of%20Ground%20Water%20in%20India.pdf> (PRS Legislative Research)
4. <http://www.worldbank.org/en/news/feature/2012/03/06/india-groundwater-critical-diminishing>
5. <http://www.prsindia.org/administrator/uploads/general/1455682937~~Overview%20of%20Ground%20Water%20in%20India.pdf> (PRS Legislative Research)
6. *ibid*
7. <http://www.thehindubusinessline.com/opinion/indias-groundwater-future-is-in-crisis/article9689155.ece>
8. <http://www.livemint.com/Opinion/97fuaF2aQkO9IjPiPAjMyL/Six-charts-that-explain-Indias-water-crisis.html>
9. <http://www.thehindubusinessline.com/opinion/indias-groundwater-future-is-in-crisis/article9689155.ece>
10. <http://www.cgwb.gov.in/documents/masterplan-2013.pdf>

## APPENDIX

Figure 1



Source: <http://www.indiawaterportal.org/articles/aquifer-systems-india-atlas-compiled-central-ground-water-board-2012>

**Table 4**

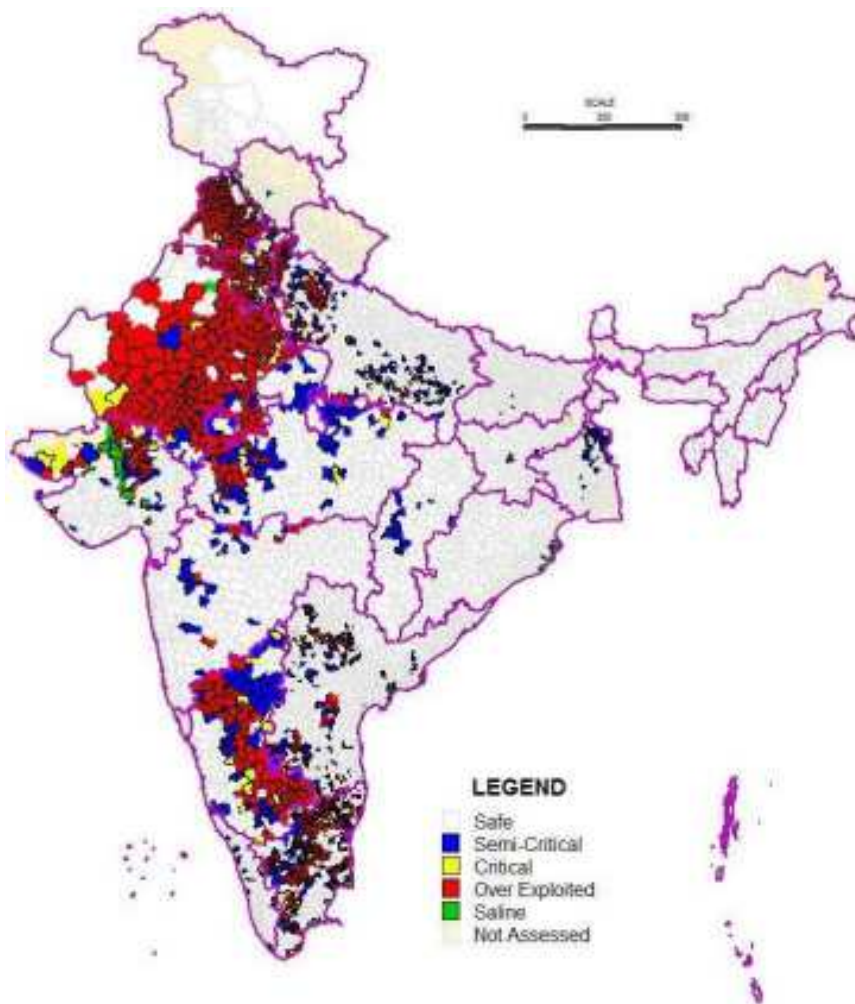
Data on ground water development as a percent of water recharge for individual states.

<b>State</b>	<b>Ground Water Development in 2011 (%)</b>
<i>Andhra Pradesh</i>	37
<i>Arunachal Pradesh</i>	0
<i>Assam</i>	14
<i>Bihar</i>	44
<i>Chhattisgarh</i>	35
<i>Delhi</i>	137
<i>Goa</i>	28
<i>Gujarat</i>	67
<i>Haryana</i>	133
<i>Himachal Pradesh</i>	71
<i>Jammu &amp; Kashmir</i>	21
<i>Jharkhand</i>	32
<i>Karnataka</i>	64
<i>Kerala</i>	47
<i>Madhya Pradesh</i>	57
<i>Maharashtra</i>	53
<i>Manipur</i>	1
<i>Meghalaya</i>	0
<i>Mizoram</i>	3
<i>Nagaland</i>	6
<i>Odisha</i>	28
<i>Puducherry</i>	90
<i>Punjab</i>	172
<i>Rajasthan</i>	137
<i>Sikkim</i>	26
<i>Tamil Nadu</i>	77
<i>Telangana</i>	55
<i>Tripura</i>	7
<i>Uttar Pradesh</i>	74

<i>Uttarakhand</i>	57
<i>West Bengal</i>	40
<i>Total *</i>	62

*\* Total includes Union territories*

**Figure 5: Categorization of Ground Water assessment Units**



## STATUS OF RAINFED AGRICULTURE IN INDIA

### BACKGROUND

“There was a time when it was said that the Indian budget was a gamble on the monsoons. That is not the case anymore, with industrial production soaring and agriculture on the margins. But what is clear is that without addressing the problems of the majority of farmers in unirrigated land (where medium of irrigation is none except rain), we are not going to achieve food security.”<sup>1</sup>

“Rain-dependent areas can be broadly split into two: ‘dry lands’, which receive less than 750 mm (75cm) of rain a year; and rainfed areas, which receive more than 750 mm. (75cm). Comprising arid and semi-arid ecosystems, dry lands stretch from Gujarat in the west till Eastern Madhya Pradesh; and from Rajasthan till the southern tip of India.

India ranks first among the rainfed agricultural countries of the world in terms of both extent and value of produce. Due to population pressure on agricultural lands, the *poverty is concentrated in rainfed regions*. The climate in India’s rainfed regions is characterized by complex climatic deficiencies, manifested as water scarcity for rainfed crop production. The climate is largely semi-arid and dry sub-humid with a short (occasionally intense) wet season followed by long dry season. Rainfall is highly unreliable, both in time and space, with strong risks of dry spells at critical growth stages even during good rainfall years.”<sup>2</sup>

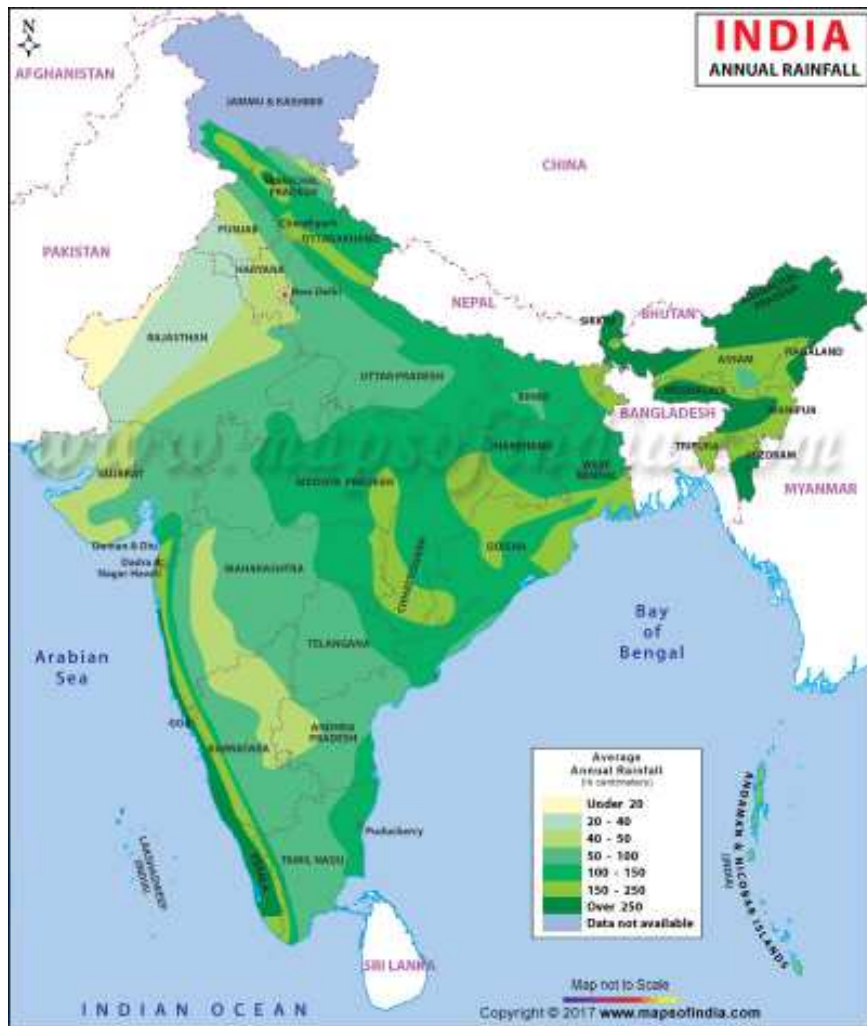
On page 33 is the average annual rainfall map of India. (Figure-1)

There has been deficient rainfall over past few years and that has affected availability of water for agriculture. Figure 2 on page 34 shows this data.

“Rainfall in the country (as compared to the average rainfall since 1951) has been volatile over the past 20 years. The lowest

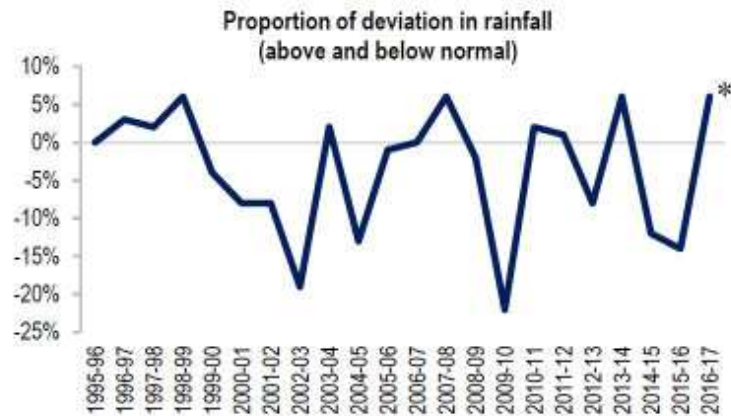


Figure 1: Average annual rainfall map of India



level of rainfall was in 2009-10, at 22% below normal, whereas the highest level of rainfall was in the years 2013-14, 2007-08 and 1998-99, at 6% above normal. This deviation in rainfall may not be uniform across the country. For example, in a year of overall excess rainfall, there may be regions which received deficient rainfall.”<sup>3</sup>

**Figure 2**



\*estimate of Indian Meteorological Department for 2016 season.

Note: Above 0% = surplus in rainfall; below 0% = deficiency in rainfall.

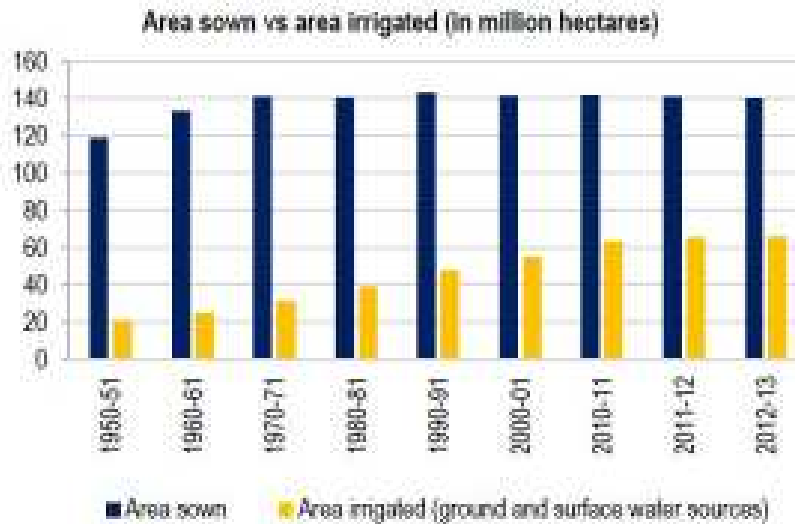
## **PRESENT SCENARIOS**

It is estimated that “more than half of agricultural sown land, i.e. 53% is dependent on rain-fed irrigation. 53% (73.83 million hectares) of the sown agricultural area (total sown area for 2012-13 was 139.93 million hectares) in the country is dependent on rain-fed irrigation as of 2012-13, which is the latest data available. Rain-fed irrigation is dependent on rain water and is not supplemented by water from any other source.

Rest 47% (66.1 million hectares) of the sown area is irrigated by ground water sources such as wells and tube-wells, and surface water sources such as canals and tanks, as of 2012-13 [Net irrigated area]. This area constituted 18% (20.9 million hectares) of the sown area in 1950-51.”<sup>4</sup> See Figure 3 on page 35.

It is mostly the North Eastern states that depend on rainfall while Northern states depend on ground and surface water. “The northern states of Punjab (99.5%), Haryana (90%), and Uttar Pradesh (76%) have the highest proportion of sown area which is irrigated by ground water and surface water sources.

**Figure 3**



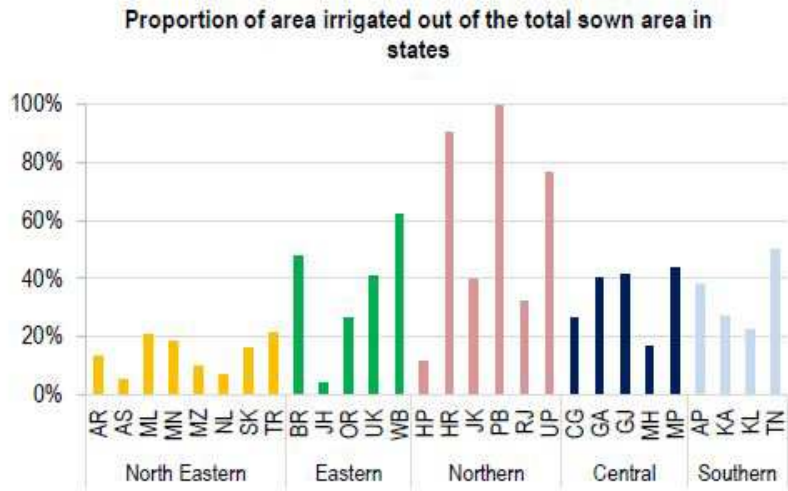
In contrast, less than 25% the sown area in the north-eastern states of Manipur, Meghalaya, Mizoram, and Nagaland is irrigated by ground and surface water sources. This implies that these states rely more on rain-fed irrigation.

The central states such as Maharashtra (17%) and Chhattisgarh (26%), and southern states such as Kerala (22%) and Karnataka (27%) also have lower proportions of sown area under irrigation.”<sup>5</sup> See the figure 4 on page 36.

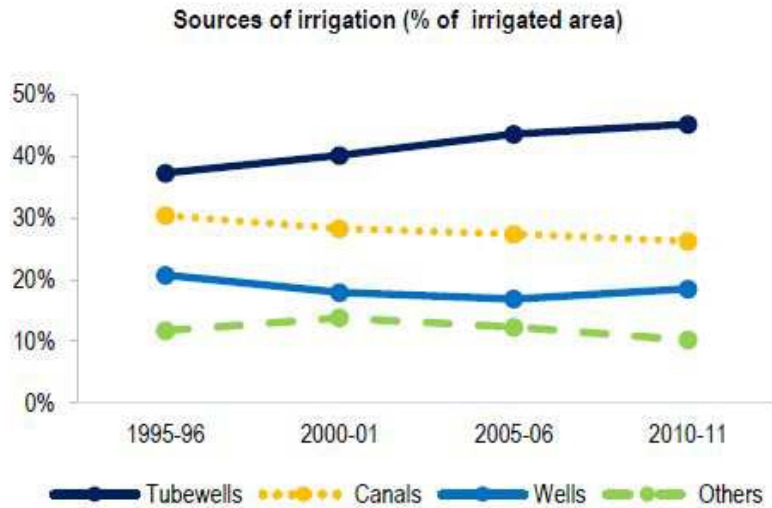
### **CONCLUSIONS ON STATUS OF WATER AVAILABILITY FOR AGRICULTURE IN INDIA**

In the first part of the article on agriculture, we explored one of the major sources of irrigation in India, i.e., dams and canals. In this part we have seen the status of the next two major sources of irrigation, i.e., groundwater and rain. As we saw above 53% of the sown agricultural area in the country is dependent on rain-fed irrigation as of 2012-13 and the rest 47% is dependent on groundwater. On page 36 is the breakdown figure 5 of the “sources of irrigation.”<sup>6</sup>

**Figure 4**



**Figure 5**



For complete data on land use and irrigation pattern see table 1 in the Appendix (p.38).

**References:**

1. <http://www.downtoearth.org.in/coverage/india-must-focus-on-rainfed-farming-6259>)
2. <https://www.gktoday.in/rainfed-agriculture-in-india/>)
3. Source: "PRS Legislative Research" [<http://www.prsindia.org/parliamenttrack/vital-stats/status-of-water-availability-for-agriculture-in-india-4339/>])
4. Ibid, 5. Ibid, 6. Ibid, 7. Ibid

## APPENDIX

**Table 1:** Data on land use and irrigation pattern.

(Area in million hectares)				
Year	Net Sown Area	Gross Sown Area	Net Irrigated Area	Gross Irrigated Area
1	2	3	4	5
1990-91	143.00	185.74	48.02	63.20
1991-92	141.63	182.24	49.87	65.68
1992-93	142.72	185.70	50.29	66.76
1993-94	142.34	186.58	51.34	68.26
1994-95	142.96	188.05	53.00	70.65
1995-96	142.20	187.47	53.40	71.35
1996-97	142.93	189.50	55.11	76.03
1997-98	141.95	189.99	55.21	75.67
1998-99	142.75	191.65	57.44	78.67
1999-00	141.06	188.40	57.53	79.22
2000-01	141.34	185.34	55.20	76.19
2001-02	140.73	188.01	56.94	78.37
2002-03	131.94	173.89	53.90	73.06
2003-04 <sup>1</sup>	140.71	189.66	57.06	78.04
2004-05	140.64	191.10	59.23	81.08
2005-06	141.16	192.74	60.84	84.28
2006-07	139.82	192.38	62.74	86.75
2007-08	141.02	195.22	63.19	88.06
2008-09	141.90	195.33	63.64	88.90
2009-10	139.17	189.00	61.94	85.08
2010-11	141.56	197.56	63.66	88.93
2011-12	140.98	195.69	65.70	91.78
2012-13	139.94	194.14	66.27	92.25
2013-14	141.43	200.86	68.10	95.77
2014-15 <sup>2</sup>	-	-	-	-
2015-16 <sup>2</sup>	-	-	-	-

Notes: 1. Data of Net Sown Area, Gross Sown Area, Net Irrigated Area and Gross Irrigated Area for 2003-04 onwards are provisional.

2. Not Available.

**Source:** Ministry of Agriculture & Farmers Welfare, Government of India.



## **Why Science cannot Perfect our Life**

**“... because we can construct nothing which goes beyond our nature; imperfect, we cannot construct perfection, however wonderful may seem to us the machinery our mental ingenuity invents, however externally effective. Ignorant, we cannot construct a system of entirely true and fruitful self-knowledge or world-knowledge: our science itself is a construction, a mass, of formulas and devices; masterful in knowledge of processes and in the creation of apt machinery, but ignorant of the foundations of our being and of world-being, it cannot perfect our nature and therefore cannot perfect our life.”**

**– Sri Aurobindo**

(Complete works of Sri Aurobindo, 22, p.1071)