



For a better life on a greener planet



## BACKGROUND PAPER

# Clean & Safe Drinking Water For All

आपो हिष्ठा मयो भुवः, स्था न ऊर्जे दधातन,  
महे रणाय चक्षसे, यो वः शिवतमो रसः,  
तस्य भाजयतेह नः, उषतीरिव मातरः।

- आपः सुक्तम्, ऋग्वेद

'It is water which is the source of energy.  
Bless us like a mother and may your blessings  
continue to be showered upon us.'

- Apah Suktam, Rigveda

Water is our fundamental right, however growing scarcity of water is turning into one of the largest environmental challenges of our times. Water is a complex global issue, it controls life and its activities to a large extent. In fact, the way the sources of fresh water is drying and are getting polluted, it is likely to jeopardise many things on this planet including the survival of the humans.

Besides disappearing surface water bodies, declining water quality owing to pollution and other factors, is also contributing to reduced water availability. Among all, ground water contamination poses a threat of serious as well unique nature as treating pollution in the ground water sources or the aquifers is a far more complicated proposition and even impossible at times.

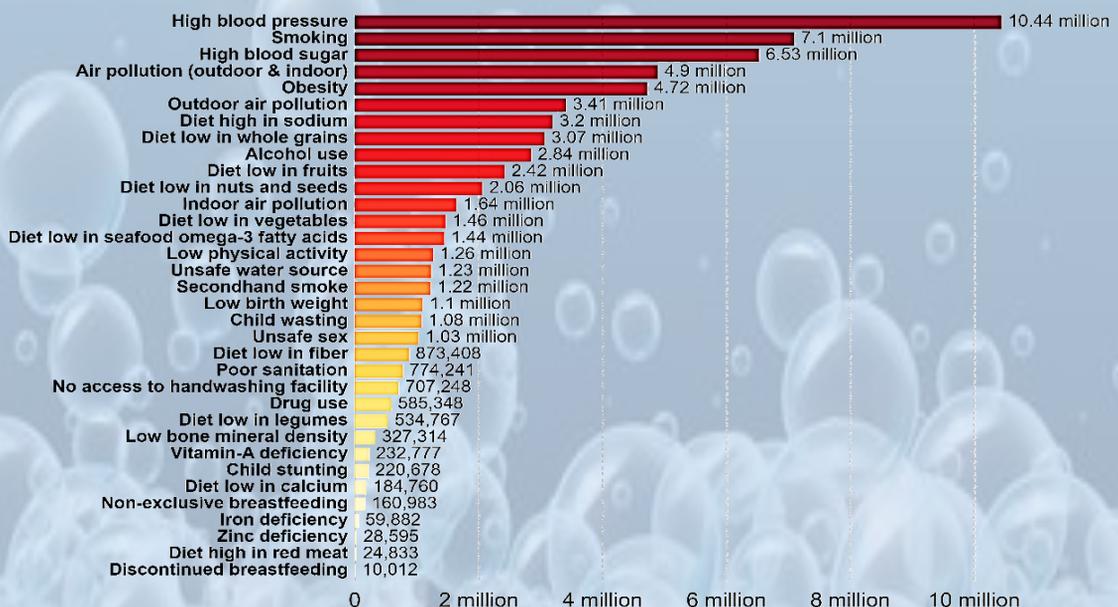
Since there is a heavy demand for ground water for drinking and agriculture related irrigation purpose, contamination of ground water could be very tricky as it can lead to major environment and health ramifications. Polluted water isn't just dirty—it's deadly. Ritchie (2019) acknowledges that unsafe water sources are responsible for 1.2 million deaths each year (Fig 1) . Tens of millions of others are seriously sickened by a host of water-related ailments, many of which are easily preventable (NAS, 2007). Particularly heavy metal contamination not only impacts environment, but also it can have major health issues due to the presence of elements like fluoride and arsenic (Sriraj, 2017). Excess fluoride causes several diseases, like osteoporosis, arthritis, brittle bones, cancer, infertility in women, brain damage, Alzheimer's disease and thyroid disorders (Joshi, 2015). Conservation and management of water resources, thus becomes a top priority today to ensure availability of clean and safe water.

Though the direct use or the demand for water is confined only to a few needs/human activities, there are several other indirect usage of water and they are equally critical. The diversity of services provided by a water body is huge and is far more complex than it appears. By the extent of services provided by a water ecosystem and its economic valuation can reflect its true worth. A study undertaken in the Yuan river in 2000 indicated surprisingly very high monetary value (94.11%) of indirect ecosystem services as compared to direct benefits, which was accounted for just about 5.89% ( Hao et al , 2013).

Incidentally with growing trend of unsustainable development and increasing human population, these ecosystem services are also getting diminished drastically. Human activities can be attributed to creating multiple stress on the source of water as well as on the supply system (Fig 2). The growing risk of losing the available water sources has reached such a stage that there

### Number of deaths by risk factor, World, 2017

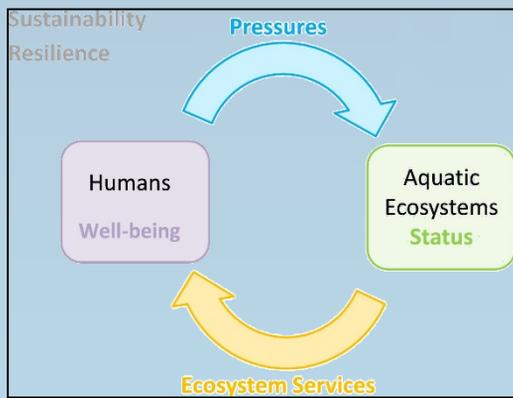
Total annual number of deaths by risk factor, measured across all age groups and both sexes.



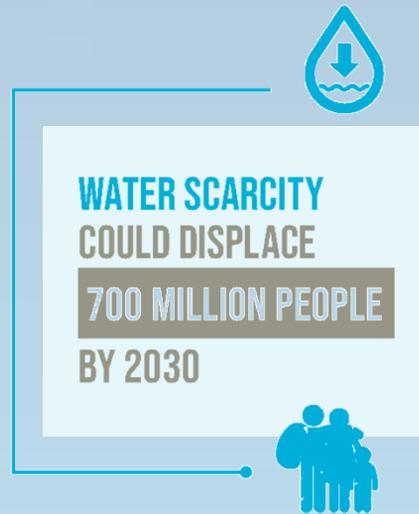
Source: IHME, Global Burden of Disease (GBD)

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Figure 01



**Figure 02.** Relationships between humans & aquatic ecosystems (Grizzetti, 2016).



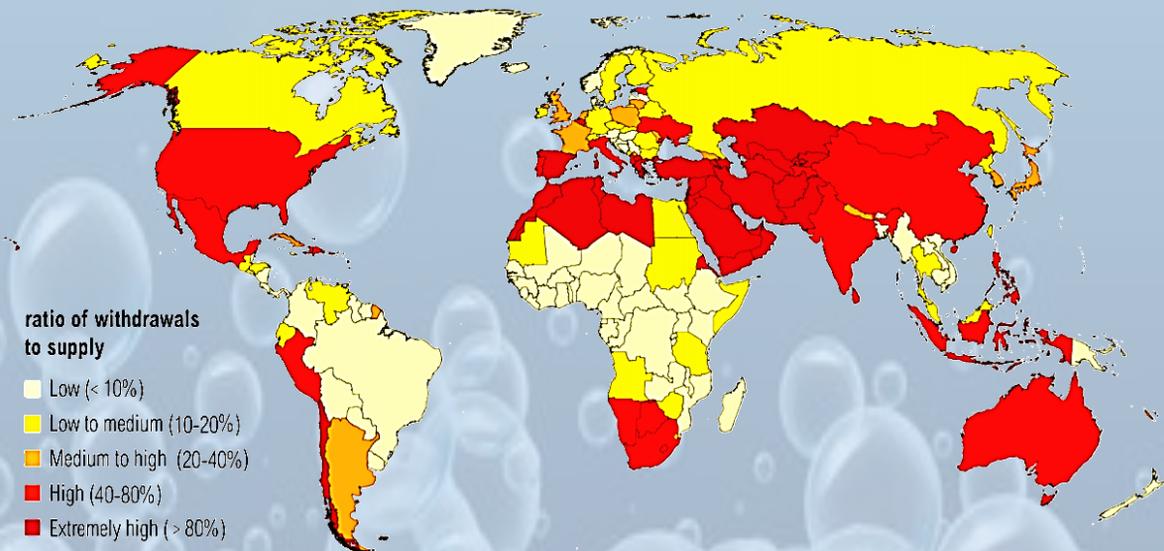
**Figure 04**

is a rising concern of almost half of the world getting into serious water stress by 2040 (Fig 3) and displace about 700 million people by 2030. And the repercussion would be manifold, such a situation would invite all forms of emergencies in social, environmental, financial and political dimensions world-wide. The world is facing various levels of water crisis today – from moderate

to total dryness depending on geographies. As a result of such severity, water features as a high global risk in the Global Risks Report 2020 (Fig. 5) published by the World Economic Forum with support from Marsh & McLennan.

The overall water scenario of India is also no different as it faces a serious risk of losing

### Water Stress by Country: 2040



**NOTE:** Projections are based on a business-as-usual scenario using SSP2 and RCP8.5.

For more: [ow.ly/RilWop](http://ow.ly/RilWop)

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**Figure 03.** Ranking the World’s Most Water-Stressed Countries in 2040 (WRI 2015)

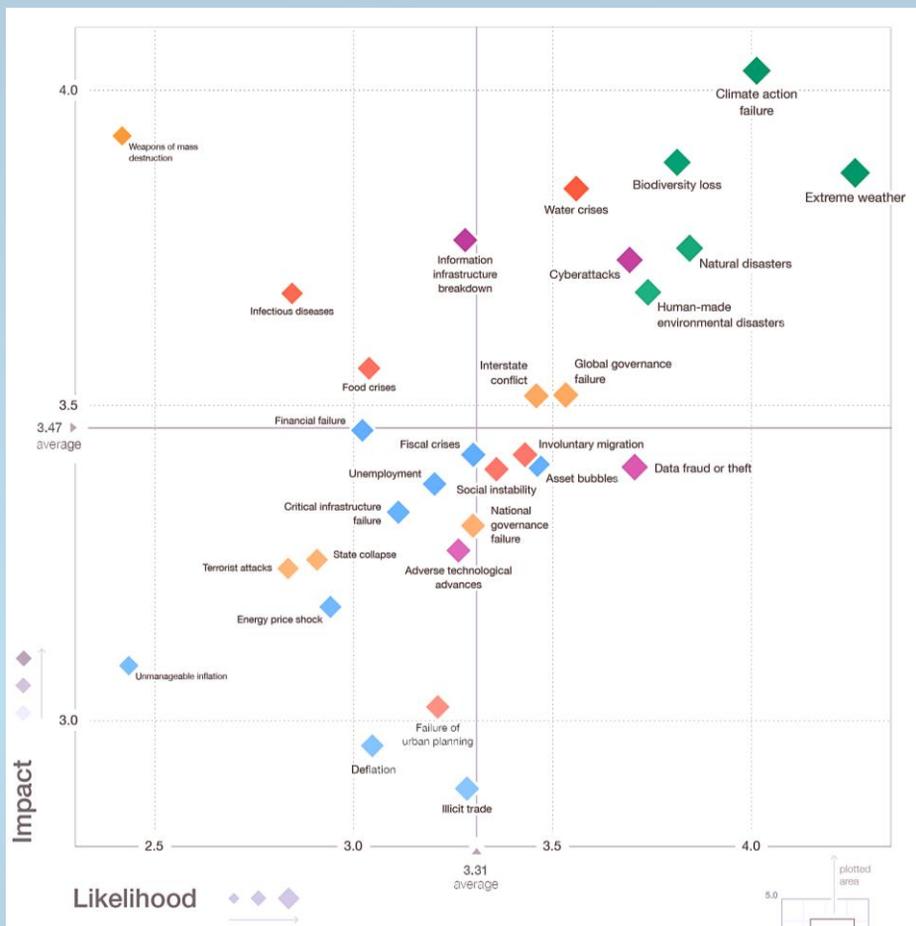


Figure 05. The Global Risks Report 2020

a large number of its waterbodies including rivers, wetlands, lakes and ponds besides the ground water aquifers. India is the largest groundwater user in the world, with an estimated usage of around 230 cubic kilometres per year, more than a quarter of the global total. With more than 60% of irrigated agriculture and 85% of drinking water supplies dependent on it, groundwater is a vital resource for rural areas in India. Dependence of urban and industrial water supplies on groundwater too is increasing alarmingly in India. Through the construction of millions of private wells, there has been a phenomenal growth in the exploitation of groundwater in the last five decades (World Bank, 2010).

India is a unique country with rich and diverse cultural and natural heritage. Howev-

-er, owing to the growing population and its escalating needs, pressure on natural environment has been increasing day by day. Destruction of these resources mostly due to anthropogenic causes have appeared to diminish our future prospects by irreversibly damaging essential elements that includes water resources. It is difficult to fathom, such an ecologically rich country with innumerable waterbodies of different shapes and sizes, today is finding it difficult to fulfill its own water needs. There are wide variations in the availability of water across the country with the drier regions having greater fluctuations in rainfall thus increasing the vulnerability of people to water scarcity with increased demand.

On the other hand, although the self-cleansing of water bodies occurs naturally

but it is slow enough to combat the heavy load of pollution emanating due to urban, industrial and agricultural activities. Protecting the world's freshwater resources requires diagnosing the threats over a broad range of scales, from global to local. This study undertaken by Vörösmarty et al. in 2010, indicated that nearly 80% of the world's population is exposed to high levels of threat to water security. Massive investment in water technology enables rich nations to offset high stressor levels without remedying their underlying causes, whereas less wealthy nations remain vulnerable. Despite efforts at various levels to increase the access to safe drinking water globally, the picture is still grim. According to a 2017 data, 71% of the global population (5.3 billion people) have access to safe drinking water, and in the least developed countries, 22% of health care facilities have no water service, 21% with no sanitation service, and another 22% have no waste management service, which is adding to further sufferings.

In an attempt to bring in structured and enduring solutions to water woes, UN Sustainable Development Goal (SDG) 6, pushes for Clean Water and Sanitation to ensure availability and sustainable management of water and sanitation for all. SDG 6 calls for making water available through a improved water source that is located on premises, available when needed, and free from faecal and priority chemical contamination.

As per World Health Organisation's report, in 2017, 5.3 billion people used safely managed drinking-water services, while remaining 2.2 billion people do not have access to safely managed water services (Fig 06). Data in his



**2.2 BILLION PEOPLE  
LACK SAFELY MANAGED  
DRINKING WATER**

Figure 06

article on India's ground water issues published in Economic and Political Weekly in October 2020, while citing a report by The Hindu and the works of Bhanja et al 2017, underscored two futuristic drivers linked to India's water problems — (i) the rapid pace of urbanisation, which will lead to at least 50% of the country's population living in cities by 2030, and (ii) the pervasive dependence on groundwater for practically all aspects of water usage. This analysis could be both an indication of drastic increase in withdrawal of ground water and an alarm to check this depleting as well finite water source.

A safe water supply is the backbone of a healthy economy, yet is woefully under prioritized, globally. According to an estimate, economic burden of waterborne diseases in India alone is approximately USD 600 million a year as less than 50% of the population in India has access to safe drinking water (JMP 2017).

Responding to the urgency of water conservation and management, NITI Aayog in India developed a Composite Water Management Index (CWMI) to enable effective water resource management in Indian states through data-based decision -

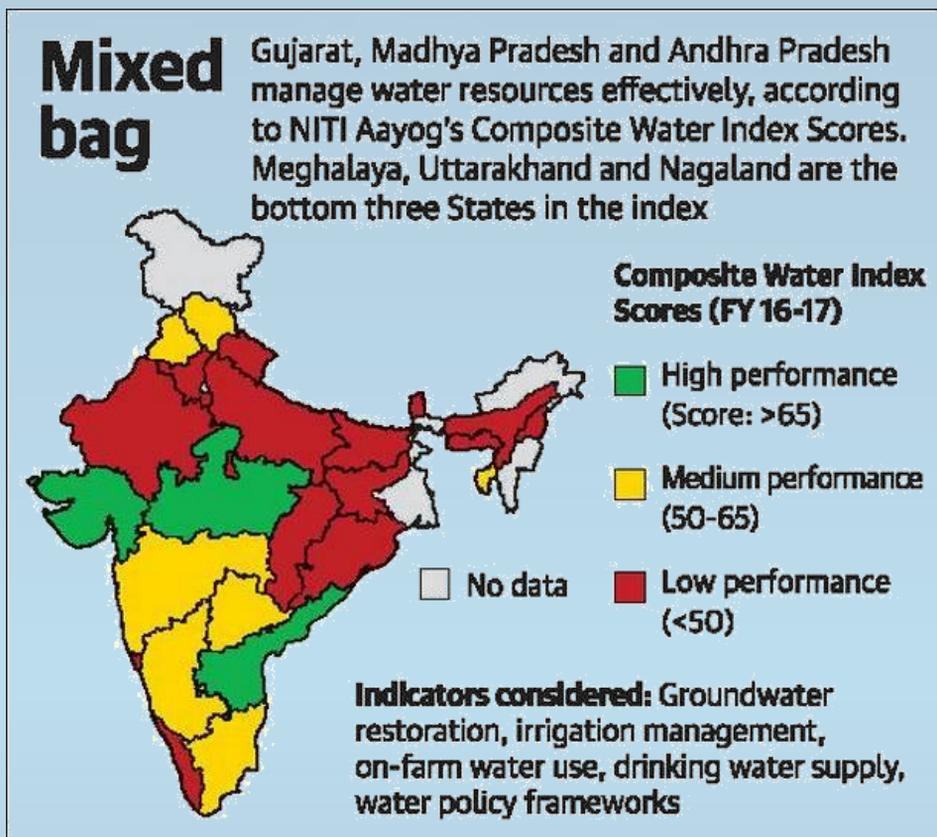


Figure 07. Composite Water Management Index (CWMI)

making for water that also helped rank various states based on their performance on water conservation measures and other related factors (Fig 7).

When we emphasize on the access to all: it means every living being on the planet not just human beings alone as water is essential for the survival of the humanity as well as other flora and fauna. The gradual loss of aquatic habitats and degradation have caused declining of flora and fauna directly dependent on waterbodies there by threatening overall biological diversity. Keeping in view of this urgency, there has been a spike in interventions to conserve and manage this precious resource sustainably. However, water is more of a social issue than an environmental challenge alone. Hence it should be dealt in a most inclusive way possible that can offer multi-directional sol -

-ution to water problems.

Like most conservation challenges, water conservation also demands participatory action particularly the community engagement. When we deal with an issue as complex as water, solution to address water issues too have to be unique. A conventional approach will not work here, if we really want to overcome the challenges of making clean and safe water available to all. It requires to analyze the larger picture bit by bit that starts with understanding why and how the water bodies/aquifers are disappearing. Before initiating any action, it is needed to secure the sources of water. Restoration of water bodies through eco-tech based and low carbon solutions needs to be backed up by afforestation drives that will help recharge the aquifers, streams and springs. And also control carbon emission,

regulate use of fossil fuel and help control global warming that will slow down the melting of glaciers. Let's not forget, many of our rivers are glacier-fed. For example, the Himalayas, which is also known as the water tower of Asia as so many of Asian rivers are originated in this region and they are glacier-fed mostly. Studies indicate, drying up of springs is likely to affect 60% of Himalayan population and major water systems of Northern India (Pandey, 2018).

Owing to fast urbanization and increasing impervious surfaces have further reduced ground water recharge leading to far reaching impact on water security (Fig 8). If we want our water bodies and aquifers to recharge on their own through rain water, the permeability of the soil will have to be improved.

Unprecedented water crisis will require unprecedented actions combined with uniform and holistic approach, unorthodox thinking, complementary regulatory regime, full proof enforcement and collective efforts on parts of policy makers, community, academia and civil society. However, getting everyone on board with a single point agenda tends to be one of the toughest challenges. Water mana-

gers and policy makers need to have the most inclusive conservation agenda as possible by engaging all the stakeholders. Involvement of everyone is not only important but it's a must. Saving a common resource is a shared responsibility, it's our moral and environmental obligation. If water is our fundamental right than protecting water resources becomes our fundamental responsibility.

Getting people to work and get them to share responsibility is a difficult task. Due to acute lack of awareness, the progress has been unusually slow. Though water is a state subject, water stewardship needs local intervention and it can be promoted through capacity development and technological deployment besides adopting new and sustainable practices at home and at work.

Further, digitalization is helping develop smart water ecosystems and distribution system both in the commercial and non-commercial settings for optimal use and zero loss of water.

About 160 million of India's 1.3 billion people don't have access to clean water (AP, 2020). For clean and safe water access, it is becoming increasingly important to push for

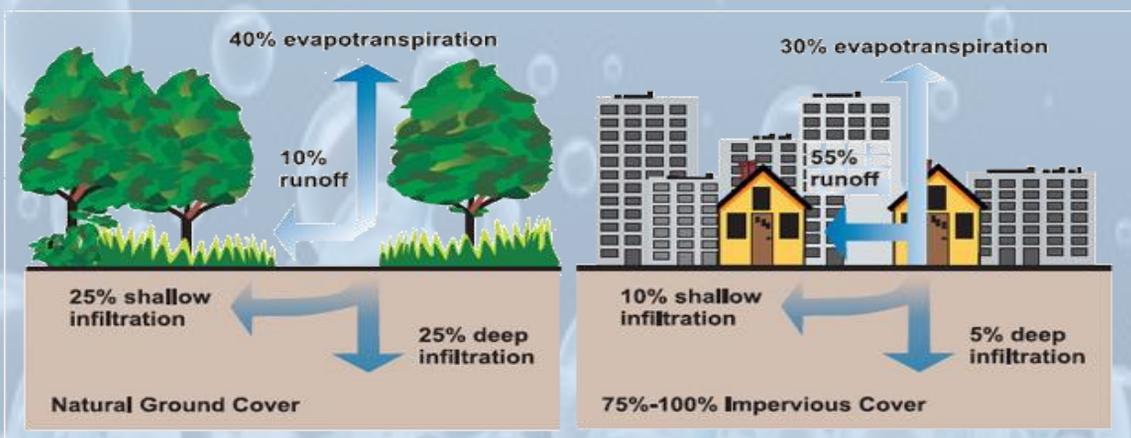


Figure 08. Relationship between Impervious Cover and Surface Runoff (U.S.EPA 2003)

decentralized approach towards water management and distribution, which could be managed by the communities and run through a PPP model for effective governance and long term sustainability and the same could form part of the existing provision of Swajal and the National Rural Drinking Water Programme (NRDWP). Localized water solutions will further enhance environmental performance of water-

management and distribution system. Such arrangement can be backed by simultaneous efforts to strengthen hygiene education through schools and non-formal platforms to improve sanitation at large. CSR provisioning as well as sustainable revenue model can enable affordable financing needed for water purification and treatment facilities and related infrastructure development.

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