Policy WATCH

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RAJIV GANDHI INSTITUTE FOR CONTEMPORARY STUDIES

Environment, Natural Resource & Sustainability

In this issue

RAJIV GANDHI
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POLICY WATCH

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Editorial

Dear Reader,

The 'Environment, Natural Resources and Sustainability' theme of the Rajiv Gandhi Institute for Contemporary Studies (RGICS) brings to you this edition of Policy Watch.

The Policy Watch issue has three articles from this theme and one infographic sourced from the Indian Express. The infographic is based on work done by the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES), highlights adverse ecological changes due to human activities.

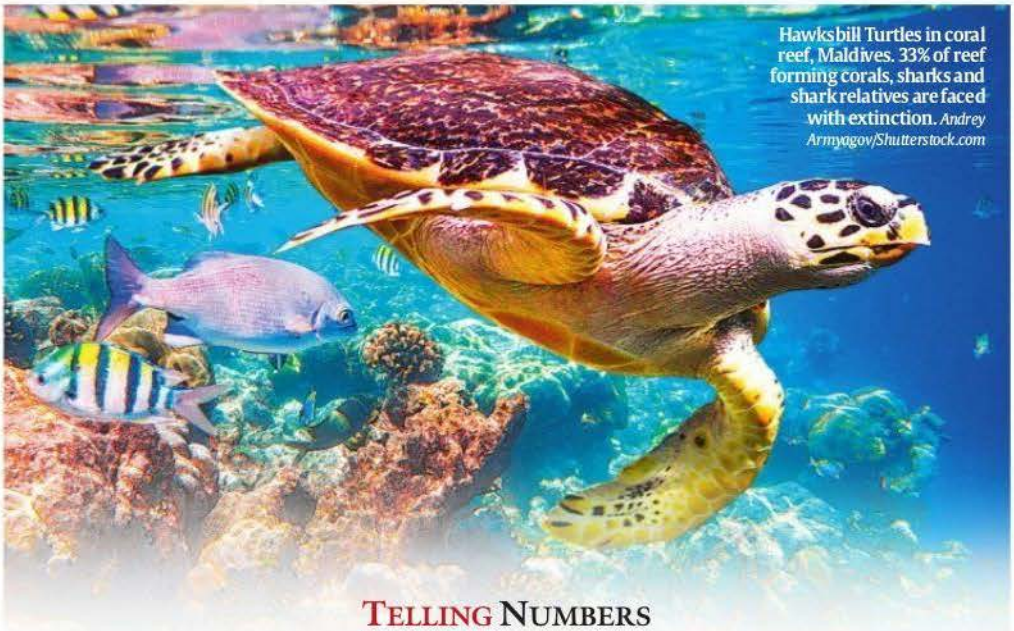
The cover article is based on a dialogue organized by RGICS in January 2019 on "How to Make Environmental Issues More Salient in India's Politics." This article also draws lessons from the European Green Movement.

One of the sub-themes we study is Jal, Jangal, Jameen (Water, Forests and Land). We have so far carried out field-based policy research in Water and Forests.

The second article highlights India's water crisis and provide some policy solution to balance constant supply of utilizable water and increasing demand.

Finally, the last article looks at the potential of forest based livelihood and its challenges in India.

Hope you enjoy this issue!



Hawksbill Turtles in coral reef, Maldives. 33% of reef forming corals, sharks and shark relatives are faced with extinction. *Andrey Armyagov/Shutterstock.com*

TELLING NUMBERS

What humans have done to nature

8 million
estimated number of animal and plant species on Earth

1 million* *(*approx)*
of these species are threatened with extinction, many within decades

40%: amphibian species threatened with extinction

33%: reef forming corals, sharks and shark relatives, and 33% marine mammals threatened with extinction

680: vertebrate species driven to extinction by human actions since the 16th century

+/-10%: tentative estimate of proportion of insect species threatened with extinction. Total insect species are 5.5 million.

3.5%: domesticated breed of birds extinct by 2016

70%: increase since 1970 in numbers of invasive alien species across 21 countries with detailed records

47%: proportion of terrestrial flightless mammals (besides 23% of threatened birds) whose distributions may have been impacted by climate change already

>6: species of ungulate (hoofed mammals) would likely be extinct or surviving only in captivity today without conservation measures

FORESTS

Tree stumps in Madagascar; result of deforestation and slash & burn farming. *Dudarev Mikhail/Shutterstock.com*

50%: agricultural expansion that occurred at the expense of forests

68%: global forest area today compared with pre-industrial level

7%: reduction of intact forests (>500 sq km with no human pressure) from 2000-13 in developed and developing countries

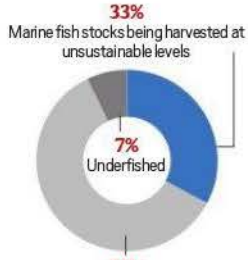
URBANISATION

>100%: growth of urban areas since 1992

105%: increase in human population (from 3.7 to 7.6 billion) since 1970 unevenly across countries, regions

>2,500: conflicts over fossil fuels, water, food and land currently occurring worldwide

OCEANS & FISHING



3-10%: projected decrease in ocean net primary production due to climate change alone by the end of the century

3-25%: projected decrease in fish biomass by end of century in low and high warming scenarios, respectively

+/-50%: live coral cover of reefs lost since 1870s

100-300 MILLION: people in coastal areas at increased risk due to loss of coastal habitat protection

>107: highly threatened birds, mammals and reptiles estimated to have benefited from the eradication of invasive mammals on islands

HEALTH

Kuta beach, Bali. Plastic pollution has multiplied 10 times since 1980. *Maxim Blinkov/Shutterstock.com*

40%: proportion of global population lacking access to clean and safe drinking water

>80%: global wastewater discharged untreated into the environment

300-400 mn TONNES: Industrial wastes dumped annually into the world's waters

CLIMATE CHANGE

1°C: average global temperature difference in 2017 compared to pre-industrial levels

>3 mm: annual average global sea level rise over the past two decades

5%: estimated fraction of species at risk of extinction from 2°C warming alone, rising to 16% at 4.3°C warming

Source: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, first assessment report

Making Environmental Issues more Salient in India's Politics

Lessons from the European Green Movement

Vijay Mahajan

Rajiv Gandhi Institute for Contemporary Studies (RGICS), organized a dialogue on the above topic earlier this year at the Jawahar Bhawan, New Delhi. Over 45 people from different backgrounds including political leaders, environmental activists, academicians, and professionals attended the dialogue. The gist of the discussion is presented below.

Why Environment is not an Issue in India's Politics

- The high faith in consumerist and capitalist model of development. It is this model, which has accelerated degradation of environment. There is need to evaluate and question this model of development.
- Our policies are far from ground realities and local conditions. We must also think about the way we frame our policies. Developmental policies framed by national government at times undermine issues of local people.
- There has been high focus on large-scale projects, which undermines several environmental concerns. They do not directly benefit local community.
- Impact of environmental degradation on human health is an observed phenomenon but it is not being politicised.

Lessons from the European Green Movement

In this context, a European Green Movement activist, Mr Marko Ulvila from Finland, was invited to the consultation to give a perspective of the European Green Movement and how the environmental agenda was brought into mainstream politics in Europe over the last three or four decades. Mr Ulvila gave a succinct history of this process.Environmentalism is age-old. Its manifestation in earlier phase include:

- Spiritual and cultural restrictions on human consumption, management of commons, including conflict
- Management of natural resources moving public to private to public – from open forests to privates hunting grounds of rulers to modern national parks from 19th century onwards
- Environmental concerns in literature: Rabindranath Tagore and Mukta-Dhara / Waterfall 1922

– Modern responses to emerging problems: London pea-soup smog of 1952 and First Clean Air Act 1956

The origins of the movement that we now know as Greens can be identified in the radical student and left movements of the 1968. The Paris Spring introduced a multifaceted transformative agenda where equality and individual liberties was at the core. General call was made for a society free of discrimination be for the sake of class, gender, ethnicity or sexual orientation. On the general political landscape anti-authoritarianism, ending colonial and neo-colonial wars, support to liberation movements, nuclear disarmament and environmental protection mobilised support.

Interestingly enough, in many of these movements ideas of Gandhiji and reference to him can be found. A well known case is how India's successful freedom struggle and liberation from the colonial rule inspired similar movements in Africa and elsewhere in Asia. Also Gandhiji as a champion of non-violence and inspiration for peace movement is an iconic role. For example, in 1952 one the first calls for nuclear disarmament was the Operation Gandhi lend in London. From it numerous peace *padiyatras* followed and they continued with quite some popularity until the 1980s.

On environment, the links to Gandhiji are much less known. In year 1968 three seasoned scholars from Norway toured India for Gandhiji's birth centenary. They were Arne Næss, founder of the deep ecology school of though, Johan Ganltung, founding figure of the peace research movement and eco-philosopher Sigmund Kvaløy. Soon after returning to Norway they got involved in a struggle against a hydro-electric dam in Mardøla and introduced Gandhian satyagraha approaches to the movement. Næss run a course on non-violent resistance at his university to prepare ground for the actions that included chaining oneselves to construction machinery. The dam was eventually built, but eco-satyagraha was introduced in Europe to be a central element of the Green movement in the continent thereafter.

These and many other movements such as ones promoting anti-authoritarisim, feminism and sexual freedoms surfaced in the revolutionary year of 1968. They mobilised large number of people and attention and pursued their goals through demonstrations, other

RGICS Dialogue on Making Environmental Issues more Salient in India's Politics

actions and independent media outlets. They became to be called the alternative or new social movements. Many of them found the existing parties or the whole parliamentary party system unpromising avenues for change.

After the 1968 movements, environment picked up as a theme in several ways:

- Civil Society: Foundation of Friends of the Earth and Greenpeace in 1969
- Governments: UN Conference on Human Environment in Stockholm 1972
- Business: Limits to Growth 1972

Only the party sector was still rather silent on the environment. However, towards the end of 1970s increasing number of activist saw also electoral politics as a necessary and useful avenue for action, and independents were set up successfully in local elections here and there. Because of the proportional representation system practiced in the elections in the continental Europe, such independents and alternative lists were able to pass the threshold of some five percent and got local representation. Such experiences eventually lead to creation of national parties, starting with German Green Party established in 1980.

The diverse German movements that joined hands in forming the Green Party agreed on **four pillars** as the common minimum standing: social justice, ecological wisdom, grassroots democracy and nonviolence. Of these social justice can be considered as a direct continuation of the European left parties while the three others emanate from the new social movement priorities. The spearheading theme of the founding times was opposition to nuclear power with vibrant local movements mobilising ordinary people to prevent plants built in their localities. In early 1980's the peace movement in Europe mobilised in grand scale against placing American nuclear missiles in Europe.

The German Green Party fully supported the demands of the movement. By taking this popular stand in contrast to other parties, the Greens got in the 1983 federal elections the required 5 percent of the popular vote and got its first 28 MPs in the Reichstag or the German federal parliament. In 1985 Greens became a junior partner in the state government of Hesse, thus ascending to a state power within five years from the establishment of the party.

Two innovations of the German Greens:

- 50 percent quota for women
- Quota used also to accommodate various alternative views within the movement.

During the next decade three important events or processes took place.

1. The UN Commission on Environment and Development, set up in 1983 with former Prime Minister of Norway, Ms. Gro Harlem Brundtland as the chair. Its aim was to "propose long-term environmental strategies for achieving sustainable development". The commission was a response the environmental movements and concerns. While the commission with its 1987 report "Our Common Future" increased the awareness and commitment to the environment, it at the same time presented the questionable case that the three pillars of sustainable development - economic, social and ecological - are mutually compatible and supportive. In the 1970s there was strong transformative demand identifying growth as a source of environmental problems. Now Brundtland commission said that not only is growth

compatible with environmental concerns, but absolutely necessary for sustainable development. Finnish ecological economist Jan-Otto Andersson has written about the trilemma of sustainable development where he argues that two of the three goals can be achieved simultaneously, but then a third one will be inevitable undermined. And this we have seen in the three decades after the commission: strong advances on social progress and economic growth and destruction of the global environment.

2. German election result 1990 where the Greens had very ambitious environmental agenda and fell below 5 percent threshold and got no MPs to the parliament. The party was emboldened by the Chernobyl nuclear disaster and the environmental wave partly caused by the Brundtland commission and build-up towards the Rio Earth Summit in 1992.
3. Collapse of the Soviet Union: Green movements played also important role in the collapse of the Soviet Union. Environment was one of the few things where debate and even popular activity was tolerated in the Soviet Union, especially after Gorbachov was elevated to power and he introduced glasnost and perestroika policies. During that time the central government had produced massive river diversion plans and scientist were questioning these in public. Several leaders of the environmental movement became in the Baltic countries also political leaders, though the green parties in the former eastern bloc have not had stable strong presence.

Now thinking about **achievements of the Green Movement in Europe**, there are notable things to mention. Much of these are outcomes from electoral victories and Green joining national coalition government. Most important is the ten year period when German Green Party ruled with social democrats from 1998-2005. The achievements include:

- Preventing the massive building of nuclear power envisioned in the 1970's and turning the tide for phasing down of nuclear power production.
- Cleaning up local environment through regulation of air and water pollution as well as waste management.
- Small advances in protection of natural environment and biodiversity.
- Promotion of renewable energy, most notably through the feed-in tariff introduced in Germany that brought down the price of solar and wind power construction.
- Relatively consistent commitment to climate protection internationally, though clearly inadequate.

Marko Ulvila then presented the 2019 Manifesto as adopted by the European Green Party Council. This is reproduced below:

Time to renew the promise of Europe: The 2019 Manifesto as adopted by the European Green Party Council, Berlin, 23 – 25 November 2018

– A vote for the Greens is a vote for change. It is a vote to not let go of Europe, but to make it into what it was promised to be: a union not of selfish interests, but of shared responsibility. A union not for financial gains for the few, but economic and social progress for all. A union that leads the world by protecting people and the planet. Now is the time to fulfil that promise. Now is the time for change.We are a truly European movement united by our vision, mission and passion. From Ireland

to Georgia, from Norway to Malta, we fight for human dignity, sustainability, equality, peace and solidarity. We do it in the parliaments and we do it on the streets.

- But today powerful forces are trying to steer us back. On one side, new groups are using aggressive tactics and the temptation of hatred to trick and force their way to power. On the other, status quo politicians are failing to enact real change in a time that calls for ambitious action.The UK has decided to leave the Union, and other forces want to weaken it. Authoritarianism, racism, neoliberalism, terrorism and wars in our neighbourhood – all in different ways – have eroded the sense of security for many Europeans. The financial crisis and austerity policies left millions in poverty, while big multinational corporations avoid taxes. People fleeing war and persecution exposed governments unwilling to help, while Europe as a whole is wealthier than ever. The climate crisis threatens to rapidly undo the very foundations of our civilisation. Europe's future is at jeopardy. Now is the time for change. Now, more than ever, we need to act. We need to build a democratic and inclusive Europe that is socially just and environmentally sustainable. We need an economy that serves both current and future generations. We need a Europe that bears its global responsibility and leaves no one behind.
- In today's globalised world, no country is big enough to tackle problems alone. We can only take back control by working together and looking to the future – not by building walls and retreating into the past. We are guided by the Sustainable Development Goals, providing a roadmap for all countries.The European Union is far from perfect, but it can be a powerful force for good. We can build on what has been achieved – and change what has not worked. By working together, Europe can reduce poverty and create jobs, tackle the climate crisis and restore our nature, fight discrimination and defend freedom. We know that building this Europe will not be easy. Old status-quo parties have long resisted calls for progressive reforms. But we are committed to working hard every day with people, organisations and movements fighting for change.

  [*Editor's note:* Marko later informed us that in the general election held in Finland in April 2019 for the 200 member Parliament, the Green League got the best result ever with 11.5 percent of the vote (+3 percent from the previous election) and 20 MPs (+5). The party leader Pekka Haavisto ignited an energetic campaign with a positive content highlighting climate, education and equality. Nationally Greens ended up as the fifth, in Helsinki they were the most popular one. Of the twenty Green MPs 17 are women!]

Back to India, the consultation came up with the following strategies for making environmental issues more central to India's politics. These are sub-divided into six different sub themes.

Clarifying the environmental aspect of everyday problems

- Local and every day issues of life and livelihood have more potential to mobilize people.
- Ground water is contaminated, surface water is highly polluted, forest cover has decreased, air has been polluted to the dangerous level and these evidences are enough to mobilize people.
- Communities see environmental issues from different perspective, depending on their location and their direct and indirect dependency on natural resources.

Mr. Marko Ulvila, European Green Movement activist describing journey of the European Green Movement

- Farmers is a big group and drastically affected by changing environment. Their problems such as low productivity, inadequate returns, and indebtedness, need to be defined in the context of climate change and environment.
- The degradation of environment and scarcity of resources is leading to conflict.

Research and evidence-based arguments

- Research is important aspect to find evidence of the impact of environmental degradation on the people.
- Mapping of distribution of natural resources and calculating monetary value of these resources can be effective way to share consciousness of common people.

Communication and dissemination of information in effective manner

- Environmental issues needs to be re-defined in local language. Our vocabulary must capture popular imagination of common people.
- There is need to use effective and modern communication system to mobilize people. The communication should also provoke people to actively engage. Local or folk ways of communications do also have far reaching impact, such methods should also be used for effective communication.
- Climate change and degradation of environment is affecting both rich and poor. Each of them is concerned about it. However, popular imagination of both the group is different. There is need to bridge this gap through effective communication.
- The big task is to convince our political leaders that climate change is not an external issue. It is our people who will suffer most from climate change.

Organizing, Mobilizing and Networking masses

- People must be mobilized on their different issues such as youth on jobs, farmers on agrarian crisis, tribal on forest and Himalayan people on mountain issues and link all such issues with the umbrella issue of the environment to build constructive opinion.
- Integration of social, economic and environmental issues is essential to address the complex issue of environmental degradation and its impact.

– Farmers can be mobilized for ecological farming; it is one of most vulnerable group.

– Issues of young people especially jobs has lot to do with environment and climate change. This group is also important and can be mobilized.

– Women especially in Himalayan region are more close to the nature; we have history of women's role in protecting environment. This group needs to be given due share in representation and decision making.

Networking of organizations

– Social, economic and political organizations working on issues of common people must come together to form coalition to fight this common problem.

– There are contradictions in the way of looking at the problem of environment between village, state, national and international level. There is need to understand and engage with these contradictions.

– A real bottom-up approach of developmental planning is required. So, the focus should be on strengthening and reviving District Planning Committees (DPCs).

Sensitizing political and other leaders

– Policy makers must acknowledge that millions of underprivileged people are highly dependent on nature for their life and livelihood.

– There should be more dialogues between scientists, activists, policy makers and political leaders. Such dialogues will help in deepening knowledge of politician and developing and political discourse.

– Interaction among stakeholders including politicians is important to discuss environmental issues, comprehensive planning and effecting implementation.

– Political parties in India should also promote and support leaders in their organizations who have genuine concerns for environmental issues.

We end with some excerpts about the sayings and doings of various Indian political leaders on the issue of environment.

> The UN held the first global conference on the human environment (UNCHE) in Stockholm in June 1972. [Indira] Gandhi used her platform to express the inextricable goals of poverty alleviation and environmental protection. "There are grave misgivings that the discussion on ecology may be designed to distract attention from the problems of war and poverty," she said. "We have to prove to the disinherited majority of the world that ecology and conservation will not work against their interest but will bring an improvement in their lives."[1]
>
> "As Prime Minister, there was in Indira Gandhi, a sense of engagement with issues of the environment…in 1973, Project Tiger was launched…No one living in Delhi is unaffected by the fate of its city-forest, the Ridge. In the flurry of activity in courts and in the media, it is easy to forget that she was the first prime minister who gave it a mantle of protection in the summer of 1980, when petitioned by a student group from the city, Kalpavriksh".[2]

1 https://www.theguardian.com/global-development-professionals-network/2014/may/06/indira-gandhi-india-climate-change

2 https://www.theguardian.com/environment/blog/2011/jul/13/jairam-ramesh-india-environment-ministry

Rajiv Gandhi's interest on preserving natural resources and the environment was visible through his actions. In 1985 he announced the setting up of a National Wastelands Development Board (NWDB) in 1985 with a mission of greening five million hectares of wastelands every year, which if achieved would result in one-third of India acquiring a green cover by the year 2000 A.D. Sensing the danger to the planet and life, he brought about the Environment (Protection) Bill, 1986 before the Parliament.

"Jairam Ramesh was named India's Minister for Environment and Forests in 2009 in the UPA Government led by Dr Manmohan Singh. As Ramesh ...observed: 'India needs to be liberated both from the 'high GDP growth hedgehogs' and the 'conservation at all costs hedgehogs'. What India needs, he said, is a smooth, cunning and crafty fox that balances high growth and conservation. 'The hedgehog view' (sticking to one big idea) is unresponsive and inattentive to the untidiness and complexity of real life."Ramesh held public consultations, raised environment-related objections, and cancelled some projects. He set up a national green tribunal, and worked on forest dwellers' rights. In 2010 he imposed a two-year moratorium on India's genetically engineered aubergine, [but] Ramesh lashed out against what he saw as 'politicisation of climate science'". [3]

KN Govindacharya, former RSS ideologue and former BJP General Secretary said, in 2011 "Allowing indiscriminate globalisation is not conducive to our environment and we will not be able to cope up with its ill effects. We have seen the example of Brazil which started off economic reforms ahead of India, the ill effects of indiscriminate urbanisation despite the fact that their population is much less and they have double land mass, if India treads the same path the impact will be catastrophic."[4]

3 https://www.theguardian.com/environment/blog/2011/jul/13/jairam-ramesh-india-environment-ministry

4 https://www.indiatoday.in/india/story/fdi-policy-changes-former-rss-ideologue-cautions-modi-govt-against-allowing-indiscriminate-globalisation-1136210-2018-01-11

India's Water Crisis

Problems and solutions

Jeet Singh and Jasleen Kaur

India, accounting for around 17 percent of the world population has been endowed with just four percent[1] of the world's fresh water resources, which clearly highlights the need for its judicious use. Following the *Falkenmark Index*, more than half of the twenty river basins have water scarcity conditions with availability of less than 1000 cbm per capita per annum. According to a report of the Union Water Resources Ministry, total water demand in the country is estimated to increase by 34 percent by 2025 and over 78 percent by 2050, indicating a major gap of around 30 percent with respect to the replenishment rate capacity signaling a serious water crisis in the nation.

Water has been identified as a critical resource in India's public policy more than three decades ago. It brought the first national water policy in 1987 and revised in 2002. However, the water crisis continues to augment. In 2012, the government of India adopted a fresh National Water Policy, which provided for significant change in our approach and action. This policy draws principles of water resource management from globally recognized sustainable systems such as Integrated River Basin Management, Conjunctive water management and aquifer as unit of ground water management. However, even after six years of the adoption the policy, there has been no progress on implementation of this policy. On the other hand, the water crisis continues to loom. This article is an attempt to understand the gravity of current water crisis, its future risks and policy solutions.

An Overview of the Status of Water Resources in India

Water Resource Potential of India

The main source of water in India consists of precipitation including snowfall which is estimated to be 4,000 cbkm and trans-boundary flows received in its rivers and aquifers from the upper riparian countries,[2] which is approximately 500 cbkm. The average annual natural flow in rivers and aquifers is approximated to be 1,869.3 billion cubic meters (BCM) considering the loss due to evapotranspiration. Further, due to various

1 IITM: Climate Change Impact on Water Resources in India, Keysheet-5, IITM

2 National Water Mission under National Action Plan on Climate Change, 2008 (Vol-II), Ministry of Water Resources, Government of India.

topographical, technological and resource constraints[3], only about 1123 cubic km3 can be accessed yearly by India. (See Table-1).

Table 1: Water Resources of India

Estimated annual precipitation (including snowfall)	4,000 cbkm
Run-off received from upper riparian countries (approx)	500 cbkm
Average annual natural flow in rivers and aquifers	2,301 cbkm
Estimated utilizable water	1,123 cbkm
(i) Surface	690 cbkm
(ii) Ground	433 cbkm

Source: Water Mission, NAPCC

While the precipitation is major source of water, it is distributed highly uneven across the country and over the year. For a large part of the country, it is concentrated in the Monsoon season during June to September or October. Precipitation also varies from region to region. The annual rainfall varies from 100 mm in western part of India (Rajasthan) to 11000 mm in Cherrapunji in Meghalaya[4]. This flows into nearly 2 lakh km of rivers and 7.5 million hectares of lakes, pond, underground aquifers and reservoirs/tanks constructed by people and governments (see Table-2).

Table 2: Inland Water Resources of India

Length of Rivers and Canals (in km)	1,95,095 Km
Other Water Bodies (Area in Million Hectare)	
- Reservoirs	2.93 M.Ha
- Tanks and Ponds	2.43 M.Ha
- Flood Plain Lakes & Derelict Water bodies	0.80 M.Ha
- Brackish Water	1.15 M. Ha.

Source: EnviStatsIndia 2018

Water resources in India is limited and geographical distribution ranges from highly wet areas to extreme dry regions. However, it has been observed that even in traditionally wet regions, people are now struggling for drinking and irrigation water due to many reasons. Therefore, the management of water resources is crucial to use this resource in more sustainable manner.

To meet water demand there has been a high focus on creating water reservoirs and water storage structures. According to River Basin Atlas published by WRIS in 2010, there were 4,728 operational dams and 397 under constructed dams in India. These dams had capacity of storing about 304 BCM water. An additional live storage capacity of six BCM had been created through medium storage projects[5]. However, despite the huge live storage capacity created over the decades, the large population remained deprived of drinking and irrigation water.

The latest NFHS survey (NFHS-4, 2015-16) reveals that more than 10 percent people

3 National Water Mission under National Action Plan on Climate Change, 2008 (Vol-II), Ministry of Water Resources, Government of India.

4 Ibid

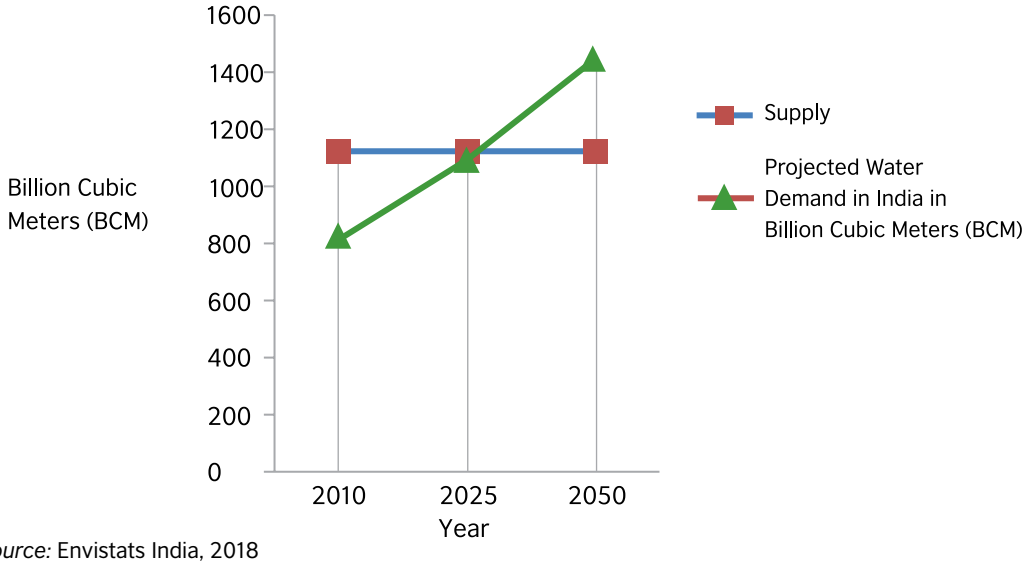
5 http://www.india-wris.nrsc.gov.in/Publications/RiverBasinAtlasChapters/RiverBasinAtlas_Full.pdf

do not have access to clean drinking water and more than 50 percent people do have access to improved sanitation facilities. In terms of irrigation, only about 90 million-hectare land is irrigated. The Maharashtra has 40 percent of country's large dams but nearly 82 percent of agriculture land of the state is rain fed[6].

Demand-Supply Gap

According to the Ministry of Water Resources, the total demand of water in India was 813 BCM in 2010, which is estimated to increase to 1,093 BCM by 2025 and 1,447 BCM by 2050. This clearly indicates the gap in demand and supply, and in the near future, with growing population and thus the demand, the total demand for the country as a whole would be higher than the total replenishable water capacity of India (1,123 BCM).

Chart 1: Demand-Supply Gap in water availability per capita



Source: Envistats India, 2018

Further, the crisis is compounded by an increasing population, which results in a mounting pressure on the water resources of the country. According to the Water and Related Statistics published by the Central Water Commission, per capita annual availability of water in the country has decreased from 1,816 cubic meters in 2001 to 1,545 cubic meters in 2011[7], and is likely to further fall to 1,421 by 2021 and 1,174 by 2051[8].As per the Falkenmark Index, one of the most commonly used index of water scarcity, if per capita water availability decreases below 1700 M3 per year the condition is termed as water stress. If it further decreases and goes below 1,000 cm per annum the condition is termed at water scarcity.

While at the aggregate level, the utilizable potential stands at 1,123 BCM, the water availability at the disaggregate level depends on several other factors and it varies both, temporally and spatially. The major source of water for India i.e. precipitation is highly uneven in its distribution. Owing to the large spatial and temporal variability in the rainfall,

6 High Powered Committee Report, 2016, 'A 21st Century Institutional Architecture for India's Water Reforms', July, 2016, Government of India.

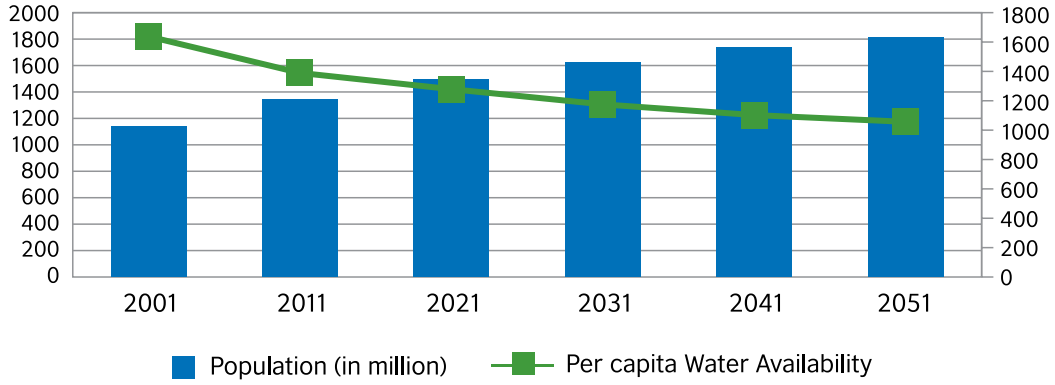
7 Chapter 3- Water: The Nectar of Life, EnviStats India 2018. (Supplement on Environmental Accounts) http://www.mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/EnviStats/5_Chapter%203%20-%20Water.pdf

8 Chapter 3- Water: The Nectar of Life, EnviStats India 2018. (Supplement on Environmental Accounts) http://www.mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/EnviStats/5_Chapter%203%20-%20Water.pdf

water resources distribution is highly skewed in space and time.[9] Therefore even while the overall picture shows a demand supply gap which will begin to worsen only in the near future, many regions in the country have already started to witness water scarcity conditions due to shrinking water resources in their close vicinity, including depleting level of groundwater.

Reducing the Gap: Solutions to water management

Chart 2: Population growth and per capita availability of water



Source: Envistats India, 2018: Environmental Accounts[10]

The supply of the water is constant and in fact, decreasing but the demand is on rise. Some estimate shows that between 2025 and 2030 the total water demand of India will surpass the total available water. Moreover, the increasing rate of evapotranspiration is major concern, which is resulting into decline in total water available for various human uses. Scientist have observed that decline in the rate of water recharge due to erratic whether, melting glaciers due to global warming and rapid spread of water pollution due to untreated discharge of sewage & industrial waste and use of excessive chemical in agriculture. All these problems are manifestations of unsustainable and consumerist world order, which has now pose serious related to water risks. There are chances to reduce these risks by changing our behaviour and re-working on designing and implementation of sustainable policies. Within the policy space there is a need to adopt integrated approach and address both the issue of supply and demand of water. This section briefly describes possible policy recommendations to address current water crisis in India.

Supply Side Solutions

India has a strong history of policy driven management of water resources. The First national water policy adopted by the country in 1987 prioritized water uses. The drinking water was given first priority in this policy. We revised our water policy in 2002. The latest national water policy was adopted by the country in 2012 and it emphasizes on adopting integrated river basin management approach to manage water resources in more sustainable manner.

A river basin approach comprises the entire catchment area and therefore acknowledges and strives to maintain all ecological services available in the catchment area. According to WWF the integrated river basin management approach rests on the principle that naturally functioning river basin ecosystem, including accompanying wet land and groundwater system[11].

9 http://www.fao.org/nr/water/aquastat/countries_regions/IND

10 Chapter 3- Water: The Nectar of Life, EnviStats India 2018. (Supplement on Environmental Accounts) http://www.mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/EnviStats/5_Chapter%203%20-%20Water.pdf

11 WWF: https://wwf.panda.org/our_work/water/rivers/irbm/, Accessed on 28.03.19

River Basin and Aquifer as Unit of Water Management

To manage supply of water resources in more sustainable manner, the river basin approach is much needed policy intervention. The high powered committee constituted by the government in 2015 led by Dr. Mihir Shah has also strongly advocated for adopting integrated approach to deal with the issue of water crisis. The committee took the idea of the National Water Policy 2012 further and recommended for structural changes in the system of water governance. Now these recommendations need to be converted into policy without any further delay.

Within the integrated approach of water resource management, there is need to change the way we manages ground water. Acclaimed ground water expert Dr. Himanshu Kulkarni, argues that aquifer is unit of ground water with limit defined by physical and hydraulic boundaries. Major ground water policies/schemes in India looks at the supply and augmentation side of ground water resource without any consideration of aquifer. The Easement Act, 1882 freely entitles the owners of land to collect and dispose the water under their land. This leads to an unregulated proliferation of wells and borewells. There is virtually no legal liability for them to cause any damage to water resources including over extraction of ground water. Dr. Kulkarni advocates for recognizing ground water as public good by removing provisions of the Easement Act, 1882 allowing land owner to extract ground water without any regulations.

Demand Side Solutions

Agriculture and Irrigation

Out of total available water 813 BCM in India, agriculture demands nearly 84 percent (688 BCM) for production in the form of irrigation. The coverage of irrigation has significantly increased in India after independence and currently it has potential to provide irrigation facility to nearly 113 million hectare land across the country. However only 89 million hectare land actually utilizes irrigation facility provided through various means. This demand will further increase to 910 BCM in 2025 and 1,072 BCM in 2050[12]. With this estimate in next 30 years, the water demand for irrigation will overshoot the total fresh water available in the country. According to a recent study by NABARD, the three water guzzler crops namely rice, sugarcane and wheat consumes more than 50 percent of total water for irrigation in India[13].

Table 3: Production and Water Consumption by Water Guzzler Crops in India

Crop	Total Cropped Area (million hectare)	% of Gross Cropped Area	Total Production (million tons)	Total Consumptive Water Use (TCWU) (cbkm)	Irrigation coverage (%)
Rice	43	22	110	206.2	59.6
Wheat	30	16	98	82.7	93.6
Sugarcane	4	3	306	57.4	95.3

Source: Agricultural Statistics, 2017 and NABARD, 2018

The three water guzzler crops namely rice, wheat and sugarcane cultivation together consume around 346 BCM water. It accounts more than 50 percent of total water

12 Envistats India, 2018, Envi Stats India-2018: Supplement on Environmental Account, MoSPI, government of India.

13 NABARD, 2018, Water Productivity Mapping of Major Indian Crops, NABARD, India.

Residents take water from a static tank in Kalinganagar, Chennai
Photo by: S. Senthalir, Scroll.in

demand for agriculture in India. Surprisingly larger producers of these crops are state which are water stressed such as Punjab, Andhra Pradesh, Madhya Pradesh, Karnataka, Maharashtra, Haryana and Gujarat. The ground water meets nearly two third of irrigation water in India and the groundwater data shows that states leading in cultivation of wheat, rice and sugarcane such as Punjab, Rajasthan, Uttar Pradesh, Haryana and Tamil Nadu have over extracted their ground water reserve.

Suggested Policy Solutions

Re-alignment of Cropping Pattern: the high production of water intensive crops like sugarcane and rice in water stressed states such as Punjab, Haryana, Maharashtra, Andhra Pradesh and Tamil Nadu is because of system of procurement through government at assured price especially for rice and establishment of sugar mills to process sugarcane developed in these states over a period. Surprisingly production of these water intensive crops in wet part of the country such as eastern Uttar Pradesh, West Bengal, Odisha and Assam is less. In order to make our agriculture more sustainable there is need to re-align cropping pattern in the country. Incentivising water intensive crops in the wet part and less water intensive crops in water stressed areas will help in this re-alignment.

Irrigation Infrastructure Improvement: India has spent huge amount to create large, medium and small project for irrigation after independence. However, of the total 113 million hectare irrigation potential, the country is able to utilize only 89 million hectare land. This gap is further increasing as we have paid little attention on distribution of water. While it is necessary to strengthen irrigation water distribution system by involving people and decentralizing them, it is also necessary to promote new and efficient irrigation technologies such as micro irrigation.

Conjunctive Water Management: The ground water meets nearly two-third of our water demand for irrigation. After green revolution, the share of ground water for irrigation has tremendously increased due to various policy and technological reasons. This has resulted in rapid decline in water table in many states. The conjunctive use of water to meet our various demands is way out. The conjunctive management approach in this sector attempts to use surface water, ground water and other water bodies in unified

and comprehensive manner.The conjunctive use must also incorporate new ideas of water harvesting, storage and distribution. Bhungroo technology innovated by social entrepreneurs Biplab Paul and Trupti Jain of Naireet Services[14], based in Gujarat is one such idea. The Bhungroo technology tries to store accumulated rainwater in s specific cavity identified underground through a drilled hollow pipe. This hollow pipe is called Bhungroo in Gujarati, which also can be used to lift water from the cavity for irrigation, when needed.

Climate Resilient Agriculture: with rapid change in climatic conditions and higher risk to crop production, there is need to innovate, promote and adopt climate resilient agriculture. Apart from new technologies on climate resilience, traditional agriculture also teaches us to grow climate resilient crops. There are thousands of indigenous seed varieties for all major crops in India and these variations in seeds used to diversified our agriculture production and sustain us against any drastic climatic change.

Policy Reform: India has large web of policies related to farm and farmer, many of them are unsustainable and risky for the future of agriculture production. For example use of unregulated tube wells with free or subsidised electricity to run them were introduced to solve the problem of irrigation. But, now this solution has become a problem as excessive underground water extracted by these tube wells has drastically depleted the water table. Such policies needs to re-visited to correct them for more sustainable future.

Drinking Water

According to an official estimate, the water demand for domestic use is 56BCM, which is projected to increase by 73 BCM in 2025 and 102 BCM in 2050. The major part of this demand is met through groundwater resources - 85 percent of India's rural domestic water requirements and 50 percent of its urban water requirements are met from ground water. Providing safe drinking water to all is still a big challenge. According to NFHS, 2015-16, more than 10 percent people in the country do not have access to clean drinking water and more than 50 percent people do not have access to improved sanitation facilities. According to Ministry of Drinking Water and Sanitation of the total 17,26,031 rural habitations only 77 percent have access to drinking water.

Water quality for 4.2 percent habitations is highly contaminated due to sewage discharge and untreated discharge from industries[15].The current gap between demand and supply for drinking water both in rural and urban is huge. We are unable to provide minimum 40 litres per capita per day (lpcd) to all in rural areas. Similarly, the standard water requirement in urban areas is 135 lpcd of which our total urban supply is merely 69 lpcd[16]. This is bound to increase in near future if radical policy interventions are not adopted. Following policy initiatives suggested by various experts and organizations can be adopted to address risks related to drinking water.

Arresting Water Pollution: The water pollution has come up in big way in last few decades and became a major challenge for water portability. Available data suggests that pollution level has increased in surface water as well as ground water. Moreover, the pollution is spreading rapidly and contaminating more water bodies. The main

14 https://www.naireetaservices.com/

15 Water Aid India: http://wateraidindia.in/faq/drinking-water-problems-india/ , Accessed on 30.03.19

16 TERI: Syed Qazi, Waming Ali and Nathaniel B Dkhar, 'India's rampant urban water issues and Challenges' December, 2018, TERI, Accessed from:https://www.teriin.org/article/indias-rampant-urban-water-issues-and-challenges, Accessed on 29.03.19

sources of water pollution are discharge from sewage, industry and use of fertilizers and pesticides. The prevention of pollution of water sources is critical in order to continue to portable water supply. The government of India has identified 19 states severally affected high fluoride content in drinking water and at least 10 states suffering from arsenic contamination leading to diseases that affect lungs, skin, kidney and liver[17]. While public awareness and capacity building of local people is important to keep water bodies free from contamination, it is also important to find policy solutions to ensure sustainable use of chemicals and proper treatment of sewage and industrial waste.

Decreasing Slippage: Slippage is yet another major problem in achieving goal of universal access to safe drinking water. Data of Ministry of Drinking Water and Sanitation reveals that the coverage of safe drinking water has only increased from 74 percent in 2012 to 77 percent in 2017. Slippage in this context means fully covered habitation slowly slips back to non-covered or partially covered state due to shortage of water. Erratic whether, depletion of ground water, reduction of water bodies and pollutions are some major reason behind slippages. Unfortunately, this has become a recurrent problem especially in rural areas. Therefore, intergraded approach of water resource management is needed for schemes related to drinking water supply.

Curbing Water Leakage and Pilferage: The national water policy, 2012 suggest to local urban bodies to collect and publish water account and audit report to fix the problem of leakage and pilferage. Several studies on water leakages in India indicate that about 30 percent to 50 percent water in urban supply is lost due to leakages, theft, unauthorised connections and incorrect metering[18].

Conclusion and Way Forward

As has been discussed in the section on *An Overview of the Status of Water Resources in India*, the water resources in the country are under stress. Although India has 4 per cent of the total water resource in the world, but it is much less than proportionate when we take into account that India has 17 percent of the world population. The demand-supply gap for the country as a whole has been estimated to be imbalanced (with demand over shooting supply) in the near future; however many regions are already suffering from conditions of water scarcity and drought. This situation, which affects both rural and urban areas, is further compounded by climate change, which not only would lead to erratic rainfalls and shrinking glaciers but also would make the extreme weather events like floods and cyclones much more common. It would put to risk the living standards of 60 million Indians, as has been highlighted by a 2018 World Bank report[19] on *South Asian Hotspots*. It is thus important to have adequate mechanism and policy framework considering that the supply of water is constant and in fact depleting over time as against rapid increase in demand. The country is already in deep water crisis and it is expected to worsen in near future if radical corrective measures are not taken now.

17 Water Aid India: http://wateraidindia.in/faq/water-quality-quality-water-available-india/ , Accessed on 30.03.19

18 Public Information Bureau: http://pib.nic.in/newsite/PrintRelease.aspx?relid=84072, Accessed on 30.3.19

19 Mani, M., Bandyopadhyay, S., Chonabayashi, S., Markandya, A., & Mosier, T. (2018). *South Asias Hotspots: The Impact of Temperature and Precipitation Changes on Living Standards*. The World Bank Group. doi:doi:10.1596/978-1-4648-1155-5.

Forest Based Livelihood

Potential and challenges

Jeet Singh

Introduction

The history of evolution of human being reveals that forest has always been crucial for life and livelihood. The dependency on forest changed drastically over the time from initially living in the forest for everything to using forest goods and services while living outside of the forest. In last few centuries, with technological inventions and development of other sources of income, the dependency of people on forest for livelihood decreased significantly. However, even today, worldwide around 1.6 billion (25% of world population) people depend on forest for their livelihood (FAO, 2014). Indigenous forest dwellers across the globe are heavily dependent on Non-Timber Forest Produces (NTFP) and numerous other ecological services to sustain their life and livelihood. India does not have official number of people dependent on forest partially and fully. However, some estimates suggest that about 275 million to 400 million Indians are dependent on forest (TERI, 2015). These people living in forest fringe villages depend upon forest for variety of forest produces and services. These includes edible fruits, flowers, roots, leaves, medicinal plants, firewood and tools for agriculture, fodder and cattle grazing.

While the forest has been main source of livelihood for millions of Indians, It also raises genuine concerns related to environment and protection of the forest. Numbers of people, group and institutions have argued that the huge dependency on forest will gradually degrade forests and will lead to environmental crisis. A group of NGOs has in fact challenged the Forest Rights Act, 2006, which allows tribal and other forest dwellers to collect, use, process and sale minor forest produces. While hearing this case on February 13, 2019 the Supreme Court ordered to evict nearly 1.8 million families whose claim under the forest rights Act, 2006 have been rejected. However, the court later stayed its own order after hearing petition by few state governments. Moreover, some people raised concerns related to ensuring sustainable collection and use of forest produces. There is high chance that if forest produces are extracted un-sustainably, the quality of forest will degrade. This article is an attempt to highlight the potential of forest base livelihood in India and its challenges.

Forest and Local Livelihood

According to the latest India's State of Forest Report, 2017 (ISFR) the country's forest cover is more than seven lakh square kilometer. This comprises little more than 21% of total geographic area of the nation. This forest cover is much less as compared to global standard of 33% forest of the total geographical area. However, successive ISFRs reveals that the forest cover remained unchanged even after diversion of huge amount of forest land for non-forest use. According to a report, of the total 11.86 hectare forestland diverted from 1980 to 2001 more than two third (69%) land diverted for development and industrial activities such as construction of road, power projects, mining and railways[1]. The Forest Survey of India (FSI) attributes unchanged gross area of forest in last three decades to activities such as forestation and better management of forest and forest produces.

India's Forest Cover (Area in Sq Km)

Type of Forest	1991	2001	2011	2017
Dense forest (more than 40% canopy density)	3,85,008	4,16,809	4,04,207	4,06,476
Open forest (10% to 40% canopy density)	2,49,930	2,58,729	2,87,820	3,01,797
Scrub Area (Canopy density less than 10%)	59,641	47,318	42,176	45,979

Source: Compiled from India's State of Forest Reports, 1991 to 2017

The NTFP commonly refer to heritable material maintained within and among trees and other woodly plant species that are of actual or potential economic, environmental, scientific and societal value[2] (FAO, 2014). India too has rich tradition of collecting and using such minor forest produces for various purposes. Major types of forest produces and services in India are categorized in the following matrix.

Minor Forest Products

Edible products	Fruits, flowers, seeds, roots, roots, rhizomes, tubers, etc. of several forest species are edible.
Grasses and grazing	Forests provide grazing facility to about 30 per cent of the total livestock population of the country.
Fodder trees and shrubs	Forests provide fodder from trees, shrubs and climbers. Leaf fodder of several tree species is almost as nutritious as that of agricultural fodder crops.
Bamboo and canes	India is very rich in bamboo resources. The bamboo is used for housing, for rural agricultural works, for paper pulp, for packaging and other uses.
Oil seeds	Many tree species produce oil-bearing seeds, which are commercially important. Some of these oils are fit for human consumption.
Essential oils	Many species in the Indian forest yield essential oils, which are used in making perfumes, soaps, cosmetics, etc.
Tans and dyes	A variety of vegetable tanning material are produced in the forest.

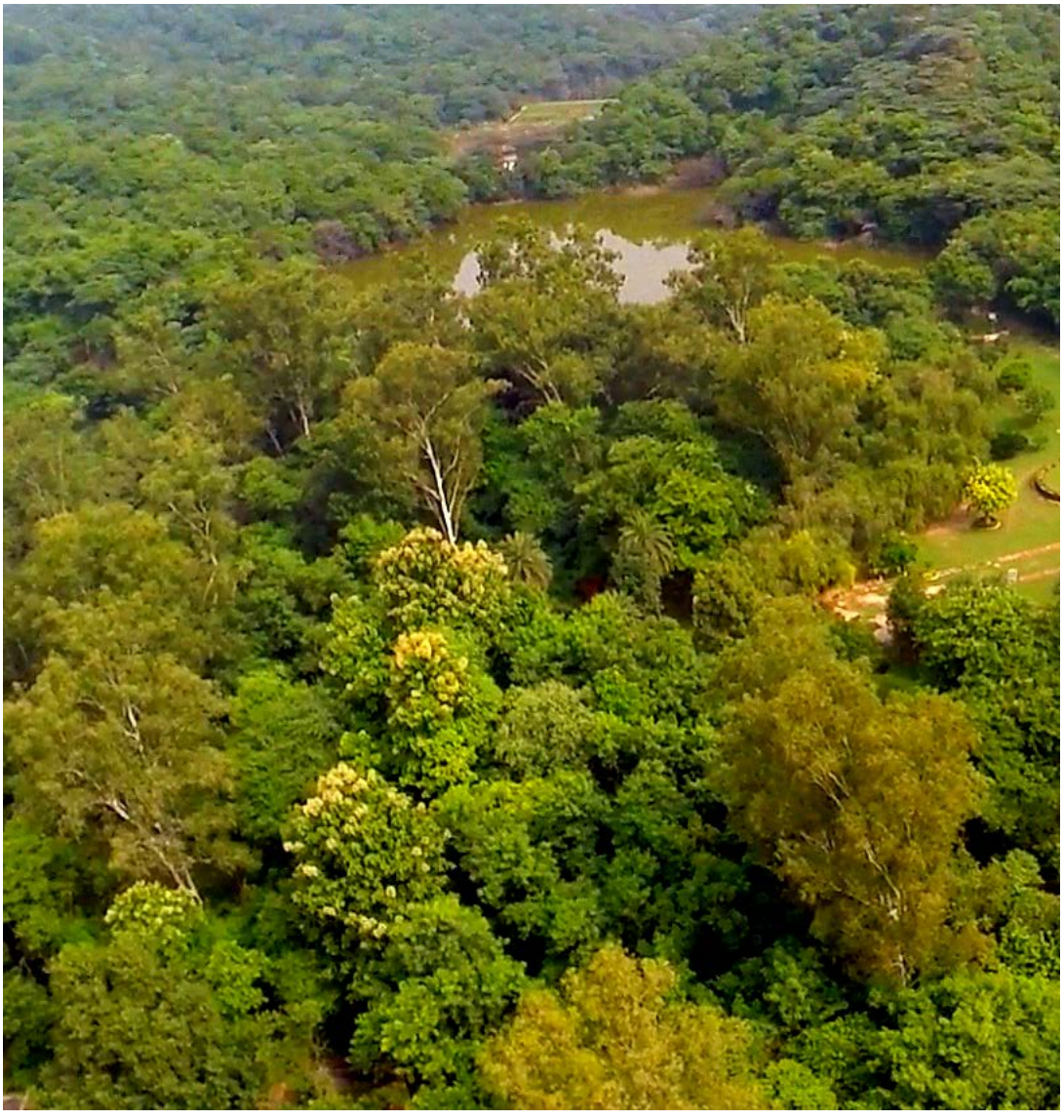
1 Forest Research Institute, Dehradun: http://frienvis.nic.in/Database/Purpose-Wise-Forestland-Diversion_1807.aspx , Accessed on 25.4.19

2 FAO, 2014, 'the state of the world's forest genetic resources', Food And Agriculture Organization Of The United Nations, Rome, 2014, accessed from: http://www.indiaenvironmentportal.org.in/files/file/state%20of%20the%20world's%20forest%20genetic%20resources.pdf

Gums and resins	Gums and resins are exuded by trees as a result of incision or injury to the bark of wood. Gums are collected from several tree species. Resins find wide use in industries and in Indian pharmacy.
Fibres and flosses	A wide range of plants, yielding fibre occur in the forests of India. Fibres are obtained from tissues of different parts of certain woody plants, which are used for making cloth, rope and cordage.
Flavouring plants	A variety of plants including cumin (seeds of Carum carvi), cinnamon (bark of Cinnamomum zeylanicum), cardamom (dried capsule of Elettaria cardamomum), bay leaf (leaves of Cinamomum tamala), are obtained from forests used locally and throughout the world.
Animal products	Animal products include Lac, honey, silk, horns, fur, skins, tusks, musk, bones, fur and feathers, meat etc.
Leaves	Leaves of various forest tree species have been used for various purposes since ancient times and help earn forest revenue. Leaves of several trees and shrubs are widely used as food, fodder, medicine, etc.

Source: Nautiyal, S. and Kaul, A.K. Eds. Non-timber forest products of India. Dehradun, Jyoti Publishers. 2003.

The non-wood forest products, generally termed as Non-Timber Forest Produce (NTFP) of plants includes bamboo, canes, fodder, leaves, gums, waxes, dyes, resins and many other forms of food including nuts, fruits and honey. India's forest cover of more than seven



lakh square kilometer has huge potential of producing these NTFPs, which contributes substantially in rural the economy.

The availability of kinds of forest produces in India varies from region to region because of the rich biodiversity of the country. This further has diversified and enriched local traditional ecological knowledge, practices of collection and use of forest produces all across the country. We don't have gross estimation of abundance and potential yield of NTFP, however, some researcher attempted to estimate region specific potential of NTFPs. TERI in 2018 estimated abundance and potential yield of selected forest produces in central and western states of India (See table below)

Total abundance and potential yield of major NTFP in 9 selected States (Madhya Pradesh, Chhattisgarh, Odisha, Jharkhand, Andhra Pradesh, Telangana, Maharashtra, Rajasthan, and Gujarat)

S.No.	MFP	Total Potential abundance (No. of Tree)	Total Potential Yield
1	Bamboo	3338 million bamboo culms	2,837 million culms
2	Chironjee	42 million trees	350 million tones of Chironjee pods
3	Gum Karaya	0.45 million trees	1,000 tonnes
4	Harra	11.91 million trees	0.66 million tones
5	Karanj	9.1 million trees	0.56 million tones karanj seeds
6	Lac	510 million tress of Kusum, Palash and Ber	16,978 tonnes
7	Mahua Seeds	880 million trees	88 million tones of hahua seeds
8	Sal leaves	19.8 million trees	3.2 million kg leaves
9	Sal seeds	0.39 million Sal trees	4.75 million tones of seeds
10	Tamarind	0.85 million trees	55,800 tonnes of tamarind
11	Tendu leaves	3.1 billion bushes and 1.8 million small trees	0.36 million tones of tendu leaves
12	Wild honey	--	30,000 tonnes of wild honey

Source: TERI, 2018

It is difficult to quantify the value of NTFP produced in Indian forest and collected by people. However, an assessment of Joint Forest Management in 2011 estimated that about 99 lakh families connected with JFM committees all across the country used NTFP of worth around Rs. 1928 core[3]. This estimate includes worth of fodder and firewood along with commercially potential forest produces. The JFM is relatively new mechanism to collect, process and use forest produces and services, their also exist traditional systems of tribal and other forest dwellers related to collection and management of forest produces. Therefore, in actual the value of NTFP and related services is much higher than estimated by JFM alone.

Other than the environmental resource, forests in India are treated as social and economical resource. More than 300 million people are deriving full or partial livelihood from forests (TERI, 2018). Of the total people dependent on forest, tribal population accounts for more

3 Forest Research Institute, Dehradun, Accessed from: http://frienvis.nic.in/Database/Benefits_from_JFM_2244.aspx , accessed on 23.4.19

than 100 million all across the country[4]. There are around 1.73 lakh villages located in and around forests, and all of them are either fully or partially dependent on forests (MoEF, 2006).

Tribal communities across the country are more dependent on these forest produces for their livelihood as around 30-40% of their income comes from collection of forest produces[5]. According to the report of the National Committee on Forest Rights Act, 2011 an estimated 100 million tribal derives their source of livelihood from the collection and marketing of minor forest produces. Moreover, a large number of tribal and non-tribal group in Indian villages are heavily dependent on forest for cattle grazing, collection of fodder and firewood.

Challenges of Forest based Livelihood

The dependency of people on forest for livelihood has environmental implication. The unsustainable use of goods and services from the forest adversely affect environment and the biodiversity. Therefore, concerns for sustainability of traditional forest base livelihood practices have emerged in big way in last few decades. Largely there are two opinions. One, which believes that forest dwellers, should be given all rights to use forest goods and services in sustainable manner. The opposing opinion believes that allowing access of forest for its dwellers will further degrade forests, which will lead to serious environmental crisis. While both sides have enough evidences and justifications in their support, it is important to resolve the issue with the perspective, which should respect people's rights over forest produces along with urgent need of protecting richness of the biodiversity for greater cause. Therefore, it is highly important to stop further degradation of forests due to local livelihood practices and promote sustainable harvesting of forests goods and services.

4 TRIFED: http://www.trifed.in/trifed/(S(5sgw2dg1uqnuf15ywcgwrpbu))/MFP_development.aspx, Accessed on 23.4.19

5 TRIFED, Accessed from: http://www.trifed.in/trifed/(S(5sgw2dg1uqnuf15ywcgwrpbu))/MFP_development.aspx, Accessed on 24.04.19

Local Livelihood and Forest Degradation

People living close to and within forest are partially or fully dependent on forest for variety of forest products for food, medicine, fodder, housing, livestock and other marketable products. Various field based studies shows that dependence on forest for livelihood results in degradation of forest[6]. Three wildlife NGOs have challenged the Forest Rights Act, 2006 in the Supreme Court on the basis that allowing tribal and other forest dwellers in the forest will destroy biodiversity and wildlife. The fight between livelihood and environment protection will continue unless we provide alternative livelihood options for forest dwellers and tribals. Many experts think that given the traditional knowledge and skills of forest dwellers, alternative occupations should be developed in the sector of tree based livelihood outside the forest. It will serve two purposes. One, it will decrease pressure on the forest and second, it will increase tree cover outside the forest area.

Sustainable Harvesting of NTFPs

The expansion of market in last few decades has substantially changed the rural economy. It has generated huge demand for rural products and raw material. In the case of NTFPs, the market has increased demand of a variety of forest produces. It has guaranteed relatively more cash inflow in the villages. On the contrary, the boom in forest based rural economy has resulted in exploitation of forest beyond its carrying capacity in many parts of the country. DN (2001) in a study in the North-eastern states found that over extraction has led to decline in the availability of various forest produces. In many parts of these states, people started migrating due to unavailability of marketable forest produces after a point. Traditional systems of management of forest produces were effective in regeneration of forest and forest produces. But, with the intrusion of the market in rural and tribal economy, the traditional systems of NTFP management have failed (DN, 2001). Therefore, it is important to develop a system for sustainable harvesting of forest produces.

Conclusion and Way Forward

Forest goods and services provides livelihood to millions of Indians. The relationship of indigenous people with forest for ages has developed numerous social and cultural system of forest management in scientific and sustainable manner. However, with intrusion of market forces and increasing commercialization of minor forest produces, these traditional systems are in danger. This shift in rural and tribal economy has promoted over exploitation of forest produces, which further leads to degradation of forests.

The Panchayat (Extension to Scheduled Areas) Act, 1996 (PESA) and the Scheduled Tribes and Other Forest Dwellers (Recognition of Forest Rights) Act, 2006 (FRA) protects right of forest based livelihood of forest dwellers in India. Provisions of these two laws override other laws, which had restricted tribals and forest dwellers from accessing goods and services from the forest. These two laws recognize traditional rights of forest dwellers and allow them to collect, process, use and sale forest produces and services. However, we still do not have market mechanism, infrastructure and institutions to ensure sustainable harvesting of these forest produces. While better management of forest produces can improve economic conditions of poor forest dwellers, we must also be cautious about degrading forest and over exploitation of minor forest produces.

6 TERI, Livelihood of Local Communities and forest degradation in India: Issues for REDD+: https://www.teriin.org/projects/nfa/2008-2013/pdf/Policy_Brief_Livelihood_Local_Communities.pdf

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