Policy WATCH

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Environment, Natural Resources and Sustainability

In this issue

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RAJIV GANDHI
INSTITUTE FOR CONTEMPORARY STUDIES

1 Editorial

The Rajiv Gandhi Institute for Contemporary Studies (RGICS) is the knowledge affiliate of the Rajiv Gandhi Foundation. RGICS carries out research and analysis as well as policy advocacy on contemporary challenges facing India. RGICS currently undertakes research studies on the following five themes of general public utility including:

1. Constitutional Values and Democratic Institutions
2. Governance and Development
3. Growth with Employment
4. Environment, Natural Resources and Sustainability
5. India's Place in the World

This issue of Policy Watch is on the theme Environment, Natural Resources and Sustainability. It consists of five articles on issues pertaining to conservation of natural wealth (water and forest), mechanisms to remove Green House Gases from atmosphere (carbon credit and green credit schemes) and international environmental conventions and protocols signed by India.

The first article is by Ms. Sneha Mahapatra, Fellow, RGICS. It provides an overview of major international environmental agreements and protocols signed by India. In this article she has touched on 18 different conventions and protocols signed by India, divided in three themes namely Biodiversity Conservation, Protection against Degradation of the Environment and Climate Change.

Collectively these agreements and initiatives underscore the interconnectedness of global environmental challenges and the importance of collaborative action for a sustainable future. The article analyses the status of implementation and bottlenecks therein for two of the most important protocols from each of the three themes.

The second article is an analysis of a newly imposed carbon tax policy of the European Union called the Carbon Border Adjustment Mechanism (CBAM). This article is based on a desk research of RGICS and authored by Mr. Jeet Singh, Head of Research, RGICS.

The article critically reviews the impact of CBAM on India's net zero pathways, which is aligned with all major international climate conventions and commitments. The article argues that CBAM is an unwarranted external pressure on developing nations that can affect global collective climate mitigation and adaptation negotiations.

The third article by Mr. Devesh Dubey from ARHAS Technologies has critically analyzed the foundation and the future of India's Green Credit Scheme. The article appreciates the policy but raises apprehensions related to "green-washing" in the guise of green credit in the absence of robust market based mechanism.

Images Courtesy:
Google Images (free to use images)
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The fourth article is on the implementation status of Forest Rights Act in Rajasthan is based on a short qualitative study conducted by RGICS in October to December 2023. This research article by Mr. Murari Mohan Goswami, RGICS field coordinator in Rajasthan attempts to decipher the struggle of villagers to secure rights on community forests and analyzes community processes leading to management of forest resources to maximise their social, economic and ecological outcome. The article argues that strong community leadership, active decision making role of women and community level awareness are essential for sustainable management of community forests.

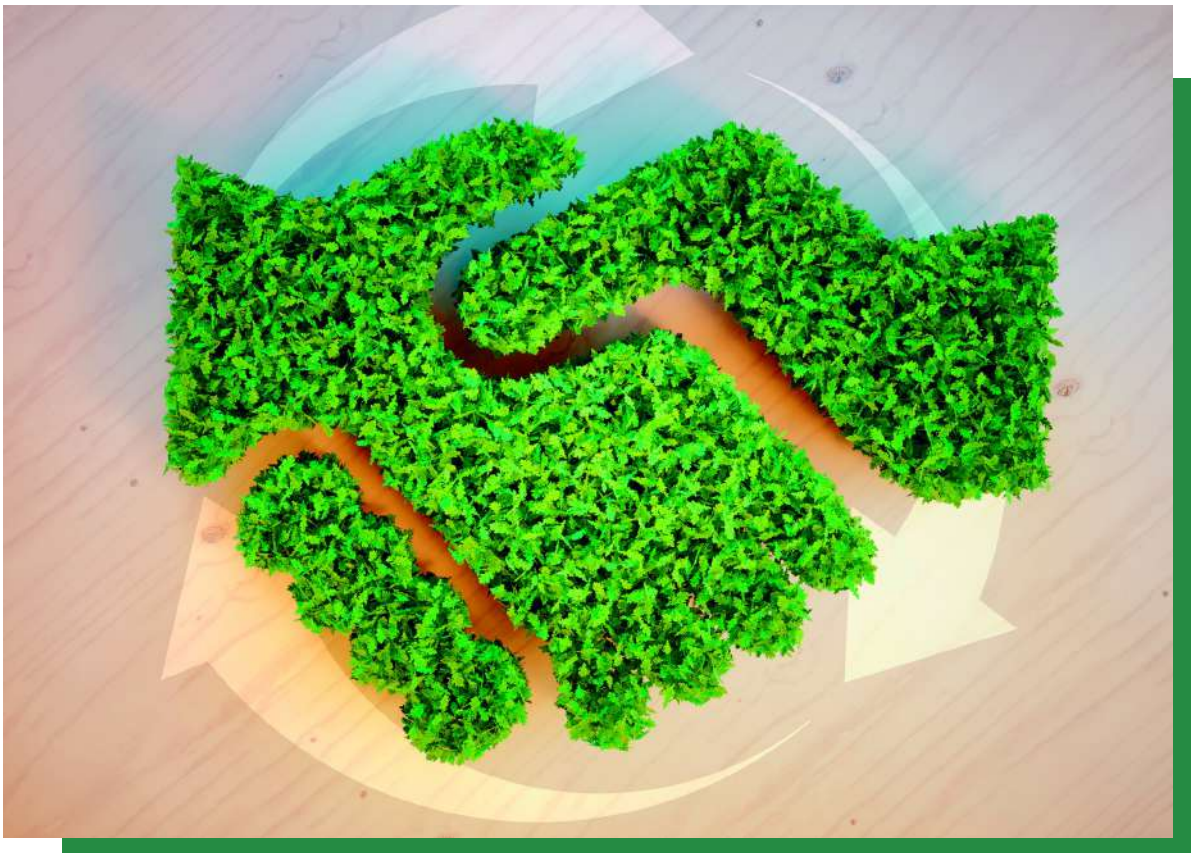
The final article on water resources of India is an overview of conjunctive use of surface and ground water. This article is by India Data Insights (IDI) and it compiles water related statistics from different sources to argue that water stress is escalating and groundwater reserves are depleting rapidly in India. For effective management of water resources, ground water recharge becomes indispensable.

We hope you enjoy reading these articles. We look forward to your feedback.

Vijay Mahajan,
Director, Rajiv Gandhi Institute for Contemporary Studies

2 International Environmental Agreements/Protocols signed by India- Status of Implementation

Sneha Mahapatra, Fellow, RGICS



Source: Image

2.1 Introduction

India has played an important role in international action for environmental conservation and sustainable development. One of the first global conferences on environment was held in Stockholm in 1972. India's Prime Minister at the time, Indira Gandhi, was the only foreign head of government out of 113 nations in attendance. Her speech at the conference was ground-breaking in that it linked environmental conservation with poverty reduction.[1]

Within the global environmental action framework, various themes guide international efforts towards sustainability and protection. Among these, themes such as Biodiversity and Conservation, Protection against Degradation of the Environment and Climate Change stand out prominently.

- Under the theme of Biodiversity and Conservation, conventions like the Ramsar Convention prioritize the preservation of wetland ecosystems, while treaties such as CITES regulate international trade to safeguard endangered species.

[1] https://www.unep.org/news-and-stories/opinion/india-key-success-stockholm50-it-was-1972

- In addressing Protection against Degradation of the Environment, initiatives like the Montreal Protocol focus on phasing out ozone-depleting substances and the and treaties such as the Minamata Convention, targeting global mercury pollution reduction, stand out.

- Efforts to reduce greenhouse gas emissions which cause climate change, have been led by the United Nations Framework Convention on Climate Change and several other initiatives such as the Kyoto protocol and the Paris Agreement.

Collectively these agreements and initiatives underscore the interconnectedness of global environmental challenges and the importance of collaborative action for a sustainable future.

In this article we have listed 18 important environmental conventions/agreements/ protocols under the three themes mentioned above. Each of these has been described briefly, specifying their objective, scope and modus operandi.

Out of the 18 agreements listed, we have chosen six – two each covering biodiversity conservation, addressing environmental degradation and climate change - for studying their implementation status by India. These six include the Ramsar Convention, for preserving wetlands, the Convention on Biological Diversity (CBD), United Nations REDD+ program, aiming to reduce emissions from deforestation and forest degradation; the Montreal Protocol and the Kigali Amendment, for phasing out ozone-depleting substances; the United Nations Framework Convention on Climate Change (UNFCCC), and the Paris Agreement.

Though India has signed all these conventions/agreements/protocols, and remains committed to implementing them, bottlenecks remain in implementation. In this article, using literature survey, the main bottlenecks have been identified and some suggestions have been made for overcoming those to enhance the implementation.

2.2 Biodiversity Conservation

Source: Image

Biodiversity is a natural characteristic of the living organisms, and nature's enabling mechanism for ensuring the survival of some form of life, even under major catastrophes. If all living organisms were identical, then they would be affected identically by adverse events and all life could perish. On the other hand, diversity ensures that at least some living organisms adapt to the changes and survive, or even thrive.

Biodiversity is also the source of essential resources and ecosystem services that sustain human life, including food production, purification of air and water and climate stabilization. Moreover, the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits are essential to ensure a prosperous future for both the natural world and human societies, making it a critical theme to be chosen when assessing the implementation status of treaties such as the Ramsar Convention on Wetlands, Bonn Convention on the Conservation of Migratory Species, the Nayoga Protocol, and the Cartagena protocol. [2]

2.2.1 Ramsar Convention on Wetlands, 1971

The Convention on Wetlands, established in Ramsar, Iran in 1971,which came into effect in 1975, aims to conserve and sustainably manage wetland ecosystems globally.

Source: Image

Under the text of the Convention (Article 1.1), wetlands are defined as: "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". In addition, for the purpose of protecting coherent sites, the Article 2.1 provides that wetlands to be included in the Ramsar List of internationally important wetlands: "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands". [3]

India became a party to the Convention in 1982. With 172 contracting parties worldwide, representing nearly 90% of United Nations member states, the treaty designates over 2,500 wetlands covering a total area exceeding 257 million hectares. India, a contracting party since 1982,[4] has 80 Ramsar sites spanning approximately 1.33 million hectares. These sites play a crucial role in biodiversity conservation, water regulation, and providing habitats for countless species.[5]

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[2] *International Institute for Sustainable Development. (2024). Biological Diversity: Protecting the Variety of Life on Earth. IISD. Retrieved April 2, 2024, from https://www.iisd.org/articles/deep-dive/biological-diversity-protecting-variety-lifeearth#:~:text=The%20outcome%20of%20billions%20of,and%20water%2C%20and%20climate%20stabilization*

[3] https://www.ramsar.org/sites/default/files/documents/library/info2007-01-e.pdf

[4] https://indianwetlands.in/our-work/implementing-the-ramsar-convention/

[5] https://indianwetlands.in/our-work/implementing-the-ramsar-convention/

Wetlands earn a spot on the List of Wetlands of International Importance due to their ecological, botanical, zoological, limnological, or hydrological significance. Yet, over time, the Convention has evolved to acknowledge wetlands not only for their biodiversity value but also for their crucial role in sustainable development. Thus, the Convention now fully embraces the diverse importance of wetland ecosystems as outlined in its text.[6]

In India, the convention has been in place since 1982, with a total of 80 Ramsar sites covering a surface area of 1.332.200 ha.[7] India stands first in South Asia and third in Asia in terms of number of designated sites. Under the convention, "wise use" is a critical component, which is broadly defined as maintaining the ecological character of a wetland. The major problems with respect to wetland protection in India are

- encroachment of wetland peripheries, and sometimes even the main tracts
- blocking of water inlets and outlets due to human settlements, industries, roads, etc.
- pollution of various kinds including chemical fertilisers and pesticides in rural areas
- plastic waste, sewage and industrial effluents including chemicals and heavy metals in urban areas - for instance, plastic bags, bottles and other wastes dumped in several wetlands across the country and from various lakes settle to the bottom and adversely affect bottom feeders.
- alteration of species composition and spread of invasive species of flora and fauna. A decline in carnivores and a dominance of omnivores (58%) followed by 6% herbivores, 6% larvivores, and 2% detritivores also indicates organic pollution. [8]

For several wetlands across India, the discharges of industrial effluents contaminate and pollute them, additionally, the pollution load index indicates that the sediment/s are heavily polluted, for example, what is common is severe and moderately severe increase of Cadmium and Zinc with minor increase of Lead, Chromium and Mercury- this causes long term degradation which results in the loss of ecosystem services in the wetland.

In Kerala, extensive encroachments have changed the land-use of the wetland for agriculture, especially rice cultivation. There is, thus, a need for cross state policies, to update laws and protocols on how to reduce extensive encroachments changing the land-use of the wetland for agriculture, especially rice cultivation in India, an important source of livelihood for most of its workforce.

Fostering collaboration and monitoring efforts with other countries to share knowledge, best practices and biodiversity and livelihood protection is important given the scale of effort required by India to safeguard and protect its biodiversity as well as the livelihood/s associated with it.[9]

India should make concerted efforts toward restoring and conserving wetland ecosystems which may involve measures such as hydrological connectivity, controlling invasive species, and implementing habitat restoration projects. Learning from other countries, India must focus on reducing plastic pollution and other forms of litter, which pose significant threats to aquatic life in wetland environments, specifically.

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[6] https://www.ramsar.org/sites/default/files/documents/library/handbook1_5ed_introductiontoconvention_finale.pdf

[7] https://www.ramsar.org/

[8] *Kumar, K. K., and Rajan, P. D. (2012). Fish and Fisheries in Vembanad Lake. Consolidated report of Vembanad fish count 2008- 2011. New Delhi: CERC, 42.*

[9] https://www.frontiersin.org/articles/10.3389/fevo.2020.00144/full

2.2.2 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975

CITES, established in 1975, safeguards endangered species by regulating international trade. With 184 member nations, CITES classifies species into Appendices[10] I, II, and III and since wildlife trade crosses borders, international cooperation is necessary, with CITES providing varying levels of protection to over 40,000 species today.[11] India became a party to CITIES in 1976 to ensure that it remains at the forefront of wildlife convention and international cooperation.[12]

Source: Image

CITES combats illegal wildlife trade, ensuring sustainability, while fostering global cooperation for biodiversity conservation. India hosts significant biodiversity and traditional knowledge. As a CITES Party, it regulates international trade to protect endangered species.[13] The international wildlife trade involves billions of dollars and millions of animals and plants annually. Some species are heavily exploited, threatening their survival. While not all traded species are endangered, having the CITES agreement to ensure sustainable trade is crucial.

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[10] *Appendix I lists species that are the most endangered among CITES-listed animals and plants (see Article II, paragraph 1 of the Convention). They are threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial (see Article III), for instance for scientific research. Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. It also includes so-called "look-alike species", i.e. species whose specimens in trade look like those of species listed for conservation reasons (see Article II, paragraph 2 of the Convention). International trade in specimens of Appendix-II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Appendix III is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation (see Article II, paragraph 3, of the Convention). International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates. (See Article V of the Convention).*

[11] *Convention on International Trade in Endangered Species of Wild Fauna and Flora. (n.d.). What is CITES? Retrieved from https://cites.org/eng/disc/what.php*

[12] *https://www.traffic.org/site/assets/files/10042/cites-india.pdf*

[13] *CITES Appendices. (2024). https://cites.org/eng/app/index.php*

2.2.3 Bonn Convention, 1979 on the Conservation of Migratory Species

Signed in 1979, the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention; CMS) is an environmental treaty under the aegis of the United Nations Environment Programme (UNEP), providing a global platform for the conservation and sustainable use of migratory animals and their habitats.

The Convention on the Conservation of Migratory Species emphasizes protecting migratory species, especially those with unfavourable conservation status. Parties aim to promote research, conclude agreements for species listed, and provide immediate protection for "Appendix I species" – with the aim to conserve habitats, minimize migration obstacles, and address endangering factors. Furthermore, given the grave threat of species extinction and the need for protection to the species under Appendix I, parties also are required to prevent or minimize effects of harmful practices, except for specific purposes.[14]

Agreements for Appendix II species covers migratory species that have an unfavourable conservation status and that require international agreements for their conservation and management, as well as those that have a conservation status which would significantly benefit from the international cooperation that could be achieved by an international agreement. Additionally, there is a supporting article IV (4), under which agreements can be made for any population crossing national boundaries.

The Conference of the Parties reviews convention implementation and can adopt recommendations with amendments being possible. Disputes are resolved through negotiation or arbitration.[15]

Source: Image

[14] *United Nations Environment Program (UNEP). (2023). Convention on the Conservation of Migratory Species of Wild Animals (CMS). CMS | Convention on the Conservation of Migratory Species of Wild Animals.* https://www.cms.int/sites/default/files/instrument/CMS-text.en_.PDF

[15] *Convention on Migratory Species. (n.d.). Appendices I & II of the Convention on Migratory Species (CMS). Retrieved from* https://cms.int/en/species/appendix-i-ii-cms

2.2.4 Convention on Biological Diversity, 1988

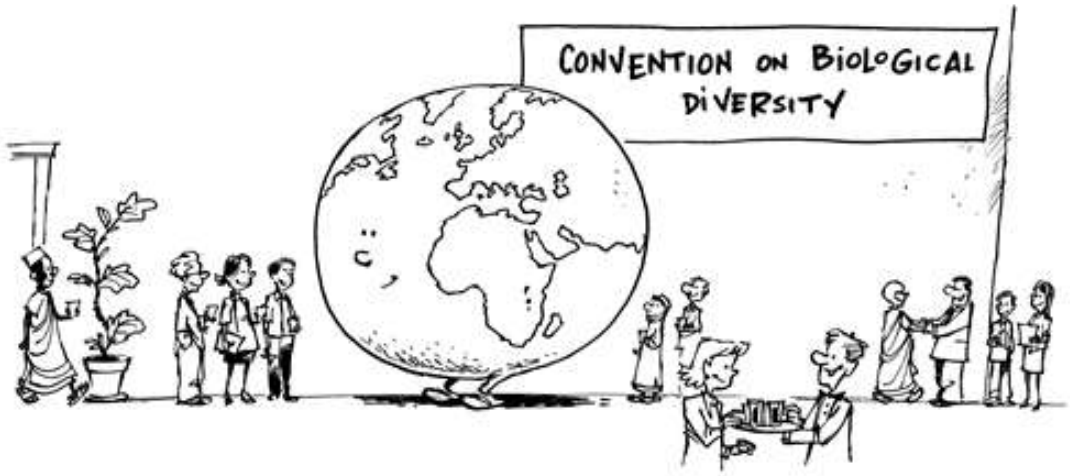
In November 1988, experts convened to explore the need for a biodiversity convention. The Convention on Biological Diversity(CBD), signed by 168 countries, aimed for conservation, sustainable use, and equitable benefit-sharing. Parties implement it through national plans and reports, aligning with global targets.

India, a signatory since 1993, aligns its efforts with the CBD through legislative frameworks like the Biological Diversity Act (2002). India's National Biodiversity Action Plan (NBAP), first drafted in 1999 and updated periodically, reflects its commitment to CBD objectives. With 12 National Biodiversity Targets (NBTs) in place, India strives to meet global biodiversity goals while addressing national priorities.[16]

The Union Ministry of Environment and Forests (MoEF) of the Government of India has been designated the Nodal Agency with the responsibility of implementing the Convention of Biological Diversity in the country. The MoEF involves a number of other ministries, departments, institutions and NGOs as major partners for developing and implementing national strategies on conservation and sustainable use of biodiversity.

Objectives highlighted in the National Report 6, submitted to the CBD in December 2018, have National Biodiversity Targets (NBTs) which aim to address different aspects of biodiversity conservation in a focused manner. For example, NBT 3 targets habitat degradation and loss, NBT 5 emphasizes sustainable management practices, and NBT 7 focuses on conserving genetic diversity.[17]

India has over-achieved the ACHI 11 target of 20% of total biological area under conservation and as of 2020, more than 20% of India's land has been set aside for conservation and protected areas, particularly those crucial for biodiversity and ecosystem services, are conserved through effectively managed, ecologically representative systems. These areas are well connected and integrated into wider landscapes and seascapes.[18]



Source: Image

[16] *Indian Institute of Bio-Social Research and Development. (2022, August 19). Convention on biological diversity (CBD). Indian Institute of Bio - Social Research And Development.* https://www.ibradindia.org/convention-on-biological-diversity-cbd/

[17] https://www.cbd.int/doc/world/in/in-nbsap-other-en.pdf

[18] *National Biodiversity Authority & United Nations Development Programme. (2018). Aichi Target Design: A Low Level Guide. Retrieved from* http://nbaindia.org/uploaded/pdf/Aichi%20target%20design%20low%2014-11-2018.pdf

In addition, following the Nagoya Protocol, certificates have been issued showing that benefit sharing, access and management of biodiversity has been adhered in an internationally recognized manner and India has received a certificate of compliance (IRCC) under the Protocol in 2015.

India's Environment Minister stated that India is on track to meet the 30x30 conservation target by 2030, with nearly 27% of the country's area already under some conservation measure. However, challenges like infrastructure gaps, connectivity issues, neglected ecosystems, and the need for financial support from developed nations persist.[19]

Realising the importance of Environmental Information, the Government of India, established in December, 1982, established an Environmental Information System (ENVIS) which plays a vital role in implementing the Convention on Biological Diversity (CBD). ENVIS has been providing environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. all over the country.

ENVIS serves as the National Focal Point and Regional Service Centre Information System for the South Asian Sub-Region within the INFOTERRA network, supported by UNEP. Additionally, ENVIS is designated as the National Focal Point of Sustainable Development Network Programming by UNDP. It functions as the Clearing House Mechanism for the CBD in India, facilitating information exchange crucial for biodiversity conservation. ENVIS also collaborates closely with national systems like NISSAT and Biotechnology, enhancing integration and effectiveness in CBD implementation. [20]

However, such institutions, which often are responsible for conservation, lack the necessary resources and expertise to effectively implement conservation measures. This is evident where the management of marine protected areas has been criticized for its reliance on training and experience geared towards terrestrial ecosystems. The absence of specialized expertise in marine conservation highlights the institutional capacity gap that needs to be addressed.

Other bottlenecks in implementation have been identified, such as, despite commitments made by countries, the current level of funding falls short of the estimated biodiversity finance gap, with a need for substantial increases in financial resources to bridge this gap. For instance, while the Global Biodiversity Framework (GBF) sets ambitious targets, such as mobilizing at least USD 200 billion annually by 2030, reports indicate that the annual biodiversity finance gap ranges from USD 598-824 billion. This lack of adequate funding presents a significant barrier to implementing conservation measures effectively.

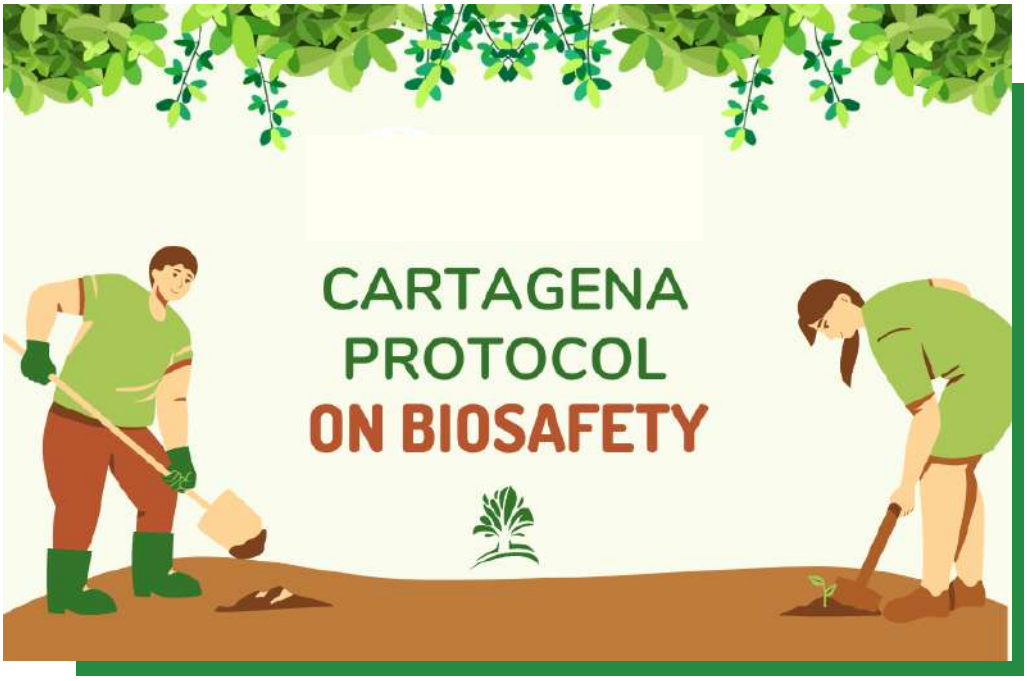
Regulatory shortcomings pose another obstacle to effective conservation. While the Forest Rights Act of 2006 protects the land and access rights of forest-dwelling communities in terrestrial protected areas in India, there is no equivalent statute safeguarding the rights of fishing communities in marine protected areas. This regulatory gap underscores the need for comprehensive legal frameworks that address the diverse conservation challenges across different ecosystems.[21]

[19] *Pardikar, R. (2023, January 18). India's position at COP15: Striving to balance biodiversity conservation and socio-economic concerns. The Wire Science. Retrieved from https://science.thewire.in/environment/india-biodiversity-targets/*

[20] *Environmental Information System (ENVIS). (n.d.). About ENVIS. Ministry of Environment, Forest and Climate Change. Retrieved from http://envis.nic.in/ENVIS_html/about.html*

[21] *Ibid*

2.2.5 Cartagena Protocol on Biosafety, 2003



Source: Image

The Cartagena Protocol on Biosafety is an international agreement linked to the Convention on Biological Diversity. India signed it in 2003. The Protocol focuses on managing the risks of genetically modified organisms (GMOs) from modern biotechnology. It requires countries to establish a Biosafety Clearing House (BCH) to share information on GMOs. The Protocol emphasizes caution and thorough evaluation of new technologies. It also gives developing countries the freedom to balance health and economic concerns.

Moreover, the Cartagena Protocol on Biosafety (CPB) focuses on regulating the transboundary movements of Living Modified Organisms (LMOs), ensuring countries have necessary information for informed decision-making. By doing so, it distinguishes LMOs from GMOs to exclude non-living products derived from them. The Protocol promotes biosafety through procedures for border movements, risk assessment, a biosafety clearing house, capacity building, and public awareness.[22]

Moreover, countries are empowered to prohibit GMO, or, genetically modified, imports in the absence of sufficient scientific evidence attesting to their safety, and exporters are mandated to label shipments containing genetically altered commodities like corn or cotton.

2.2.6 Nagoya Protocol on Equitable Genetic Resource Utilization, 2014

The Nagoya Protocol, effective since October 12, 2014, seeks to ensure fair and equitable sharing of benefits from genetic resource utilization.

This international agreement under the Convention on Biological Diversity emphasizes the importance of mutually beneficial relationships between providers and users of genetic resources. India enacted domestic legislation in 2002 to address this.

[22] *The Cartagena protocol on Biosafety. Biosafety.* https://biosafety.org.za/information/know-the-basics/regulation-of-gmos/the-cpb

The Nagoya Protocol has provisions facilitating effective implementation of Access and Benefit Sharing (ABS). It covers benefits from genetic resources outlined in Article 15 of the Convention and associated traditional knowledge, ensuring equity for Genetic Resources and Traditional Knowledge providers domestically and internationally.[23]

India's implementation of the Nagoya Protocol included a legal framework, institutional mechanisms, stakeholder engagement, capacity building, benefit-sharing mechanisms, compliance monitoring, international cooperation, awareness campaigns, information systems, and an emphasis on sustainability and biodiversity conservation, exemplified by initiatives such as the India Business and Biodiversity Initiative.[24]

2.3 Protection against degradation of the environment

Source: Image

The second theme chosen is, protection against the degradation of the environment and this is important because over exploitation of natural resources results in environmental degradation, reducing the effectiveness of essential ecosystem services, such as the mitigation of floods, and the reduction of landslides, which cause increased risks of disasters.

The theme chosen also reflects issues such as deforestation, crop yields reduction, and water shortages all of which also contribute to long term effects of inequality, food insecurity and poverty.

2.3.1 Vienna Convention on the Ozone Layer, 1988/2009

The Vienna Convention signed by all participating nations in 1988 stands as a landmark in global environmental cooperation. India ratified the Convention on June 19, 1991, underlining its commitment to addressing ozone layer depletion.[25] The convention achieved universal ratification only by 2009.

The Convention's inception reflected widespread concern over ozone depletion and signalled a global resolve for collaborative action.

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[23] *The Nagoya protocol on access and benefit-sharing. (2024, February 29). Convention on Biological Diversity.* https://www.cbd.int/abs/default.shtml

[24] *Ministry of Environment, Forest & Climate Change. (2018). Implementation of Nagoya Protocol on Access and Benefit Sharing India's Experience. National Biodiversity Authority.* https://nbaindia.org/uploaded/pdf/Implementation%20of%20Nagoya%20Protocol%20in%20India.pdf

[25] https://ozone.unep.org/Meeting_Documents/research-mgrs/6orm/6orm-India.pdf

The primary aim of the Convention was to foster international cooperation by facilitating the exchange of information on impact of human activities on the ozone layer. Parties were expected to adopt legislative measures to protect human health and the environment from ozone depletion, focusing on understanding physical and chemical processes, health impacts, and climate effects, while exploring alternatives.

Parties to the Convention facilitate technology transfer, exchange information, and report implementation to the Conference of the Parties (COP), which oversees, reviews, and promotes harmonized policies. The COP serves as a platform for settling disputes and is supported by a secretariat, playing a pivotal role in fostering global cooperation on climate change.[26]

2.3.2 Montreal Protocol to Safeguard the Ozone Layer, 1992

The Montreal Protocol, adopted in 1987, represented a ground-breaking international effort to safeguard the Earth's ozone layer. It targeted nearly 100 man-made chemicals known as ozone-depleting substances (ODS), such as chlorofluorocarbons (CFCs) and halons, which, when released into the atmosphere, degrade the ozone layer. The Protocol set out specific measures for the phasedown of ODS production and consumption, with developed and developing countries committing to different timelines for implementation.

The Montreal Protocol, in effect for three decades, successfully eliminated 99% of ozone-depleting substances, aiming to restore the ozone layer by 2070. Without it, the Antarctic ozone hole would have been 40% larger by 2013. The Protocol prevents an estimated 2 million skin cancer cases yearly by 2030.[27]

Additionally, it establishes mechanisms for monitoring, reporting, and compliance verification. By reducing ODS emissions, the Protocol aims to mitigate ozone depletion, thereby protecting human health, ecosystems, and the environment from harmful ultraviolet radiation.[28]

2.3.3 Kigali Amendment to the Montreal Protocol - 2016

Source: Image

[26] *Eur LEX: Access to European Law. (2019, December 12). 4413654. EUR-Lex — Access to European Union law — choose your language.* https://eur-lex.europa.eu/EN/legal-content/summary/vienna-convention-for-the-protection-of-the-ozone-layer.html

[27] *ThePrint. (2022, February 7). Kigali Amendment: Global pact just ratified by India targets greenhouse gases used in your AC. ThePrint Essential.* https://theprint.in/theprint-essential/kigali-amendment-global-pact-just-ratified-by-india-targets-greenhouse-gases-used-in-your-ac/743754/

[28] *UN Environment Programme. About Montreal Protocol. UNEP OzonAction. Retrieved from* https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol

The Kigali Amendment to the Montreal Protocol is an international agreement aimed at gradually reducing the consumption and production of hydrofluorocarbons (HFCs).Originally focused on preserving the ozone layer by phasing out chlorofluorocarbons (CFCs), the Protocol now includes HFCs due to their contribution to climate change as potent greenhouse gases.

According to the agreement, the signatory parties are divided into 3 groups, where India is part of the third group which consists of the hottest climatic countries in the "developing" economies region of India, Pakistan, Iran, Saudi Arabia. These nations are to start phasing down HFCs by 2028 and reduce it to 15% of 2024-2026 levels till 2047.The target set by India is that it should start phase down by 2028 and cut HFC emission by 15% of 2024-26 levels by the year 2047. [29]

As of October 3, 2023, 155 states, including the European Union, ratified the Kigali Amendment. India's commitment aims to phase down Hydrofluorocarbons (HFCs), mitigating greenhouse gas emissions, fostering industry transition to low Global Warming Potential technologies, such as R290, R1234ze and so on to commence by the end of the decade with a freeze in 2028 and simultaneously ozone depleting refrigerants such as HCFCs to be phased out by 2030 also with the goal to promote domestic manufacturing and innovation. India will implement HFC phase-down in four steps starting from 2032.[30]

India has made significant strides in implementing the objectives of the Montreal Protocol and the country has successfully phased out ozone-depleting and climate-warming chemicals such as HCFC 141b and HCFCs in new equipment manufacturing, surpassing the 35% phase-out target by achieving an impressive 44% reduction. Furthermore, India is ahead of schedule in eliminating another such gas, HCFCs, in new equipment manufacturing, showcasing its proactive approach to environmental protection.

India's proactive measures in the HCFC Phase-out Management Plan (HPMP) Stage-II demonstrate a strong commitment to meeting climate targets and setting a global example for climate action. Moreover, the compliance with regulations for refrigerant management aligns seamlessly with e-waste rules and Extended Producer Responsibility (EPR) guidelines, reflecting a comprehensive approach to environmental stewardship.

The India Cooling Action Plan (ICAP) further underscores India's dedication to sustainable cooling methods, serving as a model for other nations.[31]This involves adopting practices like reducing the demand for cooling by sheltering and insulation, and ensuring proper end-of-life recycling of air-conditioning and refrigeration equipment.

However, significant challenges persist in terms of notable lack of awareness among consumers regarding the advantages and safety aspects of natural refrigerants, transitioning to natural refrigerants entails high costs, posing financial hurdles for businesses and consumers alike and retrofitting existing systems being both expensive and time consuming.

Furthermore, the dependence on imports due to the lack of domestic manufacturing of suitable components adds complexity to the transition. Lastly, overcoming the dominance of HFC-based systems in the air conditioning industry requires substantial investment and capacity building, both of which are essential to facilitate the shift towards natural refrigerants.[32]

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[29] *ThePrint. (2022, February 7). Kigali Amendment: Global pact just ratified by India targets greenhouse gases used in your AC. ThePrint Essential.* https://theprint.in/theprint-essential/kigali-amendment-global-pact-just-ratified-by-india-targets-greenhouse-gases-used-in-your-ac/743754/

[30] *Cabinet approves ratification of Kigali amendment to the Montreal protocol on substances that deplete the ozone layer for phase down of Hydrofluorocarbons. (2023). Press Information Bureau.* https://pib.gov.in/PressReleasePage.aspx?PRID=1746946

[31] *India surpasses Montreal Protocol targets, leads global efforts in sustainable cooling: New govt report.Economic Times, January 6, 2024.* https://economictimes.indiatimes.com/news/india/india-surpasses-montreal-protocol-targets-leads-global-efforts-in-sustainable-cooling-new-govt-report/articleshow/105703346.cms?from=mdr

2.3.4 Rio "Earth" Summit - The UN Conference on Environment and Development, 1992

The UN Conference on Environment and Development (UNCED) in Rio de Janeiro, 1992, known as the 'Earth Summit', united global leaders, scientists, and Non-Governmental Organizations to address the intertwined impacts of human activities on the environment. Emphasizing interdependence, it promoted sustainable development, integrating economic, social, and environmental concerns. The summit highlighted the need for holistic approaches to production, consumption, and decision-making.

Source: Image

"The 'Earth Summit' had many great achievements: the Rio Declaration and its 27 universal principles, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity; and the Declaration on the principles of forest management.

The 'Earth Summit' also led to the creation of the Commission on Sustainable Development, the holding of first world conference on the sustainable development of small island developing States in 1994, and negotiations for the establishment of the agreement on straddling stocks and highly migratory fish stocks." [33]

Agenda 21 emerged as a pivotal outcome, as it emphasized the importance of a global action plan for sustainable development, calling for integrated approaches to address poverty, hunger, ill health, illiteracy, and ecosystem degradation.

The declaration stresses the need for a global partnership, financial resources for developing countries, attention to economies in transition and provides a framework for coordinated action and collaboration to achieve sustainable development goals.[34]

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[32] *Shakti Foundation. (2022, January). Policy brief: Natural refrigerants. Retrieved from https://shaktifoundation.in/wp-content/uploads/2022/01/Policy-brief-Natural-Refrigerants.pdf*

[33] *UN Environment Programme. About Montreal Protocol. UNEP OzonAction. Retrieved from https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol*

[34] *United Nations. (1992). Agenda 21. https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf*

2.3.5 United Nations Convention to Combat Desertification (UNCCD), 1994

The United Nations Convention to Combat Desertification (UNCCD), adopted in 1994, is the sole legally binding international agreement linking environment and development to sustainable land management, focusing on arid, semi-arid, and dry sub-humid regions, termed drylands.

India became a signatory to UNCCD on 14th October 1994 and ratified it on 17th December 1996.[35] Parties convene in Conferences of the Parties (COPs) biennially and in technical meetings to advance its goals.

Given that land degradation disproportionately affects women due to their significant roles in agriculture, higher vulnerability to poverty, and weaker legal protections and with nearly 80% of employed women in least developed countries reliant on agriculture and comprising 43% of the global agricultural labour force, the Convention emphasizes women's crucial role in combating desertification and drought mitigation, advocating for their full participation.[36]

2.3.6 Basel Convention on Hazardous Wastes, 1992

Source: Image

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted in 1989 and it came into force in 1992. It is the most comprehensive global environmental agreement on hazardous wastes and other wastes. With 175 Parties (as of 31 March 2011), it has nearly universal membership.

The Convention aims to protect human health and the environment against the adverse effects resulting from the generation, transboundary movements and management of hazardous wastes and other wastes. The Basel Convention regulates the transboundary movements of hazardous wastes and other wastes and obliges its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.

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35 *https://moef.gov.in/moef/division/forest-divisions-2/desertification/indias-engagement-with-unccd/index.html#:~:text=India%20became%20a%20signatory%20to,it%20on%2017th%20December%201996*

36 *United Nations convention to combat desertification. UN Women – Headquarters https://www.unwomen.org/en/how-we-work/intergovernmental-support/climate-change-and-the-environment/united-nations-convention-to-combat-desertification#:~:text=The%20United%20Nations%20Convention%20to,development%20to%20sustainable%20land%20management*

The Convention covers toxic, poisonous, explosive, corrosive, flammable, eco-toxic and infectious wastes. Parties also have an obligation to minimize the quantities that are transported, to treat and dispose of wastes as close as possible to their place of generation and to prevent or minimize the generation of wastes at source.[37]

2.3.7 Reducing Emissions from Deforestation and forest Degradation (REDD)

UN-REDD Programme provides technical assistance and knowledge, helping its 65 partner countries to protect their forests, access finance and achieve their economic and climate goals through REDD+, in order to protect, restore and manage forests for current and future generations.

India signed the convention in July 1976 and since has been developing its National REDD-plus strategy to enhance forest cover and ecosystem services while combating emissions. A REDD-plus Cell under the Ministry of Environment, Forests and Climate Change coordinates national efforts, guiding state departments in data management and policy implementation, with future plans focused on delegating forest carbon stock assessments to State Forest Departments, aiming for precision through increased sample points and remote sensing technology.

The extensive forest cover in India, comprising 21.67% of its total geographical area, highlights the nation's pivotal role in global biodiversity conservation and climate change mitigation. With 712,249 sq km of forest and 95,027 sq km of tree cover, India's ecosystems play a crucial role in carbon sequestration and support a diverse array of flora and fauna. However, rampant deforestation and degradation pose significant threats to this invaluable resource, both locally and globally. [38]

Against this backdrop, the India REDDs treaty emerges as a critical instrument for the nation's sustainable development and environmental preservation. By embracing REDD+ principles, which encompass biodiversity conservation, livelihood improvement, and forest carbon stock enhancement, India can effectively address the multifaceted challenges posed by deforestation and degradation.

This holistic approach not only aligns with India's conservation objectives but also acknowledges the socio-economic dimensions of forest management.[39]

By 2030, India has committed to increase the carbon stock by 2.5- 3.0 billion tons via increasing forest and tree cover under the Intended Nationally Determined Contribution (INDC).

The soil organic pool was the biggest, accounting for about 56% of the total, followed by the aboveground (forests, crops) carbon pool (31%).[40] Forests are rich in biodiversity with great potential for carbon storage. From 1995 to 2019, carbon stocks in India's forests are estimated to have increased from 6245 million tons to 7124.6 million tons.[41]

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[37] *Basel convention on the control of Transboundary movements of hazardous wastes. (2017, October 19). UNEP - UN Environment Programme. https://www.unep.org/resources/report/basel-convention-control-transboundary-movements-hazardous-wastes*

[38] *Grassroots Institute. (2021, September 3). Comprehensive Overview of REDD+ in India: Status, Opportunities and Challenges. Grassroots Journal of Natural Resources. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3951364*

[39] *Ibid.*

[40] *Ibid.*

[41] *FSI (2019). India State of Forest Report. Forest Survey of India, FSI (Ministry of Environment and Forest), Dehradun, India. Available online: https://fsi.nic.in/forest-report-2019?pgID=forest-report-2019*

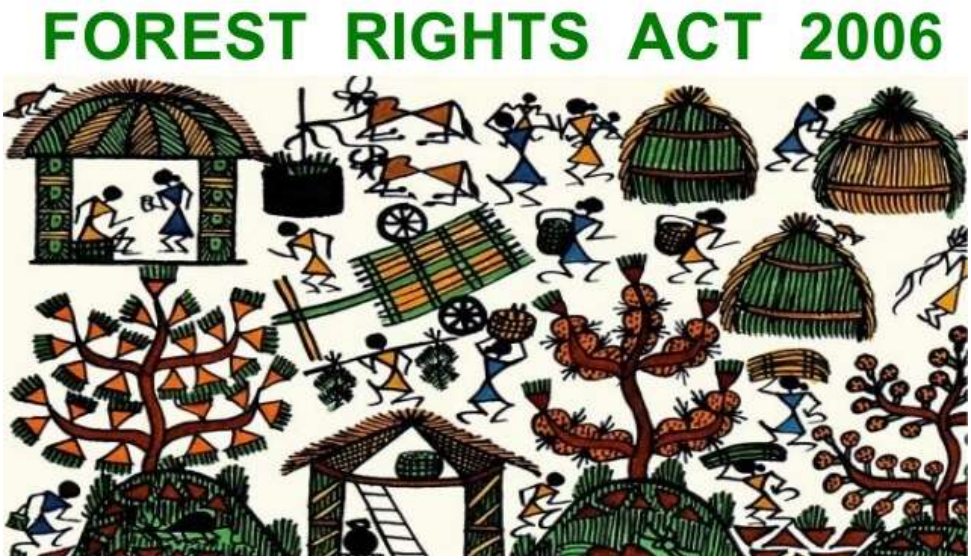
The major elements of REDD+ are developing a National REDD+ strategy. For its effectiveness, the causes of deforestation need to be addressed, understanding and linking direct and indirect drivers to policy development and implementation is critical[42] to modify recent trends in forestry leading toward a better climate future.

To promote its commitment, spearheaded by the Forest Survey of India (FSI), the National Forest Monitoring System (NFMS) has been pivotal since its inception in 1987, utilizing advanced remote sensing technologies to assess forest cover and track changes over time.[43]

Integral to India's forest management strategy is the estimation of carbon stocks, crucial for REDD+ implementation. Following the Intergovernmental Panel on Climate Change (IPCC)'s tier 2 and 3 methodologies, FSI combines remote sensing data with ground-based measurements to accurately quantify carbon in India's forests – which has the added benefit for positioning India for result-based financial incentives under REDD+.

Over 73,000 villages on the fringes of forests are home to over 300 million people, according to the Ministry of Environment, Forest and Climate Change.[44] Many of these individuals rely wholly or partly on the forest for their livelihood. Additionally, 27.5 percent of the total population, living in poverty, depend on forest resources either directly or indirectly to make a living.

The Forest Rights Act of 2006 delineates clear rights for individuals and communities regarding forest resources, establishing a solid foundation for inclusive forest management. This legal framework aligns with India's forest policy, emphasizing community participation in stewardship. The Joint Forest Management Committee (JFMC) model, initiated in the 1990s, exemplifies this ethos, aiming to improve forest quality while uplifting local communities economically.



Source: Image

[42] *Goetz, S.J., Herold, M., De Sy, V., Kissinger, G., Brockhaus, M. and Skutsch, M. (2014). How countries link REDD+ interventions to drivers in their readiness plans: implications for monitoring systems. Environmental Research Letter, 9:074004. DOI: https://doi.org/10.1088/1748-9326/9/7/074004*

[43] *India's forest monitoring has advanced from LANDSAT-MSS data at 80-meter resolution to cutting-edge remote sensing methods. Today, utilizing LISS-III data at 23.5-meter resolution, mapping occurs at 1:50000 scale, offering precise assessment down to 1-hectare units by FSI.*

[44] *MoEFCC (2018). National REDD+ Strategy India, Ministry of Environment, Forest and Climate Change, Government of India. Available online: https://redd.unfccc.int/files/india_national_redd__strategy.pdf*

With over 118,000 JFMCs managing around 22 million hectares of forests, engaging approximately 20 million people, India's Joint Forest Management (JFM) program embodies community-driven conservation. By empowering local communities and facilitating benefit-sharing, JFMCs provide a needed platform for implementing REDD+ initiatives. Through respectful inclusion of community rights, these committees create an enabling environment for successful REDD+ implementation.

Critical to the success of REDD+ is the active involvement of all stakeholders, including local communities represented by Joint Forest Management Committees. Capacity building and awareness initiatives are pivotal in achieving this engagement. However bottlenecks in implementation remain, as cited in a report by the Grassroots Institute, Canada, where:

1. Awareness of and understanding of REDD+ strategies and Capacity building remains insufficient particularly among forest-dependent users, especially at the grassroots level and among relevant institutions involved in REDD+ implementation.

2. Legal framework and policies are not modified the way in which they should be, such as the Indian Forest Act (1927), Wildlife Protection Act (1972), and others to effectively address REDD+ concerns and align with evolving forest management paradigms.

3. The Forest Carbon Partnership Facility (FCPF) and the UN-REDD initiative to access funds are challenging against issue of lack of uniformity in criteria for financing and insufficient international and national funding pose significant challenges to REDD+ implementation in India.

4. The absence of a long-term financing plan, and misusing REDD+ credits for market financing raises ethical concerns and risks market flooding, potentially driving down carbon prices and reducing mitigation efforts in other sectors, further complicates the financial aspect of REDD+ implementation.[45]

2.3.8 Stockholm Convention on Persistent Organic Pollutants, 2004

Source: Image

[45] *Grassroots Institute. (2021, September 3). Comprehensive Overview of REDD+ in India: Status, Opportunities and Challenges. Grassroots Journal of Natural Resources.* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3951364

The Stockholm Convention, since 2004, tackles toxic, long-lasting organic pollutants and POPs, or persistent organic pollutants, mandating control and reduction of 29 regulated emissions with the aim to protect human health and the environment from persistent organic pollutants (POPs), which persist, bio-accumulate, and cause adverse effects through long-range environmental transport.

India ratified the Convention on January 13, 2006, maintaining an opt-out stance for Annex amendments. In 2018, the Ministry of Environment, Forest and Climate Change enacted the 'Regulation of Persistent Organic Pollutants Rules,' prohibiting seven listed chemicals, aligning with the Convention's objectives.

These Rules prohibit the manufacture, trade, use, import and export of the following seven chemicals, namely: (i) Chlordecone; (ii) Hexabromobiphenyl; (iii) Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octa-BDE); (iv) Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial penta-BDE); (v) Pentachlorobenzene; (vi) Hexabromocyclododecane; and (vii) Hexachlorobutadine.[46]

This commitment underscores the Government of India's resolve to take action on POPs by implementing control measures, develop and implement action plans for unintentionally produced chemicals, develop inventories of the chemicals' stockpiles and review as well as update its National Implementation Plan (NIP).

The ratification process would enable India to access Global Environment Facility (GEF) financial resources in updating the National Implementation Plan (NIP).[47]

2.3.9 Minamata Convention on Mercury Pollution, 2013

Minamata Convention tackles mercury pollution, aiming for global reduction in the coming years. It is named after the Japanese city that suffered a tragic decade long mercury poisoning known as the Minamata disease.[48]

India, a signatory to the Minamata Convention on Mercury since June 18, 2018, has ratified the agreement. Annex A of the convention outlines the phased-out mercury-added products by 2020, because mercury, as defined by the convention, is in the top 10 of chemicals causing major public health concern according to the World Health Organization. By enhancing the reduction of mercury pollution, the Convention protects the environment and the lives of millions of people around the world. India has been granted the exemption which is now extended the phase-out to 2025.[49]

Additionally, exemptions for phasing out the production of Acetaldehyde using mercury compounds as catalysts have been extended until 2023. Proposed amendments by the European Union, Africa Region, Canada, and Switzerland were reviewed in the fourth meeting of the Conference of the Parties (COP-4) in early 2022. The Department of Chemicals and Petrochemicals engaged Indian industry associations to gather input for India's position on the proposed amendments.[50]

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46 https://pib.gov.in/PressReleasePage.aspx?PRID=1662335

47 *Ibid.*

48 *Minamata Convention on Mercury. (2022, June). Minamata Convention: Facts and figures. Retrieved from* https://minamataconvention.org/en/minamata-convention-facts-and-figures

49 *Press Information Bureau, Government of India. (2022). PM inaugurates COP14 to UNCCD at Greater Noida. Department of Chemicals and Petrochemicals. Press Information Bureau. Retrieved from* https://pib.gov.in/Pressreleaseshare.aspx?PRID=1519620

50 *Ibid*

2.4 Climate Change

Climate change stands as a paramount issue, intricately linked with the very fabric of our existence and the sustenance of life on our planet. By selecting climate change as the final theme, we aim to shine a spotlight on one of the most pressing challenges of our time, recognizing its far-reaching implications on global sustainability, societal stability, and human well-being.

Source: Image

First and foremost, shifting weather patterns pose a direct threat to food production systems worldwide. The unpredictable nature of climate change disrupts agricultural cycles, leading to crop failures, decreased yields, and compromised food security.

This phenomenon aggravates the situation of communities already grappling with hunger, distress, poverty, insecurity, and unemployment.

Moreover, the adverse impacts of climate change exacerbate existing inequalities, disproportionately affecting vulnerable populations and exacerbating social injustices.

The consequences[51] of climate change extend far beyond immediate food concerns, permeating various aspects of human and environmental well-being.

From catastrophic flooding to ocean acidification, species extinction to economic damage, the ripple effects of climate change reverberate across ecosystems, economies, and societies.

Coastal communities face the imminent threat of inundation, while biodiversity hotspots teeter on the brink of collapse. Meanwhile, economic systems strain under the weight of climate-related disasters, imposing significant costs on both current and future generations.

[51] *United Nations. (n.d.). What is Climate Change? Retrieved from https://www.un.org/en/climatechange/what-is-climate-change*

2.4.1 United Nations Framework Convention on Climate Change (UNFCCC), 1994

The UNFCCC entered into force on 21 March 1994, and today has near-universal membership with 198 countries ratifying the Convention, who are called Parties to the Convention, and preventing "dangerous" human interference with the climate system is the ultimate aim of the UNFCCC.

While initially focusing more on mitigation, the Convention later addressed adaptation, especially for vulnerable and "developing" nations lacking resources to allow ecosystems to adapt naturally to climate change, as well as ensure that "food production is not threatened, toward the goal of sustainable economic development." [52]

With the IPCC's Third Assessment Report, adaptation gained prominence, leading to funding arrangements and the establishment of the Adaptation Committee. As a Rio Convention alongside the UN Convention on Biological Diversity and the Convention to Combat Desertification, the UNFCCC seeks synergy through the Joint Liaison Group for collective action on shared concerns.

India announced five climate pledges ("Panchamrit") at the 26th session of the Conference of the Parties (COP26) of the UNFCCC in Glasgow. These five elements were

1. Reach 500 GW non-fossil energy capacity by 2030.
2. 50 per cent of its energy requirements from renewable energy by 2030.
3. Reduction of total projected carbon emissions by one billion tonnes from now to 2030.
4. Reduction of the carbon intensity of the economy by 45 per cent by 2030, over 2005 levels.
5. Achieving the target of net zero emissions by 2070.

In addition, India put forward a value proposition - LiFE – Lifestyle for Environment as a key to combating climate change. LiFE is a mass movement for a healthy and sustainable way of living based on the traditions and values of conservation and moderation.

India is working with other countries to strengthen multilateral initiatives and foster strategic bilateral partnerships to meet these climate goals. It is also supporting other developing countries to do the same by advocating for a fair international climate regime that acknowledges the principle of equity and CBDR-RC under the UNFCCC and provides vulnerable populations with access to financial and technical assistance to meet their climate obligations without sacrificing their development and poverty alleviation goals toward ensuring that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

While the updated Nationally Determined Contributions give instructions on how to separate, spearhead and foster growth separate from greenhouse gas emissions, for instance, ambiguity regarding the regulation of carbon credit certificates can hinder the smooth operation of carbon trading markets and undermine efforts to incentivize emission reductions.

A major aspect of UNFCC is placed on local communities and food protection through safeguarding the intrinsic relationship between the environment and their livelihood, however missions such as the Green India Mission, aimed at rejuvenating forests through afforestation activities, has not met its objectives, falling short by 30% from 2015-16 to 2020-21.

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[52] *UNFCCC. (n.d.). What is the United Nations Framework Convention on Climate Change? Retrieved from https://unfccc.int/process-and-meetings/what-is-the-united-nations-framework-convention-on-climate-change*

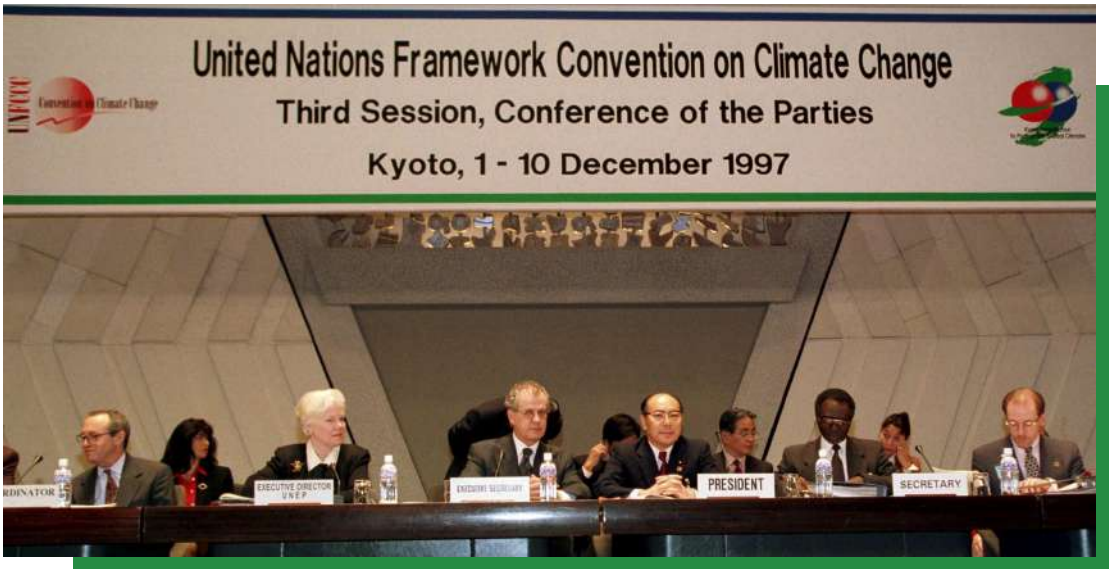
States like West Bengal, Jammu & Kashmir, and Himachal Pradesh have yet to fully participate in this initiative. Moreover, there remain major gaps in the National Mission for Sustainable Agriculture (NMSA) which includes less focus on small and marginal farmers for climate change resilience and less attention to adaptation scenarios.

Moreover, the success of NMSA relies heavily on its integration with other national programs on agriculture, development, and food security like MNREGA, National Food Security Mission, and Farm Management Mission. However, this is a complex task as these programs are managed by different ministries, making coordination and thus structured and successful implementation difficult.[53]

Additionally, the choice of the Ministry of Power (MoP) as the nodal Ministry instead of the Ministry of Environment, Forest and Climate Change (MoEFCC) leads to a lack of alignment with broader environmental objectives and policies. This lack of clarity and coordination could result in delays, conflicting regulations, and ineffective implementation strategies, ultimately hampering India's progress towards achieving its climate targets and commitments.

In addition, India has been slow in her progress towards solar power capacity than anticipated. Despite installing 6.7 GW of solar rooftop panels, significantly less than the targeted 40 GW by 2022, there remains a shortfall of 32 GW to achieve the goal of 100 GW solar capacity by 2022. Challenges such as inconsistent policies, underperformance of distribution companies, tariff hikes, and a focus on large-scale renewable energy projects contribute to this slow pace.

2.4.2 Kyoto Protocol on Climate Change, 1997



Source: Image

The Kyoto Protocol was an international agreement linked to the United Nations Framework Convention on Climate Change. The Kyoto Protocol is based on the principles and provisions of the Convention and follows its annex-based structure.

It only binds developed countries, and places a heavier burden on them under the principle of "common but differentiated responsibility and respective capabilities", because it recognizes that they are largely responsible for the current high levels of GHG emissions in the atmosphere.

[53] *Sharma, S. (2023, January 6), ISPP. (n.d.). India's climate change policy: Challenges and recommendations. Retrieved from https://www.ispp.org.in/indias-climate-change-policy-challenges-and-recommendations/*

In its Annex B, the Kyoto Protocol sets binding emission reduction targets for 37 industrialized countries and economies in transition and the European Union. Overall, these targets add up to an average 5 per cent emission reduction compared to 1990 levels over the five-year period 2008–2012 (the first commitment period).

India signed the protocol on August 26, 2002 and eventually there were 192 parties to the protocol. As the first legally binding climate treaty, the Kyoto Protocol became effective 16 February 2005. It was the most prominent international agreement on climate change.

The major feature of the Kyoto Protocol was that it set binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. Through differentiated responsibilities, India stood to gain from the transfer of technology and additional foreign investments when the Kyoto Protocol comes into force- such as renewable energy generation and efficiency promotion and afforestation projects.[54]

A major flaw of the agreement, however, was that the three leading emitters of greenhouse gases in the world, the United States, China and India were not bound by the protocol. The Kyoto protocol established a two-tier system, of Annex I (developed) and Annex II (developing) countries, who were differentially affected as signatories.

Both China and India, the world's two most populous countries, were ranked as "developing countries". As a result, although both ratified the protocol, they were not required to reduce or even limit the growth of carbon emissions under the agreement.

The United States and Australia were the only major developed nations to sign but not ratify the Kyoto protocol. The agreement was brokered by then-Vice President Al Gore and signed by then-President Bill Clinton on 12 November 1998 but it was never ratified by the US Senate.

Soon after taking office, in March 2001, then-President George W. Bush withdrew the US as a signatory.

Thus the Kyoto protocol was a great opportunity lost to combat GHG emissions and combat climate change. The next opportunity arose a full decade later in Paris.

2.4.3 Paris Agreement on Climate Change, 2015

The Paris Agreement, a landmark global treaty established in 2015, aims to combat climate change through coordinated international efforts. Its objectives include limiting global temperature rise to well below 2°C, with efforts to cap it at 1.5°C above pre-industrial levels.

Participating nations commit to reducing greenhouse gas emissions and enhancing resilience. Implemented through Nationally Determined Contributions (NDCs), countries update their climate action plans every five years.

The Agreement also fosters transparency and support for developing nations. Operational details were outlined in the Paris Rulebook, finalized in COP26, guiding the world towards a sustainable, net-zero emissions future while advancing the Sustainable Development Goals. [55]

[54] https://archive.pib.gov.in/release02/lyr2002/raug2002/07082002/r070820027.html

[55] https://www.un.org/en/climatechange/paris-agreement

India's commitment to the Paris Agreement necessitates a comprehensive understanding of its status regarding implementation, particularly in the realm of mitigation and adaptation efforts.

Source: Image

A crucial aspect of the Paris agreement is in establishing common timeframes and accounting frameworks for emission reductions, a task that entails meticulous research, monitoring, and reporting. In order for India to achieve its commitment to the Paris agreement, notably with global mitigation efforts garnering substantial attention, India's intricate ties (economic) to sectors like agriculture, water, natural ecosystems, forestry, health and sanitation, and energy requires institutional arrangements conducive to long-term research.

Such research forms the bedrock for devising strategies and action plans across various sectors. Integral to this endeavour is the formulation of a national adaptation goal, alongside robust mechanisms for monitoring and reporting the impacts of adaptation actions. Given the iterative nature of adaptation planning, the development of systematic approaches to enhance and refine adaptation practices is of critical importance.

In navigating the adaptation-related requirements stipulated by the Paris Agreement, India faces multifaceted challenges. Crucially, India's pursuit of Paris Agreement objectives hinges on advancements in impact and vulnerability studies, particularly within key sectors like water, forestry, and agriculture. These advancements necessitate a paradigm shift towards:

1. assessing observed climate trends and their sectoral impacts;
2. leveraging high-resolution climate change projections at various geographic levels;
3. refining uncertainty estimates in regional climate projections; and
4. conducting integrated climate impact and vulnerability assessments.

Methodological innovations are imperative for evaluating adaptation options under uncertainty and assessing their implications for vital ecosystems and human well-being.

Transparency and accountability, cornerstones of the Paris Agreement, impose rigorous monitoring, reporting, and verification (MRV) requirements on signatory parties.

Key deficiencies for India include the absence of a long-term national greenhouse gas (GHG) inventory management system, institutional gaps, and limitations in data collection, quality assurance, and accessibility.

The Paris Agreement requires modelling of low-carbon futures, coupled with robust assessment of mitigation options and impacts – and for this to be achieved, there is urgency for bolstering India's technical capacities.

India's journey towards Paris Agreement compliance demands a holistic approach encompassing research, data quality enhancement, and institutional strengthening.

As a major economy and emitter of GHGs, India's periodic reporting obligations necessitate concerted efforts to enhance transparency, accuracy, and comparability in Measuring Reporting Verification processes.

Addressing these imperatives not only facilitate India's alignment with the Paris Agreement goals but also foster resilience, sustainable development, and global climate action leadership.[56]

Source: Image

[56] *Ravindranath, N. H., Chaturvedi, R. K., & Kumar, P. (2017). Paris Agreement; research, monitoring and reporting requirements for India. *Current Science, 112*(5), 916-922. https://www.jstor.org/stable/24912481*

3 Carbon Boarder Adjustment Mechanism (CBAM) and its Impact on India's Net Zero Roadmap

Jeet Singh, Head, Research, RGICS

3.1 Introduction

The European Union (EU) in October 2023 had rolled out a Carbon Border Adjustment Mechanism (CBAM). The mechanism is set to come in force from January 2026 and imposes a carbon tax on certain products imported by EU member countries from non-EU member countries.

Source: Image

The imposition of carbon tax through CBAM is in the name of climate change mitigation strategy. The CBAM regulation document states that the objective of the policy is to prevent carbon leakages and also encourage trade partners of the EU to reduce carbon emission intensity of their production.

The financial implication of the CBAM will start from its second phase starting from January 2026. However, various institutions, business houses, governments and multilateral institutions have started assessing financial and trade implications of the CBAM.

The issue has also been raised by India in the thirteenth ministerial conference of WTO held in February 2024. Countries like India and South Africa have argued that the CBAM is against free trade agreements of the WTO.

The CBAM has clear implications on domestic climate mitigation strategies of various countries exporting high carbon intensive products to the EU.

The implication of the CBAM on domestic climate policies and targets has not been explored yet. This paper is an attempt to compare and contrast CBAM and India's climate change strategy.

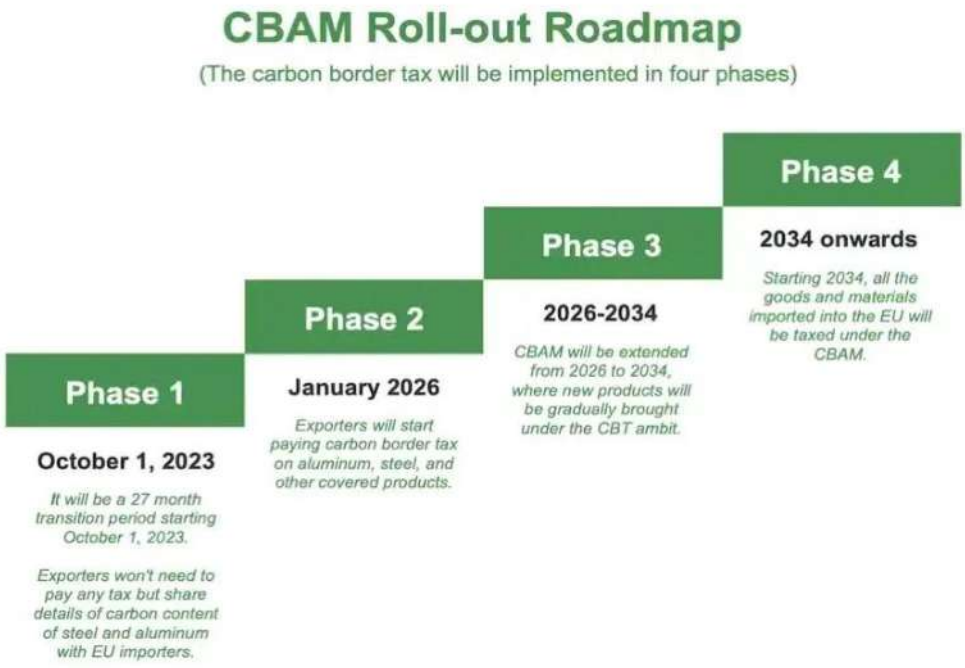
3.2 Carbon Border Adjustment Mechanism details

The CBAM is a new carbon tax proposed by the EU that will significantly change global production and trade of selected high carbon intensive products. The core argument of the EU is that the production of selected products by non-EU countries covered by this policy must pay a carbon tax equivalent to carbon tax paid by their EU based producers. The EU has further argued that the new tax policy is compatible with the WTO rules and encourages cleaner industrial production in non-EU Countries. [57]

The CBAM is currently designed for taxing six non-EU productions namely Cement, Iron and Steel, Aluminum, Fertilizers, Electricity and Hydrogen. The carbon tax in the EU regulated by EU-ETS is one of highest in the world. Therefore, developing countries where carbon taxes are not imposed or are not that high will suffer while exporting to the EU. The mechanism calculates a carbon tax both on direct embedded emission of CO2 and indirect embedded emission of CO2 such as production of electricity used for the production of CBAM covered items.

The importer will have to furnish actual direct and indirect emission data and carbon tax paid in its country of origin. This data will be used for calculating the carbon tax to be imposed on a particular imported item. In the absence of actual direct and indirect embedded emission of an imported item, default rate of tax will be imposed under the CBAM. The carbon tax already paid in the country of origin will be deducted from the price of carbon emission calculated as per guidelines of the CBAM.

The implementation of the CBAM is divided into different phases. The first phase of the CBAM began in October 2023 and will end in December 2025. This phase is also called transition phase, where no carbon tax under the CBAM will be levied on an import of covered items from the non-EU countries. This 27 month long phase will, however, require importers in the EU country to furnish reports of direct and indirect embedded carbon emission to the registry of the CBAM. The report will also reveal the total carbon price due in the country of origin.



Source: indiabriefing.com

[57] *European Commission, Taxation and Customs Union: https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en#cbam-transitional-phase-2023--2026, Accessed on 28 March 2024*

The second phase of the CBAM will begin in January 2026 when the EU will start collecting carbon price on selected six imported items through CBAM certificates. The calculation of embedded carbon emission will only be calculated by methods developed by the EU. Moreover, in the absence of actual emission data, the default value used for calculation of the carbon price will also be decided by the EU.[58] This phase of the CBAM will continue till 2034, which is co-terminus with its domestic incentives for various industrial sectors. In this period more items may be added under the CBAM. The EU aims to bring every import under CBAM from 2034 onwards.

The total annual import budget of the EU with regards to selected six sectors covered by CBAM namely Steel and Iron, Aluminum, Cement, Fertilizer, Hydrogen and Electricity is more than USD 1 billion.[59] Taxing this import for carbon will adversely affect exports of low income and developing countries.

3.3 Relative CBAM Exposure Index of India

The World Bank has developed a CBAM Exposure Index to assess the economic implication of CBAM on countries exporting CBAM products to the EU. According to this index, India has a higher CBAM Exposure Index in the sector of Iron and Steel. Its export of Iron and steel as per this index is around 23.5% of the total iron and steel export of India.[60]

The CO2 equivalent emission intensity of India's iron and steel is 2.01 kg CO2eq/USD. The carbon intensity of Indian cement is as high as 9.09 Kg CO2eq/USD. However, it will have low impact on India's overall all CBAM exposure due to low volume of cement export to the EU.

Sector	CO2 emission Intensity of Exported Product (Kg CO2eq/USD)	Export to EU (of the total global export)	Relative CBAM Exposure Index
Steel and Iron	2.01	23.5%	0.04
Fertilizers	1.39	1.1%	0.001
Electricity	-	-	-
Cement	7.09	0.6%	0.001
Aluminum	0.33	9.1%	0.002

Source: The World Bank

A positive relative exposure index indicates that an economy has higher carbon emission intensity than EU average and so will likely have higher costs under CBAM. The aggregate CBAM exposure Index of India is 0.03, which is fifth highest in the world. Top five countries with higher carbon emission intensity than the EU are Zimbabwe (0.087), Ukraine (0.053), Georgia (0.046) and Mozambique (0.045). The CBAM exposure index of India in the steel and iron sector is second highest along with Ukraine (0.04). Zimbabwe produces the highest carbon intensive steel.

[58] *Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R0956, Accessed on 28 March 2024*

[59] *The World Bank, World Integrated Trade Solution, https://wits.worldbank.org/Default.aspx?lang=en, Accessed on 29 March 2024*

[60] *The World Bank, Relative CBAM Exposure Index, https://www.worldbank.org/en/data/interactive/2023/06/15/relative-cbam-exposure-index#1, Accessed on 29 March 2024*

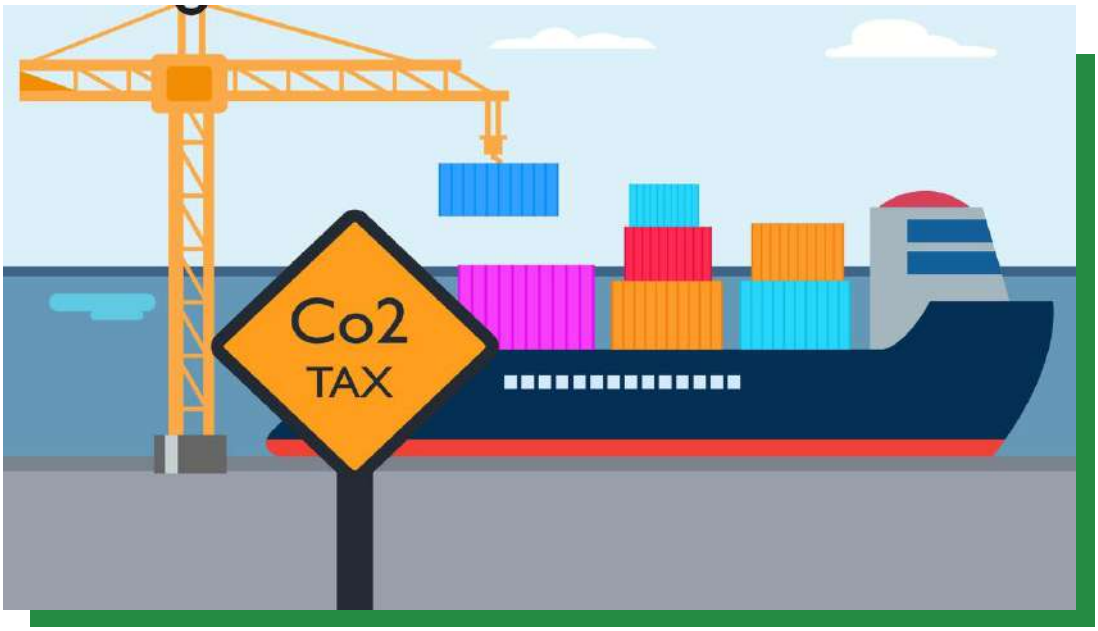
Aggregate Relative CBAM Exposure Index of India

Most Affected Sector	Steel and Iron
Product Export to EU (%of GDP)	0.1%
EU Share in Export of CBAM Products	18.9%
Overall relative CBAM exposure Index	0.03
Cement	7.09
Aluminum	0.33

Source: The World Bank

An analysis by the Asian Development Bank based on the Relative CBAM exposure index calculated by the World Bank found that fast developing economies such as South Africa, India and the Russian Federation have to pay a very high carbon price on its export to the EU under the CBAM.

This analysis calculates CBAM carbon price in the sector of base metal production by multiplying the carbon intensity with the carbon price difference between the EU and other countries, using EU carbon price of USD 96.30. It found that South Africa will have to pay the highest rate of CBAM carbon tax – 68.2% of its basic metal export. As per this analysis India will have to pay the second highest rate of carbon tax – 38.8% of its export of basic metal.[61]



Source: Image

[61] *ADB, European Union Carbon Border Adjustment Mechanism: Economic Impact and Implications for Asia, Brief No. 276, November 2023, https://www.adb.org/sites/default/files/publication/928466/adb-brief-276-eu-carbon-border-adjustment-mechanism.pdf, Accessed on 27 March 2024*

3.4 CBAM's Impact on India's Exports

The Carbon Border Adjustment Mechanism will adversely affect countries exporting CBAM covered items to the EU. This impacting the form of financial loss is going to hit more to developing countries and emerging economies such as India and Turkey. The domestic carbon tax in these countries is much lower than carbon tax charged by EU ETS in the European market.

Realizing this threat the government of India has officially registered its objections against CBAM in a recent meeting of WTO. India has argued that the idea of CBAM goes against free trade principles of the WTO. The Commerce Secretary of India Mr. Sunil Barthawal argued that the CBAM is a unilateral measure of trade protection, which is sought to be justified in the guise of environmental protection.[62]

India's Exports Globally and to the EU in 2022

Sectors covered under CBAM	Number of India's tariff lines affected	India's Exports (US$ Million)		EU's share in India's Exports (%)	Impact of CBT on India's exports
		World	EU		
Iron ore concentrates	16	1,619.60	322.90	19.90%	High
Steel products	163	7,316.90	1,460.70	20%	
Iron and steel	473	11,770.30	3,696.40	31.40%	
Aluminum products	85	9,866.40	2,734.20	27.70%	
Cement	14	93	5.70	6.10%	Low
Hydrogen	24	92	0.60	0.70%	
Fertilizer	1	0	0	0	
Electrical energy	1	647.90	0	0	
Total	**777**	**31,406.10**	**8,220.40**	**26.20%**	
India's total merchandise exports		4,53,325.70	73,670.20	16.30%	
Share of CBAM products (%)		**6.90%**	**11.20%**		

Source: GTRI

Of the six items covered under CBAM, India is going to be affected significantly in two sectors namely iron and steel, and aluminum. These two sectors include iron ore concentrates, steel products, iron and steel and aluminum products. Nearly one third (31%) of India's export of iron and steel is to EU.

Moreover, the EU is a significant trade partner of Indian exports in the sectors of iron ore concentrates (20% of total export), steel products (20%) and aluminum products (27.7% of the total export).

Other sectors affected by CBAM are India's export of cement to the EU. India exports nearly 6% of its total cement export to the EU. This sector is also a carbon intensive sector that will see huge imposition of carbon tax on its import.

Other sectors included in the CBAM namely fertilizers, hydrogen and electricity have insignificant impact on India's export as there is very little or no export of these items from India to the EU. An analysis of the impact in the Iron and Steel sector is done separately in the latter part of this article.

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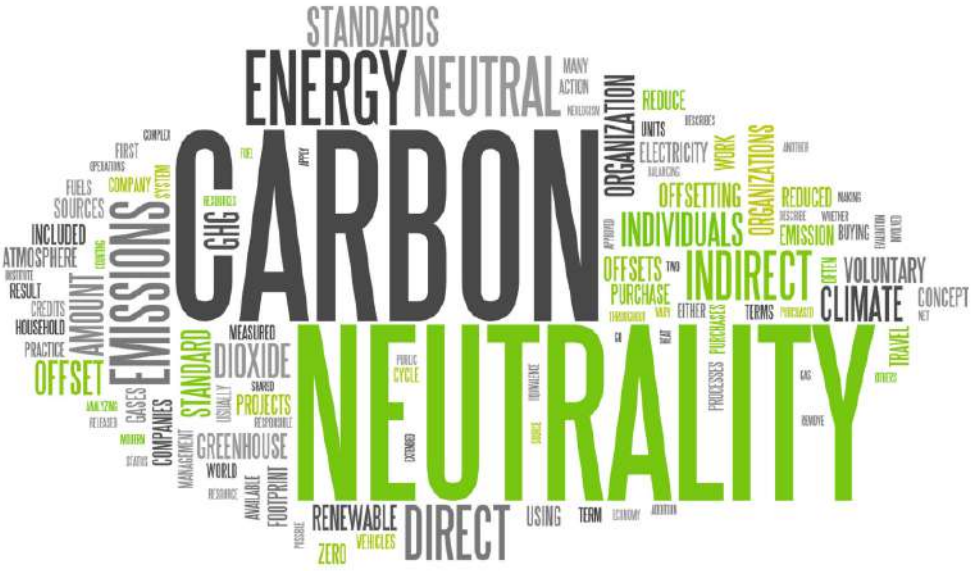
[62] *The Hindu, Feb 26, 2024, India expresses serious concerns in WTO meet over unilateral protectionist measures, https://www.thehindu.com/news/international/india-expresses-serious-concerns-in-wto-meet-over-unilateral-protectionist-measures/article67889564.ece, Accessed on 28 March 2024*

3.5 Impact of CBAM on India's Net-Zero Pathways

India has always been a serious and proactive member of global negotiations and collaborations on climate change. Right from the Stockholm Conference in 1972 to till now, India played an important role in leading climate actions and advocating common and differentiated responsibility to address issues pertaining to climate change.

India's proactive efforts can also be assessed by accepting and meeting the Bonn Challenge of the IUCN, timely submission of its Nationally Determined Contributions (NDCs) and setting 2070 as net-zero target to itself. India in 26th Conference of Parties of UNFCCC held in Glasgow in 2021 declared that India will streamline its all efforts to meet net zero target by 2070.

Such a consistent approach of India irrespective of its domestic political complexities is important because India is the third largest emitter of Green House Gases after China and the United States of America. However, the per capita emission of India is much less compared to many countries in the world. The roll out of CBAM will currently affect India's steel trade but with extension of this policy in other sectors will adversely affect rapidly growing economies such as India.



Source: Image

The impact of CBAM in the long run will be to affect social, environmental and climate policies of developing countries. This section is an attempt to highlight the possible impact of CBAM on India's Low Carbon Strategy and Net Zero pathways.

3.6 CBAM versus the CBDR-RC Principle of UNFCCC

The United Nations Framework Convention on Climate Change (UNFCCC), 1992 is the foundational arrangement for all international climate change negotiations and collaborative actions for climate change mitigation and adaptation. 198 member nations including India and European nations are parties to this convention.

The UNFCCC treaty document is based on five principles that brings together all parties and encourages mutual cooperation and collaboration for collective climate actions. The first and foremost principle of UNFCCC is – Common But Differentiated Responsibilities and Respective Capabilities (CBDR-RC). The treaty document reads:

"The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof." [63]

The second principle of the treaty further strengthens the idea of equity by acknowledging special circumstances and specific needs of developing countries. These principles follow with commitments signed by parties in accordance with their common but differentiated responsibilities and their specific national and regional development priorities.

The introduction of CBAM rolled out by the EU goes against stated principles of the United Nations Framework Convention on Climate Change and common and differentiated commitments formula agreed by parties of the convention. In the core of CBAM the EU has argued that it will work as a tool to impose fair price on emitted carbon during the production of carbon intensive products in non-EU countries.

The carbon price imposed by the EU Emission Trading System (ETS) is one of the highest in the world. With the help of CBAM, the EU wants to impose an equal carbon price on all carbon intensive goods produced in non-EU countries, exported to the EU.

The high price of carbon under the EU ETS is part of their obligation under the UNFCCC as Annex-I countries of the treaty. As per the convention treaty countries listed as Annex-I have greater responsibility and mitigation role. Being Annex-I countries, members of the EU are bound to have such carbon pricing for their production. But, imposing the same rate of carbon price on other countries especially non annex-I countries (developing countries) goes against the principle of common but differentiated responsibility and respective capabilities.

The roll out of CBAM is a unilateral imposition of carbon price beyond the capabilities of non-annex countries (developing countries) including India. Moreover, it seems to be an attempt of the EU countries to outsource its own differentiated commitment of a high mitigation role under the UNFCCC. India's Low Carbon Development Strategy.

1. Low Carbon Footprints of India: India recognizes climate change as a collective action problem and continues to be the main partner despite its very minimal contribution in GHGs accumulation. The strategy document claims that India's historical contribution to the "accumulation of GHGs is about 4% even though it is home to nearly 17% of the global population."

2. CBDR-RC: India firmly believes in equity through the Common but Differentiated Responsibility and Respective Capabilities (CBDR-RC) as laid out in the treaty document of United Nations Framework Convention on Climate Change (UNFCCC).

3. Equitable Carbon Budget: India is drawing a very small portion of the carbon budget. The carbon budget should be equitably distributed among all countries and utilized responsibly. India should be allowed to use its fair share of global carbon budget on the basis of CBDR-RC

The Long term low carbon development strategy released by India in 2022 is in accordance with the Paris Agreement and it heavily banks on an internationally agreed framework and principles of equitable sharing of mitigation responsibility. The roll out of the CBAM forces developing countries to cut down their fair share of the carbon budget. For instance, India has its own national circumstances and development needs. To meet its developmental needs, India has to draw from the global carbon budget.

The Paris Agreement is legally binding on parties with the UNFCCC; however it gives autonomy to parties to set their own mitigation targets in the form of NDCs.

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[63] *United Nations Framework Convention on Climate Change (UNFCC), 1992, GE.05-62220 (E) 200705, https://unfccc.int/resource/docs/convkp/conveng.pdf, Accessed on 28 March 2024*

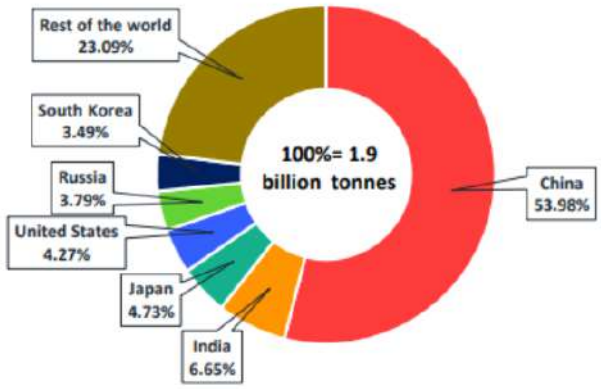
The idea behind updating of NDCs every five year provides space for parties to incorporate new science and technology in their mitigation plan in order to make incremental progress. The LT LCD is the articulation of countries' longer vision statements connected to periodically updated NDCs. The CBAM is an attempt to undermine NDCs and therefore disrupt LT LCD of developing countries exporting carbon intensive products to the EU.

3.7 India's Iron and Steel Industry and its Carbon Intensity

The iron and steel industry of India is the major sector affected by the CBAM policy of the EU. India is the second largest producer of crude steel in the world accounting 6.65% of total global production. The People's Republic of China is the biggest producer of crude steel and produces around 54% of global steel. Other major steel producing countries include Japan (4.73%), United States (4.27%), Russia (3.79%) and South Korea (3.49%).

The accumulated production of crude steel by these six countries is nearly 78% of the global production. All of these countries export a sizable iron and steel products to the EU. Russia exports more than 29% of its iron and steel to the EU followed by India (23.5%). The EU as a block is the largest importer of iron and steel and imports more than 11 million metric tonnes of iron every year.[64] China, India, Russia and South Korea are amongst the top ten sources of EU's steel and iron imports.

Figure 1: Global Crude Steel Production in 2022



Source: World Steel Association, 2022

India as a key source of iron and steel products of the EU is the biggest import source for stainless steels and amongst first five top sources in the category of semi-finished steel and flat products. With the introduction of CBAM, India is likely to be affected more as it has the highest CBAM exposure index of 0.044 amongst largest crude steel producers in this category. This high CBAM exposure of India is due to very low carbon tax in India and very high carbon intensity production of steel and iron. According to the World Bank statistics India's carbon emission intensity of exported iron and steel is 2.01 KG CO2eq/USD. This is the fourth highest carbon emission intensity after Nigeria, Laos and Kazakhstan. [65]

Steel production is high energy consuming in India compared to other countries. According to the data of the Union Ministry of Steel, the energy consumption of steel plants in India is 6 to 6.5 Giga Calorie per tonne of crude steel compared to 4.5 to 5 Giga calories per tonne abroad.[66]

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[64] *International Trade Administration, Global Steel Trade Monitory, August, 2019 https://legacy.trade.gov/steel/countries/pdfs/imports-eu.pdf, Accessed on 29 March 2024*

[65] *The World Bank, Relative CBAM Exposure Index, https://www.worldbank.org/en/data/interactive/2023/06/15/relative-cbam-exposure-index#1, Accessed on 29 March 2024*

[66] *Ministry of Steel, Government of India, https://steel.gov.in/en/energy-environment-management-steel-sector, Accessed on 29 March 2024*

Being the second largest producer of the crude iron, India produced 125 million metric tonnes in 2022. The sector has observed steady growth in the last five years. India is a net exporter of crude iron and steel. It had exported 8824 thousand Tonnes in 2021-22 and 695 thousand tonnes in 2022-23.[67]

To further explain the carbon footprint of the Indian steel sector, a recent report of Institute of Energy Economics and Financial Analysis (IEEFA) reveals that the steel sector accounts for about 12% of India's carbon dioxide emissions. It further states that the carbon emission intensity is 2.55 tonnes of CO2/tonne of crude steel compared to the global average of 1.85 tCO2/tcs. This sector is responsible for emitting 240 million tonnes of CO2 and is expected to increase exponentially as the domestic and international demand of steel and iron is increasing.[68]

The high emission intensity of Indian steel production is due to existing technologies used by steel plants such as Blast Furnace (BF)/Basic Oxygen Furnace (BOF) or Direct Reduced Iron (DRI)-Electric Arc Furnace (EAF) and scrap-based Electric Arc Furnace (EAF). These are coal based technologies leading to high emission. Currently 92% of steel production in India is coal based. However, India is committed to decarbonise the steel sector by replacing coal based technology with Best Available Technologies (BAT).

Percentage Share of Different Technologies in Steel Production by 2070

Source: Industry Reports, JMK Research

The government of India has set an ambitious target for the steel sector to reduce its carbon emission intensity from 2.64 t CO2eq/tcs in 2020 to 2.4 t CO2eq/tcs in 2030 as part of its sector specific contribution to India's NDCs.[69]

By adopting the best technologies in the sector, India has reduced its emission intensity from 3.1 t CO2eq/tcs in 2005 to 2.64 t CO2/tcs in 2020.

[67] *Ministry of Steel, Government of India, https://steel.gov.in/en/overview-steel-sector, Accessed on 27 March 2024*

[68] *IEEFA, September 2023, Steel Decorbonization in India, http://www.indiaenvironmentportal.org.in/files/file/Steel%20decarbonisation%20in%20India.pdf, Accessed on 29 March 2024*

[69] *Ministry of Steel, Government of India, https://steel.gov.in/en/energy-environment-management-steel-sector, Accessed on 27 March 2024*

During this period Indian steel plant adopted technologies such as Coke Dry Quenching (CDQ, Sinter Plant Heat Recovery, Bell Less Top Equipment (BLT), Top Pressure Recovery Turbine (TRT), Pulverized Coal Injection (PCI) system in Blast Furnace, Hot stove waste heat recovery, Dry type Gas Cleaning Plant (GCP) etc.

While India has made efforts in the last few decades to seriously reduce its carbon emission intensity in the steel production, it is still very high in the world. India's steel may find it difficult to compete in the European market after roll out of CBAM due to its high carbon emission intensity.

Despite several technological innovations, the steel production in the country remained coal based. The Long Term- Low-carbon Development Strategy (LT-LDS) adopted by the government of India in 2022 acknowledges the high carbon footprint in the steel production due to dominance of Blast Furnace-Basic Oxygen Furnace technologies used by steel plants which use coke, coal and oxygen.

Steel Sector Decarbonization Plan of India	
Phase – I (2022 to 2030)	**Phase – II 2031 to 2050**
• Monitoring energy efficiency and CO2 emission in production • Implementing Best Available Technologies (BAT) such as Top-pressure Recovery Turbines (TRT) and Coke Dry Quenching (CDQ) • Demand reduction through material efficiency • Reduction in Coke rate using High Iron bearing raw material • Reduce indirect emission of 0.68 tCO2eq/tcs by using renewable energy sources • Increase utilization of scrap • Demand Pull for low carbon steel • R&D Collaborations	• Carbon Capture Usage/ Storage (CCUS) • Carbon Avoidance – Usage of Green Hydrogen as a fuel in Blast Furnace • Carbon Avoidance – Use of Green Hydrogen for Direct Reduction Iron (DRI) • Carbon Avoidance – Molten Oxide Electrolysis of Iron Ore

Source: NITI Aayog, Government of India

The strategy paper of the Government of India is eager to adopt cleaner technologies in steel production such as Hydrogen based technology and HIARNA technology which is being developed under the ULCOS program. However, these technologies require international commercial collaboration and technology transfer.[70]

The report of IEEFA also suggests replacing coal based technology with green hydrogen to substantially reduce its carbon emission intensity.[71]

A report of NITI Aayog in 2022 prepared a phase wise de-carbonization plan for the steel and iron sector for India. It has proposed three phases to work with hard to abate sectors like steel and iron. In the first phase it proposes to work with existing available technology to enhance energy and emission efficiency.

The second phase of steel de-carbonization will start from 2031 and end in 2050. The success of this phase is solely dependent on the use of green hydrogen as fuel for blast furnaces and DRI.[72] The third phase will start in 2051 to sync steel production efficiency with India's net zero commitment by 2070.

[70] *MoEFCC. (2022). India's long-term low-carbon development strategy. Ministry of Environment, Forest and Climate Change, Government of India.*

[71] *IEEFA, September 2023, Steel Decorbonization in India, http://www.indiaenvironmentportal.org.in/files/file/Steel%20decarbonisation%20in%20India.pdf, Accessed on 29 March 2024*

[72] *NITI Aayog, Government of India, Report of the Inter-Ministerial Committee on Low Carbon Technologies, 2022: https://www.niti.gov.in/sites/default/files/2022-11/Report-Committee-on-Low-Carbon-Technologies.pdf, Accessed on 29 March 2024*

The IEEFA report suggests that the real reduction in carbon emission intensity of India's steel will depend on replacing coal and coke with green hydrogen as fuel. However, various reports and plans of the government of India suggest that green hydrogen technology requires more time and effort to be utilized in steel plants in India.

The Low Carbon Development Strategy of India released by MoEFCC in 2022 acknowledges that green hydrogen production requires international commercial collaboration and further research. The NITI Aayog report in 2022 expects its trial and application only after 2031.

3.8 Nationally determined contributions hard to achieve for the steel sector

Source: Image

The Paris Agreement adopted by parties at the UNFCCC in COP-21 held in Paris, France in December 2015 is a legally binding document on all its 196 member nations. The ultimate goal of the Paris Agreement is to hold the increase in the global average temperature to well below 2 degree Celsius above the pre-industrial levels. The agreement further encourages parties to pursue efforts to limit the temperature increase to 1.5 degree Celsius above the pre-industrial level.[73]

To measure the effort and result of the Paris Agreement, the UNFCCC has mandated all parties to submit a national climate action plan called the Nationally Determined Contributions (NDC). The agreement is being implemented in cycles of five years, where each party has to update its NDCs after every five year by setting more ambitious targets compared to the previous cycle.

India being a proactive party of convention submitted its first NDCs in 2015 itself. Its first set of NDCs was as follows:

i.) To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level; and

ii.) To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.

In August 2022, India updated its NDCs and set even more ambitious targets. As per the new NDCs, India aims to reduce emissions intensity of its GDP by 45 percent by 2030 from 2005 level. It has further enhanced its commitment to install non-fossil fuel based energy sources from 40 percent to 50 percent of cumulative electric power installed capacity by 2030.[74] The government has claimed that it has achieved previous NDCs well before time.

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[73] *UNFCC, Paris Agreement, https://unfccc.int/process-and-meetings/the-paris-agreement, Accessed on 29 March 2024*

[74] *PIB, Government of India, 18 December 2023, https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1987752#:~:text=In%20August%202022%2C%20India%20updated,enhanced%20to%2050%25%20by%202030., Accessed on 29 March 2024*

While India has submitted its updated NDCs in time, it has not specified sector specific mitigation plans to achieve the NDC target. However, the Union Ministry of Steel has revealed its sector specific NDC target on its website. According to the data available on its website the carbon emission intensity of the Indian steel industry was projected to reduce from 3.1 t CO2eq/tcs in 2005 to 2.64 t CO2eq/tcs by 2020 and 2.4 t CO2eq/tcs by 2030 (approximately 1% reduction every year).[75]

The Ministry had banked on adoption of clean and green technology in steel production to achieve above targets. As per data available on the website of the Ministry, the industry as whole had managed to reduce its carbon emission intensity to 2.5 tCO2eq/tcs in 2020. The data from the World Bank suggests that carbon emission intensity of India's exported steel to EU is 2.01 tCO2eq/tcs. Despite all these progress made in the last 15 years the carbon emission intensity of the Indian steel remains very high compared to its competitors.

The steel and iron sector is hard to abate. Moreover, radical technological transformation is required to adopt clean and green technology. The government of India has itself declared in its long term low carbon strategy paper that it requires international commercial collaboration and technology transfer. India is expecting drastic reduction in carbon emission in steel production only after 2030 by having clean and green technologies. India's NDC overachievements will not help it to keep its iron and steel export competitive in the EU market.

3.9 Conclusion

The Carbon Border Adjustment Mechanism (CBAM) rolled out by the EU has the intention to prevent carbon leakages, reduce carbon footprint of EU's consumption and encourage its trade partners to reduce carbon intensity of their productions. This policy has been widely analyzed from the trade and economic perspective by different stakeholders. But very little emphasis has been given to analyze its impact on global and domestic climate change policies. The CBAM has challenged the fundamental principle of global climate cooperation of 'Common but Differentiated Responsibilities and Respective Capabilities' (CBDR- RC) as entered in the UNFCCC treaty document in 1992. The intention of the CBAM is to replace UNFCCC's equitable sharing of responsibility with equal responsibility sharing.

Challenging the CBDR RC principle of the global climate change policy has wide ramification both at national and international level. A policy like CBAM leaves no incentive for developing countries to bear the burden of reducing GHGs, which has been accumulated largely by developed countries including members of the EU. Moreover, the forceful imposition of carbon price on developing countries is an attempt to interfere in their respective NDCs and long term low carbon development strategy.

The Paris Agreement, 2015 focuses on cumulative effort of parties to reduce emission. Each party with the UNFCCC has designed their NDCs targets in accordance to their local circumstances and developmental needs. However, the CBAM ignores the cumulative progress of a country in reducing emission and focuses on six selected sectors as per their own convenience.

India has announced to streamline all its efforts to meet the target of net zero by 2070. For this, the country has been regularly updating its NDCs for incremental progress and prepared a long term low carbon development strategy for various sectors. These plans and strategies are based on local circumstance and developmental needs of India. However, the CBAM expects from India to suddenly focus on radical de-carbonization of selected hard to abate sectors such as iron, steel, aluminium and cement. This may not yield any result. Moreover, such unwarranted external pressures can affect negotiation instruments for global collective climate mitigation and adaptation.

[75] *Ministry of Steel, Government of India, https://steel.gov.in/en/energy-environment-management-steel-sector, Accessed on 27 March 2024*

4 A Deep Dive into India's Green Credit Programme

Devesh Dubey

Source: Image

Environmental issues such as climate change, biodiversity loss, water scarcity, air pollution, and waste management are some of the most pressing challenges facing the world today. To address these challenges, various policies and regulations have been implemented by governments and international organizations.

However, these measures are often insufficient or ineffective due to various barriers such as lack of awareness, compliance, enforcement, and financing.

In the pursuit of a greener and sustainable future, the Indian government has introduced a new initiative called the Green Credit Programme. The Green Credit System is designed to incentivize voluntary environmental actions undertaken by individuals, private sectors, small scale industries, cooperatives, forestry enterprises and farmer-produce organizations for their environmental actions.

4.1 What is the Green Credit System?

The Green Credit System is a mechanism that complements the domestic carbon market. While the domestic carbon market focuses solely on CO2 emission reductions, the Green Credit System aims to meet other environmental obligations as well, incentivizing sustainable actions by various stakeholders.

- The Green Credit System is based on the concept of 'Green Credit', which means a singular unit of an incentive provided for a specified activity, delivering a positive impact on the environment.

- The Green Credit can be generated by undertaking any of the following activities:
  - Tree Plantation-Based Green Credit: Supporting initiatives to increase greenery through tree planting and related efforts.

  - Water-Based Green Credit: Promoting water conservation, harvesting, efficiency, and wastewater treatment and reuse.

- Sustainable Agriculture-Based Green Credit: Encouraging natural farming methods, land restoration, and improving soil health and food quality.
- Waste Management-Based Green Credit: Promoting sustainable waste management practices, including collection, segregation, and treatment.
- Air Pollution Reduction-Based Green Credit: Supporting measures to reduce air pollution and other pollution control activities.
- Mangrove Conservation and Restoration-Based Green Credit: Promoting efforts to conserve and restore mangrove ecosystems.
- Ecomark-Based Green Credit: Encouraging manufacturers to obtain the 'Ecomark' label for their products and services.
- Sustainable Building and Infrastructure-Based Green Credit: Supporting the use of sustainable technologies and materials in construction projects.

The stakeholders' actions will generate Green Credits (GCs) through specific calculations verified physically. For instance, the draft on tree plantation projects specifies that 100 GCs will be allocated to eligible applicants annually for planting 100 trees over a period of 10 years.

Green Credits earned can be traded, allowing holders to sell them on a proposed domestic market platform. Buyers can utilize these credits to meet their obligations under other legal frameworks or to enhance their environmental credentials.

Source: Image

The Green Credit System is a mechanism that complements the domestic carbon market. While the carbon market focuses on reducing CO2 emissions, the Green Credit System goes further by tackling other environmental duties.

It encourages people to take eco-friendly actions. At its core is the idea of 'Green Credit,' which rewards activities that help the environment.

4.2 Administrative mechanism for the Green Credit Program (GCP)

Individuals and entities must register their activities through the central government's dedicated app/website to obtain Green Credits. The administrator will verify the activity through a designated agency. Upon verification, the administrator will issue a Green Credit certificate, tradable on the Green Credit platform.

The Indian Council of Forestry Research and Education (ICFRE) serves as the Green Credit Program (GCP) Administrator, responsible for program implementation, management, monitoring, and operation. Initially, the GCP focuses on water conservation and afforestation. The ICFRE, in collaboration with experts, is developing the Green Credit Registry and trading platforms to facilitate registration, buying, and selling of Green Credits.

Many leading tech companies in India have pledged to achieve carbon neutrality by 2050. Some have already reduced emissions through mitigation measures or offset them by purchasing carbon credits from the carbon market. A Green or Carbon Credit represents one tonne of carbon dioxide equivalent removed from or prevented from entering the atmosphere. Afforestation and preventing deforestation are significant generators of carbon credits globally, especially in Africa, Asia, and Latin America.

Similar to the carbon market system, where organizations trade carbon credits, entities can claim Green Credits for environmentally positive actions and trade them for financial benefits on a domestic market platform. The Green Credit system complements the carbon credit system, with activities eligible for Green Credits also eligible for carbon credits if they lead to carbon emission reduction or removal. However, Green Credits generated or acquired due to legal obligations cannot be traded.

With the risk of large-scale and irreversible environmental changes increasing, it is important to focus not only on preserving but also restoring natural resources. So the green credit system is a significant step taken towards reshaping financial systems for a more sustainable future.

Source: Image

4.3 Green Credits for Tree Planting

The Green Credit Programme (GCP) draft on tree plantation projects specifies that 100 Green Credits (GCs) will be allocated to eligible applicants annually for planting 100 trees over a period of 10 years. The requirement for qualifying under the tree plantation-based Green Credit is the plantation of a minimum of 100 trees per hectare, with a maximum of 1,000 trees per hectare.

However, there are also some serious reservations about the programme. As it aims to boost forest cover by rewarding tree planting, but for true impact, strategies tailored to local ecology and socio-economic realities are crucial. Despite the seemingly positive rationale of incentivising voluntary action for sustainable environmental practices through a payment system or tradable green credits, tree-plantation programmes warrant a more critical examination of their modus operandi and outcome. This is particularly important when considering factors such as instances of high mortality rates of plantations, sub-optimal use of financial resources, and unclear benefits to local communities.

The GCP aims to generate tradable green credits for activities such as increasing forest cover for which the government has issued guidelines. However, knowledge asymmetries and mismatched expectations of stakeholders may cause bottlenecks in its implementation, leading to ineffective outcomes. The guidelines have generated both concerns as well as criticism from environmental experts, researchers, and conservationists.

To begin with, the payments, or green credits, do not indicate the objective of the tree-planting activities and, therefore, it is not clear what the measurable outcome is for which the credit is generated. If, however, the objective is carbon sequestration, the outcome should be the amount of additional carbon sequestered.

Large-scale tree planting, for instance, does not guarantee the desired outcomes. It will require a strong monitoring and evaluation mechanism where the outcomes and success indicators are clearly defined. Historical experience tells us that high monitoring and evaluation costs have been the bane of all market-based forest carbon sequestration schemes, and these costs need to be factored into the GCP at the very beginning for effective implementation.

The GCP rules also outline species lists based on rainfall zones. Although this is a good starting point, it also needs to consider other crucial factors such as soil quality, water availability, and topographical features.

Another key issue is that the guidelines propose a standardised recommendation of 100-1,000 trees per hectare. This is unreasonably high for the subhumid, semi-arid, and arid regions of India, necessitating a reconsideration.

4.4 Some potential issues

India has dabbled with similar mechanisms to drive down energy consumption and is now moving into the trade of carbon credits while setting up its domestic carbon market.

Even tracking carbon credits, which focuses on just one gas, is a complex exercise that is challenging to regulate. Extending that same method to other ecosystems and pollution areas creates a strong risk of greenwashing - the practice of making deceptive or exaggerated claims regarding environmental sustainability to portray a positive image. Although the concept of Green Credits appears promising, experts have voiced concerns about the risk of greenwashing within this market-based mechanism without actually delivering substantial environmental benefits.

But unlike a carbon market – which prices a standard unit of per tonne carbon emitted – the GCP does not yet have a standard unit of measurement for the benefits accrued across various activities, which range from tree plantations to sustainable infrastructure. The GCP is envisioned to function as a separate market mechanism but may overlap with the carbon market if the “green credit” also results in the reduction of carbon emissions, notes the programme draft.

Without proper oversight or strong regulatory mechanisms, the green credit scheme could open the door to greenwashing or double counting, experts warn. There is uncertainty over details of how the credits will be calculated, measurement of benefits and what happens if the credits are fraudulent.

There's apprehension that certain companies or entities might engage in superficial activities solely to accrue Green Credits, without genuinely addressing environmental concerns. Moreover, doubts linger regarding the effectiveness of these mechanisms in achieving immediate emissions reductions.

Some argue that resources might be better directed toward more transformative government-led initiatives rather than solely focusing on monitoring and preventing fraud within the Green Credit system.

It also raises serious questions about how rigorous the monitoring will be and who should take responsibility for pollution reduction and biodiversity savings. Any programme, regardless mandatory or voluntary, needs robust process, involving technical support, good measurement tools and more importantly proper monitoring at the source level.

Since green credit or for that matter carbon market are new programmes for Indian companies, these would work well with process support involving awareness to monitoring.

4.5 The Way Forward

The environment ministry has come out with two separate methodologies for generating such credits through water harvesting and tree plantation projects in different states/UTs, and buying/ selling it through a centrally-managed dedicated platform.

Going forward, we need an ecologically sensitive approach that accounts for India's diverse bio-geographic zones. There is an opportunity to cultivate a dynamic, more extensive, and non-prescriptive list of tree species, drawing insights from local knowledge documented in People's Biodiversity Registers.

This approach aims to enhance ecological suitability and provide users with a broader range of choices. The list could incorporate 'no-go rules', particularly excluding exotic or non-native species.

The vision therefore is to create a system that becomes a beacon for sustainable practices within the complex fabric of India's environmental landscape.

Source: Image

5 Empowering Forest Dwelling Communities through the Forest Rights Act, in Udaipur District, Rajasthan

Murari Mohan Goswami, RGF

Source: Image

5.1 Introduction

The Schedule Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 provides land access, control, use and management right to tribal and forest dwellers who have been living in tribal, forest areas for generations. Land ownership in forest areas has always been a complex and contentious issue in India.

Most of the land in forest areas falls under the custody of the Forest Department. Forest dwelling communities live in forest areas and use forest land and resources for their living and livelihood. This results in conflicts between forest department and communities for access, control, use and management right of land and forest resources

There have been efforts to re-distribute rightful land tenure to marginalised and poor people particularly forest dwelling communities. The Schedule Tribe and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 also known as the Forest Rights Act (FRA) is an attempt to redress historically unresolved issues pertinent to the life and livelihood dependence of forest dwelling communities on forest land and resources.

The law recognises three forms of Rights for Forest Dwelling Communities:

1. Individual Forest Rights (IFR) given to households traditionally living in the forest land and using it.
2. Community Forest Rights (CFR) for only use and right over Non Timber Forest Produce and
3. CFR for the conservation and management by community forest management committee. However, rights do not allow selling of the land in any form rather judiciously and sustainably use and manage by the individual and community.

Community rights and Community Forest Resource rights are two categories of rights which can be awarded to forest dwelling communities and tribes under the Forest Rights Act, 2006.

Various sub-sections of Section 3 of the Act provide for the right to access, use and dispose of minor forest produces and other exploitable forest resources and services. It includes the right of grazing, camping and collecting fuel and fodder from the forest.

Further, the Section 3 (i) of the Act provides for vesting of rights to manage, conserve, protect and regenerate the claimed forest.

The law notes, "Rights to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use." The law further provides for creating a separate category of forest recognized under this provision of the Act.

National Scenario of FRA Implementation

Since it was passed in the parliament, this law has provided land ownership to more than two million households in different states. Moreover, more than 1 lakh community claims over forest resources have been settled.

Status of FRA Claims Sanctioned All India

All India	Claims Settled	Total Land Sanctioned (In acres)
Individual Rights	2370001	517511244
Community Rights	115180	1383871158
Total	2485181	1901382402

Source: https://tribal.nic.in/FRA.aspx

5.2 FRA Scenario of Rajasthan

Rajasthan is the largest state in India in terms of total land. The state has about 32,737 sq km (2,740 8.00 hectares) of forest area which is about 8% of total land of the state. According to the Government of Rajasthan, the Rajasthan Forest Department is responsible for the management of 9.6% of the state area in order to conserve as well as protect wildlife and forest within the state.

Rajasthan state is known for its vast desert area. However, the eastern and southern Rajasthan have concentrated forest cover with pockets of scheduled tribe (ST) population and forest dwelling communities.

The life and livelihood of these people are dependent on forest. They have been living in forest land for generations. Also, they do farming in occupied forest land and get various forest resources for meeting various life and livelihood needs. Their culture is also connected to forest. Thus, forest becomes an inseparable aspect of their life and livelihood.

According to Census, 2011, as many as 92.38 lakh people, that is about 13% of the population in the state, are dependent on forest for their life and livelihood. There are about 16 districts in Rajasthan where there is potential of FRA implementation and people also in these districts significantly dependent on the forest.

Map of Rajasthan with Pockets of Green Cover

Since these people live on the forest land, forest department officials visit their villages for eviction of illegal capture of forest land and the community came in face to face conflict with the forest officials.

There have been cases where people's farms have been destroyed, fines have been imposed and people have been taken to custody.

There are also cases of corruption and harassment of women. In such a context, FRA provides a rightful space to ST and OFD communities to live and continue their livelihood activities in their occupied land.

Therefore, proper implementation of the FRA has the potential to impact the life and livelihood of a large segment of population in the state.

However, there is a huge gap in total number of claims by the individuals and community and number of claims sanctioned.

In Rajasthan, until December 2023, 48724 Individual Forest Right (IFR) claims and 2445 Community Forest Rights claims (CFR) have been sanctioned out of total 120218 claim application received. See Table below.

Status of FRA Claims Sanctioned in Rajasthan

Total Claims Application Received	120218
Total Claim Sanctioned	51169
Total Claims Rejected	64302
Claims under Review Process	4747
Total Land Sanctioned (in Hectare)	138283
IFR Sanctioned	48724
Total Land Sanctioned (in Hectare)	27903
CFR Sanctioned	2445
Total Land Sanctioned (in Hectare)	110360

Source: https://tribal.nic.in/FRA.aspx

Over 50% of the claims have been rejected. Thus, it becomes important to understand the reasons for rejection of such a huge number of claims; and also to understand the efforts of various stakeholders such as community, Government and civil society organisations to overcome the challenges. This study by RGICS aimed to do that.

The study was also conducted with an aim to understand the contributing factors for the successful implementation of FRA where it has happened. Secondary literature is available on issues related to implementation of FRA.

However, there are limited studies on understanding various facilitative, contributing factors for successful implementation of FRA in various pockets of the country and particularly in context of Rajasthan.

The Udaipur district of Rajasthan saw the maximum number (2467) of total 8548 in the state. Thus, we have identified Udaipur district for this study to understand various factors, which contributed to this momentum, so that the same can be replicated elsewhere and implementation and policy gap can be addressed.

5.2.1 The Study and Methodology

This qualitative study conducted by RGICS to understand the implementation status of the Forest Rights Act, 2006 in Rajasthan is part of a series of such studies conducted in a number of other states by the organization.

Field work for this study was conducted in Kotra block of Udaipur district in Rajasthan, where Kotra Adivasi Santgathan and Astha Sansthan are helping tribal to claim their community forest rights.

Researchers reviewed the available literature, interviewed the experts, activists and Government officials to understand the issues in detail and then visited 5 villages in Kotra Block of Rajasthan.

Out of 5 villages, 3 villages have been sanctioned Community Forest Rights and remaining 2 villages are still struggling and waiting for the claims to be sanctioned.

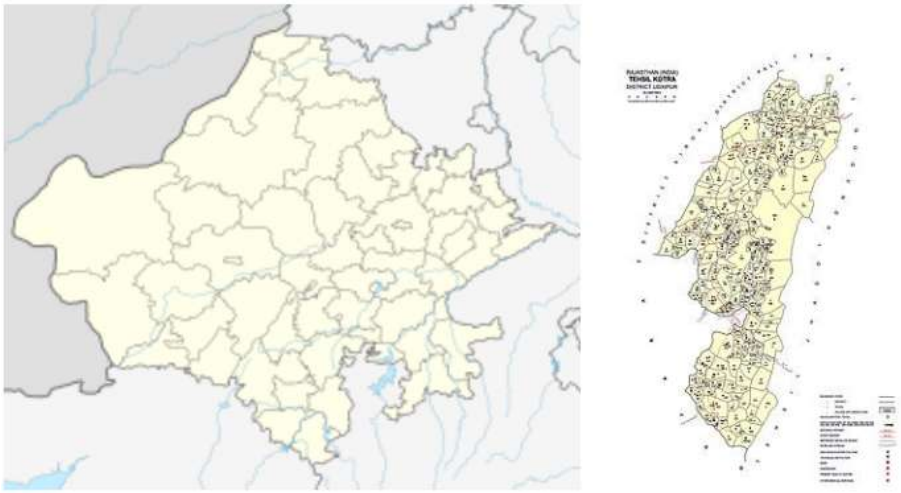
NGO Astha and community based organisation Kotra Adivasi Sansthan (KAS) supported the community to file the claims and helped in the process of accessing claims. We accessed studied villages through the contacts of the organisation.

We conducted Focused Group discussion with the selected villagers and Forest Management Committee members was done to understand the entire process of Accessing community Forest Rights. In few cases triangulation was done with Government records and from KAS wherever possible to verify the information provided by the community.

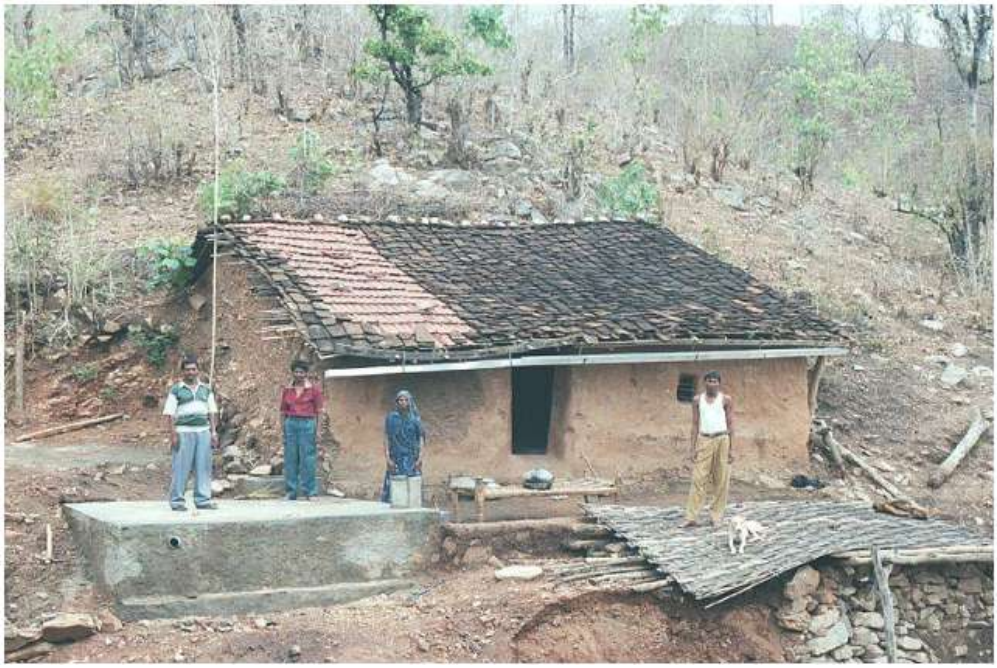
5.2.2 Field Information and Discussion

Kotra (also spelt Kotda) is a Block, Tehsil of Udaipur district, consisting of 262 revenue villages and 31 panchayats. The tehsil is bordered to the north by Pali and Sirohi districts, to the east by Gogunda and Jhadol tehsils, and to the south by Gujarat state. The tehsil headquarter is located in the village of Kotra, southwest of the Udaipur. Kotra tehsil has 96% of the population belonging to Scheduled Tribes, mainly Bhils and Garasias.

Map of Udaipur District and Kotra Block and Tehsil



Typical house in rural Kotra tehsil, Udaipur district



Source: https://commons.wikimedia.org/wiki/File:Typical_house_in_rural_Kotra_tehsil,_Udaipur_district,_Rajasthan.jpg

Kotra Adivasi Sansthan (KAS) helped 161 Gram Sabha in the Udaipur district to file their CFR claim under the Forest Rights Act, 2006. Of these, 75 CFR claims have been approved by the concerned authority. We visited 3 villages namely Mewaro Ka Math, Tulika Ka Khet and Bedadhar, whose claims have been approved.

The forest has an abundance of bamboo and other local species such as Khankra (Butea monosperma, Palash), Sitafal (Annona squamosa, Custard apple), Reetha (Sapindus mukorossi, soapnut), Hara (Terminalia chebula) and Behera (Terminalia bellirica) and Amla (Phyllanthus emblica, Indian Gooseberry). Moreover, it is the habitat of many wildlife species such as leopard, bear, rabbit, pig and hyena.

We interacted with the community people to understand the process of getting CFR claims and what changes they experienced after they received the claim. Moreover, what are the future plans of the community to conserve and manage the forest.

The secretary of KAS, Mr. Sarfraz told us that the most CFR claims pending for years in their area of operations are stuck due to two main reasons. 29 CFR claims are pending because the claimed forest land is not settled in revenue records. These recorded purposes of the forest land in the records of the Revenue department include agriculture land, habitation, pasture land and land belonging to other agencies.

According to information available on the website of the state forest department nearly 15% of State's forest land is not recorded in the accounts of the state revenue department.[76] Of this un-settled forest land, a large portion is recorded as individual's 'naap' land and habitation. According to the government of Rajasthan 4,87,501 hectare of forest land which accounts for 15% of the total forest land in the state is un-settled. The state revenue department has claimed that out of this nearly 2 lakh hectare of this land cannot be easily settled as these forest lands are recorded for some other purposes in the records of the forest department.[77]

The second reason behind the long pending CFR claim in Kotra region of Udaipur is that the claimed forest land is in the wildlife sanctuary. Kotra Adivasi Sansthan informed that 36 CFR claims filed by them for different Gram Sabhas are pending as they are in the "Phulwari ki Nal" wildlife sanctuary. We visited two villages namely Torana and Adiwada to understand how above mentioned two reasons have restricted people to avail benefits of the Forest Rights Act.

i.) Mewaro Ka Math

Mewaro Ka Math is a small village Mewaro Ka Math Panchayat in Kotra Block of Rajasthan. The village is surrounded by forest. We conducted a focus group discussion in the village where about 15 male and female villagers participated.

The group informed us that the entire village is inhabited by Garasia tribe. They further informed that as per their tradition, Garasia is the main tribe of the village and members of this tribe hold the position of village leader (mukhiya).

According to villagers, in the last four to five decades many people from outside settled here. The village has their own system of inducting and accommodating a new person willing to settle in the village.

Traditionally the Mukhiya had power to allot land to the migrants from the barren and unused land of the village. There are about 150 households living in the village. The average land holding is 2-3 bigha. The primary livelihood is farming and migrant labour.

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[76] https://forest.rajasthan.gov.in/content/dam/raj/forest/ForestDepartment/PDFs/Department%20Wing/Forest%20Settlement/Forest_Settlement.pdf

[77] https://forest.rajasthan.gov.in/content/dam/raj/forest/ForestDepartment/PDFs/Department%20Wing/Forest%20Settlement/Forest_Settlement.pdf

The villagers collect different kinds of forest produce for their own use and also sell in the market. They formed Gaon Sabha under PESA Act 20 years back for made different rules for the protection and promotion forest.

The Gram Sabha of Mewaro Ka Math filed CFR application multiple times to the Panchayat. However, none of their application was processed. Then with the support of KAS, the community followed it up with the Forest Department and at the end with the support of forest department official, mobilization of political support and KAS, their CFR has been sanctioned.

Total 772 Hectare land was sanctioned under CFR. After sanction, community with the support of Forest Department took various soil and water conservation measures to promote forest in the area. Now community plans to plant usable trees in the sanctioned area and craft rules for its use by the community.

ii.) Tulika Ka Khet

Tulika ka khet is small village of Bakawas Panchayat. The tribe live in the village are called Garasia and Gameti. The total households are 70 and population of the village is about 400. The village is surrounded by forest. We conducted a focus group discussion in the village where about 20 male and female villagers participated.

Most people in the village are cultivators. However, most households are marginal farmers with very limited forest land. The focus group discussion held in the village informed us that seasonal outmigration of men is very common in the village to support families. Many young people migrate to nearby cities as agriculture and construction labourers.

In this village, women were at the forefront of community mobilization, filing of application for CFR, and negotiating with Panchayat and Forest and Revenue Department. The village has a Van Aadhikar (Forest Rights) Committee and Van Prabhandhan (Forest Management) Committee.

These committees are working for last seven years to file CFR claim, follow up, protect and conserve forest. The village was sanctioned CFR. The community now plans to plant various usable trees and fodder. They have also imposed fines for cutting of trees.

Source: Image

iii) Bedadhar

Bedadhar is a small village of Bedadhar Panchayat. The tribe live in the village are called Garasia. The total households are about 96 and population of the village is about 350. The village is surrounded by dense forest. We conducted a focus group discussion in the village where about 10 male villagers participated.

Most people in the village are cultivators. However, most households are marginal farmers with very limited forest land. The focus group discussion held in the village informed us that seasonal outmigration of men is very common in the village to support families. Many young people migrate to nearby cities in Gujarat and Rajasthan as agriculture and construction labourers.

Villagers applied for CFR three years back with the support of KAS and later followed up with various Government officials. Recently they got the sanction. They have made the rule for conservation of forest but no system of fine yet because they found that community generally follows the rule.

RGICS Study team members interacting with the villagers in Kotra block

iv) Torana

Torana village is part of Juda Gram Panchayat in Kotra block of Rajasthan. The total population of the village is about 1000. The village is surrounded by a reserve forest under the jurisdiction of Udaipur (north) Territorial forest division. We conducted a focus group discussion in the village where about 20 male and female villagers participated. The group informed us that the entire village is inhabited by various groups of Scheduled Tribe. Garasia and Bheel are two major tribal groups in this village. They further informed that as per their tradition, Garasia is the main tribe of the village and members of this tribe hold the position of village leader (mukhiya).

This village has always been open to members of other tribal groups in the region. According to villagers, in the last four to five decades many people from outside settled here. The village has their own system of inducting and accommodating a new person willing to settle in the village. Traditionally the Mukhiya had power to allot land to the migrant from the barren and unused land of the village. However, today most people who have come from outside have bought land from other people in the village.

Most people in the village are cultivators. However, most households are marginal farmers with very limited forest land. The villagers informed us that seasonal outmigration of men is very common in the village to support families. Many young people migrate to nearby regions of Gujarat as agriculture labourers. However, a sizable migrant population from the region is also accommodated by big cities of Rajasthan like Udaipur as construction workers.

The third major activity of local subsistence is collection of minor forest products (MFP) from their adjacent forest. Villagers informed us that they collect a number of forest products for their own consumption and trade.

Major forest products collected by villagers to sell in the market include Gond, Amla, Honey, Sitafal and Tendu. They also collect other fruits and vegetables such as kanji, bahera, areetha and khankara for their own consumption.

The forest apart from these products also provides them fuel and fodder on a regular basis. Bamboo is in abundance in the forest, so people from the village are hired by the contractor of the forest department for commercial harvesting of bamboo.The forest of the village spread on three sides of the village, well demarcated using natural boundaries like hilltop and stream.

This forest land is governed by the Udaipur (north) Territorial forest division of the state forest department and has full control over its forest resources. The forest department allows villagers to access their rights related to collection of fuel, fodder and NTFP as per management plan approved by the state government.

The Kotra Adivasi Sansthan helped villagers to develop an application to claim their rights of forest under the Forest Rights Act, 2006. A long process of social mobilization and community organization led to filing of CFR claim in 2018. Following the filing of the CFR claim, officials of revenue and forest department conducted field verification of the claimed forest land by the villagers. These officials found that the claimed forest land is not recorded in the records of the revenue department.

The claimed forest land is currently in the category of un-settled land in the books of the state forest department. Legally every piece of the forest land must be surveyed by the revenue department to settle the land ownership of the forest land. The CFR claim of the Torna village could not be approved as the claimed land is un-settled. However, villagers have received 11 IFR claims out of total 41 claims filled by villagers. Most of these claims could not be approved because of the same reason- unsettled forest land.

The unsettled forest of Torna village has also restricted them from accessing other developmental rights such as road, electricity, telephone and other major infrastructural projects in the village. Villagers informed that the conflict among forest and revenue departments has led to abortion of many developmental projects in the villages including a tower for mobile connection.

v) Aariwara- Sanctuary

Ariwara is a village under the Beelwan Gram Panchayat in Kotra development block of Udaipur. A village of nearly 100 households has a population of 550 belonging to scheduled tribes. Major tribal groups in the village are Grasia, Gamatu, Bheel, Laur and Parmar. The village is a PESA village located in the Phulwari Ki Nal Sanctuary in Udaipur (north) forest division.

According to census data, most families in the village are cultivators, however the focus group discussion organized in the villages informed us that households in the village do not have enough agricultural land.

Most people migrate out in search of jobs. Most people migrate to nearby regions in Gujarat during agricultural season to work as agriculture labourers. Other people work as construction labour in cities of Rajasthan and Gujarat.

The Ariwara village is one among 134 villages located inside the Phulwari Ki Nal Wildlife Sanctuary. The notification for creation of this sanctuary was issued in 1983 under the Wildlife Conservation Act, 1972. The sanctuary is habitat of wildlife such as Leopard, Hyena, Sloth Bear, Jackal, Fox, Porcupine, Jungle Cat, Langoor and Indian Peafowl.

The forest is the backbone of the subsistence as it provides local villagers fuel, fodder and many minor forest products such as Gond, Amla, Reetha, Honey, Seetaphal, Kanji, Mahua and Ratanjot. Most of these products are being sold in the local market through contractors.

The management plan of the Phulwari ki Nal Wildlife Sanctuary acknowledges traditional rights of villagers on forest for their lives and livelihoods. The district collector of Udaipur settled most of the traditional rights in 1998 under section 19-25 of the Wildlife Conservation Act, 1972. Further, the management plan reveals that all settled rights have been withdrawn by the forest department in compliance with orders of Supreme Court of India in IA No 548 and orders dated 11.05.2001.[78]

Source: Image

Currently, villagers are not entitled to access any forest right. Villagers told us in the focus group discussion that, despite blanket ban on access to forest, villagers have been using forest for fuel, fodder and some minor forest products. However, all these transactions are solely dependent on mercy of forest officials. Often, villagers are booked for illegally collecting forest produce from the sanctuary.

In 2018, with the help of KAS, the Adiwara Gram Sabha filed its CFR claim under the forest rights Act, 2006. In their application, villagers had applied for recognition of their traditional forest rights along with the right to manage the forest and its resources. However, no action has been taken on this application. It has been observed that maximum cases of CFR in the protected forest are either rejected or not processed by SDLCs.

The reason for keeping the CFR claim of Ariwara village on hold was communicated to the villagers was that the forest department wants to declare the forest as Critical Wildlife Habitat under the Forest Rights Act, 2006, which has not been done so far. The forest department has kept it on hold till the area has been declared as a critical wildlife habitat.

5.3 Management of CFR Entitlements

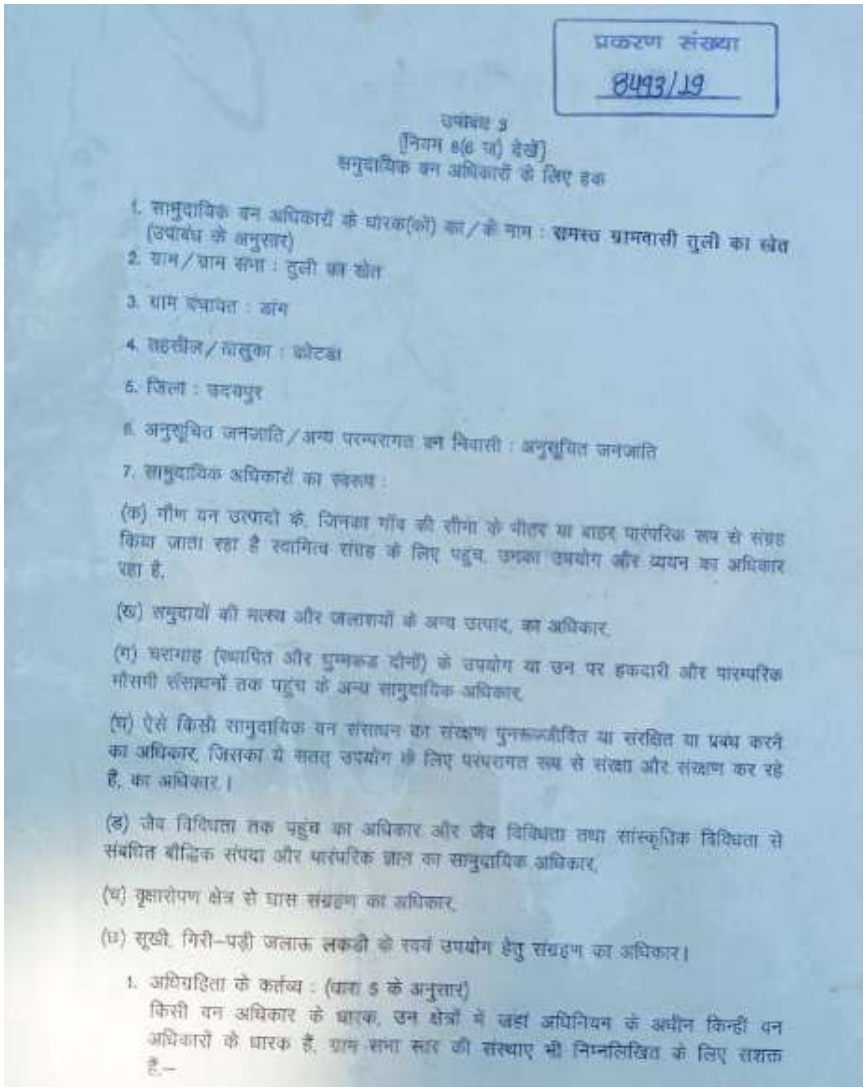
The overall objective of the Community Forest Rights (CFR) under the Forest Rights Act, 2006 is to allow community members to autonomously manage forest and its resources to support their lives, livelihoods and conserve local biodiversity.

This provision is on the principle that the social and economic interests/benefits of forest dwellers incentivizes and motivates them to conserve forest and its resources. This principle reflects in the actions and behaviour of villagers of Tuli Ka Khet and Mewaro Ka Math. However, villagers could not mentally disassociate themselves from the historical dominance of the state forest department.

[78] https://www.geocities.ws/cwwraj/2007-08/apo_phulwari.pdf

Our field investigation in five villages of the Udaipur district in Rajasthan reveals that the management of community forest allotted as CFR under the Forest Rights Act, 2006 is dependent on local community leadership. Villagers of Tuli Ka Khet showed greater interest in managing and distribution of forest resources. Moreover, they systematically planned their forest conservation activities to maximize their economic gain in the form of firewood, fodder and NTFP.

Using the opportunity, villagers of this small village developed their own rules, punishment on rule violation, local grievance redressal system to regulate behaviour of forest users. Such pro-active and visionary planning led to decrease in forest fire, conservation of trees, increase in supply of fire wood and fodder and strengthened social fencing of forest. The gram sabha of Tuli Ka Khet village managing this community forest is led by women.



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[नियम 8(6 घ) देखें]
सामुदायिक वन अधिकारों के लिए हक

1. सामुदायिक वन अधिकारों के धारक(कों) का/के नाम : समस्त ग्रामवासी तुली का खेत (उपाबंध के अनुसार)
2. ग्राम/ग्राम सभा : तुली का खेत
3. ग्राम पंचायत : डांग
4. तहसील/तालुका : झोटवा
5. जिला : उदयपुर
6. अनुसूचित जनजाति/अन्य परम्परागत वन निवासी : अनुसूचित जनजाति
7. सामुदायिक अधिकारों का स्वरूप :

(क) गौण वन उत्पादों के, जिनका गाँव की सीमा के भीतर या बाहर पारंपरिक रूप से संग्रह किया जाता रहा है स्वामित्व संग्रह के लिए पहुंच, उनका उपयोग और व्ययन का अधिकार यहां है,

(ख) समुदायों की मत्स्य और जलाशयों के अन्य उत्पाद, का अधिकार,

(ग) चरागाह (स्थायित और घुम्मकड दोनों) के उपयोग या उन पर हकदारी और पारम्परिक मौसमी संसाधनों तक पहुंच के अन्य सामुदायिक अधिकार,

(घ) ऐसे किसी सामुदायिक वन संसाधन का संरक्षण पुनरूज्जीवित या संरक्षित या प्रबंध करने का अधिकार, जिसका वे सतत् उपयोग के लिए परंपरागत रूप से संरक्षा और संरक्षण कर रहे हैं, का अधिकार।

(ङ) जैव विविधता तक पहुंच का अधिकार और जैव विविधता तथा सांस्कृतिक विविधता से संबंधित बौद्धिक संपदा और पारंपरिक ज्ञान का सामुदायिक अधिकार,

(च) वृक्षारोपण क्षेत्र से घास संग्रहण का अधिकार,

(छ) सूखी, गिरी-पड़ी जलाऊ लकड़ी के स्वयं उपयोग हेतु संग्रहण का अधिकार।

1. अधिग्रहिता के कर्तव्य : (धारा 5 के अनुसार)
किसी वन अधिकार के धारक, उन क्षेत्रों में जहां अधिनियम के अधीन किन्हीं वन अधिकारों के धारक हैं, ग्राम सभा स्तर की संस्थाएं भी निम्नलिखित के लिए सशक्त हैं,–

In this study we observed that the Gram Sabha of Mewaro Ka Math has also involved community members in activities related to forest conservation.

Mere allotment of the forest land to the Gram Sabha has substantially decreased conflict between villagers and forest officials on use of forest products. Villagers now feel more confident and fearless while using their forest.

However, the Gram Sabha has not developed and executed any plan to maximize social, economic and ecological outcomes.

In the last few years many forest conservation activities such as fencing, soil conservation, water conservation and other similar activities were carried out in their community forest. But, all of these activities were carried out by the forest department and villagers participated.

The government of Rajasthan recognized the community forest rights of Bedadhar in 2018. This small village of about a population of 300 has not understood the strength of the CFR granted to them. In a focus group discussion held in this village, we observed that the Gram Sabha of the village has not developed any plan to maximize their social, economic and ecological outcomes.

The lack of awareness and no local leadership are major reasons for inaction of villagers. Moreover, the village and community forest share very complex boundaries with adjacent forests governed by the state forest department. Therefore, forest officials still exercise their authority to control use of forest land and its resources.

Other two villages- Torana and Ariwara, where the CFR claims are still under process, villagers are waiting for recognition of their CFR claim. While people in both of these villages are eager to have control over their forest land and forest resources, none of them have a clear vision on how to maximize social, economic and ecological gain once it is awarded.

In all five villages where this study was conducted, a local NGO named Kotada Adivasi Sangathan (KAS) is facilitating the process of CFR and IFR claims. The organization has successfully helped many villages in the region to secure their CFR claim under the Forest Rights Act. So far KAS has been focusing on getting CFR claims awarded. We also observed that the organization is now working with villagers where CFR is already awarded to develop their forest management plan.

We observed that local leadership, community ownership and active participation of women are crucial for management of forests recognized under the forest rights Act. The study team observed that strong community leadership, active engagement of women and awareness have resulted in maximization of social, economic and ecological benefits.

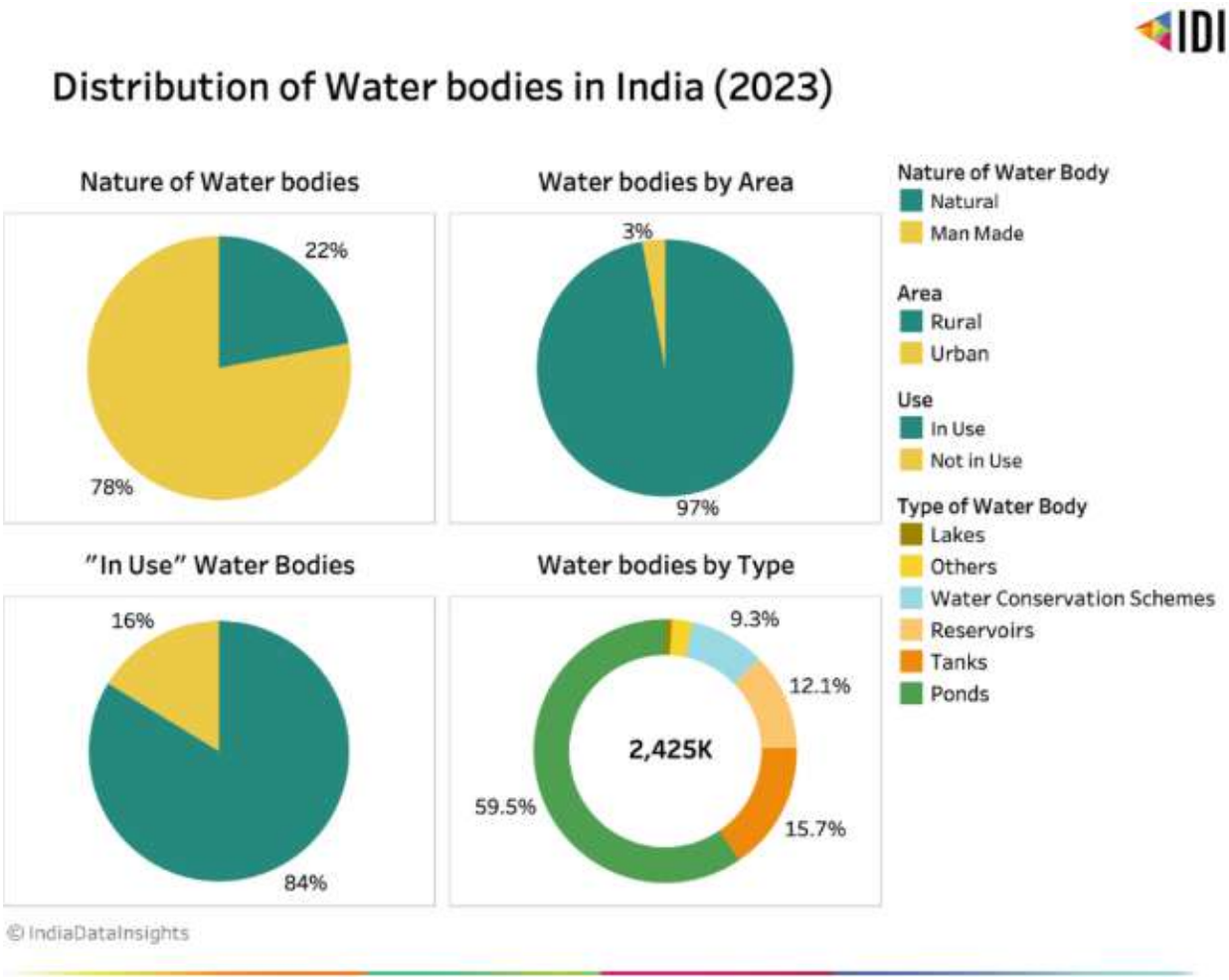
6 From Rainfall to Recharge

India Data Insights

On March 22nd, we commemorate World Water Day, a reminder of the critical importance of water in our lives. The theme for 2024, 'Water for Peace,' underscores the indispensable role water plays in fostering global stability and prosperity. When water becomes scarce or contaminated or access to it is unequal or nonexistent, tensions can escalate among communities.

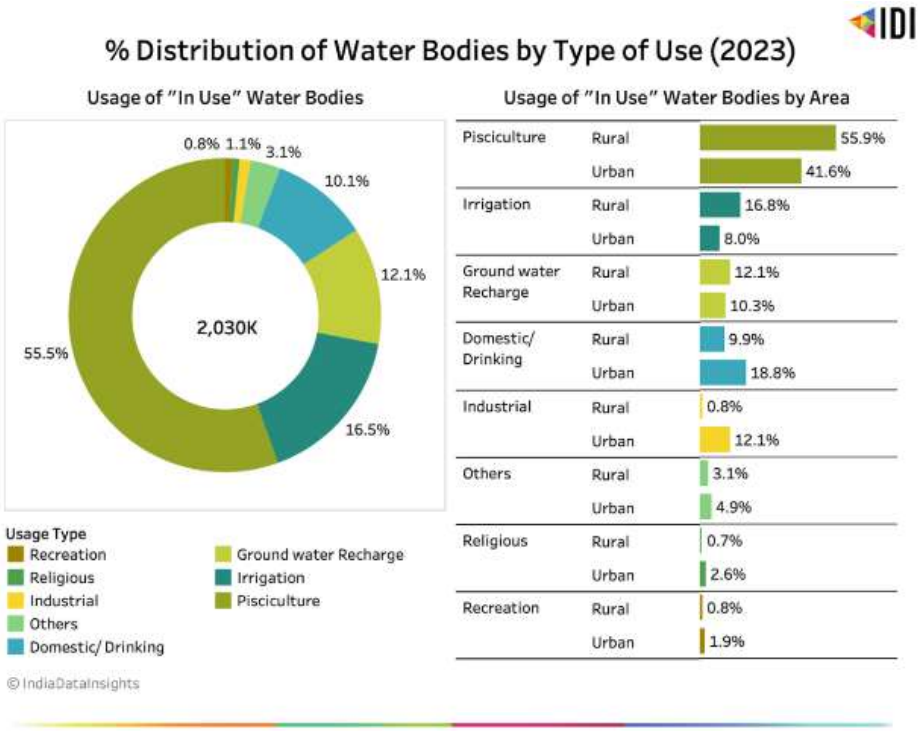
Despite accounting for only about 2.45% of the world's surface area and being home to ~18% of the world's population, India possesses only 4% of the world's freshwater resources. This places India among the most water-stressed nations globally. India's reliance on an increasingly erratic monsoon for its water needs is further exacerbated by the effects of climate change.

Surface water and groundwater resources constitute the backbone of India's water supply. In this edition of the data dialogue, we delve into different types of water resources and their utilization.



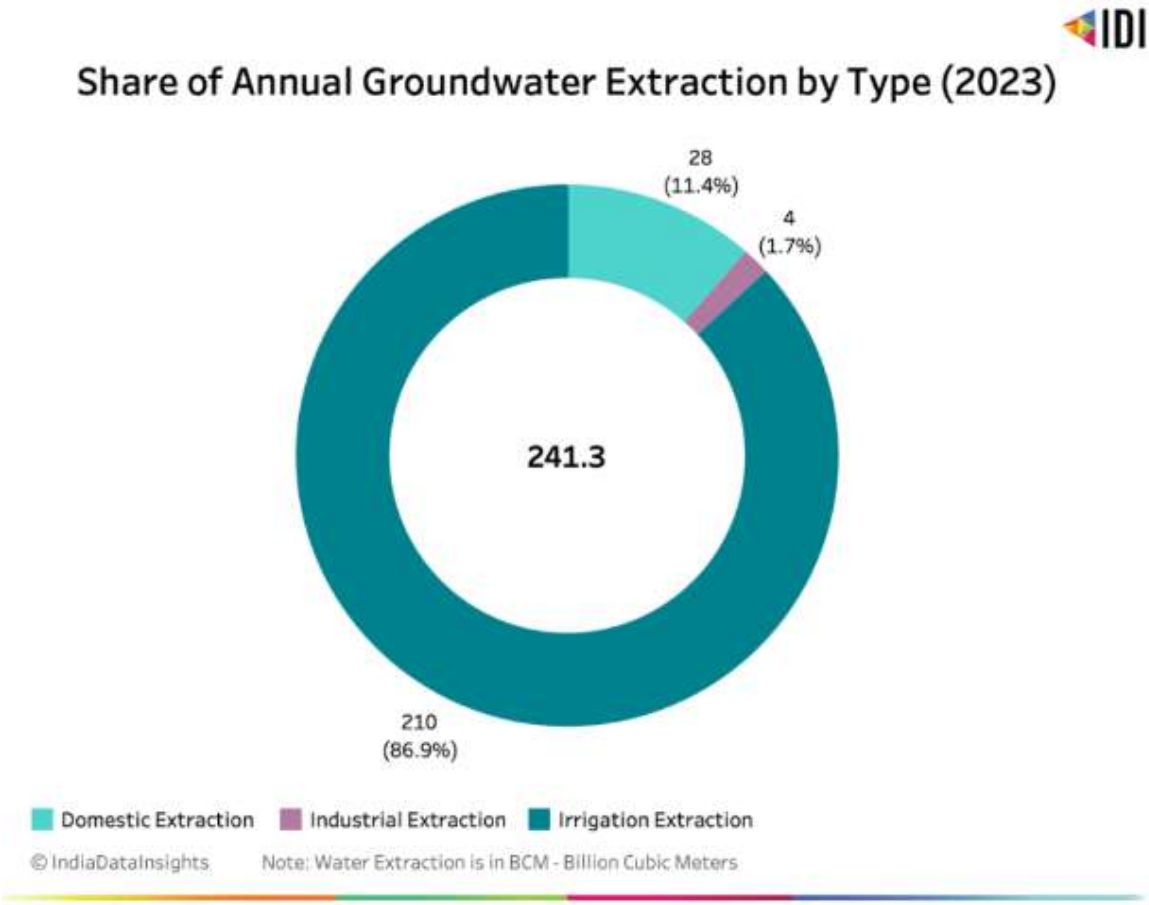
According to the Inaugural Census for Water Bodies report in 2023, India possesses approximately 2425K water bodies, with 97.1% in rural areas and 2.9% in urban areas. Among these, only 22% of water bodies are classified as natural.

The majority - approximately 87% - are ponds, tanks, and reservoirs. Further, among these, 84% (2030K) are actively utilised, while the remaining 16% (394K) are not used due to factors such as drying up, construction, siltation, irreparable damage, salinity, and other causes.

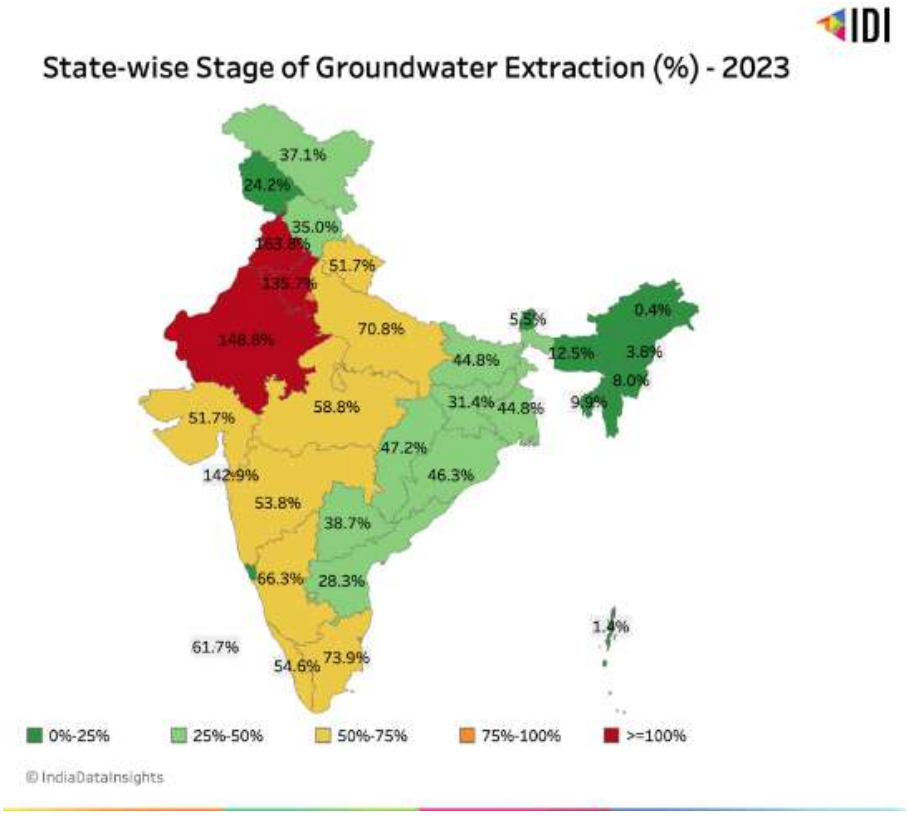


Out of the total water bodies, 84% are utilised primarily across the top three uses—55.5 % for pisciculture (1126K), 16.5% for irrigation (335K), and 12.1% for groundwater recharge (244K). These applications are predominantly observed in rural areas. Conversely, in urban locales, water bodies find utility in activities such as domestic drinking, industrial use, religious ceremonies, recreational purposes, and other miscellaneous purposes.

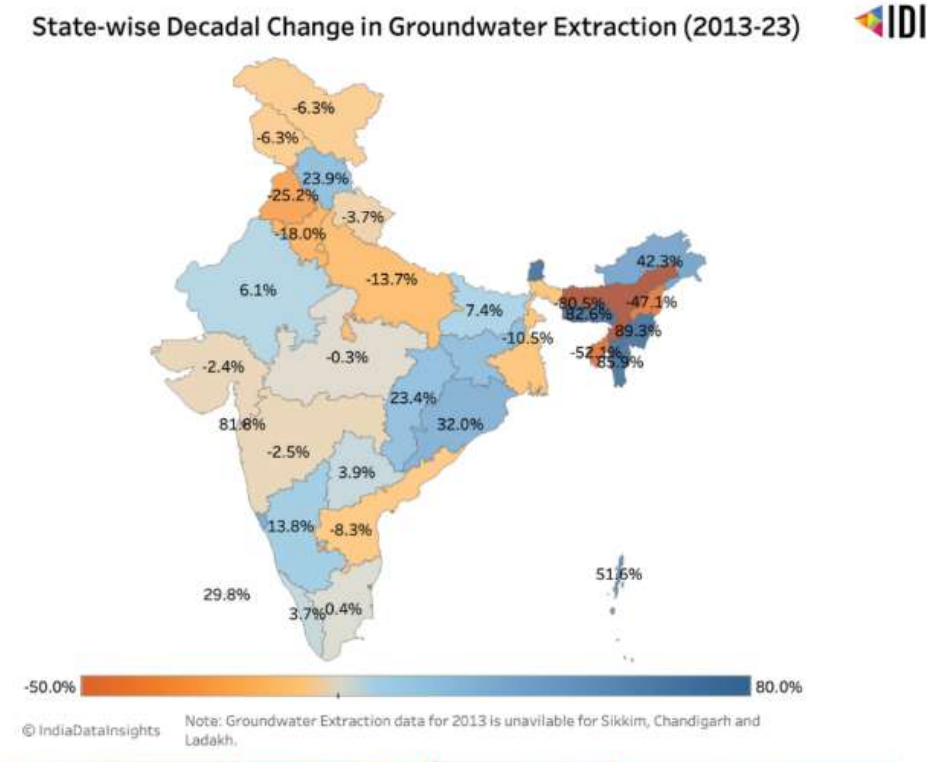
Another important natural freshwater resource in India is the groundwater. This complements surface water availability; However, excessive use of groundwater can lead to its depletion.



In 2023, the total groundwater extraction amounted to approximately 241 billion cubic meters (BCM), with a share of ~60% of GW extracted. An overwhelming majority, nearly 87% (210 BCM), of this extracted water is utilized for irrigation purposes, approximately 11% is allocated for domestic use, and the remaining 2% is utilized for industrial purposes. Over the last two decades, the water extracted for irrigation has decreased by 1.3%, and extraction for domestic purposes has increased by 52.4%.



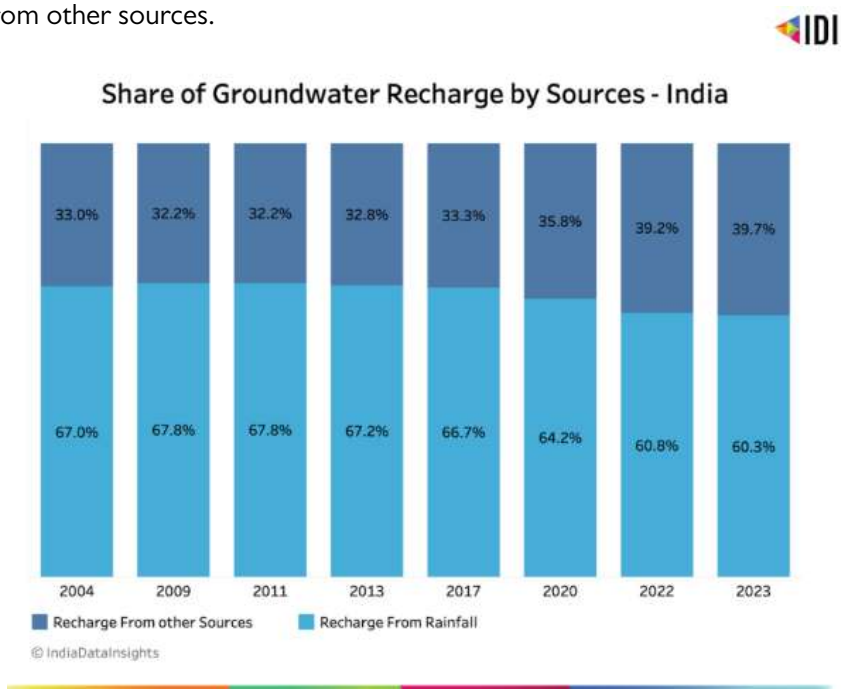
In 2023, northern states such as Rajasthan, Haryana, and Punjab have exhibited significant overexploitation of their groundwater resources. Conversely, the central belt appears to be engaged in a more moderate level of groundwater extraction, while the eastern belt demonstrates less than 50% activity in groundwater extraction. Groundwater extraction is the least in the northeastern states.



Annual groundwater extraction has decreased by 4.6%, over the last decade. The highest extraction was observed in Manipur, increasing by 89.2%, while Assam decreased its extraction by 80.5%. Extraction of groundwater in Rajasthan has risen by 6%, maintaining its position as the most exploited state for groundwater resources over the past decade.

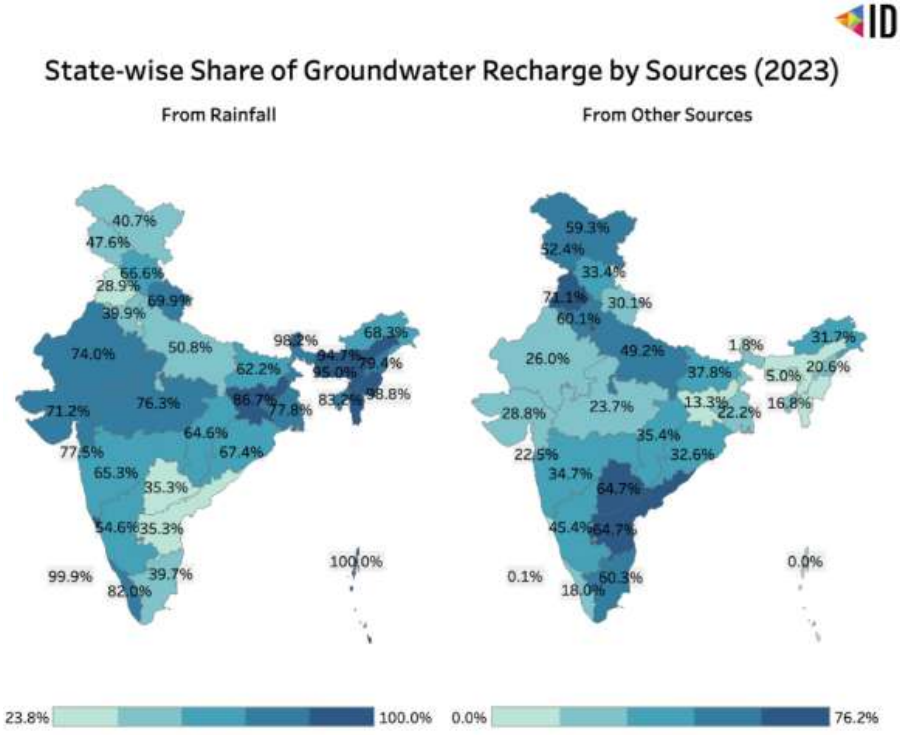
Maintaining stable groundwater levels is imperative, with more than 80% of India's groundwater used for irrigation.

In 2023, India's groundwater recharge was about 449 billion cubic meters (BCM), with rainfall-induced recharge being the primary source. Nearly two-thirds (60.3%) of the groundwater recharge is attributed to rainfall, while the remaining portion (39.7%) stems from other sources.



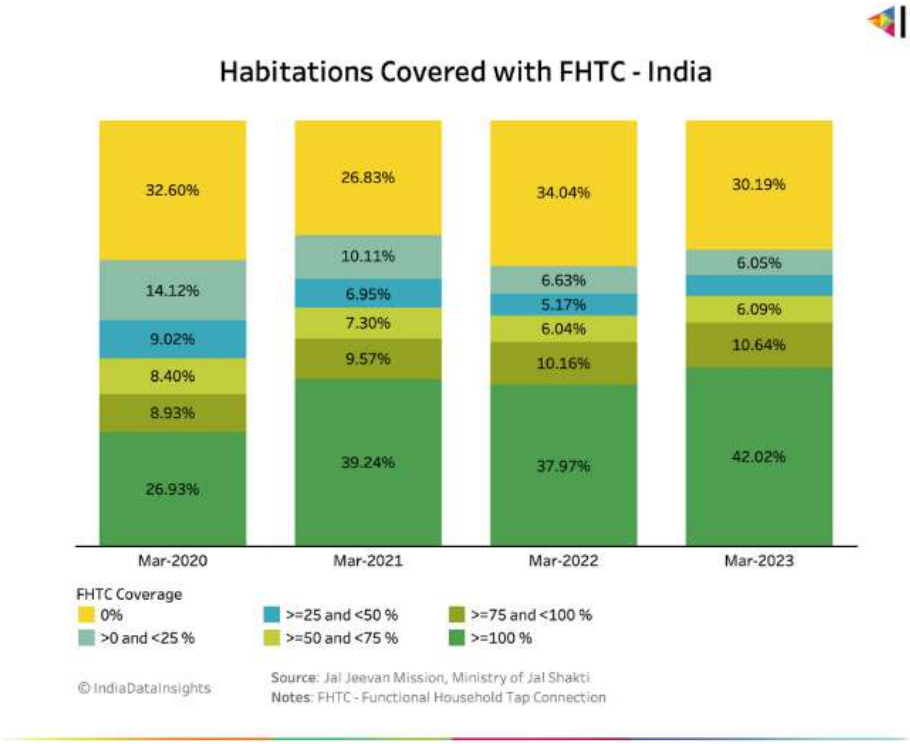
Over the past decade, groundwater recharge from rainfall has consistently declined, while recharge from alternative sources has shown an upward trend. The annual groundwater recharge from rainfall has decreased by 19 BCM (approximately 6.5%) over the last two decades.

In contrast, recharge from other sources has experienced a significant increase of 35 BCM (around 24%) during the same period.



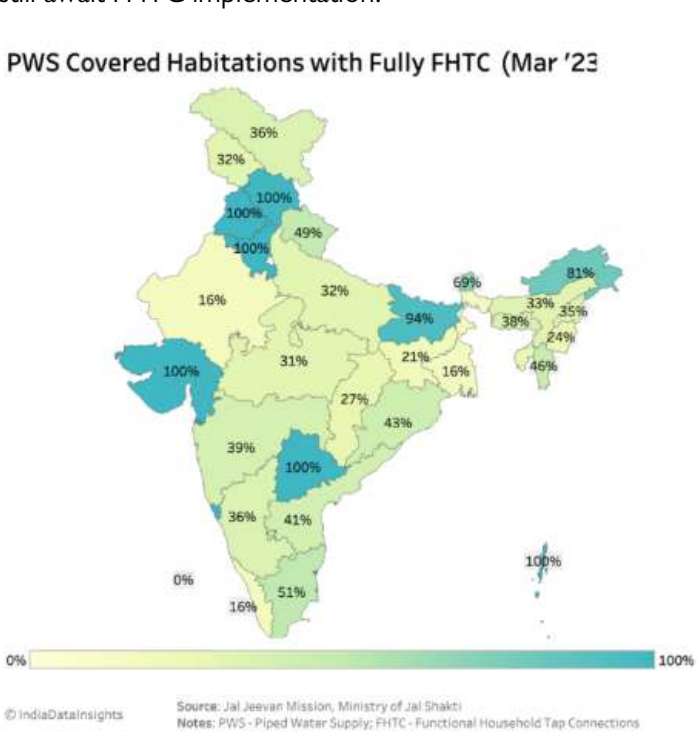
Rainfall drove groundwater recharge in certain northeastern states, including Jharkhand and Kerala, in 2023. Conversely, significant groundwater recharge from other sources was observed in states and Union Territories such as Chandigarh, Punjab, Delhi, Andhra Pradesh, and Telangana.

Both surface water and groundwater sources are integrated into piped water supply systems through extensive networks of pipelines and distribution infrastructure. They are closely interconnected components of effective water resource management, with each playing a vital role in providing reliable and safe water supplies for various uses.



Over the past four years, there has been a 60% increase in India's piped water supply (PWS) coverage. As of March 2023, out of the 16.96 lakh habitations in India, 96.33% (~ 16.3 lakhs) are now encompassed within the rural piped water supply network.

As of March 2023, ~42% of habitations have achieved full coverage with functional household tap connections (FHTCs). However, 30% of habitations still await FHTC implementation.



100% of the habitats in Himachal Pradesh, Punjab, Haryana, Gujarat, and Telangana are covered by fully functional household tap connections (FHTCs). Conversely, only 16% of habitations have achieved full FHTC coverage in Kerala, Rajasthan, and West Bengal.

As rural piped water supply advances at a rapid pace, the pressing issues of groundwater overexploitation, diminished recharge from rainfall due to climate change, burgeoning population, and other factors continue to contribute to a steady decline in per capita water availability. This emphasizes the urgent necessity for the adoption of effective water management practices.

Looking ahead, it becomes imperative to observe the actions taken to address water utilization, facilitate groundwater recharge, and mitigate pollution of our existing water reservoirs. Given the escalating water stress and depletion of groundwater reserves across various regions, prioritizing effective management and bolstering groundwater recharge becomes indispensable for fostering sustainable water management and socio-economic progress in India.

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