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# Achieving zero net land degradation in Indian forest: prospects and challenges

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**ABSTRACT**

Land is the most important natural resource which embodies soil, water, associated flora and fauna involving the total ecosystem, and on which all the activities of human beings are based. An ever increasing human and cattle population have enormous demands on land resources. These pressures have led to drastic changes in the proportion of land utilized for agricultural activities, urbanization and industrial development. Degradation of land is the result of both biotic and abiotic factors. Human and animal pressure on land, over-exploitation of soil and water resources, unscientific land use, and natural calamities like drought and floods are major factors responsible for land degradation.

Desertification alongwith climate change and the loss of biodiversity were identified as the greatest challenges to sustainable development during the Rio Earth Summit in 1992. This gave birth to three Rio Conventions, namely the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification (UNCCD). Globally, desertification is threatening the livelihoods of 1 billion people in over 100 countries, and each year 12 million hectare (M ha) of arable land are lost due to drought. The economic costs of desertification and land degradation are estimated at USD 490 billion/year. Avoiding land degradation through sustainable land management can generate up to USD 1.4 trillion of economic benefits as well as it provides huge amount of ecosystem goods and services.

The 2030 agenda for sustainable development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. There are the 17 Sustainable Development Goals (SDGs), which call for action by all developed and developing countries in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth while tackling climate change and working to preserve our oceans and forests.

SDG 15 urges countries to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss. More specifically, target 15.3 aims to combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world by 2030.

## 1. LAND DEGRADATION NEUTRALITY

The twelfth session of the Conference of Parties (CoP 12) of the United Nations Convention to Combat Desertification (UNCCD) in October 2015 endorsed Sustainable Development Goal (SDG) target 15.3 and concept of land degradation neutrality (LDN) as a strong vehicle for driving the implementation of the objectives of UNCCD, and invited all country parties to formulate voluntary targets to achieve LDN, and to incorporate them in their UNCCD national action programme. UNCCD defined LDN as "*A state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems"*.

LDN aims to sustain the productivity of land, maintain the land based natural capital, support ecosystem functions and ecosystem services, and thus meets the needs of current and future generations. In terms of neutrality, the LDN concept aims to achieve a balance between anticipated new land degradation and future efforts to improve degraded land through land restoration and sustainable land management.

LDN represents a paradigm shift in land management policies and practices. It is a unique approach that counter-balances the expected loss of productive land with the recovery of degraded areas. It strategically places the measures to conserve, sustainably manage and restore land in the context of land use planning. To achieve the target of a land degradation-neutral world (SDG target 15.3) by 2030, large amounts of financial resources need to be mobilized.

Land is fixed in quantity, there is ever-increasing competition to control land resources and capitalize on the flows of ecosystem goods and services from the land. This has the potential to cause social and political instability, fueling poverty, conflict and migration. For that reason, the implementation of LDN requires multi-stakeholder engagement and planning across scales and sectors, supported by national-scale coordination that utilizes existing local and regional governance structures.

Globally, 123 countries have committed to set LDN targets. About 80 countries have already set their targets, and many have secured high level government commitment to achieve LDN. Numbers of strategies and projects at the local, regional or national levels are required to be developed and implemented for achieving LDN targets. LDN projects will use some of the progress indicators of UNCCD reporting, such as i) Land cover and land cover changes, ii) Carbon stocks, and iii) Land productivity dynamics for tracking the progress in achieving LDN.

Achieving LDN - by preventing land degradation and rehabilitating already degraded land, scaling up sustainable land management and accelerating restoration initiatives - is a pathway to greater resilience and security for all. Restoring the soils of degraded ecosystems has the potential to store up to 3 billion tonnes of carbon annually.

Inter-governmental Panel on Climate Change (IPCC) report on "Climate Change and Land" stated that sustainable land management is required to reverse the impacts of land degradation, especially by climate change and other drivers (IPCC, 2019). IPCC report stated that knowledge and technology transfer, capacity-building, and enabling financial mechanisms can strengthen adaptation and mitigation in the land sector, and can help enhance the sustainable use of natural resources for food security under a changing climate.

## 2. LAND DEGRADATION AND DESERTIFICATION IN INDIA

India is the seventh largest country in the world having total geographic area (TGA) of 328.73 million hectare (M ha), which occupies only 2.4% of the world's TGA, however it supports over 17% of the world's human population and over 18% of world's cattle population. An ever increasing human and cattle population pose enormous pressure on land which has led to drastic changes in the proportion of land utilized for agricultural activities, urbanization and industrial development. Degradation of land is the result of both biotic and abiotic factors. Human and animal pressure on land, over-exploitation of soil and water resources, unscientific land use, and natural calamities like drought and floods are major factors responsible for land degradation.

Dry lands areas in India are about 228.3 M ha which is 69.6% of its TGA, and comprises of arid lands (50.8 M ha), semi-arid land (123.4 M ha) and dry sub-humid areas (54.1 M ha). About 32.07% of the land is undergoing various forms of degradation and 25% of the geographical area is affected by desertification. According to various estimates, about 29% to 35% of the TGA of India is subjected to land degradation (MoEF&CC, 2015). As per the Desertification and Land Degradation Atlas of India, 2016, the current extent of land degradation is estimated to be 96.4 M ha covering 29.3% of the geographic area of the India (SAC, 2016).

## 3. FOREST AND TREE RESOURCES

India, a megadiverse country with only 2.4% of the world's land area, accounts for 7-8% of all recorded species, including over 45,968 species of plants and 91,364 species of animals which constitute 11.18% of world's flora and 7.44% of world's fauna. India is one of the top ten forested countries of the world and its forest and tree cover have increased in recent years transforming country's forests into a net sink of carbon owing to national policies aimed at conservation and sustainable management of forests.

As per National Forest Policy 1988, India should have a forest cover on 33% of its geographical area. The forest cover in India is spread over an area of 7,12,249 sq km (71.22 M ha), which is 21.67 % of the geographical area of the country. In terms of canopy density classes, area covered by very dense forests is 99,278 sq km (3.02%), moderately dense forest is 3,08,472 sq km (9.39%) and open is 3,04,499 sq km (9.26%). Tree cover of the country is estimated to be 95,027 sq km (9.50 M ha) which is 2.89% of the geographical area. As per India State of Forest Report 2019, total forest and tree cover is 8,07,276 sq km, which is 24.56% of the geographical area of the country. There is an increase of 3,976 sq km in the forest cover and 1,212 sq km (1.29%) in tree cover of the country as compared to 2017 assessment (FSI, 2019).

The total growing stock of India's forest and trees outside forests is estimated 5,915.76 million cum, which comprises of 4,273.47 million cum inside the forests and 1,642.29 million cum outside the forests. The average growing stock per hectare in forest has been estimated as

55.69 cum. Total forest carbon stocks are estimated to be 7,124.6 million tonnes (Mt). There is an increase of 42.6 Mt in the forest carbon stocks of the country as compared to the last assessment of 2017. Soil organic carbon represents the largest pool of carbon stock in forests, which has been estimated 4,004 Mt, and contributes 56% to the total forest carbon stock of the country.

The local communities (about 275 million) depend on forests for fuelwood, fodder, small timber and NTFPs. It accounts for about 2% nation's GDP after agriculture, despite several pressures. More than 1,70,000 villages are located in the proximity of forest areas known as Forest Fringe Villages. Forests play an important role in the socio-economic and cultural lives of the people inhabiting these villages. They have been dependant on the forests for fuel wood, fodder, timber and bamboo since ages, but with the manifold increase in their population in the last 60 to 70 years, pressure on forests has also increased in the likewise manner.

## 4. PROSPECTS IN ACHIEVING ZERO NET FOREST LAND DEGRADATION

Large scale deforestation is not evident in India. However, the dependence of local communities on forests for their livelihoods causes forest degradation. National REDD+ Strategy 2018 has highlighted planned and unplanned drivers of deforestation and forest degradation in India. Planned drivers include developmental activities, management initiatives and projected uses such as road and railway construction; coal, iron and other mining activities; hydroelectric power and irrigation projects; industrial requirements; expansion of cities and towns; and, removals from forests as per silvicultural requirements. Unplanned drivers comprise mainly unauthorized activities, which include unregulated anthropogenic removals by nearby households for consumptive uses like extraction of fuelwood, small timber and NTFP; illegal logging and uncontrolled felling; social causes such as encroachment of forest land for agriculture and housing; unregulated livestock grazing and fodder collection; natural disturbances caused by forest fires, insect attack, disease outbreak, forest dieback; and, illegal mining operations (MoEFCC, 2018).

***Policies, laws and regulations:*** India's policies, laws and regulations related to forests are conservation centric and mainly focused on enhancement of forest and tree cover for sustainable flow of ecosystem goods and services for well being of the communities.

India is one of the few countries where forest and tree cover has increased in recent years transforming country's forests into a net sink of carbon owing to national policies and acts aimed at conservation and sustainable management of forests. Government has framed a number of policies, laws and regulations from time to time for conservation of environment, forests, biodiversity and other natural resources such as Indian Forest Act, 1927; Wildlife (Protection) Act, 1972; Forest (Conservation) Act, 1980; Environment (Protection) Act, 1986; National Forest Policy, 1988; Panchayat (Extension to Scheduled Areas) Act, 1996; Biological Diversity Act, 2002; National Environment Policy, 2006; Scheduled Tribes and Other Traditional Forest Dwellers (Reorganisation of Forest Right) Act, 2006; National Agroforestry Policy, 2014; Green Highways Policy, 2015; Compensatory Afforestation Fund Act, 2016 etc. All these policies and acts provide an enabling environment for achieving zero net forest land degradation.

***Scientific management of forests:*** Scientific management of forest began in India in 1864. Forest Working Plans are guiding documents for conservation and sustainable management of forests in India. They facilitate monitoring, evaluation and impact assessment of forest management practices being followed in the country. National Forest Policy, 1988 highlighted the importance of management plans and clearly states that forest should not be worked without the approved management plans. The Supreme Court of India had clarified in 1996 that all working plans are to be approved by the Central Government.

Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India (GoI) had adopted a uniform National Working Plan Code - 2004 for preparation of working plans for the management of forests. It was reviewed in light of climate change impacts on forest ecosystem, role of forests in climate change mitigation and technological advancement in the field of GIS and remote sensing, and new National Working Plan Code - 2014, and became effective from 1st April, 2014. According to new National Working Plan Code-2014, forest management planning must provide for sustainable management of forests and its biodiversity as enshrined in the National Forest Policy, encompassing the ecological, economic and social dimensions (MoEFCC, 2014).

***Forest governance and management:*** Forests are in the concurrent list and jointly managed by Union Government and State Governments. MoEFCC, GoI is responsible for framing national policies, laws and regulations, conducting research and surveys, preparing national forest inventories, capacity building of the forest officers, and providing financial supports to State Governments for conservation of forests and wildlife. State Governments / Union Territories (UTs) are responsible for overall management and conservation of forests and wildlife in their respective states / UTs.

***Community participation in sustainable management of forests:*** About 1,73,000 villages are identified as forest fringe villages having more than 300 million people which are largely depending on forests for their livelihood (MoEFCC, 2018). The concept of Joint Forest Management in India was initiated in 1990 with the aim to improve quality of forests, besides improving the economic status of

local communities involved in the protection and management of forests. About 22 M ha forests of the country are being managed by more than 1,18,000 Joint Forest Management Committees (JFMCs) with the involvement of more than 20 million people. JFMCs are involved towards the conversion of low-productivity forests to productive forests, which will also increase the forest carbon stocks. The other innovative institutional arrangements for management of forest resources are Van Panchayats of state of Uttarakhand. There are 12,067 Van Panchayats managing about 5,22,000 ha of forests area in the state of Uttarakhand.

The north-eastern region of India covers 1,71,306 sq km of forest cover, which is 65.34% of its geographical area. Community forest management systems have existed in diverse forms throughout north-eastern region, and continue to be the primary mode of forest conservation and protection. In Nagaland and Meghalaya, over 90% of the forests are under direct control by traditional village institutions, communities and individuals. About 1.84 M ha of forests are under the management of Autonomous District Councils in Assam, Meghalaya, Mizoram and Tripura, which are traditionally owned and managed by tribal and local communities.

***International commitments related to forests:*** India is party to all the major global conventions and agreements related to forests, biological diversity and environment such as United Nations Framework Convention on Climate Change, Convention on Biological Diversity, UNCCD, United Nation Forum on Forest, Paris Agreement, Bonn Challenge, etc.

The Bonn Challenge is a global effort to bring 150 M ha of degraded and deforested land into restoration by 2020, and 350 M ha of degraded lands by 2030. It was launched at a high level event in Bonn in 2011 organised by the Government of Germany and International Union for Conservation of Nature, and was later endorsed and extended to 2030 by the New York Declaration on Forests of the 2014 UN Climate Summit. India joined the voluntary Bonn Challenge pledge in 2015 at the UNFCCC CoP at Paris and committed to restore 21 M ha of degraded and deforested lands; out of the total commitment, India restores 13 M ha by 2020 and 8 M ha by 2030. India has published the first ever country progress report among the Bonn Challenge countries in 2018, and has brought an area of 9.8 M ha under restoration from 2011-12 to 2016-17.

The Hon'ble Prime Minister of India announced during COP 14 of UNCCD that India would raise its ambition of the restoration of degraded lands from 21 M ha to 26 M ha by 2030.

The Paris Agreement recognizes the central role of forests in achieving the goal of keeping temperatures well below 2°C through mitigation options that aim to reduce greenhouse gas emissions from deforestation and forest degradation. India's Nationally Determined Contribution (NDC) Goal for forestry sector is to create an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide equivalent through additional forest and tree cover by 2030. It provides an opportunity for widespread greening of the country, and also achieving the National Forest Policy target of 33% forest and tree cover as well as in achieving zero net land degradation.

***Major programmes and projects in forestry sector*:** India is playing a positive role in rehabilitation of degraded forest lands by implementing various missions, programmes and projects such as National Mission for a Green India, National Green Highway Mission, Twenty Points Programme, National Afforestation Programme, *Namami Gange* Programme, Forestry Interventions for Rejuvenation of Major Rivers, state specific programmes and projects etc. These programmes and projects are helpful in achieving zero net forest land degradation.

***Forestry research and training institutions:*** MoEFCC, GoI has established forestry research and training institutions across the country for providing research based solutions of the forestry problems and capacity building of State Forest Departments, communities and other stakeholders in conservation and sustainable management of forests and wildlife. Indian Council of Forestry Research and Education (ICFRE) is as an apex body in the national forestry research system. It promotes and undertakes need based forestry research, education and extension through networks of 9 institutes and 5 centers located in different parts of the country. Forest Survey of India is involved in preparation of national forest inventory on biannual basis. Indira Gandhi National Forest Academy and Central Academy for State Forest Services are involved in building the capacities of foresters of Indian Forest Service and State Forest Services on forest and wildlife management. State level Forest Training Schools are involved in building the capacities of frontline staff of the State Forest Departments. Indian Institute of Forest Management is providing training on forest management and related subjects to the forestry professionals with a view to equipping them to practice the art and profession of management. Wildlife Institute of India is conducting research and providing trainings on management and conservation of wildlife.

***Centre of excellence on sustainable land management:*** The Hon'ble Prime Minister of India Shri Narendra Modi, while addressing the high-level segment of CoP 14 of UNCCD at India Expo Center and Mart, Greater Noida, New Delhi NCR on 9$^{th}$ September, 2019 made an announcement to setup a Centre of Excellence (CoE) on Sustainable Land Management at ICFRE in order to further develop scientific approach and facilitate induction of technology on land degradation issues.

The main role of the COE would be to share knowledge and technology amongst developing countries; parties of UNCCD to arrest further land degradation, and restoration of degraded lands aiming at achieving LDN targets, conserva-

tion of biodiversity, food and water security, support livelihoods alongwith maintaining the flow of ecosystem goods and services for posterity, capacity building of stakeholders on sustainable land management, and implementation of transformative projects towards achieving LDN targets. The COE will work in close coordination with all regional, national and international organizations engaged in land restoration and allied areas. It will provide technical support to the MoFECC, GoI in achieving the LDN targets and UNCCD related issues. It also envisages south-south cooperation to enable India to share its experiences on sustainable land management with other country Parties of UNCCD (ICFRE, 2019).

ICFRE is in the process of setting up of Centre of Excellence on Sustainable Land Management. Establishment of COE will be helpful in achieving zero net forest land degradation besides other land uses.

***National REDD+ strategy 2018:*** REDD+ has a potential to bring synergies among all three Rio Conventions on biodiversity, climate change and combating desertification. Implementation of REDD+ activities can play an important role in achieving international commitments related to forestry sector under Paris agreement of UNFCCC, Aichi Biodiversity Target of Convention on Biological Diversity, LDN target of UNCCD, Global Forest Goals of United Nation Forum on Forest, pledge under Bonn Challenge and SDG 13 (take urgent action to combat climate change and its impacts) and Goal 15 (protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss).

The objective of national REDD+ Strategy 2018 is to facilitate implementation of REDD+ programme in the country in conformity with relevant decisions of UNFCCC. The strategy focuses on creation of trained human resource capable of carrying out forest related measurements at all levels of REDD+ implementation. The National REDD+ strategy addresses a road map for addressing drivers of deforestation and forest degradation. The strategy devolves major responsibility for execution of REDD+ activities on the State Forest Departments. Each State will create a REDD+ cell in the State Forest Departments and will be encouraged to prepare their State REDD+ action plans.

## 5. CHALLENGES IN ACHIEVING ZERO NET FOREST LAND DEGRADATION

Some of the challenges for achieving zero net forest land degradation are lack of readily available finance; lack of capacity building of the frontline staff of State Forest Departments and local communities to carry out restoration of degraded forest lands through assisted natural regeneration, soil and water conservation measures, forest fire protection, and control of invasive species, pest and disease management; and non-availability of quality planting stocks in sufficient quantities.

## 6. CONCLUSIONS

It can be concluded that policies, laws and regulations related to conservation of forests, biodiversity, environment and wildlife; well structured forestry institutions at centre and states level, ongoing forestry programmes and projects are subsets for achieving zero net forest land degradation. Large amounts of financial resources need to be mobilized for restoration of degraded forest lands from international, public, private, bilateral and multilateral sources. State specific transformative projects need to be developed and implemented for achieving LDN targets. Knowledge sharing and capacity buildings of the frontline staff and Joint Forest Management Committees members of forest fringe villages also need to be developed for sustainable land and ecosystem management through upscaling of tested, proven and cost effective best practices related to soil and water conservation measures, forest fire protection, control of invasive species, enhancement of carbon stocks, and pest and disease management for restoration of degraded forest lands. This will also help in achieving the national targets as well as international commitments related to climate change, combating desertification, and biodiversity conservation.

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