6TH National Report for the Convention on Biological Diversity

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Country

India

National Targets

National Biodiversity Target (NBT) - 1 : By 2020, a significant proportion of the population especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Rationale for the National Target

Public education and awareness about biodiversity is one of the thrust areas of the Government. Biodiversity touches every human being and contribution of every person is required for its conservation and sustainable use. For a meaningful contribution, people need to understand the concept, the significance of and the threats to biodiversity, as also the role they can and must play to adopt direct and indirect measures for its restoration, conservation and sustainable use. Students and youth need to be incepted in the process right from their formative years with special attention to the youth which constitute nearly 35 % of the total population in India today. The target has been adopted to meet this need, which is also recognized under the Convention on Biological Diversity (CBD), India's National Biodiversity Strategy and Action Plan (NBSAP), Biological Diversity Act, 2002 and relevant national policies. It is in alignment with Aichi Biodiversity Target (ABT) 1 and Sustainable Development Goals (SDG) 1 and 12.

Conventions that relate to NBT 1:

1. Convention on Biological Diversity (CBD), 1993
2. Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1983
3. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975
4. Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention), 1975
5. International Plant Protection Convention (IPPC), 1952
6. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), 2004
7. United Nations Convention to Combat Desertification (UNCCD), 1996
8. United Nations Framework Convention on Climate Change (UNFCCC), 1994
9. United Nations Forum on Forests (UNFF), 2000
10. World Heritage Convention (WHC), 1977

EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

1. Awareness of biodiversity values

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
2. Integration of biodiversity values
3. Incentives
4. Use of natural resources
5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
11. Protected areas
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
15. Ecosystem resilience
16. Nagoya Protocol on ABS

17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation.

Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

EN

Other relevant website address or attached documents

Commmunication, Awareness and Public Education , A toolkit for National Focal Poitns and NBSAP Coordinators
Environmental Information System, MoEFCC, Government of India
Ministry of Environment, Forest and Climate Change
National Biodiversity Authority
National Biodiversity Strategic Action Plan (Addendum 2014)
Information on State Biodiversity Boards

National Biodiversity Target (NBT) - 2 : By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation.

Rationale for the National Target

As a megadiverse country harbouring nearly 7-8% of globally recorded species while supporting 18% of the global human population on mere 2.4% of world's land area, India's quest for inclusive economic development and need to maintain integrity of its natural capital demands a delicate balance. The National Environment Policy (NEP), 2006 prepared through extensive consultations with experts in different disciplines, central ministries, legislators, States/UTs, industry associations, academic and research institutions, civil society, NGOs and the public aims at mainstreaming environmental concerns in all development sectors. India has since long put in place poverty alleviation programmes and strategies. These have generally heavily relied on primary and allied sector activities and on creation of basic infrastructure directly impacting the quality of life of people especially those below poverty line. Through this target, the government seeks to ensure that these programmes and strategies and other development sectors integrate the values of biodiversity clearly and sharply. Experience over time has shown that unless the comprehensive value of the natural resources was computed and articulated explicitly, the case of biodiversity conservation may not get adequately addressed. The NBT also seeks to promote enumeration and valuation of ecosystem services rendered by biodiversity and ensure their conservation and wise use by integrating them appropriately in national and state planning processes, development programmes and poverty alleviation strategies. This NBT is linked with NBT 3, 4, 5, 6, 7, 8 directly. This resonates with ABT 2 and is linked with SDG 1, 8, 9, 11, 13, 14, 15 and 17.

Conventions that relate to NBT 2:

1. Convention on Biological Diversity (CBD), 1993
2. Convention on Wetlands of International importance especially as Waterfowl Habitat (Ramsar Convention), 1975
3. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), 2004
4. United Nations Framework Convention on Climate Change (UNFCCC), 1994
5. United Nations Forum on Forests (UNFF), 2000

EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

2. Integration of biodiversity values

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
2. Integration of biodiversity values
3. Incentives
4. Use of natural resources
5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
11. Protected areas
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
15. Ecosystem resilience
16. Nagoya Protocol on ABS
17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/ Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation. Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.	EN

Other relevant website address or attached documents

Ministry of Environment, Forest and Climate Change
National Biodiversity Authority
Indian Institute of Forest Management
Indian Council of Forestry Research and Education
The Economics of Ecosystems and Biodiversity India Initiative
Indian Statistical Institute (ISI)
Indira Gandhi Institute of Development Research
The Institute of Economic Growth

National Biodiversity Target (NBT) - 3 : Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.

Rationale for the National Target

Degradation of natural habitats affects the entire population adversely; but the effect of the impairment of ecosystem services on the people with meagre means and dependent on land and natural resources for livelihoods is deleterious. A little more than two-thirds of	EN

India’s geographical area is arid, semi-arid or dry sub-humid on which depend a vast majority of rural and semi urban poor for their livelihoods. Studies have repeatedly emphasized that the rural poor and particularly women are severely impacted by the effect of environmental degradation on soil fertility, quantity and quality of water, air quality, forests, wildlife and fisheries. To halt such degradation and restore degraded natural habitats following landscape and seascape approach is a priority under NEP, 2006 which this target reflects. In conformity with the commitment to carry out the objectives of Convention on Biological Diversity, this target implements Aichi Target 5 and 15.

1. Conventions that relate to NBT-3:

1. Convention on Biological Diversity (CBD), 1993
2. Convention on Wetlands of International Importance especially Waterfowl Habitat (Ramsar Convention), 1975
3. United Nations Convention to Combat Desertification (UNFCCD), 1996
4. United Nations Convention on the Law of the Sea (UNCLOS), 1994
5. United Nations Forum on Forests (UNFF), 2000
6. United Nations Framework Convention on Climate Change (UNFCCC), 1994

2, Others:

Covers SDG 6,7,11,13,14 & 15

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

5. Loss of habitats
15. Ecosystem resilience

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
4. Use of natural resources
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
11. Protected areas
14. Essential ecosystem services
15. Ecosystem resilience
17. NBSAPs
19. Biodiversity knowledge
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India’s National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder’ consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation.

Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

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Other relevant website address or attached documents

India, Second National Communication to the United Nations Framework Convention on Climate Change
ICAR, DARE Annual Report 2017-18
Forest Survey of India
MoEFCC

India’s NBSAP
Webportal on India’s NR6
India's Fifth national Report

National Biodiversity Target (NBT) - 4 : By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed.

Rationale for the National Target

Invasive alien species (IAS) introduced deliberately or accidentally in Indian ecosystems is a serious problem. Anthropogenic influences further facilitate proliferation of these which in turn threaten native biodiversity, subvert natural plant succession, change structure and composition of communities, and impair ecosystem services severely. India’s National Assessment of Tigers, Co-predators, Prey and their Habitat, carried out every fourth year since 2006, includes invasive plants as an integral part of the assessment. Repeated sampling of forests in four consecutive cycles over 12 years to survey and monitor invasive plants suggests that >90% of sampled forests were invaded by some high concern invasive species. IAS now constitute one of the most significant threat to survival and integrity of biodiversity. NBT4 resonates with ABT 9 and is linked to SDG 15. **Conventions that relate to NBT 4:** 1. Convention on Conservation of Migratory Species of Wild Animals(CMS), 1983 2. Convention on International Trade in Endangered Species (CITES), 1975 3. Convention on Wetlands of International Importance especially Waterfowl Habitat (Ramsar Convention), 1975 4. International Plant Protection Convention (IPPC), 1952 5. United Nations Convention on the Law of the Sea (UNCLOS), 1994 6. United Nations Framework Convention on Climate Change(UNFCCC), 1994 7. The Agreement on the Application of Sanitary and Phytosanitary Measures, 1995 8. The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), 2004	EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

14. Essential ecosystem services

Sub-Aichi Targets or Target components

5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
11. Protected areas
12. Preventing extinctions
15. Ecosystem resilience

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India’s National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder’ consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation.	EN

Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

Other relevant website address or attached documents

Botanical Survey of India
Zoological Survey of India
Indian Council of Forestry Research and Education
Wildlife Institute of India
National Biodiversity Authority
http://www.bsienvis.nic.in/Database/Invasive_Alien_species_15896.aspx

National Biodiversity Target (NBT) - 5 : By 2020, Measures are adopted for Sustainable Management of Agriculture, Forestry and Fisheries.

Rationale for the National Target

India aims to provide food and nutritional security to all its people in “human life cycle approach” ensuring access to adequate quantity of quality food at affordable prices through sustainable agricultural growth without destroying the natural resource base ensuring inter-generational environmental equity. Social and economic equity and economic viability for nearly 54.6% of the population that depends on agriculture and allied sectors for their livelihoods must inform policies, institutions and programmes in the sector. Sustainable management of agriculture, fisheries and forests is a sine quanon to achieve these objectives which this NBT aims at and takes forward the theme of NBT 3. It is directly aligned with Aichi targets 6, 7, 8 and connects with the commitments of India in various Conventions and international agreements listed below

Conventions that relate to NBT 5:
1. Convention on Biological Diversity (CBD), 1993
2. International Plant Protection Convention (IPPC), 1952
3. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGFRA), 2004
4. United Nations Convention to Combat Desertification (UNCCD), 1996
5. United Nations Convention on the Law of the Sea (UNCLOS), 1994
6. United Nations Forum on Forests (UNFF), 2000
7. United Nations Framework Convention on Climate Change (UNFCCC), 1994

EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
3. Incentives
4. Use of natural resources
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation.

Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

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Other relevant website address or attached documents

Ministry of Environment, Forest and Climate Change
National Biodiversity Strategic Action Plan Addendum, 2014
Annual Reports, Ministry of Agriculture and Farmer Welfare
ICAR Annual Report 2017-18
CMFRI annual reports
Fisheries Survey of India
Central Institute of Fisheries Technology (ICAR CIFT)
National Fisheries Development Board

National Biodiversity Target (NBT) - 6 : Ecologically representative areas on land and in inland waters, as well as coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, on the basis of protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20 % of the geographic area of the country, by 2020.

Rationale for the National Target

Living in harmony with nature has been a part of Indian ethos. However, meeting the development needs of the 18% of the world's population with 2.4% of its land inevitably leads to severe strains on land and resources. Conscious of this imperative, India progressively instituted measures to create reserved/designated areas of nature conservation. This NBT aims at deepening and widening the conservation efforts adopting a wider seascape and landscape approach integrating development and human welfare with conservation. It corresponds to Aichi Target 11 and contributes to achievement of SDGs 6,11,14 & 15.

Conventions that relate to NBT 6:

1. Convention on Biological Diversity (CBD), 1993
2. Convention on the Conservation of Migratory Species of Wild Animals(CMS), 1983
3. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975
4. Convention on Wetlands on International importance especially as Waterfowl Habitat (Ramsar Convention), 1975
5. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGFRA), 2004
6. The World Heritage Convention, 1977
7. United Nations Forum on Forests (UNFF), 2000

EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

10. Vulnerable ecosystems
11. Protected areas
12. Preventing extinctions

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
4. Use of natural resources
5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
15. Ecosystem resilience

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation. Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.	EN

Other relevant website address or attached documents

Ministry of Environment Forests and Climate Change
Environmental Information System (ENVIS)
Forest Survey of India
National Biodiversity Authority
Central Pollution Control Board
Zoological Survey of India
Botanical Survey of India

National Biodiversity Target (NBT) - 7 : By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Rationale for the National Target

India is recognized as one of the world's 12 Vavilovian centres of origin and diversification of cultivated plants, known as the "Hindustan Centre of origin of crop plants". Farmers and local communities even today play an important role in conserving and cultivating traditional varieties, and breeding and developing new varieties. Livestock rearing, and production has been a part of agriculture enterprises and both are intrinsically linked, each being dependent on other and both being crucial for overall food security. Livestock sector is important socially and economically contributing to health and nutrition of households, offering employment and income, treated as dependable "bank on hooves" by rural population. Green revolution technologies have promoted uniform and limited number of crops demanding a different level and nature of inputs, creating the need for taking targeted action to identify, encourage and conserve genetic diversity for maintaining biodiversity and ensuring food security. The NBT7 addresses this need. It resonates with Aichi Biodiversity Target 13. **Conventions that relate to NBT 7:** 1. Convention on Biological Diversity (CBD), 1993 2. International Plant Protection Convention (IPPC), 1952 3. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPRGFA), 2004 4. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, 2014 **Others:** Sustainable Development Goals 2 and 3	EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

13. Agricultural biodiversity

Sub-Aichi Targets or Target components

7. Areas under sustainable management
16. Nagoya Protocol on ABS
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation. Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.	EN

Other relevant website address or attached documents

Ministry of Environment, Forset and Climate Change
National Biodiversity Strategic Action Plan Addendum, 2014
The Indian Council of Forestry Research and Education (ICFRE)
Indian Institute of Forest Management

National Biodiversity Target (NBT) - 8 : By 2020, ecosystem services especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified taking into account the needs of women and local communities particularly the poor and vulnerable section.

Rationale for the National Target

India has diverse ecosystems spread over 10 biogeographic zones. All these ecosystems provide essential services for human well-being. NBTs 2, 3, 5, 6, 7 enumerate these services and recognises the need to address all issues confronting their integrity and conservation and ensure measures to conserve and sustainably use them. Economic development in India has consistently aimed at inclusive growth to raise the quality of life of its people. Women, socially and economically backward communities and other vulnerable groups have been and continue to form an essential part of the development priorities. These groups are dependent on natural resources for their sustenance, and degradation of environmental and natural resources impacts these vulnerable groups the most. National Environment Policy, 2006 has provided a template for a path of development in which conservation of natural resources and environment becomes a means to economic development. Considering the interdependence of safeguarding the ecosystem services and human development index NBT 8 seeks to address the issues that help create conditions for realisation of this approach through enhancement of human development index, which in turn augments capacity and environment for conservation. It meets the requirement of ABT 14 and SDGs 3, 4, 5, 6, 7, 10, 11, 12, 14 and 15.	EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

14. Essential ecosystem services

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
2. Integration of biodiversity values
3. Incentives
4. Use of natural resources
5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
11. Protected areas
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
15. Ecosystem resilience
16. Nagoya Protocol on ABS
17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation. Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.	EN

Other relevant website address or attached documents

Ministry of Power
Ministry of Drinking Water and Sanitation
Ministry of Rural Development
Ministry of Human Resource Development
Ministry of Health and Family Welfare
Census of India
Ministry of Housing and Urban Affairs
Ministry of New and Renewable Energy

National Biodiversity Target (NBT) - 9 : By 2015, Access to Genetic Resources (GRs) and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislation.

Rationale for the National Target

This NBT significantly advances the objective of the CBD and Nagoya Protocol relating to the fair and equitable sharing of benefits (ABS) arising from the utilization of Genetic Resources (GRs) by providing legal certainty and transparency for both providers and users of GRs and associated Traditional Knowledge (TK), including researchers and industry. India had already put in place domestic legal measures for implementation of ABS through Biological Diversity Act, 2002 and Biological Diversity Rules, 2004. Nagoya Protocol created the opportunity to strengthen the domestic measures and include transboundary compliance. This NBT echoes ABT 16.	EN

Conventions that relate to NBT 9:

1. Convention on Biological Diversity (CBD), 1993
2. The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the CBD (NP), 2014

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

16. Nagoya Protocol on ABS

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
2. Integration of biodiversity values
3. Incentives
4. Use of natural resources
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
13. Agricultural biodiversity
16. Nagoya Protocol on ABS
17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation.

Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

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Other relevant website address or attached documents

National Biodiversity Authority
The Ministry of Environment, Forest and Climate Change (MoEFCC)
Access and Benefit Sharing Clearing House
PPVFR Authority
Guidelines for Examination of Biotechnology Applications for Patent

National Biodiversity Target (NBT) - 10 : By 2020, an effective participatory and updated national biodiversity plan is made operational at different levels of governance.

Rationale for the National Target

NBSAP prepared at national level through extensive consultations is the principal instrument for mainstreaming biodiversity in diverse

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development and regulatory sectors taking into cognizance their legislations, implementation mechanisms, strategies, plans and programmes. India has three levels of governance, the central government, state governments and institutions of local governance in the states. The elements of this NBT include integration of NBSAP in line ministries, integration of NBSAP in planning and implementation process at state level and participation of all levels of governance in preparation of NBSAP based action plans to ensure its effective operationalization. Many States/UTs have prepared their own SBAPs through consultative process.

SBAPs are important in that they reflect State specific ground realities and ensure decentralised approach to governance and management of biodiversity with required focus on women and local communities. MoEFCC and NBA as the national level drivers of planning and implementation provide support, and guidance for updating the plans as and when required. In addition, Biological Diversity Act creates a well-articulated administrative infrastructure to implement the objectives of CBD and NBSAP at different levels with the active involvement of local communities and women. This ensures ground level focussed action and implementation of NBSAP.

Conventions that relate to NBT 10:

1. Convention on Biological Diversity (CBD), 1993
2. Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1983
3. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975
4. Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1975
5. International Plant Protection Convention (IPPC), 1952
6. International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), 2004
7. Stockholm Convention on Persistent Organic Pollutants (POPs), 2004
8. United Nations Convention to Combat Desertification (UNCCD), 1996
9. United Nations Forum on Forests (UNFF), 2000
10. United Nations Framework Convention on Climate Change (UNFCCC), 1994
11. World Heritage Convention (WHC), 1977

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

3. Incentives
4. Use of natural resources
17. NBSAPs

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
2. Integration of biodiversity values
3. Incentives
4. Use of natural resources
5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
11. Protected areas
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
15. Ecosystem resilience
16. Nagoya Protocol on ABS
17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge
20. Resource mobilization

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India’s National Biodiversity Strategy and Action Plan (NBSAP)

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2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation.

Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

Other relevant website address or attached documents

National Biodiversity Authority
Ministry of Environment, Forest and Climate Change (MoEFCC)

National Biodiversity Target (NBT) - 11 : By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.

Rationale for the National Target

India has a vast heritage of coded and oral TK relating to elements, conservation and various uses of biodiversity for human, animal and planet welfare. This fund of knowledge is valuable for conservation and human welfare. It helps advancement in modern science in various fields. Its wider use needs to be encouraged. But the use must not lead to obtaining unjustified Intellectual Property Rights (IPRs) on something that has already been created by people nor should the inventions made on its basis go without acknowledging the contributions of the TK, and without sharing benefits with the creators of knowledge fairly and equitably.

The NBT aims at creating mechanisms and the environment for recognising and protecting TK for larger human welfare along with safeguarding interests and rights of the TK creators while meeting commitment under CBD and NP regarding TK. It directly aligns with Aichi Target 8.

Conventions that relate to NBT 11:

1. Convention on Biological Diversity (CBD) (1993)
2. International Plant Protection Convention (IPPC) (1952)
3. World Heritage Convention (WHC) (1977)
4. World Intellectual Property Rights Organisations (WIPO) Convention (1967)

Others

Related to SDG 6,9,11,12 &14

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Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

18. Traditional knowledge

Sub-Aichi Targets or Target components

4. Use of natural resources
5. Loss of habitats
7. Areas under sustainable management
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
16. Nagoya Protocol on ABS
17. NBSAPs
19. Biodiversity knowledge

Relevant documents and information

Ministry of Environment, Forest and Climate Change (MoEFCC) started the process of setting up NBTs by organising a high-level meeting with the Ministries and Departments concerned in November 2011. A round of subject matter specific inter-ministerial meetings and wider stakeholder consultations followed this first step, with a view to update India's National Biodiversity Strategy and Action Plan (NBSAP) 2008 by developing NBTs in line with the Strategic Plan (SP) for Biodiversity (2011-2020) and its 20 Aichi Targets. Thereafter, a national level stakeholder' consultation was held on 30 July 2013 which resulted in a draft document of NBTs. MoEFCC then set up a Technical Review Committee for review and refinement of the draft taking into account Result Framework Documents (RFDs) of more than 50 Ministries/Departments of the Government of India (GoI), information available in annual reports/websites of Ministries/Departments and other relevant institutions, discussions and written submissions provided by officials, scientists and other stakeholders. The exercise of determining NBTs included identification of responsibilities in respect of the concerned Ministries/Departments, institutions and stakeholders and developing monitoring schedule along with indicators. The NBSAP 2008 was updated by integrating the 12 NBTs thus prepared into NBSAP Addendum, 2014. After approval by the competent authority, the NBTs were communicated to all concerned for outreach and communication with a view to create awareness and promote implementation. Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.	EN

National Biodiversity Target (NBT) - 12 : By 2020, opportunities to increase the availability of financial human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.

Rationale for the National Target

Financial, technical and human resources are naturally needed to achieve the NBTs which are aligned with 20 Aichi Biodiversity targets. While policies and actions to progressively incorporate economic value, financial and ecosystem benefits from biodiversity in planning and development are being pursued, the challenge of identifying and channelizing existing allocations effectively towards conservation and finding resources for funding the gap areas continues. The technical and technological advances open opportunities and increasing human needs create additional challenges which generate a constant need of review, reassessment and realignment of existing resources and finding new avenues to fund the requirements of biodiversity conservation. Biodiversity Finance Initiative (BIOFIN) 2012 currently piloted in 31 countries aims at developing a methodology for quantifying the biodiversity finance gap at national level improving cost effectiveness of conservation through mainstreaming of biodiversity in national development and planning and suggesting ways to mobilise additional resources. India joined this initiative in 2015. The target reflects the seriousness of the government to create adequate funding for biodiversity conservation and implementation of National Biodiversity Action Plan (NBSAP) and related National Biodiversity Targets (NBTs) and Aichi Biodiversity Target (ABTs). It resonates Aichi Biodiversity Target 20.	EN

Level of application

Jurisdiction

National / Federal

Relevance of National Targets to Aichi Targets

Aichi Target components

1. Awareness of biodiversity values
2. Integration of biodiversity values
3. Incentives
4. Use of natural resources
5. Loss of habitats
6. Sustainable fisheries
7. Areas under sustainable management
8. Pollution
9. Invasive Alien Species
10. Vulnerable ecosystems
11. Protected areas
12. Preventing extinctions
13. Agricultural biodiversity
14. Essential ecosystem services
15. Ecosystem resilience
16. Nagoya Protocol on ABS
17. NBSAPs
18. Traditional knowledge
19. Biodiversity knowledge
20. Resource mobilization

Sub-Aichi Targets or Target components

1. Awareness of biodiversity values
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Many States have their own State Biodiversity Action Plans (SBAPs), which are being implemented taking note of the NBTs.

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Other relevant website address or attached documents

http://www.biodiversityfinance.net/about-biofin/biofin-approach

Section II. Implementation measures, their effectiveness, and associated obstacles and scientific and technical needs to achieve national targets

NBT-1: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Measures:

India's NBSAP was prepared through a participatory process of Communication, Education and Public Awareness (CEPA) that involved stakeholders at all levels. Groups identified for CEPA include all students, children outside the formal education stream, youth, and local communities in urban and rural areas, industry and business, sectoral Ministries, State/UTs, non-government organisations (NGOs), civil society organisations (CSOs), technical and scientific institutions including universities in government and non-government sectors. The measures to achieve the target are taken by national and state governments in sync with ABT 1. Several other institutions undertake CEPA activities in partnerships with government or among themselves or as independent organisations. Information generated through studies to determine the values of biodiversity, a subject covered under NBT 2, are used appropriately in CEPA packages.

This section lists out the main measures for implementing the NBT.

A. Main Measures:

Major Policy, Legal and Programme Measures *inter alia,* include:

1. Biological Diversity Act, 2002 provides that government incentivise research, training and public education to increase awareness

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with respect to biodiversity.

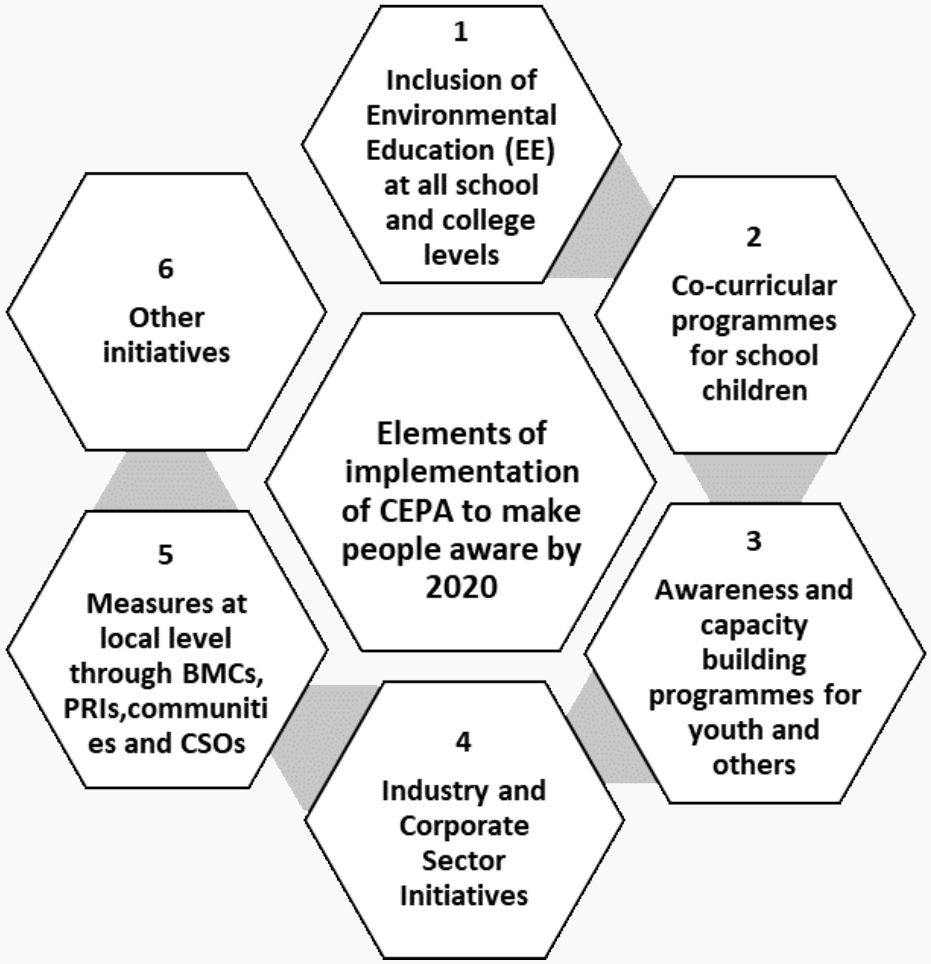
2. National Environment Policy, 2006 emphasizes the importance of enhancing environmental awareness to harmonise patterns of individual behaviour with the requirement of environmental conservation.
3. National Youth Policy, 2014 calls for engagement of youth in various initiatives including environment protection.
4. National Policy on Education, 1986 (modified in 1992) mandates that environmental consciousness should inform teaching in schools and colleges.
5. Specific programmes of Ministry of Agriculture and Farmers' Welfare (MoAFW), MoEFCC, Ministry of Science and Technology (MoST), Ministry of Youth Affairs and Sports (MoYAS) and relevant programme of other Ministries.
6. Policies and Programmes of sectoral Ministries having linkages with biodiversity related issues e.g., Ministry of Agriculture & Farmers' Welfare (MoAFW), Ministry of Drinking Water and Sanitation (MoDWS), Ministry of New and Renewable Energy (MNRE), Ministry of Rural Development (MoRD) etc.
7. States/UTs implement their own CEPA programmes.
8. Gender mainstreaming is provided for in the Constitution itself in Articles 243 D and 243 T which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most States have raised this reservation to 50 %. This ensures large-scale participation of women in planning, decision making, implementation and governance. Gender Budgeting is part of the Annual Central Government budget. Specific provisions are in place for participation and representation of women in government programmes and schemes.
9. Every year, the International Day for Biological Diversity (IDB) is celebrated on 22nd May to increase understanding and awareness about biodiversity issues.

B. Other Measures:

A holistic approach to CEPA has been adopted through specific programmes / initiatives.

Figure 1.1 captures the main elements of CEPA. Their details are given thereafter.

Figure 1.1: CEPA Programmes and Initiatives



B1. Inclusion of Environmental Education (EE) at all school and college levels

B1.1 Biodiversity conservation and sustainable use are integral part of environment education (EE). EE has been made a compulsory component in curricula at all levels of education throughout the country. National Council of Educational Research and Training (NCERT) and University Grants Commission (UGC) have professionally designed modules/courses for this in compliance with the order of the Supreme Court of India.

B1.2 Capacity building of teachers and faculty has been undertaken through various training programmes. Pedagogical tools for transaction of EE have been professionally created. See Box 1 for manner of infusion of EE and Box 2 for some pedagogical tools

Box 1: EE at all levels

School Level:

Class I and II : Activity based learning

Class III to IV : Environmental Studies introduced as a distinct subject

Class VI to X: Infusion of EE in all subjects

Class XI to XIII: Project based study

Under Graduate Level:

In all Universities/ Colleges/ Institutes

All undergraduate students to take a course on EE

Box 2 : Some Pedagogical Tools

Resource books, "Towards a Green School"

(http://www.ncert.nic.in/departments/nie/dee/publication/pdf/Towards%20A%20green%20School.pdf)

"The Environment Education Handbook: A Teachers' Resource" and other resource books at various levels guides school teachers.

(http://ncert.nic.in/book_publishing/environ_edu/handbook/content.pdf)

Scheme of "Research Projects for Teachers" for University/College teachers includes environment as a discipline.

(https://www.ugc.ac.in/oldpdf/xiplanpdf/mrpxiplan.pdf)

B2. Co-curricular programmes for school children

B2.1 MoEFCC, Department of Biotechnology (DBT), States/UTs and other line Ministries and departments fund and organise special programmes for students to give them action-oriented opportunities in the field of environment and biodiversity. These help to develop their leadership, decision-making qualities and skills for present and future through initiatives such as:

- Eco-clubs Programme (*http://www.moef.nic.in/division/environmental-education-awareness-and-training-eeat*)
- National Nature Camp Programme (*http://www.moef.nic.in/division/environmental-education-awareness-and-training-eeat*)
- Paryavaran Mitra (Friends of Nature) Programme (*http://www.moef.nic.in/division/centres-excellence*)
- DBT's Natural Resource Awareness Clubs (DNA Clubs) (*http://www.dbtindia.nic.in*)
- The Global Learning and Observation to Benefit the Environment (GLOBE)programme (*globeindia.org*)
- Biotechnology Labs in Senior Secondary schools (BLiSS) programme of DBT
- North Eastern Region (http://www.dbtindia.nic.in/dbts-bliss-program-for-teachers/)

B3. Awareness and Capacity Building Programmes for Youth and Others

B3.1 MoEFCC, Ministry of Youth Affairs and Sports (MoYAS) and other line ministries and departments sponsor programmes to channelise energies of youth, children and others into environment and biodiversity conservation. These include youth clubs for organising developmental activities including conservation of resources and greening the landscape, engagement of children, youth and members of communities in undertaking campaigns to educate and train people in water management and water conservation under *Swachh Bharat*

Abhiyan (SBA) and training the youth in environment, forest and wildlife sectors through curriculum designed by Botanical Survey of India (BSI), Zoological Society of India (ZSI) under Green Skill Development Programme (GSDP) to enhance their employability.

B3.2 People, youth and children out of school stream are reached through other means also such as:

- Mobile exhibitions e.g., Science Express, an exhibition mounted on a train which travels across India and has completed nine phases on diverse themes. It ran as Biodiversity Special from 2012-2014 during India's Presidency of Conference of Parties (CoP) to the CBD.
- *Prakriti* Bus, a mobile exhibition on biodiversity launched by the State of Uttar Pradesh and similar other initiatives by other states.
- Involvement of youth, children, members of public in counting, identification and protection of birds guided by national and state level bird-watching organisations such as Sálim Ali Centre for Ornithology and Natural History (SACON), Bombay Natural History Society (BNHS) and Bird Count India.
- Botanical/ Zoological Galleries/ Natural History Museums maintained for public viewing and education by BSI/Central Marine Fisheries Research Institute (CMFRI)/National Museum of National History (NMNH)/ ZSI and many other institutions in government and non-government sector.
- Vast network of botanic gardens maintained by BSI, Council of Scientific and Industrial Research (CSIR) institutions, universities, States/UTs and local self-government bodies.
- Film/Slide shows, lectures, tree plantation campaigns, exhibitions, sit and draw /quiz competitions are conducted.
- Use of public media.

B3.3 Recognition of outstanding work, dissemination of best practices, through:

- Biennial India Biodiversity Awards instituted by MoEFCC in association with UNDP during CoP 11 in 2012 and continued during India's Presidency. These have now been institutionalised in the NBA. Till 2018, 47 awards have been given under different categories. The best practices identified under the Award are captured in the publication 'India Naturally!'. Four editions have already been published.
- E. K. Janaki Ammal National Award instituted in 1999 for outstanding contribution in the field of Plant Taxonomy, Animal Taxonomy and Microbial Taxonomy. Twenty eight awards have been given till 2018.

B3.4 Awareness and Capacity Building

- Nearly 300 national and regional level awareness programmes have been organised since 2014 by MoEFCC and NBA in collaboration with State Biodiversity Boards (SBBs), CSOs, industry representatives, state officials, students, teachers, local communities, traditional healers and other stakeholders.
- Regular capacity building workshops and meetings with partners such as officials, Ayurvedic Drug Manufacturers' Association (ADMA), GIZ, Centre for Agriculture and Bioscience International (CABI) South Asia, Centre for Environmental Communication (CEC) and SBB are conducted.
- Periodic festivals and events with the inclusion of biodiversity as one of the important thematic area are organised.
- Some specific collaborative initiatives taken by MoEFCC, NBA and other partners to achieve identified objectives are shown in Table 1.1.

Table 1.1: Initiatives taken for Awareness and Capacity Building

Initiative	Objective
UNDP-GEF-ABS Capacity Building Project	For education and awareness generation, regarding provisions of Access and Benefit Sharing (ABS)/Nagoya Protocol, of research organisations that use genetic resources.
UNEP-GEF-MOEFCC-ABS Project	For strengthening the implementation of the Biological Diversity Act by creating institutional, individual and systemic capacities specially in relation to ABS provisions in ten states.
GIZ supported ABS Partnership Project	Augmenting capacity of NBA, SBBs, and Biodiversity Management Committees (BMCs), commercial and research user groups for implementation of ABS.
GEF UNDP Secure Himalaya Programme	Six-year project for conservation of locally & globally significant biodiversity, land and forest resources in high Himalayan ecosystem.
GEF UNDP Small Grants Program	To help CBOs & NGOs for locally important initiatives and capacity building.
ASEAN India Green Fund	Announced by India in 2007 at the 6thAssociation of Southeast Asian Nations (ASEAN) – India Summit for collaboration on ABS, City Biodiversity Index and Strategic Plan for Biodiversity. NBA, MoEFCC, MEA, ASEAN Centre for Biodiversity, ASEAN Secretariat are jointly implementing the initiative.
Transboundary projects	Projects - Kailash Sacred Landscape Initiative (KSLDI) across borders of India, Nepal and China, Bay of Bengal Large Marine Ecosystem Project (BOBLME) involving 8 littoral states, promote biodiversity conservation through exchange of information with participating countries.
Other Regional initiatives	Capacity building and experience sharing with SAARC, ASEAN and African countries.

B4. Industry and Corporate Sector Initiative

B4.1 Setting up of an India Business and Biodiversity Initiative (IBBI) anchored in Confederation of Indian Industry (CII) was facilitated by MoEFCC in 2014 with support from GIZ to ensure mainstreaming of biodiversity and ecosystem services in the operations and supply chain of industry and business. IBBI promotes awareness and green action to minimize adverse impact on the environment. Member companies sign a 10-point IBBI Declaration accepting their commitment towards positive action on biodiversity.

B4.2 IBBI provides advisory services to companies on implementation of biodiversity regulations/policies, mainstreaming biodiversity conservation and ecosystem service management and monitoring.

B4.3 Industry also participates through funding support to NGOs and through their own corporate social responsibility (CSR) activities.

B5. Measures at Local Level through BMCs, Panchayati Raj Institutions (PRIs), Communities and CSOs

B5.1 BMCs, the core institutional set-up for biodiversity governance at local level, JFMCs as people's own management committees for forest, and Peoples Biodiversity Registers (PBRs) that provide for documenting biological resources and associated traditional knowledge (TK), all play a critical role in ensuring CEPA.

B5.2 Citizen Science Initiative is being implemented across the country through networks of NGOs. It enables participants to make direct contribution to increase their scientific understanding, learn about environmental issues and contribute to research.

B5.3 Vast number of NGOs, local groups and individuals are engaged in creative work of CEPA and capacity building across the length and breadth of the country.

B6. Other initiatives

B6.1 MoEFCC has created a comprehensive Environmental Information System (ENVIS) comprising a network of 69 ENVIS Hubs and Resource Partners (RPs) of which 29 deal with 'State of the Environment and Related Issues' and are hosted by respective States/UTs and 40 RPs are hosted by governmental institutions/NGOs/ institutes of professional excellence, with varied thematic mandates pertaining to environment, forests, climate change etc.

B6.2 Participation in annually held Indian Science Congress by teams from NBA and SBBs is ensured to extend information on biodiversity issues and nuances of the Biological Diversity Act, 2002 and Rules, 2004 to scientific community, academicians, teachers, youth and school children from across India.

National Target(s)

National Biodiversity Target (NBT) - 1 : By 2020, a significant proportion of the population especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

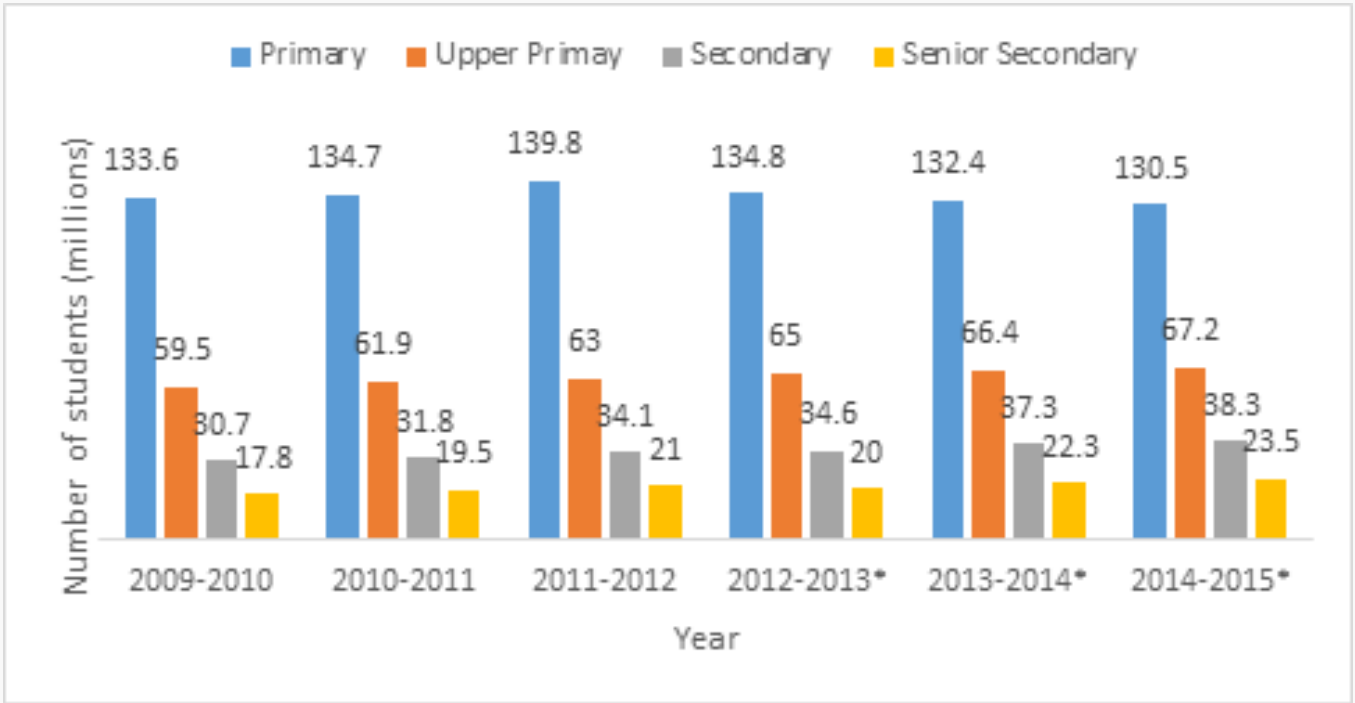
Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators in respect of all the NBTs. Indicators and assessment of progress against them with regard to NBT 1 follows.

1. **Trends in number of students benefitting from EE**

1.1. All students enrolled in school/college systems receive EE. Figure 1.2 shows the number of students enrolled at various levels of schools from 2009 to 2015. Fertility rate in the country has gone down from 2.6 in 2004 to 2.3 in 2014, which accounts for slight decrease in the number of students enrolled.

Figure 1.2 Enrollment of school students at different levels during 2009-2015

* Figures are provisional



Source: Educational Statistics At a Glance 2016, Ministry of Human Resource Development

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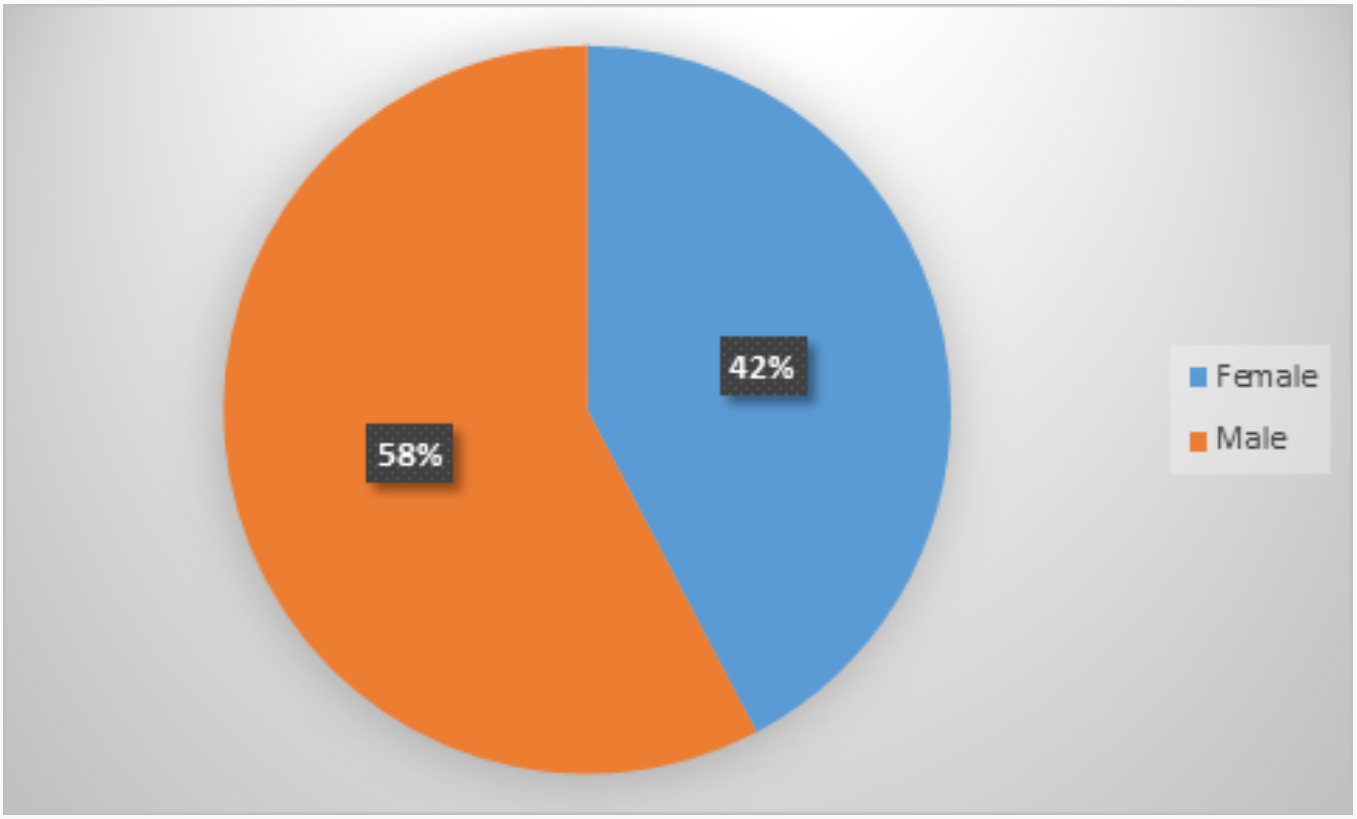
- Infusion of EE in the syllabi at all levels ensures effective awareness and capacity building of teachers more than 40% of which are women (Figure 1.3).

Figure 1.3

Gender distribution of school teachers- 2011-12

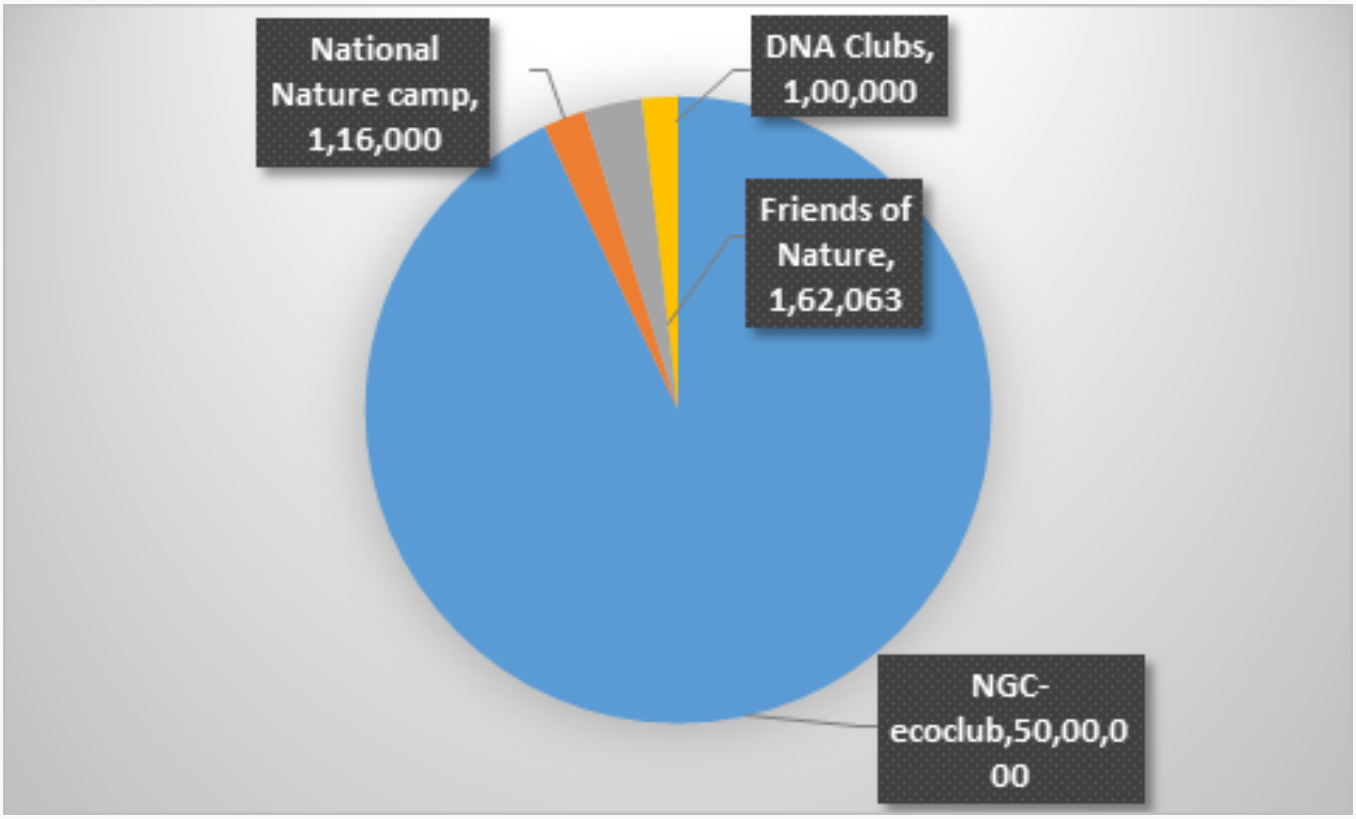


Source: Educational Statistics At a Glance 2016, Ministry of Human Resource Development

- A large number of students have been reached through measures noted in co-curricular programmes for school children. Figure 1.4 shows the details in respect of some such programmes.

Figure 1.4

Co-curricular Programmes for School Children

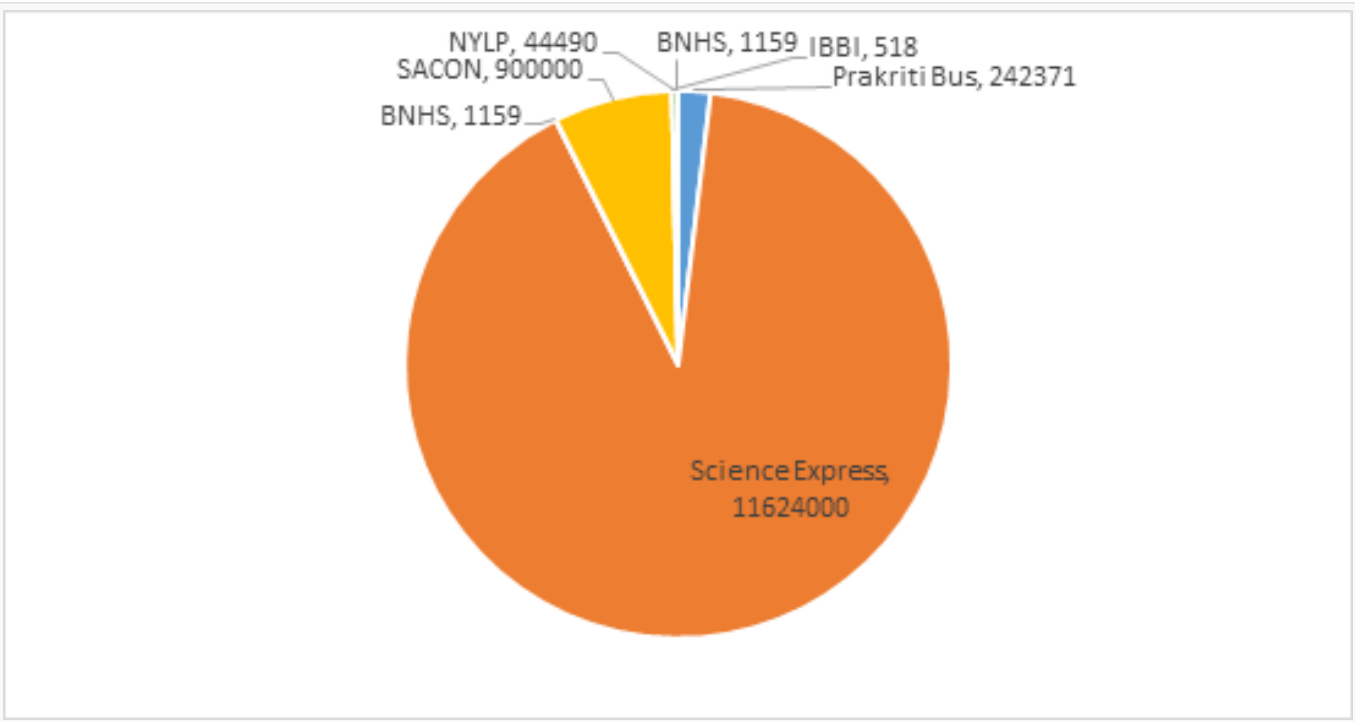


2. Trends in coverage of environment related programmes and projects with enhanced involvement of youth and others

All national and sub-national level government programmes having connect with biodiversity include a component of awareness and capacity building. Involvement of youth and local people with adequate representation of women has been on the increase in all environment related issues and programmes of sectoral ministries/departments. Capacity building programmes for youth and other stakeholders are regularly undertaken by several non-government organisations supported by government, non-government and own resources on diverse thematic areas related to biodiversity. Figure 1.5 shows the number of people covered by some such initiatives.

Figure 1.5

People covered under some Environment Related Programmes



3. Trends in Promoting Awareness at Local Levels

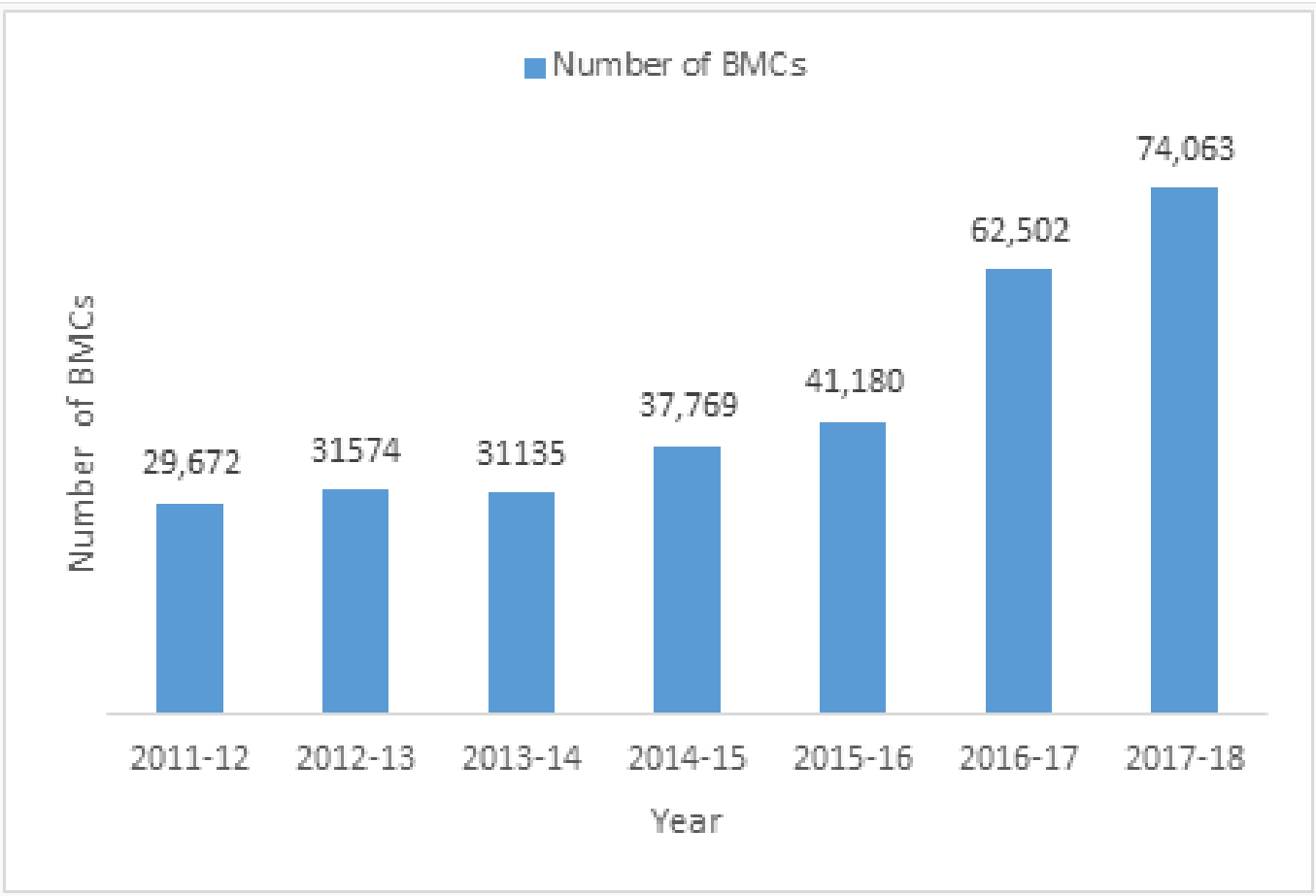
BMCs have an outreach covering all people in their respective jurisdiction. Their work of promoting awareness at local level is of a continuing and permanent nature. BMCs prepare PBRs with the participation of entire local community.

3.1 Trends in BMCs constituted/operationalised

The number of BMCs has increased over the years reaching around 74,000 by March 2018. (Figure 1.6). The greater the awareness, the larger the number of BMCs as awareness encourages demand for constitution of BMCs for biodiversity governance.

Figure 1.6

Number of BMCs

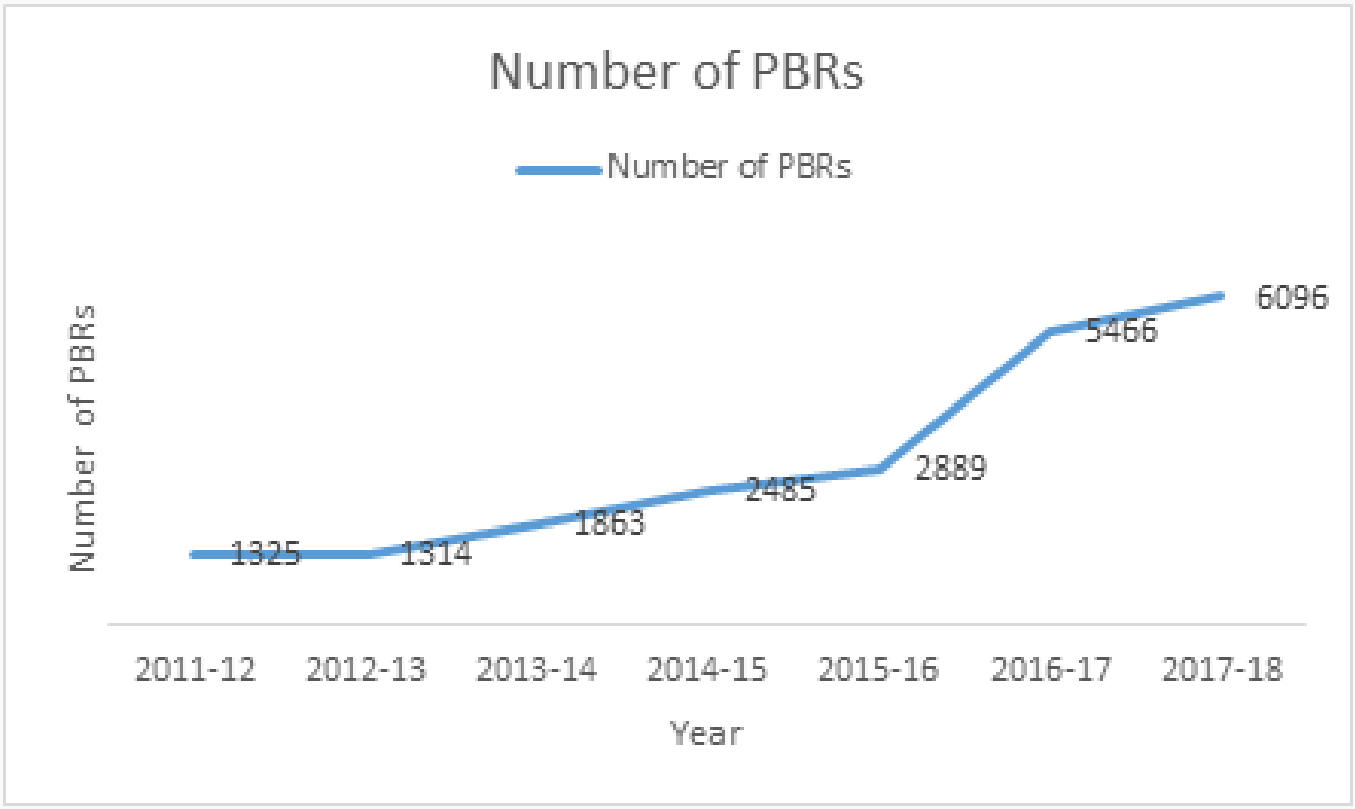


Source: National Biodiversity Authority

3.2 Trends in PBRs prepared

PBRs prepared at the local level are holistic documents of all available TK and related practices. These also cover people-scape, landscape, waterscape and culture scape. Figure 1.7 shows an increasing trend of PBRs from 1,325 in 2012 to 6,096 in 2017.

- **Figure 1.7:** Progress in number of PBRs

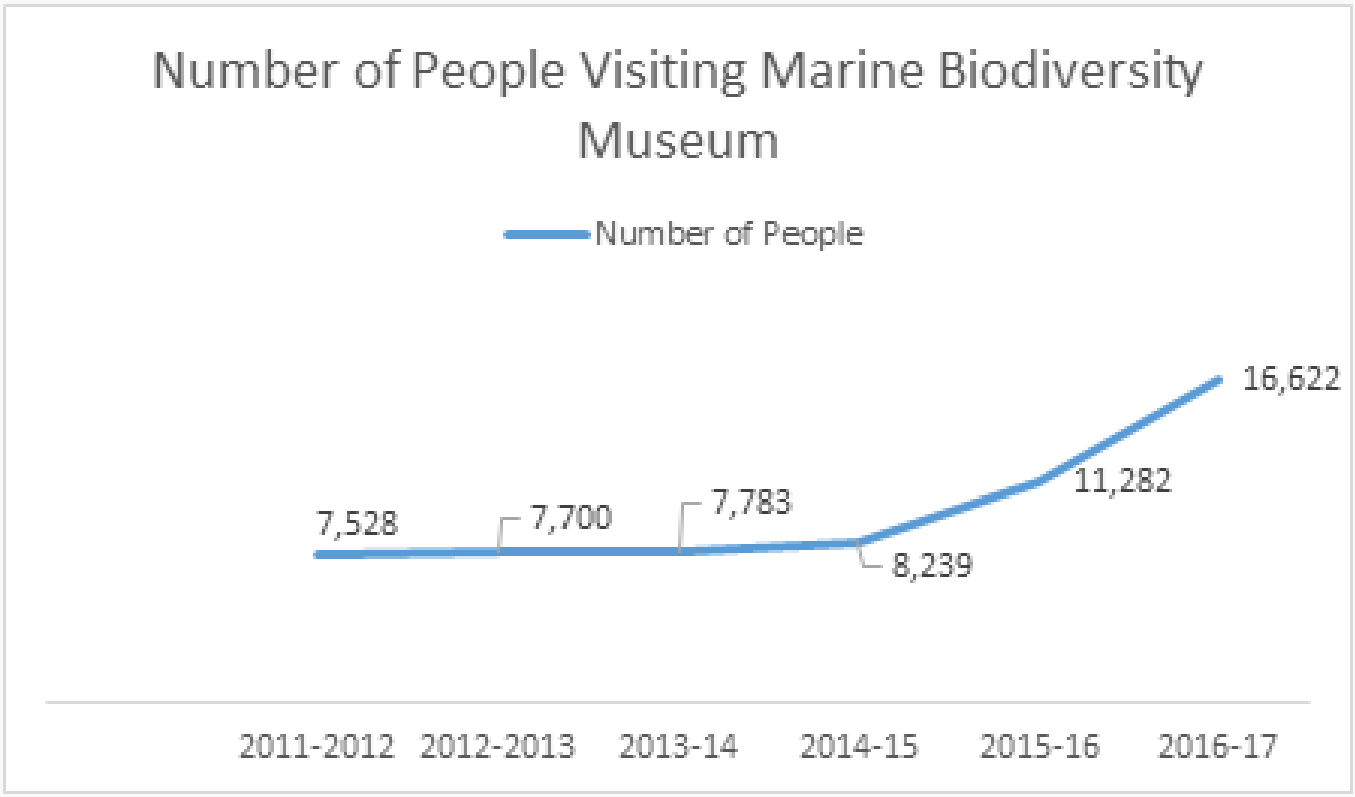


Source: National Biodiversity Authority

4. Trends in visits to protected areas, natural history museums, exhibitions and botanical/zoological gardens

Large number of people of all ages including students visit these areas and institutions. The available data of the visit to parks show increasing trend with 2,936,985 to 4,030,069 visitors from the years 2011-12 to 2016-17 in the state of Tamil Nadu and increase from 1,144,116 to 1,657,815 visitors from the years 2009-2010 to 2016-17 in the state of Madhya Pradesh. The number of visitors to CMFRI Museum from 2011-12 to 2016-17 also shows an increasing trend. Regular management of this data is being encouraged.

Figure 1.8
Visitors to CMFRI Museum



Source: Central Marine Fisheries Research Institute

Relevant websites, links, and files

Reports
Annual reports
www.in.undp.org › Home › Environment and energy
Botanical Survey of India
Zoological Survey of India
Central Marine Fisheries Research Institute
Bombay Natural Historical Society
he Sálim Ali Centre for Ornithology and Natural History
India Business and Biodiversity Initiative
Paryavaran Mitra
Science Express
Center for Environment Education

Other relevant information

CEPA has proved to be an effective tool to create awareness and generate capacity for taking actions at grassroots level. Habitats, species of flora and fauna have been identified, protected and conserved by people at times through motivations from others and often also on their own. A few sample case studies are given hereafter.

- **The Women's *Hargilla* (Greater Adjutant) Army**

Fourteen self-help groups comprising five members each in villages of *Dadara, Pacharia* and *Singimari* villages of Assam, styled themselves as 70 women *Hargilla* army to defy and change the commonly held adversarial attitudes against Greater Adjutant Stork and save this IUCN red listed bird from disappearance from their villages, which used to be an important habitat of these birds.

It all started with the effective use of CEPA by a keen woman bird researcher determined to save the Greater Adjutant habitat in these villages. Once motivated these women widened the support base for the Greater Adjutant by including children and other members of their households and surrounding. The persistent action of women secured the support of the district authorities in departments of administration, police, forest, health and the State Zoo Authority, each contributing to "Save the Greater Adjutant" goal in a coordinated manner.

Significant outcomes include saving of all the *Kadamba* (*Neolamarckia cadamba*) trees which serve as Greater Adjutant Stork habitats, increase in nests from 28 in 2008 to 143 in 2015, establishment of rescue and rehabilitation system for injured birds in collaboration with Assam State Zoo, programmes for alternative livelihood options for the community under which 28 handlooms have been distributed among the 14 self-help groups. A Fashion and Textile Designing diploma course with a specially-designed Greater Adjutant stork introduced for women. Over 10,000 people mobilised and sensitised for the conservation of the bird.

Fig. 1.9 Street Play Organised by Women to Raise Awareness about the Greater Adjutant

Fig 1.10 Greater Adjutant

II. Eco-club Members identify Genetic Diversity in Western Ghats – A Global Biodiversity Hotspot

Nearly 240 Eco-clubs comprising about 10,000 school children and teachers covering 250 villages in 13 districts of Western Ghats region of Maharashtra were involved in surveying and documenting varieties and characteristics of trees and fruits of the area by Centre for Environment Education (CEE) a Centre for Excellence for environment education under MoEFCC. Survey objectives included tree exploration, compilation of traditional knowledge including about local recipes, products, seasonality, historical incidences about these trees. It started in 2012 with a study of mangos, went on to document three more fruit trees namely Jamun (*Syzygium cumini*), Fanas or jackfruit (*Artocarpus heterophyllus*), Karvand (*Carissa carandas*) and the numbers continue to grow.

Over 205 varieties of Mango, 24 varieties of Jamun, 18 varieties of Jackfruit and 28 varieties of Karvand have been documented through these surveys. Figure 1.11 shows children's pictorial depiction of the number of varieties they identified.

Figure 1.11

Varieties of Fruits Identified

421 x 539

Source: *Centre for Environment Education, MoEFCC*

III. Village Botanists to Conserve, Grow and Sustainably Use Medicinal Plants: a case study

The Foundation for Revitalisation of Local Health Traditions (FRLHT), a Centre of Excellence under MoEFCC, State Forest Departments of Karnataka, Kerala, Tamil Nadu, Andhra Pradesh and Maharashtra established 54 'Forest Gene Banks' in their respective areas. Local individuals residing in the proximity of these areas and possessing knowledge about the local medicinal flora were trained as village botanists to build capacity in basic taxonomy of medicinal plants of the area.

The concept was expanded to three other States namely Chhattisgarh, Uttarakhand and Arunachal Pradesh under the UNDP-GEF project "Mainstreaming Conservation and Sustainable use of Medicinal Plants in three Indian States".

These trained village botanists cum para-taxonomists assist the Forest and other Departments of three states, SBBs, local NGOs, local institutions such as schools and colleges, and tourists in matters of (a) plant identification with local vernacular names and botanical names, (b) vegetation monitoring, and (c) providing cultural information to tourists about local plants. They also function as freelance consultants like other locally knowledgeable individuals such as folk-healers, traditional birth attendants.

More than 300 such trained village para- taxonomists now work in 12 states.

IV. Rehabilitation of Agrobiodiversity - case study of Pithorabad BMC

Pithorabad BMC was set up in 2013 in compliance with Section 41 of The Biological Diversity Act, 2002 . One of the first tasks that the BMC took up related to arresting the rapid loss of indigenous varieties of paddy and restoring and rehabilitating them. The BMC used all the components of CEPA with perseverance to achieve its objectives. Compilation of an exhaustive PBR with the participation of local people, making them recollect the value of the lost heritage of biodiversity, showing its linkage with the issues of local climatic conditions and climate change made people rue the loss of biodiversity they had already incurred. This led to a resolve to take action and not allow any more such losses.

Today all 110 threatened indigenous varieties of paddy of that area have been saved through *in situ* conservation. A seed bank with capacity of keeping seeds viable for 4 years has been set up and 86 traditional varieties are under the process of registration under Protection of Plant Varieties and Famer's Rights (PPVFR) Act, 2001 through the help of BMC and SBB. The awareness and capacity generated through the whole process has also led to conservation of 150 medicinal plants, herbs and tuber spices.

***V. Mowgli Utsav* in the State of Madhya Pradesh (MP)**

Named after *Mowgli*, a fictional character of Rudyard Kipling's novel 'Jungle Book', this *Utsav* (festival) is organised annually organised by the State of MP to sensitize school children to biodiversity related issues. The SBB organised the 2017 festival in the State in four National Parks- *Kanha* National Park, *Madhav* National Park, *Bandhavgarh* National Park and *Satpura* National Park and engaged children in activities such as nature trail, park safari, habitat search, quiz activity, painting competitions, message writing on banners, plays and other adventures. Nearly 300 students and over 100 teachers participated in the *Utsav* in 2017. Certificates and prizes are awarded to the winners of events in the *Utsav* every year. It proves as an effective means of reaching out to young minds to make them aware of the values of biodiversity and turn them into stakeholders in conservation.

Figure 1.12

Students Celebrating *Mowgli Utsav*

Source: State Biodiversity Board, Madhya Pradesh

VI. From Students' trips to saving the Lake – A Case Study of Singanallur lake

Singanallur Lake in Coimbatore, Tamil Nadu was created in 7th Century AD to conserve the Noyyal river water for agriculture. Over centuries it became an important habitat for birds and a transit destination of migratory birds. With the expansion of urbanisation it had become a ground for waste dumping of all manners in the recent past.

Sálim Ali Centre for Ornithology and Natural History (SACON) organised regular educational and bird watching trips of students and youth to the Singanallur Lake in recent years. The local students and youth that had participated in these tours in those years have now restored the lake and identified more than 700 species of wild biodiversity which include 160 species of birds. The lake has been declared Urban Biodiversity Conservation Zone in 2017 by the Coimbatore City Corporation. Following this, conservation of urban lakes has been included as the central agenda of the Smart City Programme in the city of Coimbatore.

Obstacles and scientific and technical needs related to the measure taken

India has 22 recognised state languages and many more dialects at the sub-regional level. Creating communication material which can easily reach the target groups is a challenge. This also comes in the way of mapping and disseminating best practices and good case studies. The area of invasive alien species requires more studies and communication material. Capacity also needs to be created in BMCs to progressively map best practices in their own jurisdiction and access these from wider areas and wherever needed include them as addendum to PBRs. Greater financial, technical and scientific resources are needed for creating communication packages in vernacular languages.	EN

NBT-2: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Measures:

Culturally and historically people in India have valued biodiversity. Urbanisation and modern imperatives of development create their own challenges for biodiversity conservation. Increasing integration of biodiversity concerns and values in development planning and poverty alleviation strategies has been promoted to meet these challenges. Programmes like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) scheme, co-management of forests, implementation of Forest Rights Act, 2006, soil mapping and soil health cards have helped improve landscapes and seascapes promoting sustainable use of biodiversity, land and water resources. Substantive work has been done on enumerating and establishing economic value of ecosystem services also. The first attempt to put economic value to biodiversity started in 1980s. Several studies have been conducted since then including the studies commissioned by MoEFCC under TEEB. These have enumerated ecosystem services and their values, with the involvement of local people, including women. These have created awareness on the value of ecosystem services and provided usable database for integration of the values in decision making and also for use in cases seeking judicial remedies.

This section lists out the main measures for implementing the NBT.

A. Main Policy and Legislative Measures include:

- National Biodiversity Strategy and Action Plan (NBSAP) provides for making valuation of biodiversity an integral part of pre-appraisal of projects and programmes to minimise adverse impact on biodiversity.
- National Environment Policy (NEP), 2006 inter alia calls for appraisal of developmental project through cost benefit analysis by assigning values to biodiversity resources and emphasises consideration of hotspots and biodiversity heritage sites as entities with incomparable values.
- The Biological Diversity Act, 2002 recognises the value of biodiversity and is aimed towards ensuring its conservation and sustainable use.
- National Forest Policy, 1988 stipulates that projects involving diversion of forest land for non-forest purpose should provide in their investment funds for regeneration/compensatory afforestation.
- National Forest Policy 1988, Forest Conservation Act 1980, Rules and Guidelines issued under the Forest Conservation Act, 1980 mandate realisation of net present value, funds for compensatory afforestation on land equal to the forest area diverted for any purpose.

B. Other Measures:

- The Economics of Ecosystems and Biodiversity (TEEB) India Initiative (TII) project implemented by MoEFCC in coordination with universities, national and state level institutions and experts on valuation of ecosystems.
- National Food Security Mission (NFSM*), Pradhan Mantri Krishi Sinchayee Yojna* (PMKSY), *Har Khet Ko Paani*, Market Development of Tribal Products/Produce (TRIFED), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), poverty alleviation programmes such as MGNREGA and other relevant programmes include consideration of biodiversity values in planning and designing of their strategies.
- National Tariff Policy 2016, mandates purchase of 8% solar energy by State Electricity Regulatory Commissions (SERCs) and procurement of 100% power produced from all Waste-to-Energy plants. Incentives for shift from non-renewable to renewable sources of energy include Generation-Based Incentives (GBIs), capital and interest subsidies, viability gap funding, concessional finance, fiscal incentives etc. The ultimate policy objective is to make solar energy compete with fossil-based energy options, through measures such as:
  - Setting up of exclusive solar parks and giving infrastructure status to solar projects.
  - Development of power transmission network through Green Energy Corridor project.
  - National Offshore Wind Energy Policy.
  - Waiving Inter State Transmission System charges and losses for interstate solar and wind power sale from projects commissioned by March 2019.
  - Identification of large government complexes/ buildings for rooftop projects.
  - Amending building bye-laws for making solar roof tops mandatory in new construction or for higher Floor Area Ratio.
  - Mandatory share of 10 % renewable energy under smart cities project.
  - Measures for Integrated Power Development Scheme (IPDS) to encourage distribution companies and to make net-metering compulsory.
  - Raising funds including through Green Climate Fund to achieve the target.

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National Target(s)

National Biodiversity Target (NBT) - 2 : By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs. Indicators and assessment of progress against them with regard to NBT 2 follows:

I. Trends in biodiversity and ecosystem services in valuation studies

- Nearly 150 valuation studies have been undertaken starting from 1980s to 2017. Of these studies, 34 cover wetlands, 68 cover forests, 19 coastal, marine and mangrove ecosystems and 25 other ecosystems.
- Included in the 150 studies are the studies conducted under the project on "The Economics of Ecosystem and Biodiversity – India Initiative (TEEB-TII)" implemented by MoEFCC with support from GIZ, with the aim of making values of biodiversity and ecosystem services explicit for integrating them into developmental planning. Fourteen studies under this covered forests, inland wetlands and coastal and marine ecosystems. Universities, research institutions, and NGOs carried out these studies with the participation of local people in enumeration of ecosystem services. These studies are now available at http://indo-germanbiodiversity.com/
- Field-based primary case studies in each of the three ecosystems in TII studies have been used to present policy relevant evidence for ecosystem values and their relation to human well-being. Availability of robust geospatial and bio-physical data underpins these studies. These studies on forests also cover issues such as hidden ecosystem services of forests, conflicts between humans and wildlife, and the economic consequences of species decline. The studies on wetlands *inter alia* draw lessons on water resource management, community stewardship and equity, and the economics of hydrological regime changes. In the coastal and marine ecosystems, the studies also explore the opportunities and economic efficiency of interventions such as eco-labelling, seasonal fishing bans, mangrove regeneration and the challenge of bycatch in marine fisheries.
- Scope of these studies varies. A large number of studies have valued all the four categories of goods and services that ecosystems offer namely, provisioning, regulating, supporting and cultural services, while some have restricted themselves to chosen category of services such as cultural and spiritual services or regulating services.
- Number of ecosystem services identified and assigned value by these studies range from 29 services in case of *Maguri – Motapung Beel* wetlands of Assam (Bhatta *et al* 2016) to 25 services in case of six tiger reserves from six different landscapes (Verma *et al* 2015) to 11 services from forest in the state of Himachal Pradesh (Verma *et al* 2000).
- These studies *inter alia* suggest: strong linkages between ecosystem services and poverty; Support of tiger reserves to a wide range of economic sectors including responses to climate change crises, support to local economies and sustainable development; and value of wetlands in providing a wide range of ecosystem services spanning provisioning, regulating, supporting and cultural services.
- Ministry of Statistics and Programme Implementation (MoSPI) through an expert group brought out a report on "Green National Accounts in India- A Framework" in 2013. The proposal of creating a regular system of Green National Accounts is under process.

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II. Trends in integration of biodiversity ecosystem service values into sectoral and development policies and programmes

- Implementation of NEP 2006, other sectoral policies, Forest Conservation Act,1980 notifications issued under Environment (Protection) Act,1986 from time to time help to ensure integration of ecosystem values in sectoral development programmes. Biodiversity Management Committees (BMCs), Joint Forest Management Committees (JFMCs) and Panchayati Raj Institutions (PRIs) at the local level take the integration to grassroots level.
- Sectoral Ministries, industry, mining, and businesses are helped by the valuation studies in incorporating values including monetary values in decision making appropriately.
- Valuation studies created consciousness about the value and costs of their conservation. The 14th Finance Commission awarded a study "High Conservation Value Forests (HCVF)" which was conducted by Indian Institute of Forest Management to account for the value of conservation of natural resources in the devolution formula of the divisible pool of taxes between Centre and States. The Commission assigned a weightage of 7.5% to forest cover in the devolution formula. This established a strong direct policy connect between enumeration and valuation of ecosystem services and government policy and programmes.

III. Trends in policies considering Biodiversity and Ecosystem Services in Environmental Impact Assessment (EIA) and strategic environmental assessment

Potential impact on ecosystems through EIA by technical experts including the experts from BSI and ZSI is mandatory for industries and businesses notified under the EP Act.

At the initial stage in EIA the project proponent has to submit information in environmental appraisal questionnaire along with other documents. The format of the questionnaire provides a definite scope for seeking information on several parameters that address biodiversity issues related to developments in different sectors. Based on the nature of the information elicited through the questionnaires, the importance and value of biodiversity components is evaluated by MoEFCC to flag any relevant issues. EIA reports are then examined for their comprehensiveness in terms of coverage of the issues flagged by MoEFCC. These reports also help in evaluating the conservation status of species in the project

area in terms of rarity, threat, endangerment, restricted distribution or endemism and in flagging biodiversity values for consideration at the time of initial scrutiny.

Valuation studies have helped in ascertaining the different types of values affected by these and advising recovery of those values through compensatory measures.

IV. Trends in identification, assessment, establishment and strengthening of incentives that reward positive contributions to biodiversity and ecosystem services

Sectoral Ministries and Departments have institutionalised initiatives that encourage and reward positive contribution to actions helping conservation and restoration of biodiversity and ecosystem services. Some examples include incentives for saving conventional energy and promoting green energy. Initiatives of the Ministry of Power and Ministry of New and Renewable Energy (MNRE) are given below-

- Perform, Achieve and Trade Scheme under National Mission for Enhanced Energy Efficiency (NMEEE) under the Ministry of Power -1.3 million (13 lakh) Energy Saving Certificate (ESC) have been traded at an overall cost of around USD 15.3 million (Rs 100 crores).
- Market Transformation for Energy Efficiency (MTEE) under Ministry of Power - to bring accelerated market transformation for superefficient appliances by providing financial stimulus innovatively at critical point/s of intervention, e.g., promotion of energy efficient fans through to replace conventional 75 Watt fans with 50 Watt 5-star rated energy efficient fans on an upfront payment or in equated monthly instalments adjusted against electricity bills of consumers.
- MNRE Capital Subsidy Scheme for promoting solar photovoltaic water pumping systems for irrigation and other purposes with the objective to replace diesel pump sets with solar pump sets and to reduce dependence on grid power.
- MNRE Lighting Scheme 2016 for Capital Subsidy Scheme for installation of solar photovoltaic lighting systems.
- Plant Genome Saviour Community Award & Plant Genome Saviour Farmer Reward– Communities and farmers promote ecosystem services by promoting conservation of landraces. Refer to NBT 5
- India Biodiversity Award– In 2012, Government of India, MoEFCC in association with UNDP India initiated the awards to recognise, incentivise and sensitise the masses by honouring outstanding models of biodiversity conservation, sustainable use and governance at the grassroots level.
- Deregulation of fossil fuel prices has been done which encourage their rational and economical use.

V. Trends in number and effectiveness of measures developed in the MGNREGA and Integrated Watershed Management Programme (IWMP) for protection and enhancement of ecosystem services and biodiversity

- Guidelines of MGNREGA have always emphasized planning and implementation of works that enhance ecosystem services and biodiversity. MGNREGA Guidelines 2018 identify 260 combinations of permissible works of which 181 relate to natural resource management. Of these, 84 are related to water. A convergence framework for scientific planning and execution of water management works with use of latest technology is mandated in consultation with Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR,RD&GR) and the Ministry of Agriculture and Farmers' Welfare (MoAFW) for 2,264 blocks with an integrated natural resource management perspective.
- Central Ground Water Board prepared a baseline map of ground water availability in collaboration with States in 2012. It assesses ground water levels four times a year. Its information base and services are to be used in works related to ground water resources. These works in conjunction with 8,214 projects under watershed development project (refer NBT 3) contribute to alleviating landscapes/ seascapes and add value to ecosystem services.
- Climate change mitigation and adaptation measures suitably incorporate biodiversity conservation and concerns. For details refer to NBT 5.

Relevant websites, links, and files

Ministry of New and Renewable Energy
Plant Genome Saviour Community Award
Plant Genome Saviour Farmer Reward
Green National Accounted in India: A Framework
Indian Institute of Forest Management
Ministry of Power
Ministry of New and Renewable Energy

Obstacles and scientific and technical needs related to the measure taken

Decentralised valuation studies at local level need to be encouraged to secure comprehensive stakeholder engagement. Though studies for evaluation of ecosystems services have been undertaken under The Economics of Ecosystems and Biodiversity –The India Initiative (TEEB-TII) with the involvement of local communities, training capacities and packages need to be created to include simple tools for valuation at the local level for creating awareness and enabling balanced decisions and actions.

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Relevant websites, web links and files

Indo-German Biodiversity Programme, GIZ,
Ministry of Environment Forest and Climate Change

NBT-3: Measures

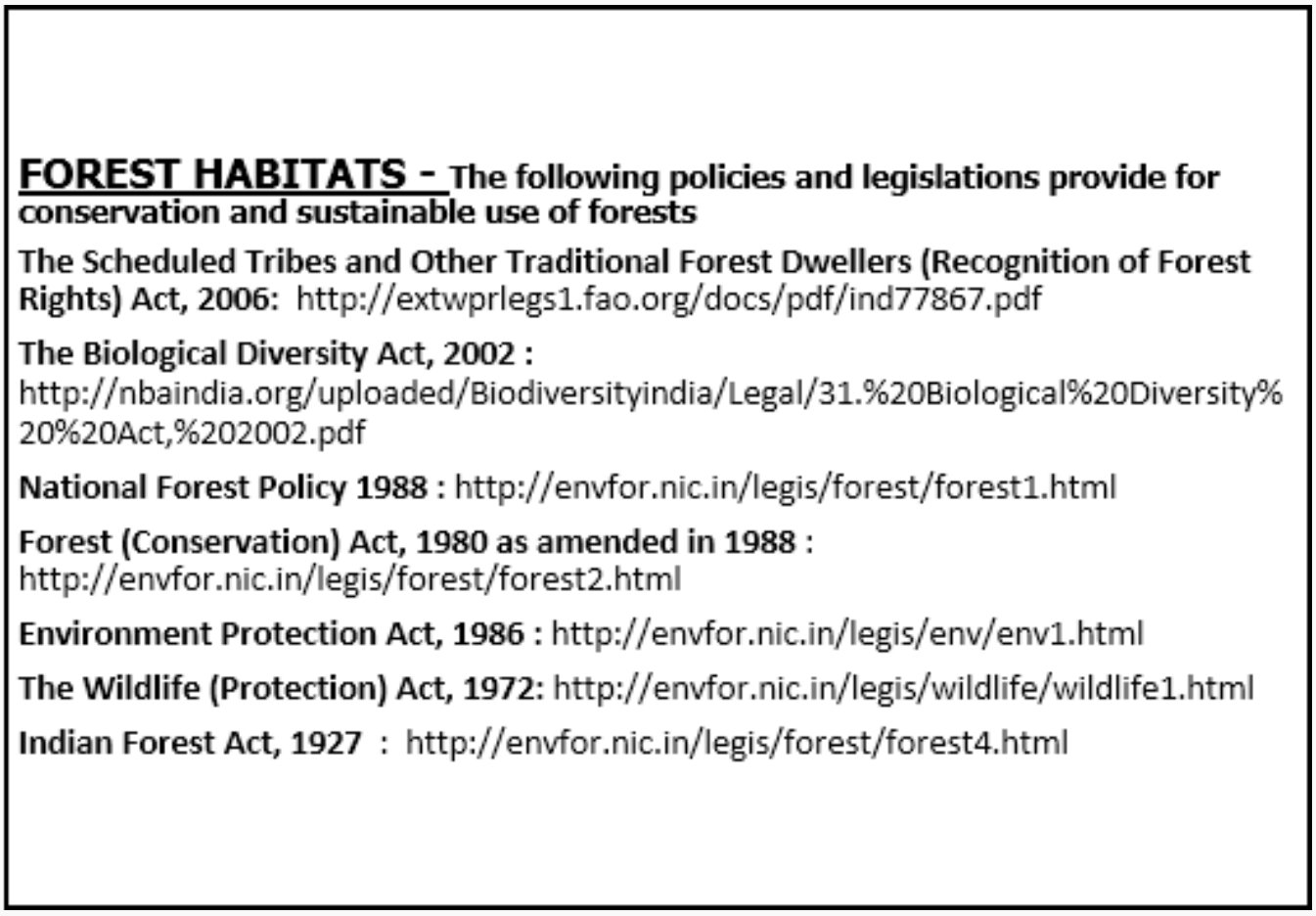
Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Forests, aquatic including coastal, and terrestrial habitats comprising agricultural and non-agricultural land are covered under the target. Pre-existing legislative and policy mechanisms provide the basic framework to build upon for effective implementation of the target. NEP, 2006 is the all-embracing policy instrument to provide requisite guideline to all the sectoral Ministries, States/UTs to mainstream environmental concerns in development activities. The dominant theme of the policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, *"the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation, than from degradation of the resource."* Together with other legislative, policy and programmes, a strong ecosystem of designing and implementing strategies to achieve this target(s) has been created.

Main Measures

Legislative and policy measures in place for forest, aquatic and other terrestrial habitats are shown in Figure 3.1.

Figure 3.1: Legislative and policy measures in place for forest, aquatic and other terrestrial habitats



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AQUATIC HABITATS - The following policies and legislations provide for conservation and sustainable use of aquatic habitatas

•Wetlands (Conservation and Management) Rules, 2017:
http://envfor.nic.in/sites/default/files/Wetlands%20(C&M)%20Rules,%202017.pdf

•National Water Policy, 2012:
http://mowr.gov.in/sites/default/files/NWP2012Eng6495132651_1.pdf

•Coastal Regulation Notification 2011:
http://www.moef.nic.in/downloads/public-information/CRZ-Notification-2011.pdf

•Water (Prevention and Control of Pollution) Act, 1974 last amended in 2003:
http://envfor.nic.in/sites/default/files/Wetlands%20(C&M)%20Rules,%202017.pdf

OTHER TERRESTIAL HABITATS - The following policies and legislations provide for conservation and sustainable use of other terrestrial habitatas

National Agroforestry Policy,2014:
http://www.indiaenvironmentportal.org.in/files/file/Agroforestry%20policy%202014.pdf

•National Policy for Farmers, 2007 :
http://agricoop.nic.in/sites/default/files/npff2007%20%281%29.pdf

•Mineral Conservation and Development Rules(MCDR), 1988
:https://ibm.gov.in/writereaddata/files/07102014115525MCDR%201988_02082011.pdf

Other Measures including Institutional Arrangements:

Mandates and programmes of the National Missions constituted under the National Action Plan on Climate Change (NAPCC) namely (i) Green India Mission, (ii) National Solar Mission, (iii) National Mission on Enhanced Energy Efficiency, (iv) National Mission for Sustainable Agriculture, (v) National Mission on Sustainable Habitat, (vi) National Mission for Sustaining Himalayan Ecosystem, (vii) National Mission on Strategic Knowledge for Climate Change and (viii) National Water Mission recognise the value of biodiversity and contribute to arresting degradation and rehabilitating degraded habitats.

India has released National REDD+ Strategy 2018 which inter alia addresses “degradation, land tenure issues, forest governance issues, gender considerations and the safeguard identified, ensuring the full and effective participation of effective stakeholders, inter alia indigenous peoples and local communities.”

Measures for gender mainstreaming include-Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50 %. This ensures large-scale participation of women in planning decision making, implementation and governance.

Gender Budgeting as part of the Annual Central Government budget-Specific provisions for participation and representation of women in government programmes and schemes.

Habitats related specific measures:

Forest Habitats

- **India State of Forest Report, prepared by Forest Survey of India (FSI) every two years to** *inter alia* survey and map state and district wise forest areas and changes therein, estimate growing stocks within and outside forest areas, assess carbon stocks and trees, bamboo and mangrove cover.
- **National Afforestation Plan (NAP)** for ecological restoration of degraded forest areas with peoples’ participation, through JFMCs at the village level, and Forest Development Agency (FDA) at the forest division level, State Forest Development Agency (SFDA) at State level.
- **Compensatory Afforestation Fund Management and Planning Authority (CAMPA) and State CAMPA Guidelines** promote afforestation and regeneration activities to compensate for forest land diverted to non-forest purposes.
- **National Wildlife Action Plan 2017-2030** includes inclusionary approach, linkage with wider landscapes and seascapes as its important focal areas.
- **Eco-Task Forces (ETF),** based on twin objectives of ecological restoration in difficult areas and promotion of meaningful employment to ex-servicemen. Some of the ETF battalions have undertaken successful eco-restoration of highly degraded difficult sites, such as the limestone mining areas in the Mussoorie hills.
- **Floral and Faunal Surveys** for taxonomic identification and enumeration by BSI and ZSI.
- **Assisted Natural Regeneration** is the dominant strategy of NAP as well as the externally aided forestry projects under implementation in 11 states.
- **Green India Mission (GIM)** is mandated to protect, restore and enhance forest cover and respond to climate change. It envisages a holistic view of greening and focuses on multiple ecosystem services, especially, biodiversity, water, biomass, preserving mangroves, wetlands, critical habitats etc, along with carbon sequestration as a co-benefit.
- ***Pradhan Mantri Ujjwala Yojana*** **(PMUY)** for alternative cooking energy through LPG connections to BPL households to safeguard the health of women and children and divert pressure of cooking fuel from forests.
- **Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (MGNREGA)** to enhance livelihood security in rural areas. Most of employment generation activities relate to restoration, rehabilitation and conservation of natural resources. It is one of the biggest social security schemes of the world.

Aquatic Habitats

- ***Namami Gange* (NG), A Ganga Conservation Mission,** is a flagship programme of the Government for effective abatement of pollution, conservation and rejuvenation of river Ganga. The Ganga basin of India houses about 40% of India's population. Municipal sewage from urban centers, effluents from industries and polluting waste from several other non-point sources get discharged into the river through its 2,525 kms journey from the hills to the sea. With an outlay of Rs. 20,370 million and involving several Ministries, NG aims at Ganga rejuvenation by consolidating the previous Ganga Action Plan (GAP) Phase-I launched in 1987, GAP Phase- II started in 1993 and National Mission on Ganges implemented in 2011.
- **National Water Quality Monitoring Programme (NWQMP),** through Central Pollution Control Board (CPCB) at National level and State Pollution Control Boards (SPCBs) at State /UTs created under the Water (Prevention and Control of Pollution) Rules, 1974.
- **National Plan for Conservation of Aquatic Ecosystem (NPCA)** for conserving wetlands through Integrated Management Plans.
- **National River Conservation Plan,** in operation since 1995, aims to reduce pollution load of rivers, improve water quality through pollution abatement works.
- **Aquifer Management Programme,** under The Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR,RD&GR) to map and manage aquifer systems in the country.
- ***Jal Kranti Abhiyaan*,** aims at increasing water security applying modern techniques and traditional wisdom, conjunctive use of surface and ground water; rain-water harvesting and to promote accountability of users.
    - **Central Ground Water Board** is responsible for developing / disseminating technologies, monitor and implement national policies for ground water resources. It has prepared a baseline map of ground water availability in collaboration with States in 2012. It assesses ground water levels four times a year. Its information base and services are to be used in works related to ground water resources. These works in conjunction with 8,214 projects under watershed development project contribute to alleviating landscapes/ seascapes and add value to ecosystem services.
- **Integrated Wasteland Development Project (IDWP):** is meant to increase bio-mass of fuelwood, fodder, fruits, fiber and small timber by revitalizing village level institutions and enlisting people's participation,
- **Integrated Coastal and Marine Area Management (ICMAM)** programme under Ministry of Earth Sciences (MoES), promotes and facilitates sustainable management of the coastal zone and rational utilization of resources by incorporating environmental and social concerns in all sectoral developmental activities.
- **Integrated Coastal Zone Management Programme (ICZMP),** a World Bank assisted project in coastal states of West Bengal, Orissa and Gujarat through Society of Integrated Coastal Management (SICOM). A National Centre for Sustainable Coastal Management (NCSCM) with Regional centers in each coastal State/Union territory has been set up to promote R &D in coastal management and issues related to coastal communities.
- ***Pradhan Mantri Krishi Sinchayee Yojana* (PMKSY),** launched in 2015, with the objective of '*Har Khet ko pani*' (water to each farm) to improve water use efficiency with the motto 'Per drop more crop' finding end to end solutions on source creation, distribution, management, field application and extension activities relating to water.

Combating Desertification

- **PMKSY** includes watershed development programme by consolidating erstwhile Drought Prone Area Development Programme and Desert Development Programme and Integrated Wasteland Development Programme.
- **Desertification and Land Degradation Atlas of India 2016** compares status of 2003-05 and 2011-2013 and provides baseline data for prioritizing action based on vulnerability and risk assessment.

Other Terrestrial Habitats

- **Soil Resource Mapping by Soil and Land Use Survey of India** to generate district wise information on nature, extent and potential of soil resources by interpretative grouping of soils for land capability and soil and land irrigability assessment.
- **Fodder and Feed Development Scheme,** for grasslands development including creating grass reserves, improvement of degraded grasslands and vegetation cover of problematic soils like saline, acidic and heavy soil.
- **National Carbon Project (NCP)** for digital mapping of organic and inorganic carbon density of the soil using intensive field and remote sensing data under ISRO Geosphere Biosphere Programme.
- **EIA:** EIA notifications under Environment (Protection) Act 1986 mandate clearance after environment impact assessment and EMP in case of notified industries and enterprises therein.

Actors involved: National Government, Sub-national Governments, Panchayti Raj Institutions, JFMCs, Forest Right Act Committees (Gram Sabhas), Women, School Children, Research Institutes.

The target is being monitored through indicators. The time period for monitoring of each indicators is fixed.

National Target(s)

National Biodiversity Target (NBT) - 3 : Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs. Indicators and assessment of progress against them with regard to NBT 3 follows.

1. Trends in Forest Cover- Change in Density, Afforestation, Restoration, Carbon stocks and Grasslands

1.1. Density of Canopy Cover of Forests

- **Very Dense Forests (VDF)** have increased over the last four biennial FSI surveys. See Table 3.1

Table 3.1 : Trends in Forest Cover –Change in Density

Classes of Forests	Change in Area (in km^2)				Change in percentage of geographical area			
Year	2011	2013	2015	2017	2011	2013	2015	2017
Very Dense Forest (VDF)	83,471	83,502	85,904	98,158	2.54	2.54	2.61	2.99
Moderately Dense Forest (MDF)	320,736	318,745	315,374	308,318	9.76	9.70	9.59	9.38
Open Forest (OF)	287,820	295,651	300,395	301,797	8.76	8.99	9.14	9.18
Scrub	42176	41383	41362	45979	1.28	1.26	1.26	1.40
Non-forest cover	2553060	2547982	2544228	2533217	77.67	77.51	77.40	77.06

Source: India State of Forest Report (ISFR), Forest Survey of India, 2018

1.2 Afforestation and Restoration of Forests

- Increase in canopy cover from 7,82,871 km^2 to 8,02,088 km^2 over past six years has been recorded in India State of Forest Report (ISFR), 2018.
- About 1.69 million ha has been covered through Assisted Natural Regeneration (ANR) over the decade 2000-10 through 42,535 JFMCs under 800 forest development agencies (FDAs).
- A web-based portal E-Green Watch depicts compensatory afforestation, diverted land, plantation and other asset categories on Google Earth imagery. For live statistics and other details refer to egreenwatch.nic.in.
- The portal also provides details on work done by Compensatory Afforestation Fund Management and Planning Authority (CAMPA) which promotes afforestation and regeneration activities as a way of compensating for forest land diverted to non-forest uses.
- About 1,664 ha of difficult area restored through plantation by Eco-Task Force (ETF) in 2017-18. ETFs are created for greening difficult areas such as mined out and severely degraded areas. Stone dams, soil and moisture conservation works are part of the restoration measure to ensure sustainability.

EN

1.3. Carbon Stocks:

- FSI survey shows a positive trend in Carbon Stocks at 7,083 Million tonnes in 2017 against 7,044 of 2015 i.e., an increase of 39 Million tonnes. Table 3.2 shows the details.

Table 3.2 : Change in Carbon Stock between 2015 and 2017

Change in Carbon Stock between 2015 and 2017 (Million tonnes)				
Component	Carbon Stock in forest as per ISFR 2015	Carbon Stock in forest as per ISFR 2017	Net Change in Carbon Stock	Annual increase in Carbon Stock
Above Ground Biomass	2220	2238	18	9.00
Below Ground Biomass	695	699	4	2.00

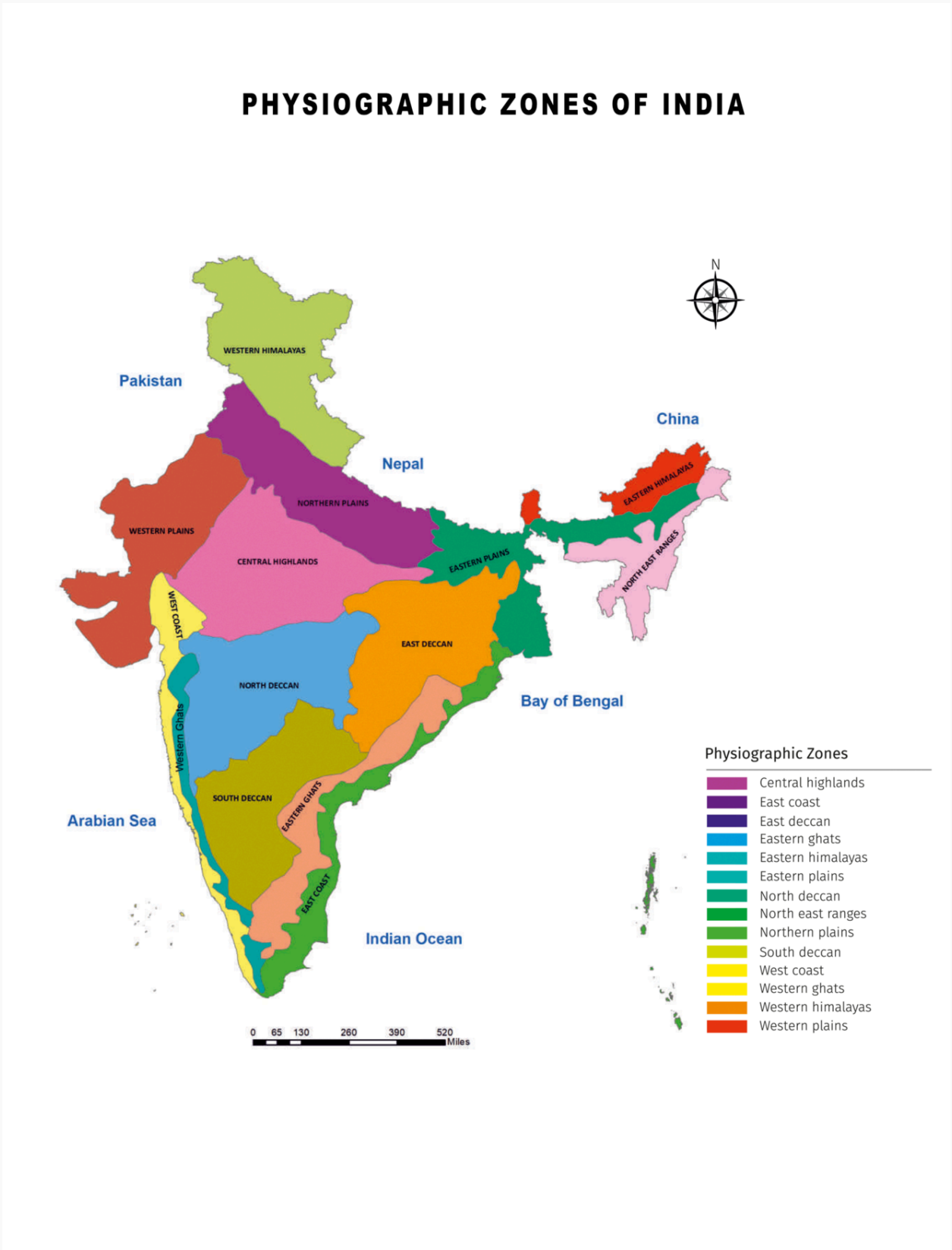
Dead Wood	29	30	1	0.50
Litter	131	136	5	2.50
Soil Organic Carbon	3969	3979	10	5.00
TOTAL	7044	7083	39	19.00

Source: India State of Forest Report, Forest Survey of India

Conservation measures and management interventions such as afforestation activities, participation of the local people in protection measures of plantation areas as well as in traditional forest areas, expansion of trees outside forests are some of the factors that have contributed to a positive change in forest cover.

- FSI has measured the growing stock by stratifying the country into 14 Physiographic zones, based on the similarities in physiography, vegetation, climate and soil type. The growing stock has also shown an increase of 53.990 million cum over the figures reported in ISFR 2015. The increase in growing stock inside the forest is 23.333 million cum and outside the forest is 30.657 million cum The Figure 3.2 shows the map of 14 physiographic zones.

Figure 3.2 shows the map of 14 physiographic zones.



- Effective implementation of Forest Conservation Act, 1980 and better rehabilitation and protection of newly afforested, rehabilitated degraded forest areas through co-management have also contributed substantially to changing the forest scene for the better. Inclusion of forests as part of criteria to determine shares of State/UTs in the national divisible pool of financial resources

of the country act as an incentive to States/UTs to conserve forests.

- All the states have prepared comprehensive action plans to meet India's commitment of REDD+ strategy http://www.moef.nic.in/ccd-sapcc
- GIM has met India's commitment under Bonn Challenge initiative by covering 9,810,944.2 ha under afforestation:
  - 9,264,976 ha by government sector,
  - 352,677.9 ha by NGOs and
  - 193,290 ha by private companies
- Special initiatives have been undertaken to reduce pressure of collections from forests. These include:
- *Pradhan Mantri Ujjwala Yojana*: 4,84,83,502 below poverty line families covered through LPG connections divert pressure of cooking fuel from forests.
- Nearly 110 Medicinal Plant Cultivation Areas (MPCAs) covering 23969.6 ha spread across the country created to secure *in situ* conservation of medicinal plants in forests simultaneous with *ex situ* cultivation of medicinal plants outside forest areas through Medicinal Plant Conservation and Development Area (MPCDA) to create alternative source of meeting the demand from outside forests. Also, large scale cultivation of 50 widely used medicinal plant species by farmers has been achieved. These measures have raised the share of medicinal plant raw materials from cultivation sources from previously recorded 20% in 2004-05 to 40% in 2014-15.
- Synergic impact of employment generation, land, soil and water conservation measures under MNREGA, implementation of natural resources conservation elements in sectoral policies and programmes and CEPA activities reduce pressures on forests.

1.4 Grasslands:

- The share of feed and forage from non-forest lands increased to 2641.95 ha by December 2017 reducing the share of forest land to 540 ha.
- Rehabilitation of non-forest, wasteland/rangeland/grassland/non-arable through Feed and Fodder scheme.

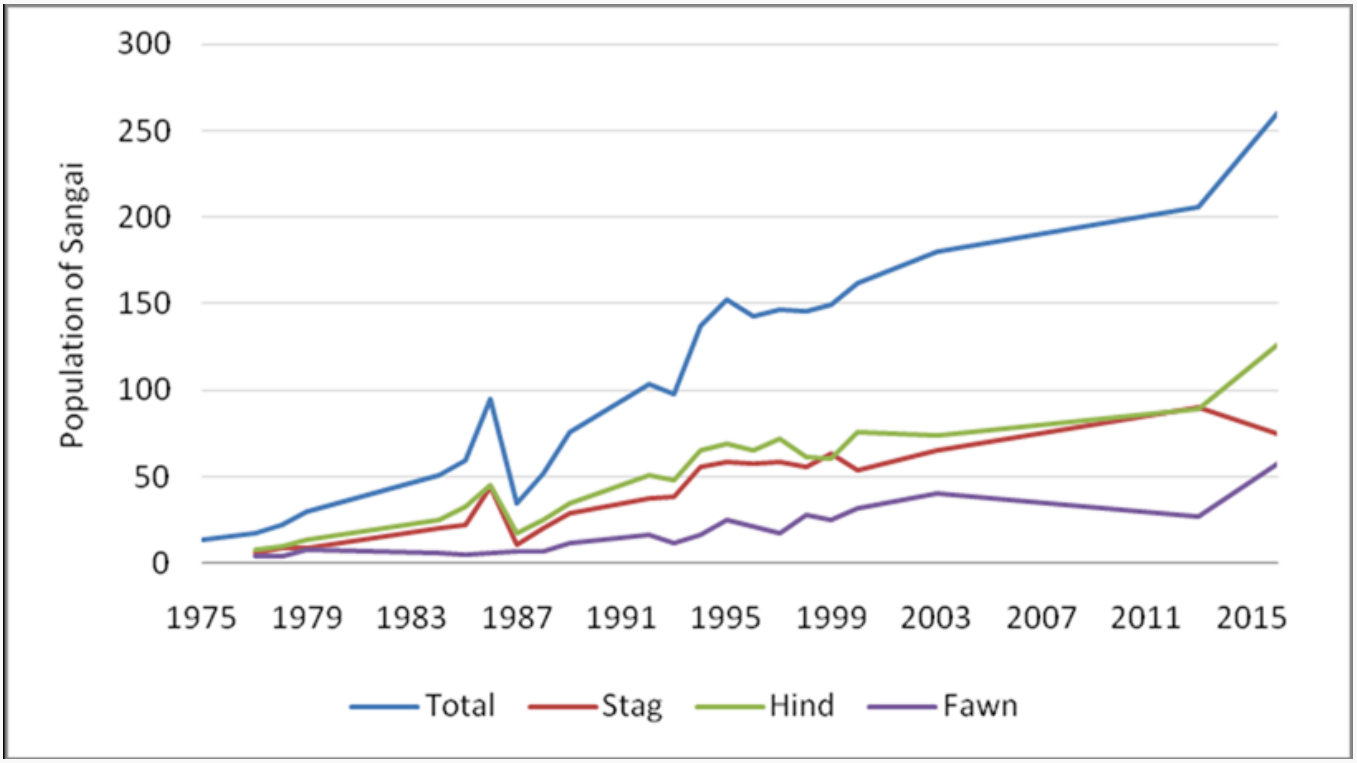
1.5. Rehabilitation of Mined Out Areas:

- 115.70 million saplings planted over 57,996 ha of mined out areas. Their survival rate is assessed at 68.38 %. (Annual Report 2017-18, Ministry of Mines)
- Rehabilitation of 110 abandoned mines covering 1,363 ha has been achieved during 2017-18. (Annual Report 2017-18, Ministry of Mines)

2. Species restoration after Forest and Water Body Restoratio

- Sustainable population of tiger and elephants have been restored with increase in the number of tigers from 1,827 in 1972 to 2,226 in 2014, and number of elephants from 12,000 in 1970s to 27,000 in 2015.
- Edible Nest Swiftlet and Lion population is showing an increasing trend.
- Manipur Brow Antlered Deer (Sangai) population in Loktak Lake shows an increasing trend. See Figure 3.3
-

Figure 3.3
Trend in Manipur Brow Antlered Deer (Sangai) Population in Loktak Lake



Source: Wetland International

- *In situ* and *ex situ* programmes to conserve the Edible Nest Swiftlets in Andaman and Nicobar Islands have resulted in significant growth in the population of the Swiftlet.
- Population of lion in Gujarat has shown an increase from 177 in 1978 to 523 in 2015.
- The number of one horned Rhinoceros has increased nearly to over 2,900 in 2015.
- Restoration of 156 threatened plant species through scientific niche modelling and developing propagation protocols under DBT pan-India initiative, 'Preventing Extinction and Improving The Conservation Status of Threatened Plants through application of Biotechnological Tools'.
- Greater Adjutant Stork and its habitat conserved with help of local community in Dadara, Pacharia and Singimari villages in Assam (Refer to NBT 1 Section II – other relevant information; The women *Hargilla* Army).
- 1,050 m^2 of area of degraded coral reef belonging to family *Acroporidae* has been restored in Gulf of Kuchh, Gujarat.
- Survey of PAs, forests and core areas of biosphere reserves (BRs) is likely to reveal more floral and faunal species whose populations would have been restored/increased.
- Black Necked Crane: WWF India in collaboration with the Department of Wildlife Protection, Government of Jammu and Kashmir, has been working towards conservation of high-altitude wetlands, with black necked crane *Grus nigricollis* as a priority species in Ladakh region. Population reported in 2010 was 62 adults and 11 juveniles, which increased to 106 adult and 15 juveniles in 2017.

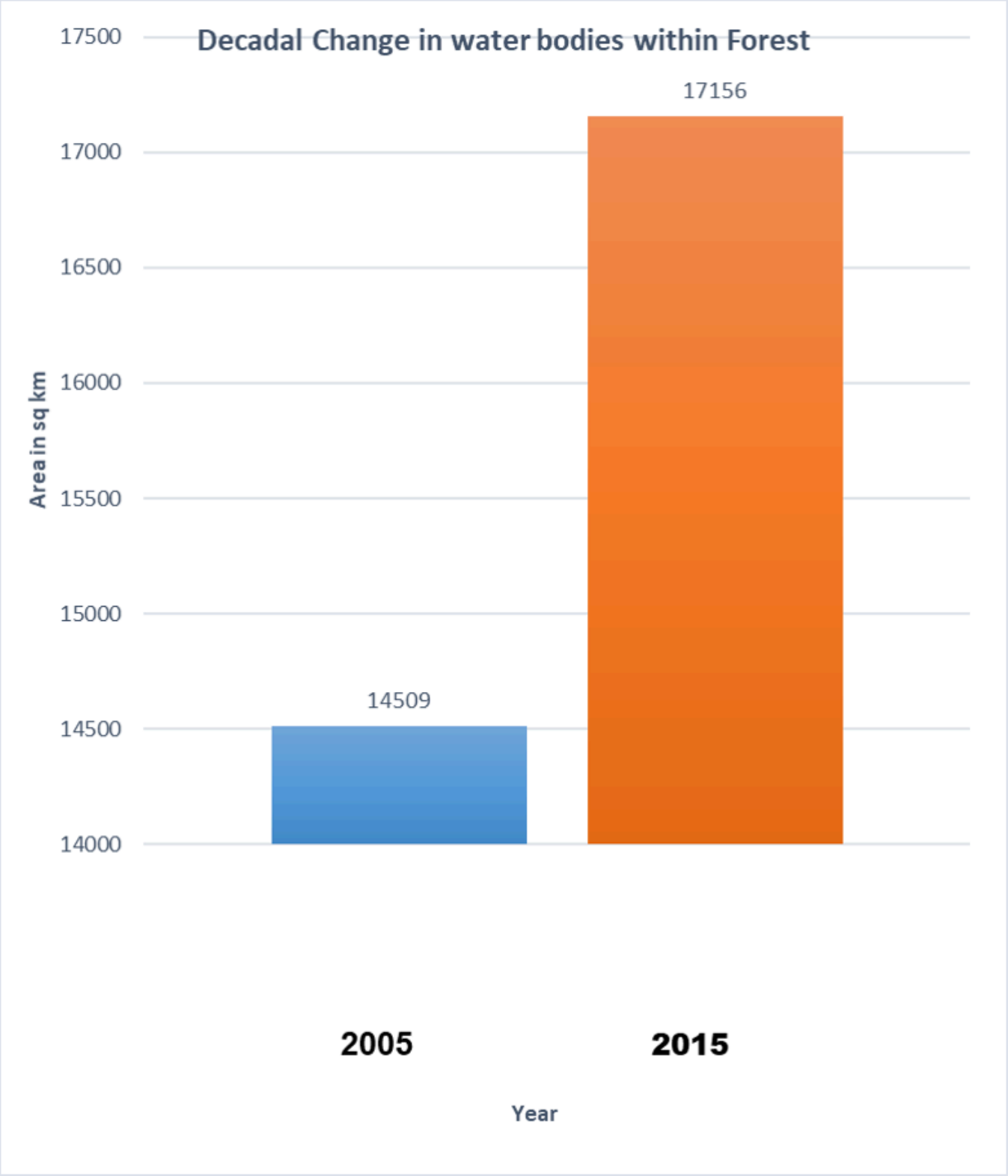
3. Trends in Aquatic Ecosystems

India's wetlands comprise 4.6 % of its land area. Faunal species diversity of these wetlands is quite high. Zoological Survey of India (ZSI) assessment places the number at 9,456 species in fresh water ecosystems which is approximately 9.4% of India's total faunal biodiversity. Wetland (Conservation and Management) Rules 2017 which replaced the Wetland (Conservation and Management) Rules 2010 reflect the renewed commitment of the Government by providing for creation of State/UT authorities for integrated management of the wetlands notified by them. The implementation has already commenced in States. For example the State of Uttar Pradesh has notified all wetlands exceeding an area of 2.24 ha falling outside the protected forest area under the Rules, 2017 and uploaded them on website www.sacup.org to secure their protection.

- A series of capacity development workshops were held by MoEFCC in collaboration with expert agencies to build capacity within States and Union Territories (UTs) for Integrated Management of Wetlands (IMW).
- Of 115 wetlands and 65 lakes identified for IMW, funds released for 83 wetlands and 65 lakes under NPCA. Management plans of seven Ramsar sites have been updated to integrated management plans covering an area of 0.30 MHA.
- Action Plans for wetlands restoration have been made a part of implementation of Smart Cities project.
- State Governments are increasingly integrating allocations for wetlands development in their budgets, e.g., Odisha has allocated approximately Rs 70 million per year in annual budget, Uttar Pradesh has done restoration in Sitapur and Lakhimpur Kheri districts through leveraging from Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) funds.
- Uttar Pradesh has notified all wetlands exceeding an area of 2.24 ha falling outside the protected forest area under the Rules, 2017 and uploaded them on website www.sacup.org to secure their protection.
- Efforts are made to encourage private sector participation in design and funding of wetland management plans. In a model initiative, IUCN, Tata Chemicals and Wetlands International South Asia developed a management plan for Chandrabhaga Wetlands, a coastal wetland in Jamnagar, Gujarat though CSR.

- To enable development of restoration projects within the ambit of Corporate Social Responsibility (CSR), wetlands have been included in training curricula of Indian Institute of Corporate Affairs, an autonomous institute under Ministry of Corporate Affairs (MCA) for research, education and advocacy on corporate regulation governance and running sustainable businesses.
- Increase of 2,647 km^2 in the water bodies within forests over the decade 2005-2015 has been achieved through leveraging of MGNREGA, Integrated Wasteland Development Programme (IWDP) and other government schemes. It creates positive landscape level benefits. See Figure 3.4

Figure 3.4



Source: India State of Forest Report- 2018, Forest Survey of India

4. Trends in Mangrove cover and Coastal Area Management

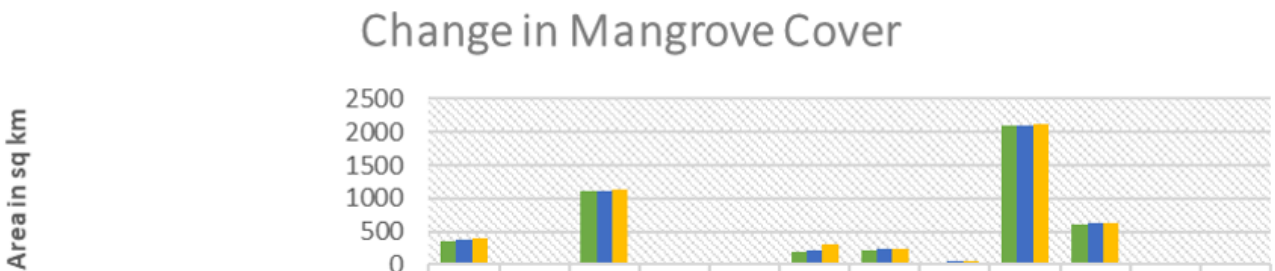
Extension and education activities and implementation of management strategies taking local people into confidence have helped these highly sensitive ecosystems improve.

4.1. Mangroves

In absolute terms the area under mangrove has increased from 4627.63 km^2 in 2013 to 4921km^2in 2017.India's contribution to global mangroves has increased to 3.33% from 2.69% noted in NR5. See Fig 3.5

Figure 3.5: Change in Mangrove Cover

*Geographic Area updated by Survey of India and published in Census of India, 2011 has been used in ISFR 2017

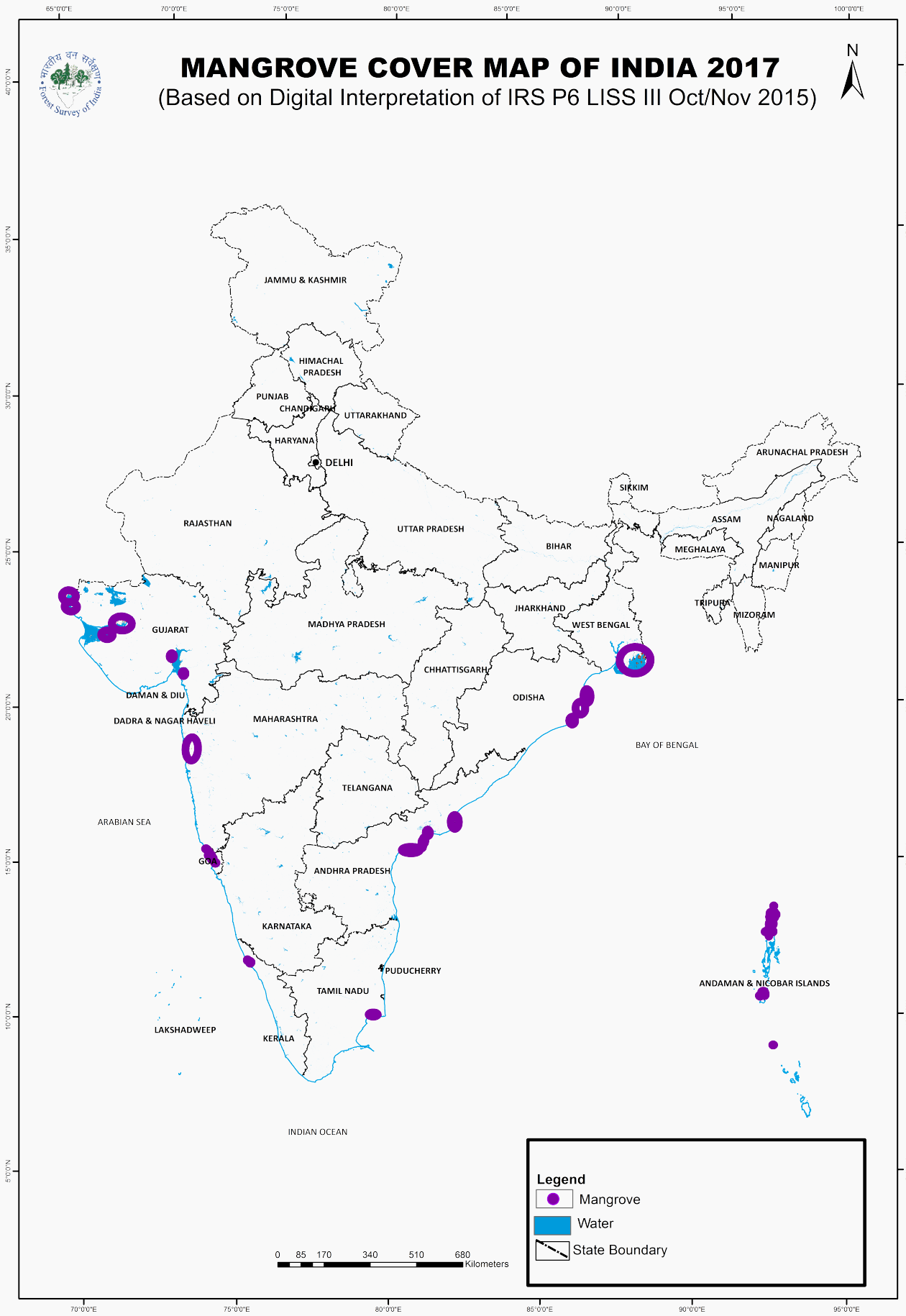


	Andhra Pradesh	Goa	Gujarat	Karnataka	Kerala	Maharashtra	Odisha	Tamil Nadu	West Bengal	A & N Islands	Daman & Diu	Puducherry
Change in area of Mangrove (sq km.) ISFR 2013	352	22	1103	3	6	186	213	39	2097	604	1	1.63
Change in area of Mangrove (sq km.) ISFR 2015	367	26	1107	3	9	222	231	47	2106	617	3	2
Change in area of Mangrove (sq km.) ISFR 2017*	404	26	1140	10	9	304	243	49	2114	617	3	2

Source: India State of Forest Report, Forest Survey of India

- Natural rejuvenation in old areas and plantations in new area have led to increase of 293.27 km^2.
- The spread of mangroves across India is shown in Figure 3.6.

Figure 3.6 Mangrove cover map of India


MANGROVE COVER MAP OF INDIA 2017
(Based on Digital Interpretation of IRS P6 LISS III Oct/Nov 2015)
N
JAMMU & KASHMIR
HIMACHAL PRADESH
PUNJAB
CHANDIGARH
UTTARAKHAND
HARYANA
DELHI
RAJASTHAN
UTTAR PRADESH
BIHAR
SIKKIM
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
TRIPURA
MIZORAM
JHARKHAND
WEST BENGAL
GUJARAT
MADHYA PRADESH
CHHATTISGARH
ODISHA
DAMAN & DIU
DADRA & NAGAR HAVELI
MAHARASHTRA
BAY OF BENGAL
TELANGANA
ARABIAN SEA
GOA
ANDHRA PRADESH
KARNATAKA
PUDUCHERRY
TAMIL NADU
ANDAMAN & NICOBAR ISLANDS
LAKSHADWEEP
KERALA
INDIAN OCEAN
0 85 170 340 510 680
Kilometers
Legend
Mangrove
Water
State Boundary

4.2. Trends in integrated coastal management

- National Centre for Coastal Research (NCCR) renamed as such from Integrated Coastal and Marine Area Management Project Directorate (ICMAMPD) provides scientific and technical support to coastal states for implementing ecosystem based integrated coastal and marine area management (ICMAM) for sustainable use of resources. Some key contributions of NCCR include:
- Development and demonstration of the concept of ecosystem modelling to facilitate better management of coastal and marine ecosystems at Kochi back water and Chilika lake.
- Development of designs and technologies for important elements of GIS based information system for coral reefs and mangrove and shore protection measures.
- Development of a model to predict movement of oil spill.
- Development of a plan for sewage treatment/disposal strategy to reduce bacterial load in sea.
- Adoption of the Shoreline Management Plan for mitigating erosion of Ennore coast in the state of Tamil Nadu.
- Completion of hazard line mapping of west coast.
- Integrated Coastal and Marine Area Management *inter alia* through aerial photography, sediment cell mapping, eco-sensitive areas and shore line mapping of the entire coast.
- Detailed field study undertaken for conservation of 893 Ecologically Sensitive Areas identified during mapping.
- Capacity building and creation of specialised manpower on mathematical models at leading institutions such as Centre for Earth Sciences Studies, Trivandrum, National Institute of Technology Karnataka, Andhra University, Hyderabad.

5. Trends in River Water Quality

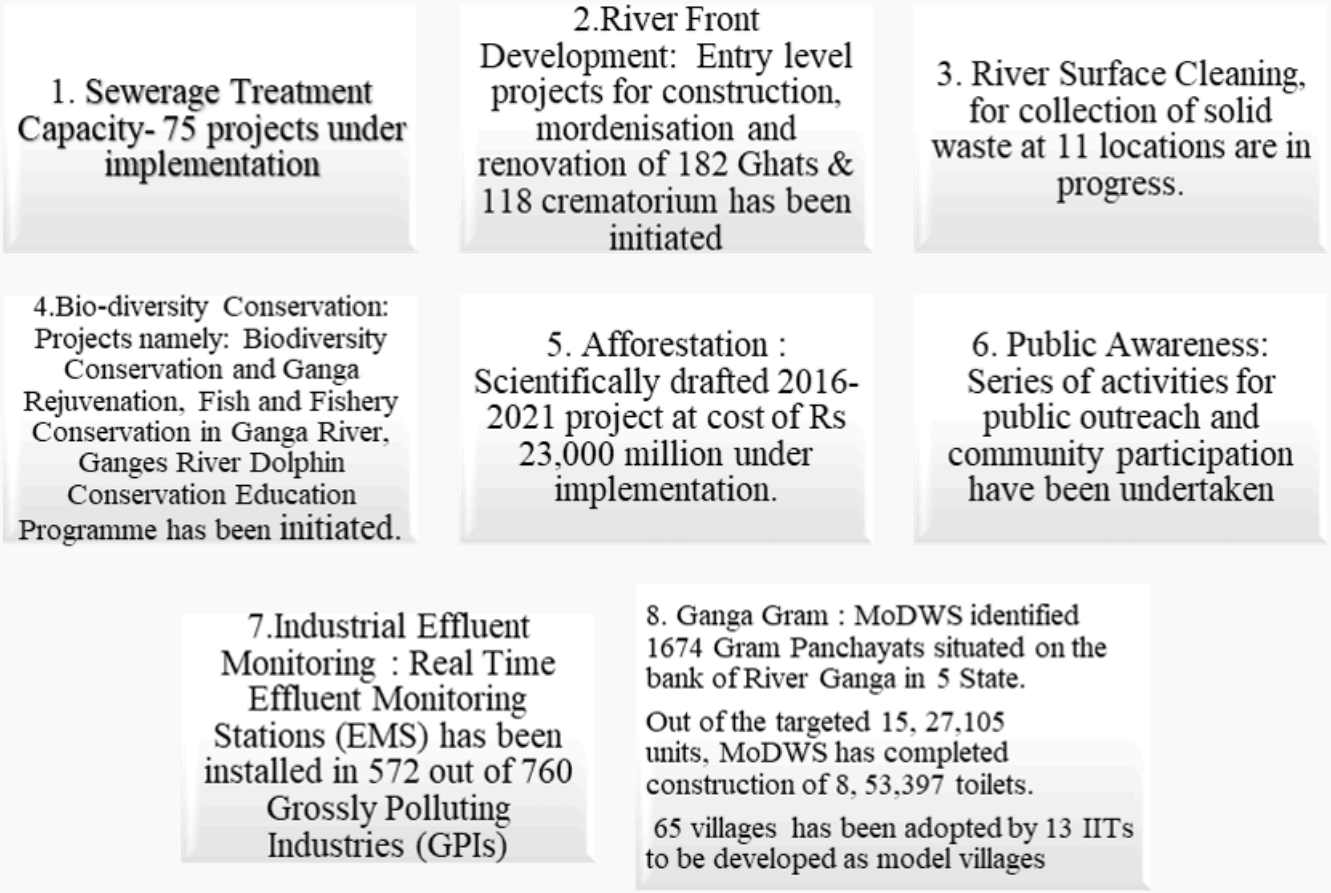
5.1 Implementation of National Water Quality Monitoring Programme (NWQMP)

- Strategic comprehensive multi-pronged water quality management approach which includes strict implementation of pollution control laws, promotion of cleaner technologies, fiscal incentives and economic instruments of appropriate prices, taxes and property rights is being followed.
- Entire water resources of the country were classified according to their designated best uses and a “Water Use Map” was prepared by Central Pollution Control Board (CPCB). The idea is to superimpose “Water Quality Map” on “Water Use Map” to identify the water bodies or their parts, which are in need of improvement (restoration).
- Through a wide network of water quality monitoring, water quality data are acquired. A large number of water bodies are identified as polluted stretches for taking appropriate measures to restore their water quality.
- 3,000 stations in 29 States/6 UTs established to cover water quality monitoring of 540 rivers, 339 lakes, ponds and tanks, 42 creeks, 26 canals, 45 drains and 893 wells.
- Surface water monitored on monthly and groundwater on a half-yearly basis for 28 physico-chemical and bacteriological parameters. Selected samples are analysed for nine trace metals and 28 pesticides.
- CPCB made a model plan for restoration of river *Hindon* and shared it with State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs) to create capacity for making similar plans for identified polluted river stretches. Training imparted to SPCBs/ PCCs and other stakeholders for the purpose.

5.2 Namami Gange Conservation Mission:

- Activities scientifically classified as Entry Level activities for immediate visible improvement, Medium Term and Long-Term activities to be implemented within five years and ten years’ time frame respectively for visible and effective implementation. Figure 3.7 shows the main achievements under *Namami Ganage* Conservation mission.

Figure 3.7: Main Achievements under *Namami Gange*



- **Clean Ganga Fund (CGF)** established to encourage people's participation and ownership. CSR activities brought within its ambit encourage corporates to contribute money to CGF or undertake activities by adopting ghats, piloting new technologies, collecting and disposing of floating debris/solid waste, conducting research, creating awareness and planting trees.
- **Local people involved through volunteers** from amongst them as motivated cadres of '*Ganga Praharis*' (watchmen of Ganga) along the river banks to protect it from polluting influences by monitoring the river stretches and mobilizing local support.

5.3. National River Conservation Plan (NRCP)

- Polluted stretches of 31 rivers in 75 towns spread over 14 States at a sanctioned cost of Rs.4,5178.2 million is covered under actions.
- Treatment capacity of 2,4554.3 million litres per day established by the end of March 2017 at a total cost of Rs. 3,0455.3 million.

6. Combating Desertification

- Land Degradation Atlas (2016): The Atlas showed a see-saw trend. 1.95 MHa was reclaimed and 0.44 MHa moved from higher severity to low severity during 2003-05 to 2011-13, but 3.63 MHa of productive land registered some level of degradation and 0.74 MHa moved from low to high severity during the same period. Water erosion, vegetation degradation and wind erosion were identified as the most significant processes abetting land degradation for which actions are in progress.
- National Water Policy 2012, National Rainfed Area Authority (NRAA)- 2007, National Policy for Farmers 2007, National Environmental Policy 2006, National Agricultural Policy 2000, National Forest Policy 1988, Environment (Protection) Act 1986, Forest (Conservation) Act 1980, all reflect the object of control and reversal of land degradation and desertification, and the sectoral programmes include ameliorating measures.
- Agriculture is the biggest land use. Resource Conservation Technologies, reclamation of problem soil, rainfed area development (RAD), organic village/cluster and Participatory Guarantee System (PGS) organic certification, soil health management and soil health cards, rainwater conservation and secondary storage structures under PMKSY, promotion of agroforestry, portable soil testing kit, soil resource data bank creation, conservation and management of agroforestry on bunds/wastelands are being implemented by the MoAFW.
- Land form maps, soil survey and soil maps prepared by ICAR for 1.73 MHa create land resource inventory for sustainable land-use plans, suitable technologies and agricultural practices to arrest and reverse degradation.
- Watershed development projects numbering 8214 covering 39.07 MHa in 28 states are being implemented under PMKSY to encourage ridge area treatment, drainage line treatment, afforestation, soil and moisture conservation, rain water harvesting, horticulture, and pasture development etc. Since 2014-15, 5,06,001 water harvesting structures were created/rejuvenated. Additional area of 10,27,837 ha has been brought under protective irrigation upto 2017-18. The number of farmers benefitted is 19,41,017 during 2017-18.

- Tree cover expansion through GIM and NAP on degraded forests helps land rehabilitation and landscape amelioration.
- 14.3 MHa of land improved through NRM interventions in MGNREGA in 2015-2018.

7. Status and Trends of levels of water in wells/groundwater table

- **CGWB has prepared "Master Plan for Artificial Recharge to Ground water in India"** in 2013 which includes construction of 11.1 million **rain water harvesting and artificial recharge structures to harness 85 BCM of water.**
- **CGWB monitors Ground water levels** through a network of 23,125 monitoring wells during the months of January, Pre-monsoon (March/April/ May), Post-monsoon (August and November).
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)** includes access to tap water with assured supply of water and sewerage connection to every household.
- **PMKSY's Per Drop More Crop** seeks to ensure wise and optimum use of water and reach scientifically assessed irrigation potential of the country at 140 MHa. This programme is an inter-sectoral programme implemented by the Ministry of Water Resources for accelerated Irrigation Benefit programme, Ministry of Agriculture for On-farm Water management and Department of Land Resources for Integrated Watershed Management Programme.
- **Rain water harvesting has been made mandatory** by 30 States/UTs. People are encouraged to undertake roof-top rainwater harvesting, erecting sustainable structures for water conservation.
- **Mass awareness programmes** through special events and media messages organized with repeated frequency to promote rain water harvesting and artificial recharge for ground water.
- **Aquifer Mapping and Management Programme** for aquifer/area specific ground water management plans, with community participation are funded by The Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR).
- '***Jal Kranti Abhiyan'*** 2015-16 to 2017-18 has been taken up to consolidate water conservation and management through a holistic and integrated approach involving all stakeholders by making it a mass movement. More than 17 lakh children participated in a nation-wide painting competition in 2016 to promote conservation of water.

8. Trends in Maintenance of Fertility in Agricultural Lands using Natural Methods

Refer to Section II- Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes- Sustainable Agriculture NBT 5

Relevant websites, links, and files

http://fsi.nic.in/details.php?pgID=sb_64

Other relevant information

Sustainable Tourism promoted by Ministry of Tourism:

Initiatives taken by Ministry of Tourism (MoT) to promote responsible tourism and protect natural habitats from any damaging impacts of tourism are summarized hereafter.

- Ministry encourages stakeholders to promote and practice eco-tourism through the annual National Tourism Awards such as for the best eco-friendly hotel, best responsible tourism project, best ecofriendly practices by tour operators to various segments.
- **Comprehensive Sustainable Tourism Criteria (STCI)** for major segments of the tourism industry, namely, accommodation, tour operators, beaches, backwaters, lakes and rive sectors applicable for the entire country. The criteria have been evolved after consultation with various stakeholders. Ministry has been encouraging the tourism stakeholders to adopt the criteria for responsible and eco-friendly tourism practices.
- A **Code of Conduct** for tourism requiring the tourism service provider to fully implement sustainable tourism practices such as discouraging litter of waste and plastic material in places visited etc.
- **MoU** signed between MoT and Ecotourism Society of India (ESOI) during 2016 to create awareness on Responsible Tourism practices among the stakeholders. Two workshops were held in 2017 and six more are proposed during 2018-19.

According to MoT's guidelines for approval of Hotel Projects at the implementation stage and also guidelines for classification of operational hotels under various categories, hotels at the project stage itself are required to incorporate various eco-friendly measures like sewage treatment plant (STP), rain water harvesting system, waste management system etc. Guidelines govern approval of Hotel Projects to ensure eco-friendly measures like Sewage Treatment Plant (STP), rain water harvesting system, waste management system etc. EN

- Once the hotel is operational, it can apply for classification under a Star category to the Hotel & Restaurant Approval Classification Committee (HRACC) of the Ministry. During the physical inspection of the hotel by HRACC Committee, it is ensured that in addition to the aforementioned measures, other measures like pollution control, introduction of non - CFC equipment for refrigeration and air conditioning, measures for energy and water conservation are also undertaken by the hotel.
- Under the guidelines for project level and classification / re-classification of operational hotels, it has been prescribed that the architecture of the hotel buildings in hilly and ecologically fragile areas should keep in mind sustainability and energy efficiency and as far as possible be in conformity with the local ethos and use local materials.
- **Ecological restoration of limestone mined out area of *Puranapani,* Odisha**

This is a limestone mined out area spread over approximately 250 ha. Deep pits, absence of soil layer and complete barrenness were its features when Centre for Environment Management of Degraded Ecosystem (CEMDE), University of Delhi in collaboration with

Department of Biotechnology, Government of India and Steel Authority of India Limited took it up for restoration. Scientists engaged local people particularly woman through self-help groups to collect native grasses and tree saplings from surrounding forests giving them remuneration. These were raised in the nurseries and then planted in the mined-out areas using cutting edge biotechnology. Today a three storeyed tropical moist deciduous forest with 150 native tree species has come up in the area. The top canopy has reached the height of 90 feet; the secondary storey has canopy reaching to 60 feet height, the third storey has height of 40 feet and fourth storey is 20 feet tall. This restored rain forest is 12-year-old only. The 200 acres mine void has been transformed into a biologically productive aquatic ecosystem. This restored forest system and the wetland ecosystem provides livelihoods to local communities in addition to providing other ecosystem services.

- **Restoration of mined out area in urban locale**

A concept of biodiversity parks was developed by CEMDE, University of Delhi, a Centre of Excellence for MoEFCC, to rescue rehabilitate and restore degraded areas in and around cities to bring back the natural heritage of these areas. Delhi Development Authority (DDA), Delhi city's planning development agency appreciated the concept and decided to promote this working in collaboration with CEMDE.

DDA notified six biodiversity parks in and around Delhi covering about 1000 ha of land. It also notified riverfront network of biodiversity parks covering over 9000 ha along a 52 kms stretch of river Yamuna. Two out of the six parks, namely, the Yamuna Biodiversity Park and Aravalli Biodiversity Park have become fully functional Nature Reserves of Delhi. The other six are under development.

Yamuna Biodiversity Park and Aravalli Biodiversity Park, Delhi

Biodiversity restored in and services rendered by these two parks are of immense value. Together they harbour some 3,000 species native to Yamuna river basin and Aravalli mountains, the two major landforms that support life in Delhi. The 3,000 species live in 45-50 communities and include 1,500 plant species, 250 bird species, 50 species of dragonflies,115 species of butterflies, 25 species of reptiles, 20 species of fish, 20 species of mammals including herbivores, primary and secondary carnivores and some 2000 invertebrate

fauna. The Yamuna Biodiversity Park is now one of the finest wetlands in the country and attracts thousands of migratory birds.

These Biodiversity Parks serve as hubs for Environmental and Nature Conservation Education for students and public. They generate a wide range of goods and ecological services such as buffering of local environment, storing of flood water, recharging of ground water, serving as filters for non-point sources of air pollution, enriching human microbiome, imparting climate resilience, serving as habitat for vanishing flora and fauna of the region, and providing recreational, aesthetic, spiritual and education services to the citizens and visitors of Delhi.

These biodiversity parks in Delhi provide an urban natural heritage conservation model for replication

elsewhere in India and the world.

Development of Yamuna Biodiversity Park figures in the publications by Julie Tasker Brown (India: Delhi Biodiversity Park Network. Supporting Local Action for Biodiversity, the role of National Government in UN Habitat. Case Study 44: Pp. 42, 2010) and also by Åshild Kolås Report on India's Climate Mitigation and Adaptation: Key Strategies, INDWORLD Conference Report, 2017: https://www.prio.org/Publications/Publication/?x=10834).

Figure3.9 Yamuna Biodiversity Park

B.

Source: The Centre for Environmental Management of Degraded Ecosystems (CEMDE), University of Delhi

Other relevant website address or attached documents

https://unfccc.int/resource/docs/natc/indnc2.pdf
https://icar.gov.in/files/DAREAnnual%20Report-2017-18_(English).pdf
http://fsi.nic.in/details.php?pgID=sb_64
http://envfor.nic.in/
https://www.cbd.int/doc/world/in/in-nbsap-v3-en.pdf
http://nationalreport6.in
https://www.cbd.int/doc/world/in/in-nr-05-en.pdf

Obstacles and scientific and technical needs related to the measure taken

- With India's 2.4% of the land supporting nearly 18% of the human population of the world, pursuit of sustainable development with social and economic equity is a challenge. Balancing the needs of providing sustainable livelihoods to vulnerable sections of the society including local and traditional communities and women through projects that achieve the twin objectives of conservation and providing livelihoods is implemented through programmes such as MGNREGA, IWDP, technology and extension support for rainfed agriculture. Nevertheless, it is a challenging situation.
- **Forest Fire:** More than 5500 million is the annual estimated loss from forest fire. The loss of biodiversity, ozone layer depletion, loss of habitat for wildlife and soil erosion etc. through forest fires causes long term damage. Rs. 4,940 lakhs were allocated for year 2017-18 under MOEFCC scheme "Forest Fire Prevention and Management" to provide technical and financial support to states. Such initiatives need additional funding, resources and technical support. Control and eradication of Invasive Alien Species (IAS) that help spread of fires also needs resources.
- **Aquatic riverine and land ecosystems/habitats** often suffer the brunt of pollution and other damaging influences because of the pressure of inappropriate use by people to satisfy their immediate, often unavoidable needs. Intensive and sustained training and capacity building of institutions of local governance such as Municipal and Panchayat bodies and Biodiversity Management Committees (BMCs) to create/tap into other locally available alternative sources of satisfying such needs would support and accelerate the work under various programmes.
- Invasive alien species are a major threat to integrity of habitats. This has been dealt in detail under NBT 4.

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NBT-4: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Measures

- **National Working Plan Code, 2014 for Sustainable Management of Forest and Biodiversity in India** includes management of invasive species for maintenance and enhancement of forest health and vitality.
- **National Assessment of Tigers**: Invasive plants monitoring, made an integral part of the co-predators, prey and their habitat, is done every fourth year, since 2006. Forest staff and trained biologists sample all the forest patches in the tiger ranges of the

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country and record presence of all invasive plants.

- **Plant Quarantine (Regulation of Import into India) Order, 2003 and Sub-Mission on Plant Protection and Plant Quarantine** *inter alia* prevents introduction of exotic pests, diseases and weeds likely to get introduced through import of agricultural commodities or plants materials into India and fulfil obligation under IPCC.
- **Plants, Fruits & Seeds (Regulation of Import in India) Order 1989 (PFS Order 1989):** Regulates the import of plants, fruits or seeds in India.
- **Forest (Conservation) Act, 1980** provides for the conservation of forests and for matters connected therewith.
- **Wildlife Protection Act, 1972** provides a legal framework for protection and conservation of various species of animals, plants and birds.
- **Destructive Insects and Pests Act,1914 and Amendments:** To prevent introduction into and transport from one state to another in India of any insects, fungus or other pest which is or may be destructive to crops.

Policies and Measures that support main measures:

- **National Forest Policy 1988 as amended in 2018**: To improve the state and quality of existing forests and protect them against various threats and drivers of degradation
- **Biological Diversity Act, 2002 mandates** the Central and State governments take steps for conservation and sustainable use of biodiversity.
- **Livestock Importation Act, 1898** enables Central government to make provisions for the regulation of the importation of livestock.
- **Environment (Protection) Act, 1986** provides for provide for the protection and improvement of environment and the prevention of hazards to plants, human beings, other living creatures and property.
- **The Indian Forest Act, 1927 as amended from time to time** stipulates measures for protection of forests by the government.

Other Measures

- Intensification of Forest Management Scheme (IFMS) started in 2009 includes control and eradication of forest invasive species as a component.

National Target(s)

National Biodiversity Target (NBT) - 4 : By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been partially effective

tools or methodology used for the assessment of effectiveness above

Indicators and assessment of progress against them with regard to NBT 4 are as follows:

- ZSI/BSI during their surveys take note of IAS. Clear identification of invasive aliens as distinct from naturalised non-invasive aliens and prioritising the identified species for control and eradication are the first two essential steps for action.
- After detailed and intense consultations with experts, NBA has now prepared an agreed list of 171 invasive alien species for further work on prioritization. See Table 4.1.

Table 4.1. Invasive Alien Species of India

	S.No.	Ecosystems	Number
	Terrestrial Ecosystem		
1.		Terrestrial plants	**53**
	Total		**53**
	Aquatic Ecosystem		
1.		Microorganism reported in freshwater and brackish water	**15**
2.		Aquatic plants (inland)	**7**

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3.	Fishes	**14**
4.	Marine invasive species	**19**
Total		**55**
Agriculture Ecosystem		
1.	Fungus	**16**
2.	Bacteria	**5**
3.	Virus	**3**
4.	Nematode	**1**
5.	Invasive Insects	**22**
Total		47
Major Island Ecosystem		
1.	Insects	**2**
2.	Cnidaria	**1**
3.	Mollusca	**1**
4.	Fishes	**2**
5.	Amphibian	**1**
6.	Reptile	**1**
7.	Birds	**2**
8.	Mammals	**4**
Total		**14**
	Terrestrial plants	**53**
	Aquatic Ecosystem	**55**
	Agriculture Ecosystem	**47**
	Island Ecosystem	**14**
	Total IAS	**169**

1. Trends in number and coverage of management plans and change in area affected by Invasive Alien Species

- Site specific measures to control IAS such as *Lantana camara*, Water hyacinth (*Eichhornia crassipes)* and some other species are taken from time to time by agencies concerned.
- Strategies tested and advocated by these studies include (i) ecological restoration by allowing selected indigenous plant species with potential to outcompete invasive species to flourish, (ii) mechanical control in combination with crop-competition method, and (iii) cut-root-stock method combined with introduction of native legumes and grasses. Identification and treatment of IAS are an essential part of wetland management plans.
    - The work for prioritization of IAS is in progress. NBA is leading the process of preparing an agreed list of names and priorities for management of IAS species in consultation with experts and stakeholders.
    - Studies are being carried out by Tropical Forest Research Institute (TFRI), Jabalpur, and others to establish workable models for control/eradication of IAS. Management of *Lantana camara* adopting one or the other of the models mentioned is being practised.
    - Extent and causes of species invasion are included as part of wetland management plans.
    - Phytosanitary and quarantine measures are implemented to prevent entry of destructive pests and plants in the country.

Other relevant information

- Biological control of Parthenium in India: status and prospects (https://www.researchgate.net/publication/303170534_Biological_control_of_Parthenium_in_India_Status_and_prospects.
- Gaurav, R.K et al., .2017. . Impact and management of *Parthenium hysterophorus*. *Global Journal of Bioscience and Biotechnology;*.6 (1); 15-18. (https://www.researchgate.net/publication/323545888_IMPACT_AND_MANAGEMENT_OF_PARTHENIUM_HYSTEROPHORUS).

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Obstacles and scientific and technical needs related to the measure taken

Pervasiveness of IAS across areas and their tendency to resurge after patchy treatments necessitates implementation of strategies that create lasting effect. Sharing of best practices from across the globe, scientific and technical cooperation, contiguous transboundary cooperation and additional earmarked funding are required to achieve this target. Within the country also a nationally coordinated system of invasive species management needs to be established which brings together domain experts such as botanists, foresters, wildlife biologists, researchers, engineers, ecologists, hydrologists, and communication experts to make areas and species-specific strategies taking a long-range management perspective of IAS.

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NBT-5: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

This NBT integrates ABT 6 to ensure that fish, invertebrate stocks and aquatic plants are managed sustainably and legally based on ecosystems approach, ABT 7 through promotion and adoption of conservation friendly sustainable agriculture, aquaculture and forestry practices and NBT 8 by addressing issues of pollution that work to the detriment of conservation and ecosystem health. This section deals with measures taken for sustainable management of agriculture, forests and fisheries.

Sustainable Agriculture Management

Sustainable management of agriculture rests on these strong pillars: (i) Soil Health Management; (ii) Irrigation Expansion and Management with 'Per Drop More Crop' motto; (iii) R & D in Bio-fortification, health foods and climate resilience; (iv) Integrated Nutrient Management; (v) Integrated Pest Management; (vi) Encouragement to organic farming; (vii) Protection of farmer's rights with respect to their contribution made at any time in conserving, improving and making available plant genetic resources; (viii) Conservation of germplasm; and (ix) Economic viability.

Pre-existing policies, laws and administrative mechanisms have provided a base for consolidating, augmenting and adding new measures for achieving these objectives.

Main Policy and Legislative Measures for Sustainable Agriculture Management *inter alia* include:

- National Farmers Policy, 2007 *inter alia* aims at increasing productivity, profitability and stability of agriculture through creating economic stake in conservation of water, biodiversity and genetic resources.
- Plant Quarantine (Regulation of Import into India) Order, 2003 prohibits and regulates the import of agricultural articles specified in the Order.
- National Agroforestry Policy, 2002 aims at supplementing farmers' income, securing convergence and synergy among elements of agroforestry.
- Protection of Plant Varieties and Farmers' Rights Act, 2001establishes a system for protection of plant varieties, farmers' and plant breeders' rights including rights in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties.
- Fertilizer Control Order, 1985 regulates trade, price, quality and distribution of fertilizers and matters connected therewith.
- Seeds Act, 1966 regulates the quality of seeds for sale and for matters connected thereto.
- Seed (Control) Order, 1983 obligates all dealers to obtain license to carry on the business of selling, exporting or importing seeds at any place.
- Insecticides Act, 1968 with Insecticides Rules, 1971, (as amended from time to time) regulates the import, manufacture, sale, transportation, distribution and use of insecticides.
- Destructive Insects and Pests Act, 1914 (as amended) prevents introduction of any insect, fungus or pest, destructive to crops.

Other measures include:

- Four National Missions supported by R&D through the Indian Council of Agricultural Research (ICAR) and National Innovations on Climate Resilient Agriculture (NICRA)implement various aspects of agriculture for sustained and sustainable development of a doggedly pursued mission mode in this vastly diverse sector. See Figure 5.1 for details of National Missions and their mandate.
- *Rashtriya Krishi Vikas Yojna* (RKVY**)** for holistic development of agriculture and allied sectors includes IPM, water and soil conservation, minor/micro irrigation, setting up of labs among its components.
- Measures for gender mainstreaming include- Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50 %. This ensures large-scale participation of women in planning decision making, implementation and governance. Gender Budgeting as part of the Annual Central Government budget. Specific provisions for participation and representation of women in government programmes and schemes.

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Figure 5.1 **National Missions to Ensure Sustainable Agriculture (NMSA) and their Mandate**

R&D and finding solutions:

National Mission for Sustainable Agriculture (NMSA), 2014

Make agriculture more productive, sustainable, remunerative and climate resilient. It has **4 components** - Rainfed Area Development (RAD), Soil Health Management (SHM) , Agro-forestry, Climate Change and Sustainable Agriculture: Monitoring, Modelling and Networking (CCSAMMN).

National Mission on Oilseeds and Oil Palm (NMOOP), 2014

Promote cultivation of all types of oilseeds sustainably encouraging integrated farming system, bio-fertilizers, IPM strategies.

National Mission of Agricultural Extension and Technology (NMAET),2014

Build upon earlier extension schemes to promote technologies and improved agronomic practices.

Has four sub-missions:

1. **Sub-mission on Agriculture Extension (SAME)**

Promote agricultural mechanisation to improve productivity and encourage judicious use of inputs.

2. **Sub-mission on Seed and Planting Material (SMSP)**

Cover entire seed production chain to provide quality seeds to farmers, create seed banks, support seed producing organisations in improving seed quality and seed produciton capacity.

3. **Sub-mission on Agricultural Mechanization (SMAE)**

For awareness creation and enhanced use of appropriate technologies in agriculture & allied sectors.

4. **Sub-mission on Plant Protection and Plant Quarantine (SMPP).**

Promote use of scientific and environment friendly techniques through promotion of Integrated Pest Management. It has **4 components** shown in Fig 5.2.

30 % of the resources are allocated for women farmers and women extension functionaries.

Mission for Integrated Development of Horticulture (MIDH), 2014

Promote holistic growth of horticulture sector through area based regionally differentiated strategies with specific emphasis on small and marginal farmers.

30% budget allocations for subsidies, training and skill development are earmarked for women

- **Indian Council for Agricultural Research (ICAR)** with its 4 Deemed Universities, 64 Institutions, 15 National Research Centres, 6 national bureaus, 13 Directorates and Project Directorates located in various parts of the country works for finding solutions for known and emerging issues in sustainable agriculture through R&D which helps the work of the missions. (https://icar.org.in/node/119)

R&D and development of strategies for climate resilient agriculture:

- **National Innovations on Climate Resilient Agriculture (NICRA),** a strategic research project of ICAR, has been started to enhance resilience of agriculture to climate change and climate vulnerability with the involvement of its leading institutes.

Technology demonstration are carried out in 100 selected districts of India involving over one lakh farm families. The research covers crops, livestock, fisheries and natural resource management. Technology demonstration is implemented in participatory mode and interventions are finalised through the Village Climate Risk Management Committee.

Timely sharing of information:

- **National e-Governance Plan in Agriculture (NeGP-A)** provides farmers easy and timely access to information through various delivery channels including Common Service Centres, Web Portals, SMSs through *Mkisan, Kisan* Call Centers, Farmers' portal and Mobile apps etc. Around 60 online services have been developed and launched for this purpose.

Support and Incentives for Organic Agriculture through:

- ***Paramparagat Krishi Vikas Yojana* (PKMY) 2015**, seeks to promote certified organic cultivation in 2 lakh ha covering 10,000 clusters.
- **Participatory Guarantee System (PGS)**India evolved after consultations between FAO and Ministry of Agriculture and Farmers' Welfare (MoAFW) to encourage organic farming certification with the involvement of farmers through a decentralised system. Consequently, the PGS Organic India Council was setup in 2006 and at National Centre of Organic Farming (NCOF) under MoAFW began to operate the PGS India as a voluntary organic guarantee programme. It involves farmers living in similar geographical area in the same or close-by villages to inspect and verify each other's process and standards to ensure adherence to established standards laid down for organic products.
- **Third Party Certification** of organic farming for exports by accredited certification bodies, under the National Programme for Organic Production (NPOP) under the Ministry of Commerce.
- **Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)**, 2014-15 to develop certified organic production in value chain mode by linking growers with consumers through 100 Farmers Producer Companies (FPCs) composed of 2,500 Farmers Interest Groups (FIGs), covering 50,000 ha area and 50,000 farmers during 2015-18.

Scientific management of water utilisation and energy efficiency:

- ***Pradhan Mantri Krishi Sinchai Yojana* (PMKSY),** 2015- with the motto "Per Drop More Crop" seeks to achieve convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation, promote sustainable use and water conservation practices, ensure water use efficiency at farm level through precision /micro irrigation.
- **Ministry of New and Renewable Energy (MNRE) Capital Subsidy Scheme for promoting Solar Photovoltaic Water Pumping (Refer to Section II, NBT 2)**
- ***Kisan Urja Suraksha evam Utthan Mahabhiyan* (KUSUM)** for solar power pumps (Refer to Section II, NBT 2)

Women in Agriculture:

National Gender Resource Centre in Agriculture (NGRCA), New Delhi acts as the focal point for addressing gender dimension to agriculture policies and programmes, renders advisory services to States and UT's to mainstream gender in agriculture development.

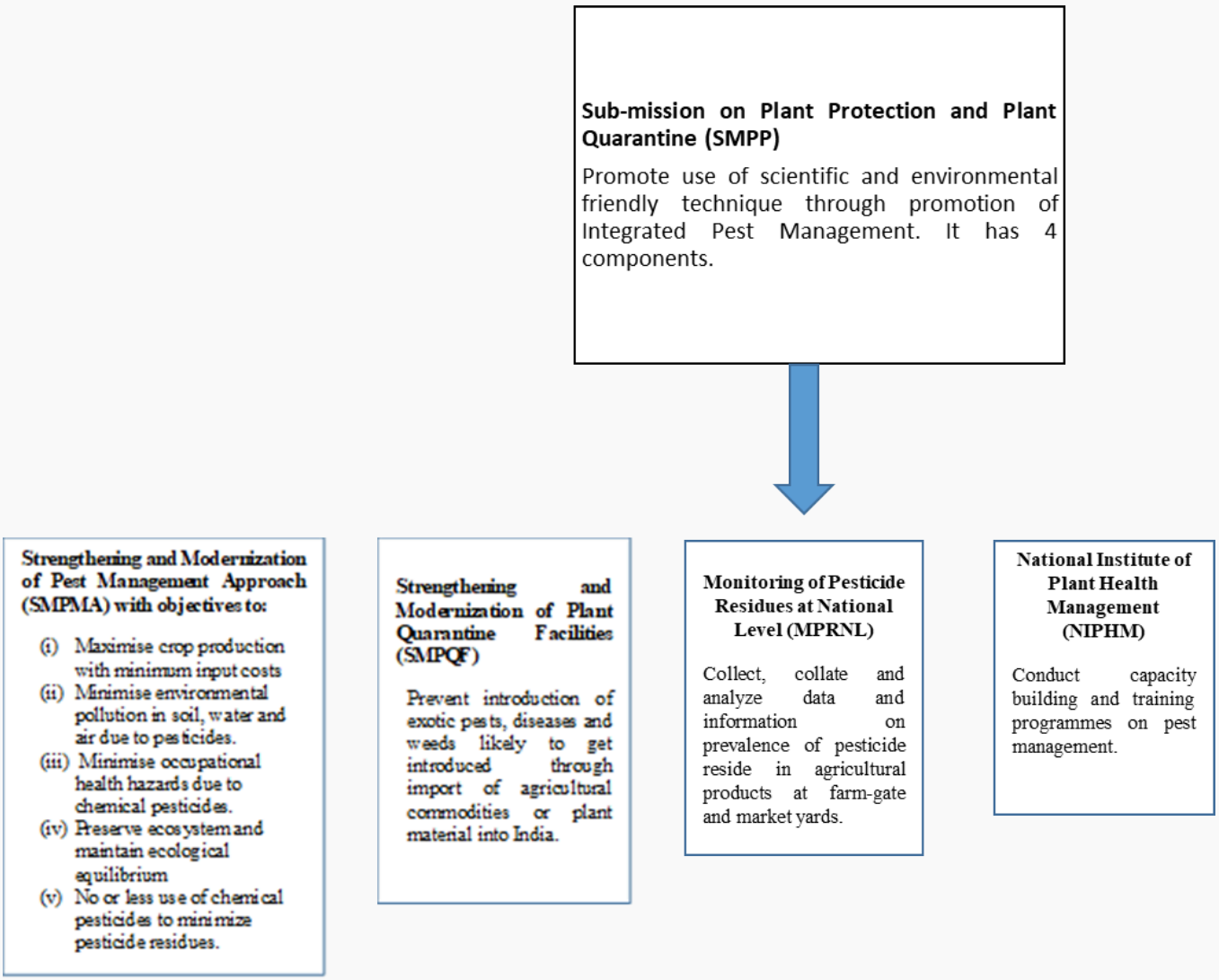
Direct support to decentralised action for extension and other services:

- Funding support to specialised institutes to impart training to extension functionaries, funding support to unemployed youth, including women to set up E-agri clinic and business centres, use of mass media, incentivising States/UTs in developing plans and actions, and
- Promoting farmer driven, farmer accountable Agricultural Technology Management Agency (ATMA) at district level including creating a platform of Farmer Friend (FF) for experienced and progressive farmers to provide advisory services to farmers at village level.

Strong accent on Plant protection, Quarantine and Ecological Equilibrium:

- The Sub-Mission on Plant Protection and Plant Quarantine (SMPP) with its **4 components** promotes Integrated Pest Management (IPM) and health of agricultural ecosystem. See Figure 5.2 for details.

Figure 5.2
Sub-mission on Plant Protection and Plant Quarantine (SMPP)



Welfare Programmes for Farmers:

- **Seed Village Programme, 2006** to upgrade the quality of farmer saved seeds which constitute about 60-65% of the total seeds used for crop production.
- **National Crop Insurance Programme (NCIP)** - Restructured as *Pradhan Mantri Fasal Bima Yojana* (PMFBY) in 2016, to protect farmers against crop failure due to natural calamities, pests & diseases, weather conditions.
- ***Mera Gaon Mera Gaurav* (My Village My Pride)** under Ministry of Agriculture and Farmer's Welfare is a scheme under which the Scientists/Officers adopt villages and provide information to farmers on technical and other related aspects in regulated time-frame through personal visits.

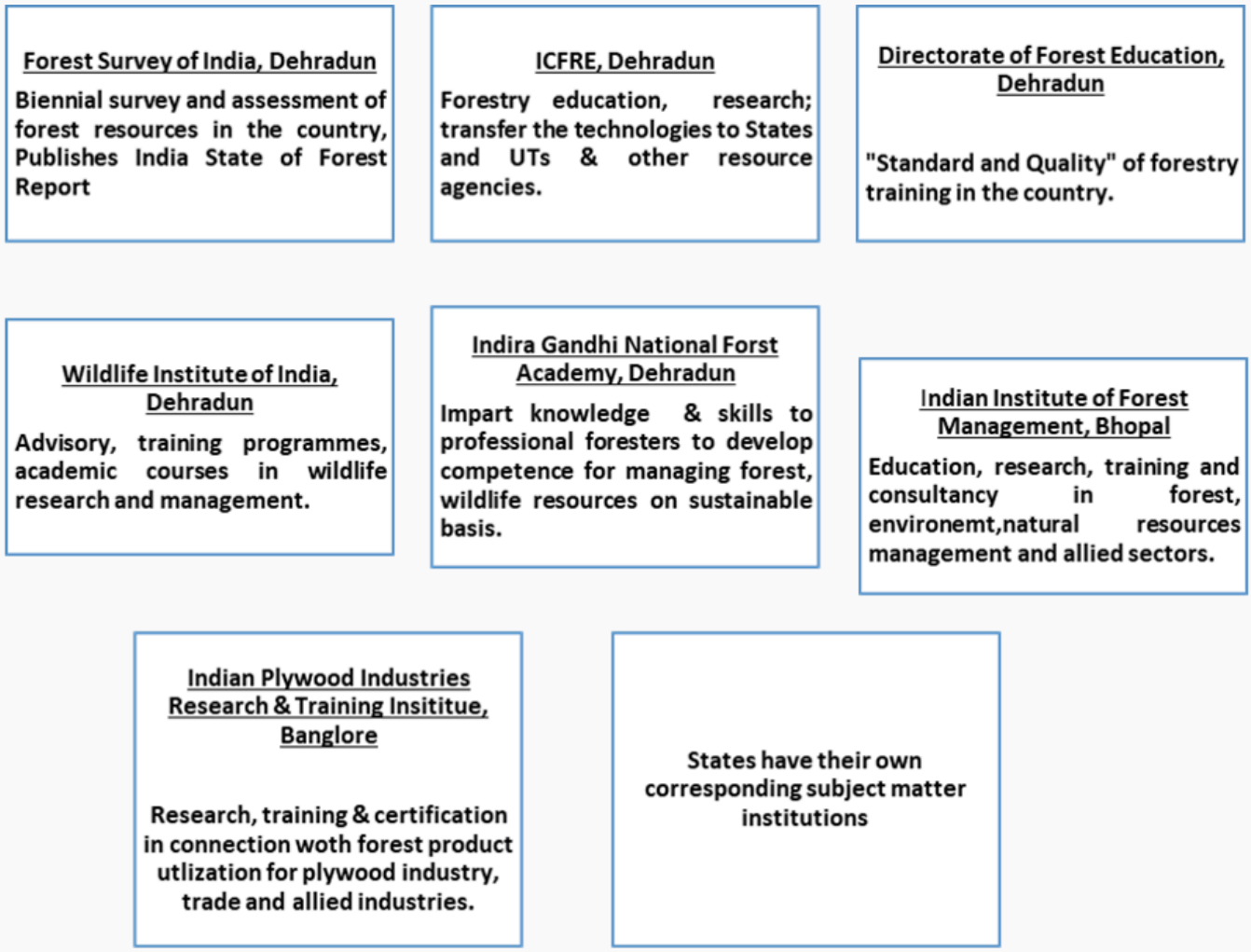
Sustainable Forestry

- "Arresting and reversing degradation and deforestation while increasing direct benefits from forests for people and the environment in a way that forest ecosystems are conserved and maintained for the benefit of present and future generations" is the basic philosophy of NEP, 2006. A strong legal and policy framework and a vibrant management has evolved for sustainable forestry through experience over the years.
- To encourage plantation of trees outside forest areas and recognise the legitimate livelihoods requirements of the local communities Indian Forest Amendment Ordinance 2017 has exempted bamboo grown in non-forest areas from definition of tree under India Forest Act, 1927. This would encourage farmers and local communities to take up plantation of bamboo on degraded land, encourage agro-forestry and contribute to ecological and soil quality gains and help achieve landscape approach in conservation.
- The Decision Support System (DSS) has been created as an online tool to help in efficient implementation of the Forest Conservation Act 1980. This web based GIS system, operational since 2014, is developed and maintained by Forest Survey of India and uses 15 spatial layers. DSS helps in informed and unbiased decisions on diversion of forest land based on qualitative and administrative characteristics of forests. The system is widely used by MoEF&CC, its regional offices and also by senior officers from State Forest Departments and others concerned.
- For main legal and policy framework refer to NBT 3, Section II, Forest habitat.
- National level technical institutions/ organisations deal with various aspects and issues of sustainable management of forestry,

advise MoEFCC, States/UT on matters included in their mandate, Figure 5.3 shows the national level institutions details.

- Forestry management in States/UTs is done by the State/UT forest department supported by their own training and R&D activities. Government also engages in promoting Forest Stewardship Council (FSC) which is a globally recognized certification system that ensures traceability of responsibly harvested forest products from the forests to the point of sale.

Figure 5.3 **National Level Institutions/ Organisations in Forestry Sector and their Mandates**



- ICFRE has subject specific units namely Forest Research Institute, Dehradun; Himalayan Forest Research Institute, Shimla; Tropical Forest Research Institute, Jabalpur, Centre for Social Forestry & Eco-Rehabilitation, Allahabad, Centre for Forestry Research & Human Resource Development, *Chindwara*, Institute of Rain & Moist Deciduous and Research, Jorhat, Institute of Forest Productivity, Ranchi, Institute of Wood Science & Technology, Bangalore, Tropical Research Institute, Jodhpur, Institute of Forest Genetics & Tree Breeding, Coimbatore.
- States/UTs have Forest Departments, Training Institutes for officials and cutting-edge functionaries, linkages with subject specific institutions.
- All the R&D and other work of national level institutes feeds into national policies/programmes, actions and States/UTs through organisations whenever and wherever needed.
- National Agroforestry and Bamboo Mission is being implemented under sub-scheme of Mission for Integrated Development of Horticulture. (Refer to Pg. 66, NR5). Steps are being taken to provide assistance to farmers/bamboo growers, *inter alia*, for plantations in non-forest area. Bamboo grown in non-forest areas has been exempted from the definition of tree under India Forest Act, 1927.

Sustainable Fisheries

- The Indian coastal ecosystems comprising mudflats, estuaries, creeks, mangroves, coral reefs, marshes, lagoons, sea grass beds, sandy and rocky beaches, have an estimated area of 42, 808 sq.km and provide habitat for a variety of aquatic flora and fauna. The country has an Exclusive Economic Zone (EEZ) of 2.02 million km[1] and a long coastline of 8118 kms. These coastal and marine ecosystems provide a range of ecosystem services contributing to economic stability of the country. The marine fisheries wealth in the Indian EEZ is estimated at 4.412 MMT (Maximum Sustainable Yield).
- In the inland side, there has been a shift from capture fisheries to aquaculture in the last two and a half decades. India is the second largest producer of inland fishes and the second largest aquaculture nation in the world. The total fish production in India has increased from 5.66 MMT in 2000-01 to 11.41 MMT (7.77 MMT from inland and 3.64 MMT from marine) in 2016-17. The transformation of inland fisheries from traditional capture fisheries to commercial scale aquaculture has led to an increase in fish production from 7.77 MMT in 1950-51 to 11.41 MMT in 2016-17.

- Approximately 14.5 million people depend on fisheries activities for livelihood and India contributes 6.3% to the global fish production. Confirming to the objective of ABT 6, a comprehensive approach to the sector is adopted through 'Blue Revolution' to achieve sustainable utilization of fisheries wealth from marine and inland aquatic resources. Elements of 'Blue Growth Initiative' and targets of SDGs are encompassed in the 'Blue Revolution'.
- National Wildlife Action Plan 2017-2030 has an inclusionary approach which has linkage with wider landscapes and seascapes as important focal areas.
- Wildlife Crime Control Bureau, a statutory multi-disciplinary body established by the Government of India under the MoEFCC, to combat organized wildlife crime in the country. It also assists and advises the customs authorities in inspection of the consignments of flora and fauna as per the provisions of Wild Life Protection Act, CITES and Export-Import (EXIM) Policy governing such an item.

Main Measures:

- **National Plan of Action for the Conservation and Management of Sharks (NPOA- Sharks):** Taking stock of the status of and issues relating to sharks conservation & matters related thereto.
- **Order SO 729 (E) (1995) under The Export (Quality Control and Inspection) Act (1963):** fresh, frozen and processed fish and fishery products subjected to quality control, inspection and monitoring prior to export.
- **The Maritime Zones of India (Regulation and Fishing by Foreign vessels) Act 1981** provides for regulation of fishing by foreign vessels and matters connected therewith.
- **The Wildlife (Protection) Act 1972** for protection of wild animal, birds and plants and for connected matters.

All fisheries resources fall within States/UTs jurisdiction. States have their own Acts/Rules and Policies e.g.

- **Kerala** Inland Fisheries and Aquaculture Act, 2010 (Act No. 15 of 2010)
- **Andhra Pradesh** Aquaculture Seed (Quality Control) Act, 2006 (Act No. 24 of 2006)
- **Tamil Nadu** Aquaculture (Regulation) Act, 1995 (Act 6 of 1995)
- **Meghalaya** Fisheries (Welfare of Fishermen) Rules, 1986
- **West Bengal** Inland Fisheries Rules, 1985 (No. 158(I))

- **The Hazardous Wastes (Management and Handling) Rules ,1989**
- **The Environment (Protection) Act, 1986** provides for the protection and improvement of environment includes water, air and land and the inter- relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property;
- **The Water (Prevention and Control of Pollution)** Act ,1974
- **Coastal Regulation Zone Notification, 1991 and 2011;**
- **Coastal Aquaculture Authority Act, 2005;**

These create ambient condition for sustainable fisheries.

- A strong institutional infrastructure for scientific sustainable management of fisheries of all types of aquatic ecosystems namely inland, coastal and marine exists. See Figure 5.4 for details.

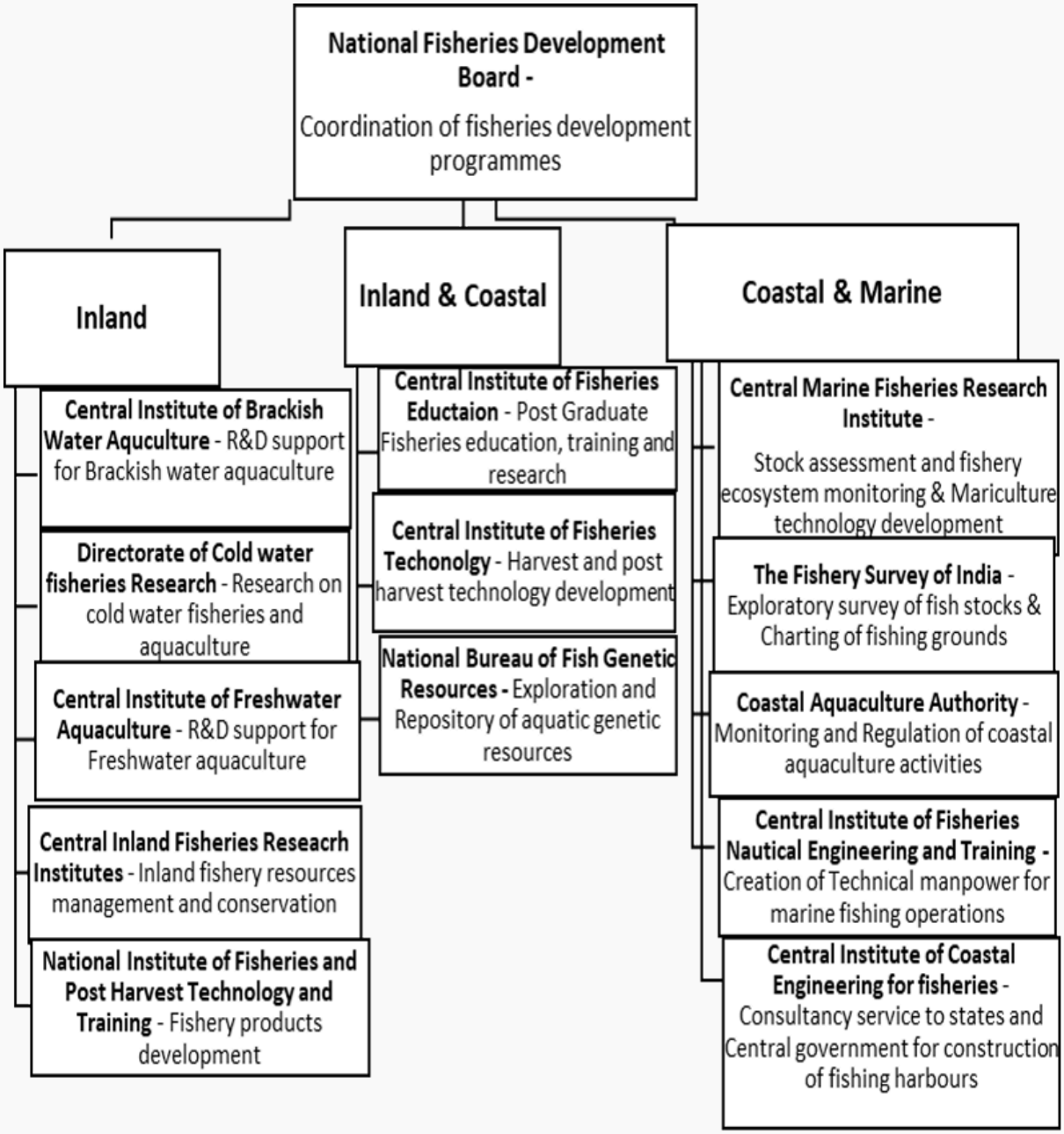


Figure 5.4
India's Institutional Infrastructure for Sustainable Management of Fisheries

- Coastal and marine fisheries policies and projects also get inputs from national level institutions concerned with various issues of coastal and marine ecosystem. Figure 5.5 lists these institutions.

Figure 5.5
National Level Institutions for Coastal and Marine ecosystems

Other measures for the sector *inter alia* include:

- **Marine Fisheries Management Code (NMFC):** On the lines of FAO Code of Conduct for Responsible Fisheries (FAOCCRF).
- **Network for Fish Quality Management and Sustainable Fishing (NETFISH) 2007:** A registered society under the MPEDA to empower fishermen community through extension and knowledge *inter alia* through multiple need-based training programmes in and around selected harbours and landing centres in all maritime states of India.
- **Mobile App Advisory**: m@krishi, for information on potential fishing zone through mobile phones has reduced scouting time for fishing by around 50%, reduced fuel consumption and increased profit to the tune of 25-35%.
- **Minimum legal size (MLS):** Central Marine Fisheries Research Institute (CMFRI), helps States in designing guidelines for MLS to ensure sustainable produce of commercially important fish stocks. Government of Kerala has issued these recently.
- **Policy guidance on light fishing:** Prohibits use or installation or operation of surface or submerged artificial lights/LED lights, fish lights attractors or any other light equipment with or without generator on mechanized fishing vessel or motorised fishing crafts in Indian EEZ beyond territorial waters.
- **Guidelines for Sustainable Development and Management of Brackish Water Aquaculture (1995):** Make all aquaculture units above 40 ha subject to EIA. Shrimp culture units of 40 ha or more to also incorporate EMP for local watercourses, groundwater, drinking water sources, agricultural activity, soil and salinization, waste water treatment and green belt development.
- **Marine Stewardship Council (MSC) Certificate:** MSC, an independent non-profit council, sets certification standards for sustainable fishing and issues certificates. MSC standards are assessed by a team of experts who are independent of both the fishery and the MSC.
- **Logo Scheme for Export**: Logo granted by MPEDA as mark of quality to be affixed on seafood products exported from India by the registered seafood processors who meet the criteria prescribed.
- Managing marine debris and micro plastics
- Standards specified by Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCB) for releasing effluents into the water bodies.
- *Namami Gange and* NRCP help sustainable fisheries by cleaning the water ways and lakes.
- Conservation of indigenous fish genetic resources.
- Co-Management practices.
- Preparation of Coastal PBRs e.g., in Kerala, Goa.

Additional measures:

- Draft National Inland Fishery Policy, 2018 is being formulated.
- Draft National Forest Policy, 2018 is being formulated.

National Target(s)

National Biodiversity Target (NBT) - 5 : By 2020, Measures are adopted for Sustainable Management of Agriculture, Forestry and Fisheries.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs. Indicators and assessment of progress against them with regard to NBT 5 follows.

I. Sustainable Agriculture

Remunerative, sustainable, climate resilient, ecosystem friendly agriculture with efficient and optimum use of environment friendly inputs is being achieved through implementation of various schemes of NICRA with the involvement of farmers. These have created a number of positive impacts and contributions to making agriculture sustainable in the face of climate related challenges.

Particularly to recount the key achievements:

- Several climate resilient crop varieties and animal breeds and efficient natural resource management technologies have been successfully introduced in 151 villages spread across the country for climate smart agriculture under NICRA.
- For the first time, all germplasm of wheat with NBPGR has been multiplied for field for phenotyping and is currently under evaluation.
- Country wide studies have been initiated to understand the impact of temperature on flowering behaviour in mango.
- A nation-wide pest surveillance and monitoring system has been put in place for all target crops for major pests and diseases wherein real time incidence is being monitored along with weather parameters to build pest warning models.
- Technologies such as on-farm water harvesting in ponds, supplemental irrigation, introduction of early maturing drought tolerant varieties, paddy varieties tolerant to submergence in flood prone districts, improved drainage in water logger areas, recharging techniques for tube wells, site specific nutrient management and management of sodic soils, mulching, use of zero till drills have been enthusiastically implemented by farmers in NICRA villages across the country. One district level agro-advisory service has been implemented successfully on pilot basis.
- More than 100 training programmes have been organized across the country covering 50,000 farmers to create awareness on climate change and variability.
- State of the art infrastructure is being built to take up long term strategic research such as impact of climate change on crops and livestock and modelling future climate impacts on agriculture.
- Specific additional projects addressing critical areas like arid zone, hill and mountain ecosystem, climate impact on pollinators, hail-storm management and socio-economic impacts of climate change including adaptation finance have been sanctioned.
- The approach includes coping strategies through water saving technologies, expanding technology demonstration and dissemination to 130 vulnerable districts of the country.

i. Trends in area under Organic Farming

- Area under organic farming increased from 1.2 to 1.49 MHa in the years 2014 to 2015. Remained more or less constant in 2016. Figure 5.6 shows movement in total area including forest area and agricultural area over years 2014 to 2017.

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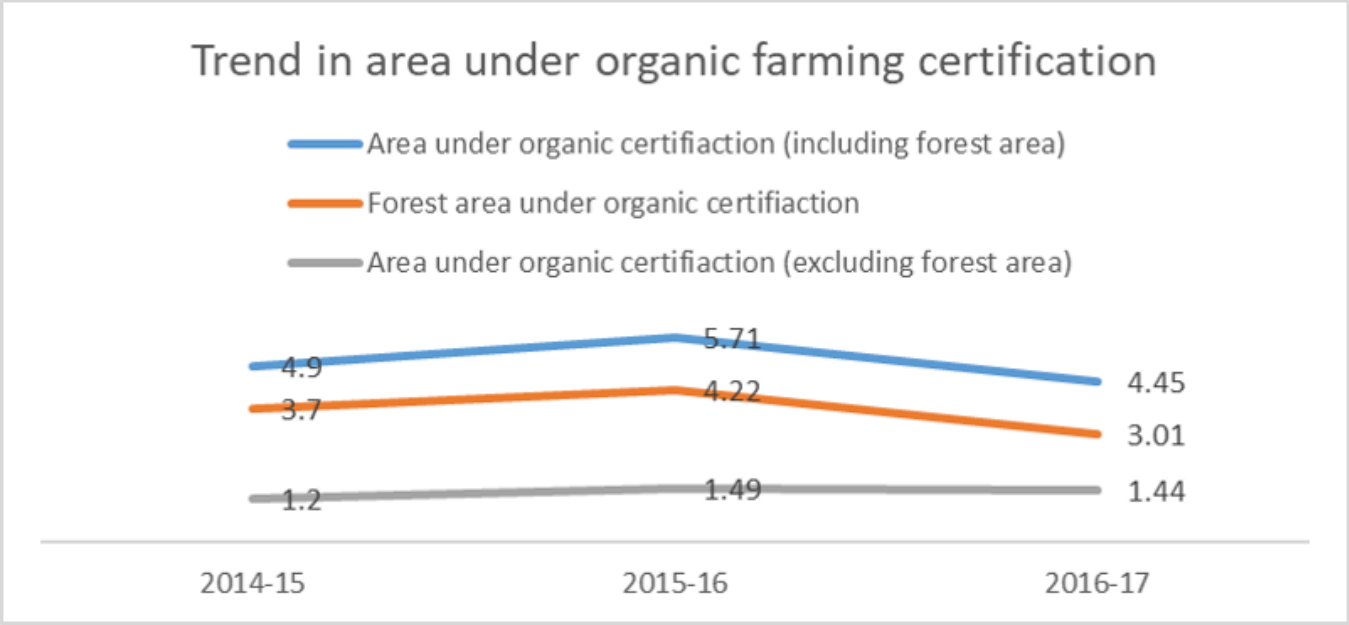
Figure 5.6 Area in million hectares (MHa)



Source: APEDA Annual Report 2014-15 to 2016-17

- Land under organic farming in India has shown third highest increase in the world between 2014 and 2015.[1]
- The PKMY is expected to yield results over next years in terms of increase in areas.
- Sikkim, Himalayan state, in the north east adopted a state policy for organic agriculture and has now become a fully organic-agriculture state.

ii. Trends in Organic Agriculture Certification

- Participatory Guarantee System (PGS) India program can be joined by any farmer either by becoming a member of an existing

PGS-India local group or by making a new group of at least 5 members. Validity of a PGS certificate is one year.7983 PGS local groups comprising 276,865 farmer members covering an area of 212553.73 ha participated in PGS certification by June 2018.

- PGS-National Advisory Committee has been set up as apex national body which makes policies, monitors standards and creates capacity for operation of the system through Regional Councils. 317 such Regional Councils coordinate, monitor and approve certification decisions of Local Groups.
- 83,866 certificates were generated since 2015 covering an area of 212553.73 ha; Figure 5.7 shows rise in certificates since 2015.

Figure 5. 7 **Number of PGS certificates**

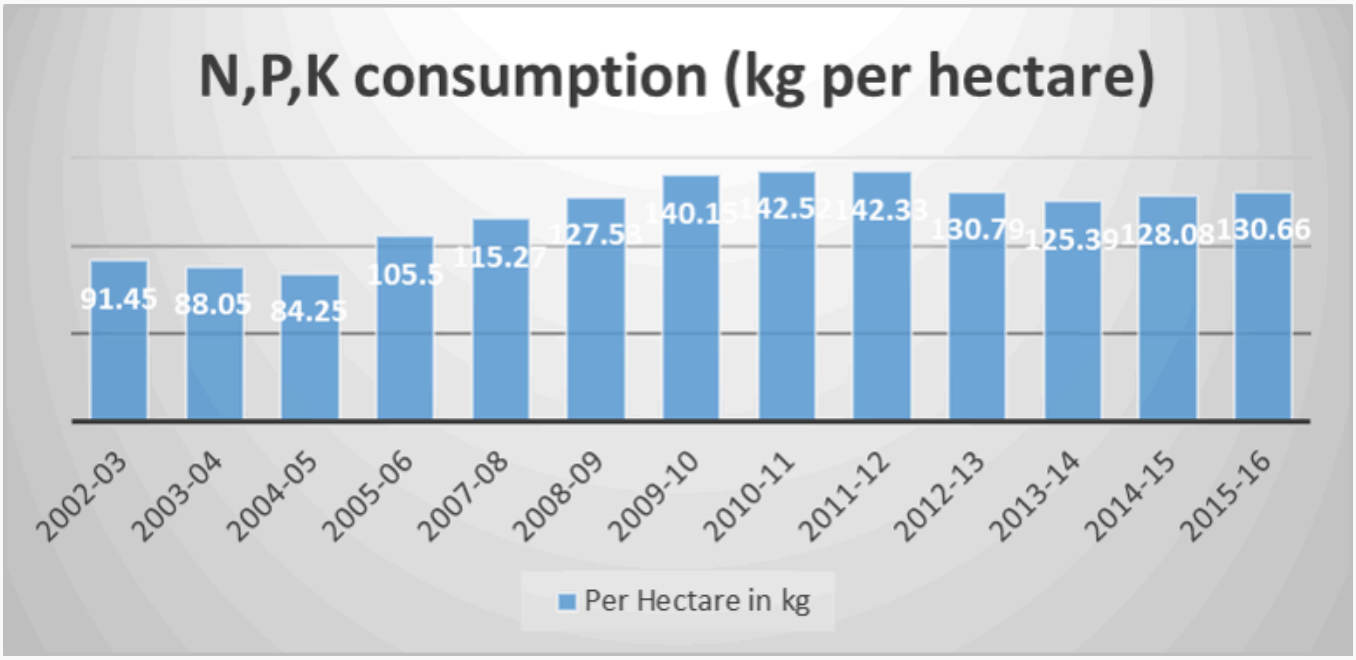
Source: Participatory Guarantee System for India, Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare

- Third party certification is done by Agricultural and Processed Food Products Export Development Authority (APEDA) through accredited bodies. List of 28 accredited bodies can be seen at apeda.gov.in/apedawebsite/organic/NPOP_certification_bodies.pdf

iii. Trends in the Production/Usage of Agrochemical Fertilizers

- Soil Health Management (SHM) system makes real time advice available to farmers for inputs and other matters based on the soil health of individual farms based on the soil health cards. Different grades of fertilizers have been notified under Fertilizer Control Order (FCO), 1985 to suit the soil specific needs. Effective implementation of the FCO ensures need based supply of fertilizers to farmers.
- 150,939,538 Soil Health Cards distributed between 2015-18. These serve the purpose of providing farm-based information to farmers on soil nutrient status and recommend appropriate dosage of nutrient for improving soil health and its fertility.
- The gross irrigated area has shown increase from 92.25 MHa in 2012-13 to 96.46 MHa in 2014-15 and consumption of fertilizer has remained nearly constant after 2013-14. This may be because of wiser use of fertilizers. See Figure 5.8 for consumption of fertilizers from 2002-03 to 2015-16.

Figure 5. 8 Consumption of fertilizers

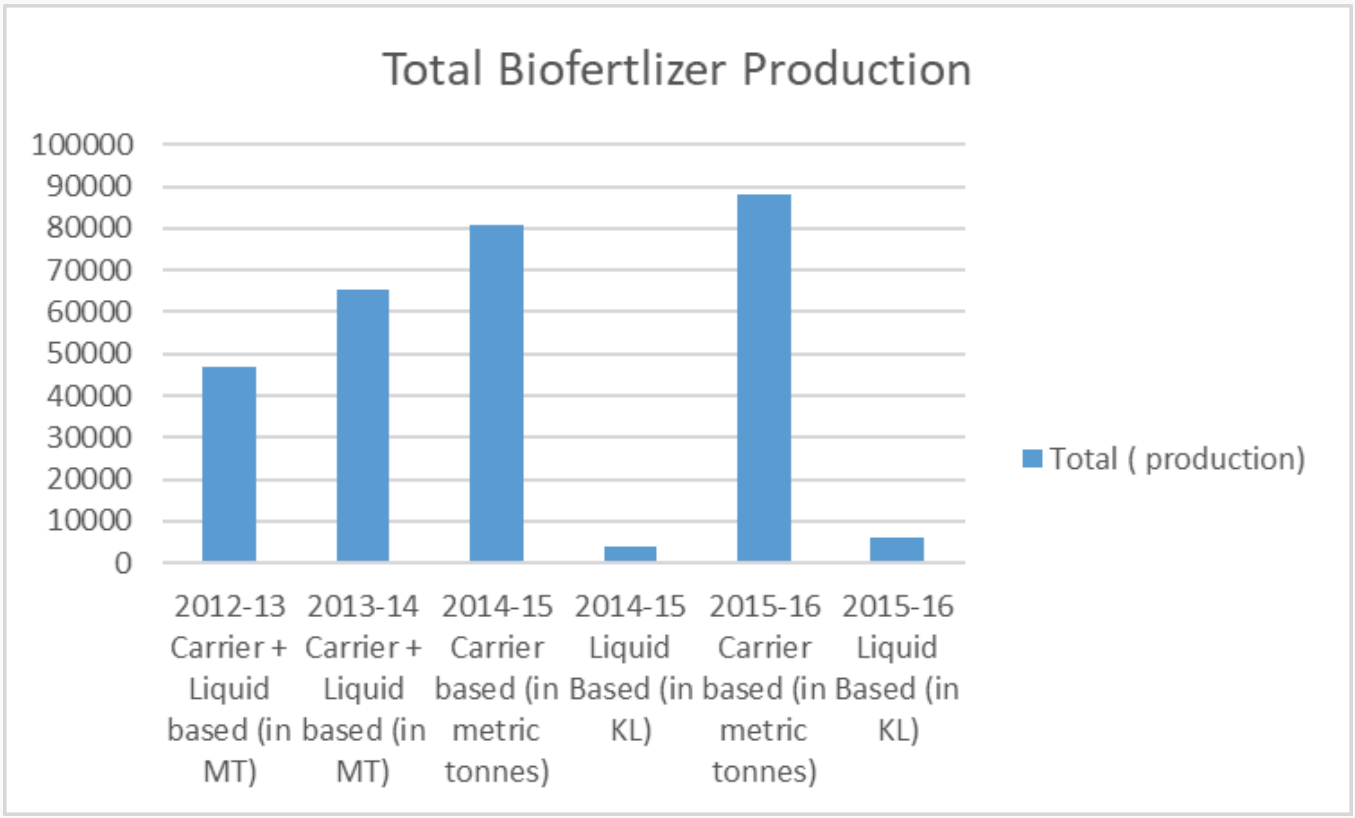


Source: Agricultural Statistics at a Glance 2016; All India Report on Agriculture Census (2010-2011)

iv. Trends in use of Bio Fertilizers/Biofuels, Organic Manure and Vermicompost

- FCO, 1985 has been amended to incorporate biofertlizers namely Rhizobium, Azotobacter, Azspirillum, Phospohate Solubilizing Bacteria, Potash mobilising bacteria (KMB), Zinc Solubilizing Bacteria, Mycorrhizae, Acetobactor and Consortia of bio-fertilizers to encourage use of quality biofertilizers.
- Generalised specification of organic manures and other organic fertilizers, namely, city compost. Vermicompost, phosphate rich organic manure (PROM) and phosphate solubilising bacteria enriched organic manure have been notified under FCO schedule IV to ensure use of quality bio-fertilizers.
- Specification of non-edible de-oiled cake/castor oil cake fertilizers have been notified under FCO schedules to ensure availability of standard quality to farmers.
- 662 Krishi Vigyan Kendra (KVK) spread across the country provide timely advisories to farmers about organic farming and improved technologies. In 2016-17 alone, 820.31 lakh quality planting material and bio-fertilizers (5,509q), vermicompost, mineral mixture etc., 3.39 lakh quality seeds, were produced at KVK and supplied to farmers.
- 2,406 farmer interested groups, 82 farmers producer companies covering 45,863 ha and 44,604 famers have been former under MOVDNER.
- Use of non-chemical fertilizers has received substantial boost as a result of activities under NMSA, PKMY, RKVY, NMOOP, NFSM and R&D by ICAR. The combined figure of Carrier and Liquid based biofertilizer production at 46836.82 Million tonnes in 2012-13 reached 88029.3 Million tonnes as carrier based and 6240.93 KL as liquid based bio-fertilizer in 2015-16, an increase of nearly 100%. See Figure 5.9.

Figure 5.9 Total Bio-fertilizer Production



Source: EnviStats India 2018, MoS

v. Trends in production of Organic Manure

Total manure at 2294.15 Million tonnes in 2013-14 reached 2547.87 Million tonnes in 2015-16 indicating rise in use of organic manure.

vi. Trends in Integrated Pest Management (IPM)

- Thirty five (35) Central Integrated Pest Management Centres (CIPMCs) carry out pest/disease monitoring, conservation, production and release of bio-control agents, and reach out to farmers through Farmers Field Schools (FFSs) to help them tailor IPM practices to suit their individual needs. Significant role of women in plant protection has been recognised. They form important part of FFS.

Table 5.1 shows cumulative achievements under IPM and Table 5.2 gives assessment of impact of IPM.

Table 5.1 Achievements under IPM measures implemented from 1994 to March 2017 and Target for 2017-18

Measures/Activities	Achievements
Area under pest monitoring	273.69 lakh ha
Field releases of bio control agents	53,452.68 million agents
Area under augmentations and conservations of bio-control agents	152.36 lakh ha
FSS organised and number of farmer participants in these	Number of FFS organised: 17,234 Number of farmers trained: 5,17,260
Extension officers trained	About 58,780 agriculture/horticulture extension officers
Number of NGOs, personnel, pesticide dealers, lead farmers etc. trained	46,680 persons
Number of crops for which IPM packages developed, revised as per needs and uploaded.	87 crops
Funds allocated for establishment of Biocontrol labs	1882.9625 lakh
Knowledge products for farmer's education	• Manual in Hindi and English on Rice and Cotton for Subject Matter Specialists (SMS) • Farmers field guide in Hindi and English on Rice and Cotton. • Handbooks on diagnosis and Integrated Pest Management of cotton pests in

	English, Hindi, Punjabi, Telugu languages. • Folders on IPM in Cotton in Hindi, English, Punjabi and Telugu • Posters in Hindi & English in Cotton and Rice for recognition of pests and natural enemies. • Safe use of Pesticides-Banner prepared. • IPM Packages for 87 crops. Can be seen at accessed at http://ppqs.gov.in/ipm-packages) • For list of registered Bio-pesticides & their formulations for use in the country refer to http://ppqs.gov.in/divisions/integrated-pest-management/ipm-glance
Annual target for 2017-18	• Pest monitoring of 9 lakh ha • Field releases of 2,200 million biocontrol agents • Augmentation and conservation of biocontrol agents over 8.50 lakh ha

Source: IPM at Glance, Directorate of Plant Protection, Quarantine & Storage

Table 5.2 Impacts of IPM activities

Parameters	Impact of IPM
Changes in crop yield of rice and cotton	Increased from 6.72 - 40.14% in rice and 22.7 - 26.63% in cotton in IPM fields compared to non-IPM fields.
Use of chemical pesticide sprays	Reduced to the extent of 50-100% in rice and 29.96 to 50.5% in cotton.
Use of bio-pesticides/ neem-based pesticides	Increased from 123 Million tonnes during 1994-95 to 63540Million tonnes during 2016-17
Consumption of chemical pesticide in the country	Reduced from 75033 Million tonnes (Tech. grade) during 1990-91 to 54121 Million tonnes (Tech. Grade) during 2015-16

Source: IPM at Glance, Directorate of Plant Protection, Quarantine & Storage

vii. Trends in Soil Quality and Land Use

- Measures have been taken under SHM to provide real time advise to farmers for promoting location and crop specific sustainable soil health management through residue management, organic farming practices by creating and linking soil fertility maps with macro-micro nutrient management and land use based on land type.
- RAD focuses at making rainfed agriculture more productive, sustainable, and remunerative and climate resilient by promoting Integrated Farming System (IFS). It includes horticulture, livestock, fishery, agroforestry, value addition along with crops/cropping system.
- Table 5.3 shows progress in respect of SHM.

Table 5.3 Facilities for and progress under Soil Health Management

Facilities/ Activities	Achievements
Soil samples tested until 2018-19	36,463,843
Soil Testing Laboratories setup until March 2017 and their analysing capacity	1414 labs set up with analysing capacity of 19.5 million samples per annum
Soil cards distributed	150,939,538
Soil Testing Laboratories (STLs) and related facilities strengthened/ set up in 2017-18	· 161 STLs strengthened · 3140 STLs approved · 10 FQCL strengthened and 1 FQCL set up · 3140 Mini Soil Testing Laboratories Labs approved

Source: Ministry of Agriculture and Farmers Welfare, Annual Report 2017-18

viii. Trends in Energy Consumption in Farms (by types/sources)

- Machinery to enhance productivity and profitability and energy management technologies including gender friendly and drudgery reducing tools for women have been developed. These achieve efficient farm operations, resource conservation and use of renewable energy.
- Solar powered technologies such as Solar Powered Kanpsack Sprayer (3 nozzles), Solar-Powered Onion Curing Chamber and Indirect Solar-Biomass Hybrid System for Drying of Spices have been developed towards use of clean and renewable energy.
- An agri-voltaic system has been developed in which electricity generation, crop production, rainwater harvesting can be done on a single land unit. Such a system of 105 KW capacity has already been established at Central Arid Zone Research Institute (CAZRI), Jodhpur.
- Community based solar lift irrigation systems have been developed and established on a site in Madhya Pradesh leading to increase in crop yields and 5-fold increase in the income of local tribal communities.
- Development of such new technologies is a continuing priority of Department of Agricultural Research and Education, ICAR.

ix. Trends in Groundwater

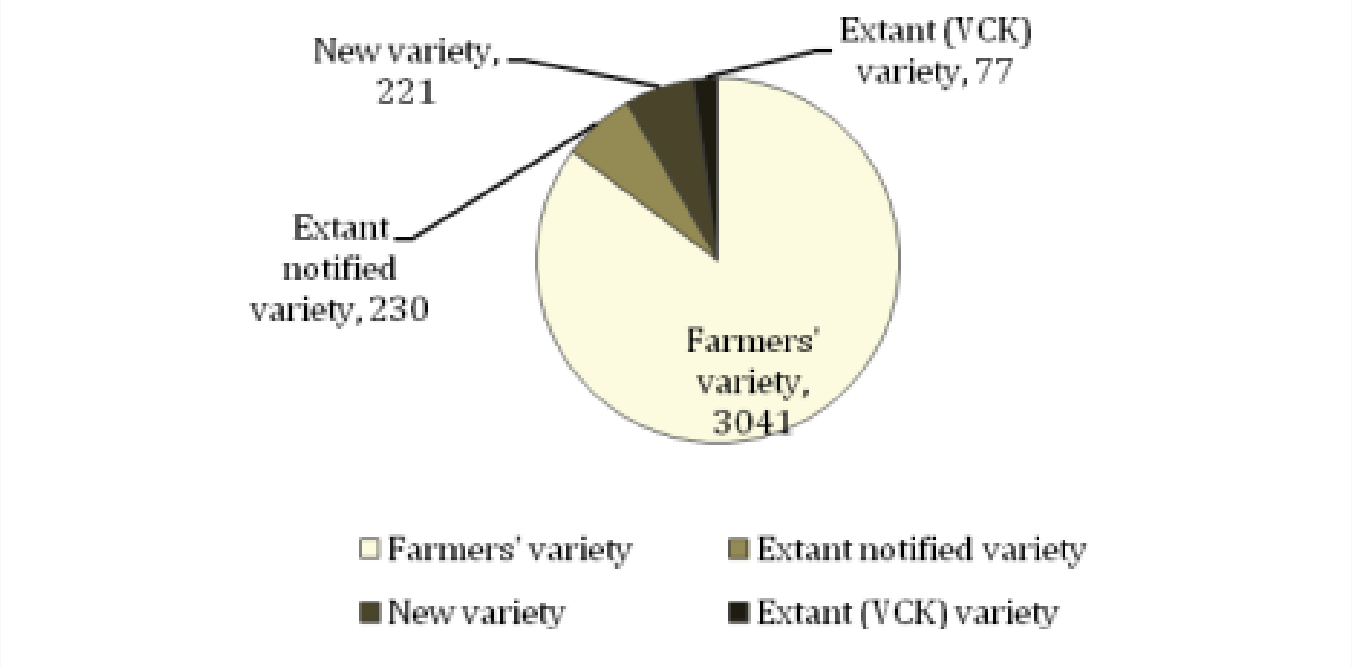
- Refer to NBT 3, Section II, Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes, Status and Trends of levels of water in wells/groundwater table.

x. Trends in enhanced use of landraces and in proliferation of local crops and varieties that are more adapted to the environment.

- Cultivation and conservation of landraces and traditional varieties is encouraged by MoA & FW through extension, exploration and awards schemes.

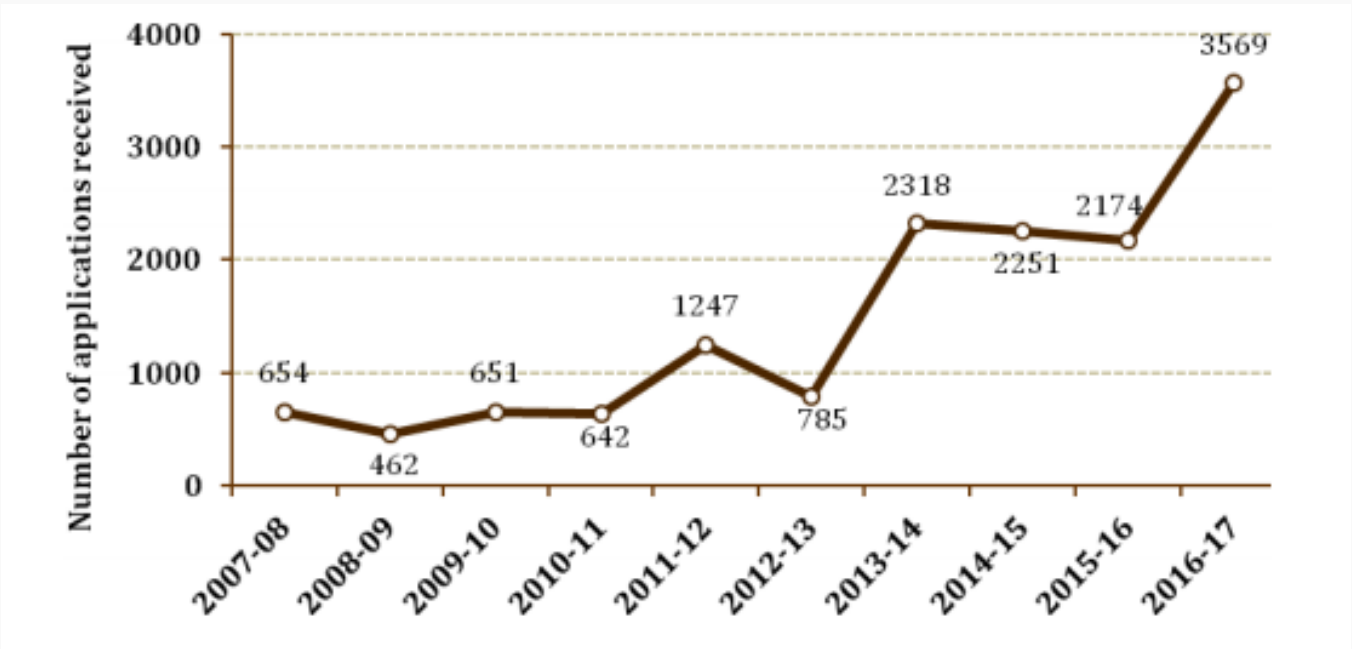
- 209 new varieties/hybrids with potential for higher yields and enhanced tolerance/resistance to various stresses across different agro-ecological regions of the country developed by ICAR in 2017-2018.
- Plant Genome Saviour Community Award & Plant Genome Saviour Farmer Reward:
- Annual awards instituted in 2010 to recognise and reward farmers and communities of farmers, tribal and rural communities for improvement and preservation of genetic resources of economic plants and their wild relatives, particularly in areas identified as agro-biodiversity hotspots from National Gene Fund. The material of the awarded cases is selected, preserved and used as donors of genes in varieties registerable under the Act.
- The PPVFR Authority conferred Plant Genome Saviour Community Awards (2012-13 and 2013-14) and Plant Genome Saviour Farmer Reward and Recognition (2014) to 10 farming communities and 13 farmers and gave recognition to 31 farmers for their contribution in conserving traditional varieties. Details and case studies related to awards are available at http://plantauthority.gov.in/pdf/E_Annual%20report%2016-17.pdf. See case study, Sec II, Other relevant information.
- Preparation of PBRs has opened up new approach for expanding/increasing the area under landraces/ local varieties with the involvement of local communities. E.g. The case study of Pithorabad BMC. See Case study, Other relevant information, Section II, NBT 1.
- Of 3,569 applications for registration of plant varieties under the PPVFR Act in 2016-17, 85% constitute Farmers' varieties. Figure 5.10 shows the number of applications received. Figure 5.11 shows the increasing trend in applications for registration over 2007 to 2016.

Figure 5.10 Applications received under the PPVFR Act, 2001



Source: PPVFRA, Annual Report 2016-17

Figure 5.11 Number of applications received



Source: PPVFRA, Annual Report 2016-17

xi. Trends in analysis of Agricultural Policies and Programmes that adversely affect Ecosystem Services such as Pollination

- As noted in page 59 of NR5, better targeting of subsidies and incentives for ameliorating socio-economic conditions of vulnerable groups and conserving biodiversity go hand in hand and are implemented in a balanced manner.
- Increased funding allocation to States/UTs based on parameters like growing stock of forests, ratio of dense forest cover to total forest cover, total carbon stock and other related actions incentivise them to conserve forests and biodiversity.
- Inclusion of bio-fertilizers in FCO ensures quality, helping the agri-ecosystem. Persistent pursuit of IPM and scientific application of inputs ameliorates ecosystem services.

xii. Trends in awareness levels of farmers and awareness levels of extension service staff, scientists and Agricultural Research System (ARS) with relation to Agro-Biodiversity and Associated Knowledge.

- All schemes and programmes have a component of extension, education and awareness building component for farmers and field officials. It is a continuous process augmented by a dedicated Krishi Darshan channel on TV and mobile apps. Table 5.4 gives a picture of such activities in 2017-18.

Table 5.4 Activities of extension schemes and programmes

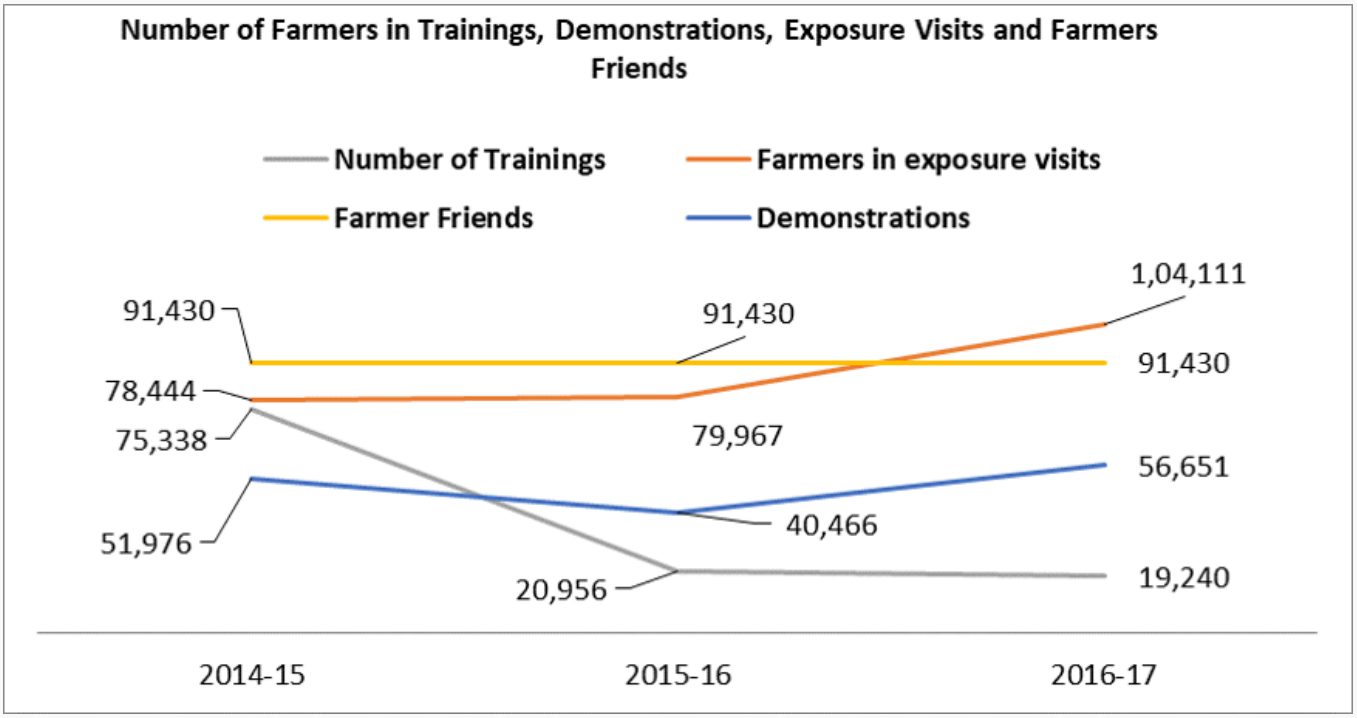
S.No	Scheme/ Program	Activity
1.	National Institute of Plant Health Management	· 1,300 agricultural field functionaries and farmers trained · 103 regular training programs conducted, wherein 1,156 and 756 officers and farmers trained respectively.
2.	IPM Village model	· 300 farmers trained · Crop-Pest Surveillance and Advisory

		Project (CROPSAP) 73 participants from trained in field diagnosis of IPM
3.	Support to State Extension Programmes for Extension Reform(2005-06)	1,04,27,917 farm women (24.05% of the total benefited farmers) participated in farmer-oriented activities like Exposure Visits, Training, Demonstrations & Kisan Melas. Since its inception 6,11,975 women farmers benefited in 2017-18
4.	Kisan Call Center Scheme	Since its inception in 2004 nearly 354 lakh calls have been registered in the KCCs.
5.	Establishment of Agri-Clinics & Agri-Business Centres(2005)	Since its inception, 56,542 candidates trained and 23,517 agri-ventures established till 2015. Out of these 4,250 and 1,334 are women candidates and entrepreneurs respectively.
6.	Extension Education Institutes (EEIs)	179 training courses with 4,099 field extension functionaries including 948 women extension functionaries conducted in 2016-17 132 training courses with 3,068 field extension functionaries including 584 women

		extension functionaries conducted in 2017-18
7.	Mkisan portal:	§ 25 million farmers registered on portal § Around 18370 million SMSs have been sent through Mkisan since inception in 2013.
8.	Mobile apps:	6,22,931 of Kisan suvidha app, 36,047 of Pusa Krishi and 43,140 of Agrimarket apps have been downloaded.

Figure 5.12 shows the increasing number of trainings for farmers, farmers in exposure visits, demonstrations for raising awareness among farmers, farmers as Farmer Friend (FF) over 2014-15 to 2016-17.

Figure 5.12 Trend in Number of Trainings, demonstrations, exposure visits and Farmer Friends held



Data Source: Department of Agriculture and Cooperation (Extension Division) ; Annual Reports DAC; ICAR Annual Reports

II. Sustainable Forestry

i.Trends in Area of Restored Forests/Degraded Forest

- Refer to Section II- NBT 3 – Trends in Forest Cover- Change in density, afforestation and restoration and carbon stocks

ii. Trends in proportion of Products derived from Sustainable Sources

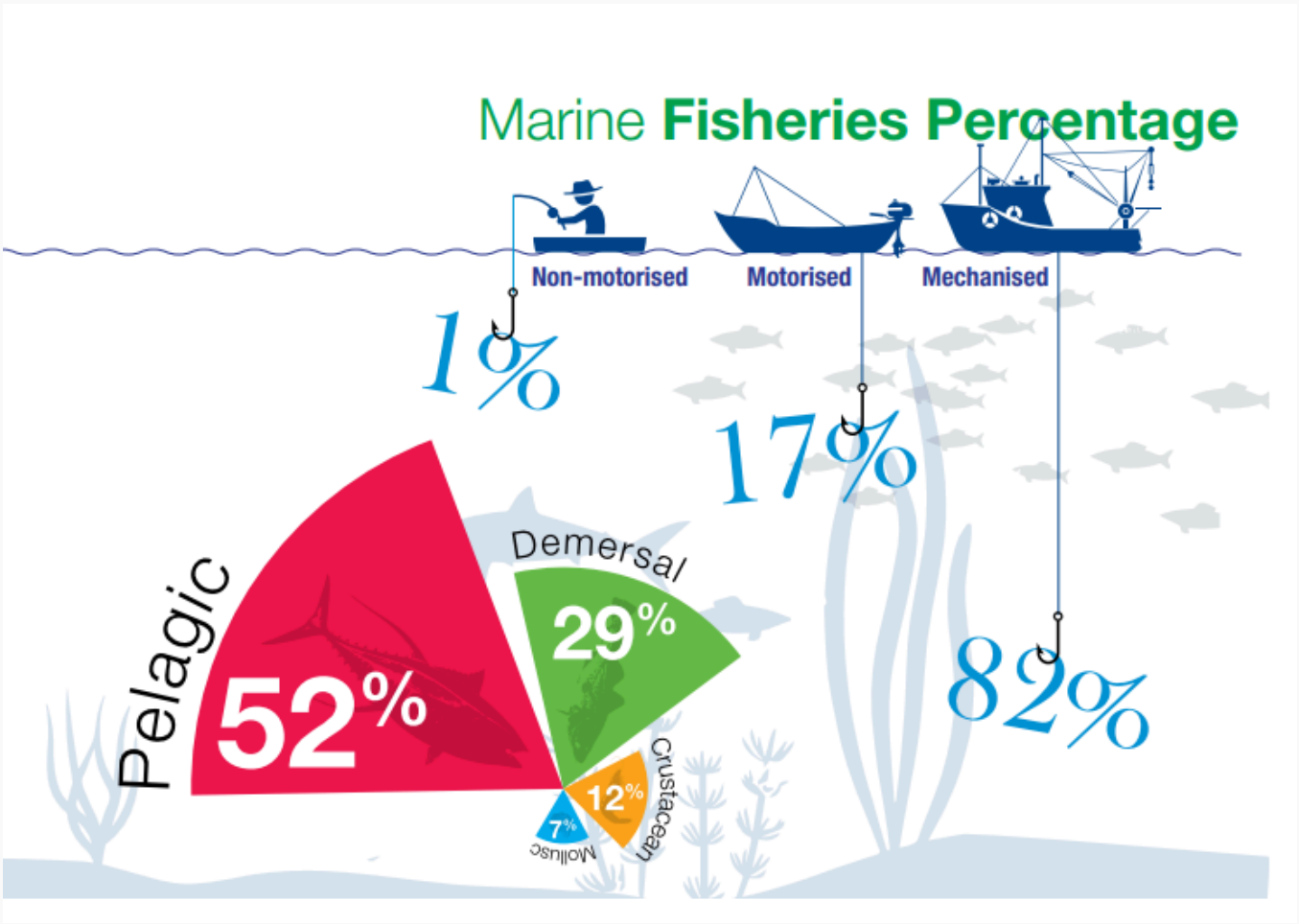
- National Working Plan Code 2014 for Sustainable Management of Forest and Biodiversity in India has included assessment of NTFPs as distinct entity in Forest Working Plan. The Code helps regulate collections to achieve the object of sustainability.
- Resource base created outside forests for easing the pressure of collection of medicinal plants, NTFP from forests e.g.

cultivation of medicinal plants through MPCDAs, conservation of germplasm in gene banks including field gene banks. For details refer to Refer to Section II, NBT 11 on sustainable cultivation of medicinal plants is being promoted by farmers and through MPCDAs.

III. Sustainable Fisheries

- **India with 3.15 MHa reservoirs, 2.36 MHa pond and tanks, 1.2 MHa flood plains and 0.19 MHa rivers and canals is the second largest fish producing and the second largest aquaculture nation in the world with marine fisheries constituting 31.9% and inland fisheries constituting 69.1% of India's fish production.**
- **Trend in Stock sizes of target and bycatch fish species (freshwater and marine)/Intensity of destructive fishing capacity**
- **Fishery Survey of India surveys Demersal, Pelagic and other resources to assess their occurrence status, undertakes experimental fishing using species specific fishing gears to establish sustainable fisheries practices, which are popularized among fisherman in accordance with Code of Conduct for Responsible fisheries (CCRF).**
- **Baseline data on biodiversity of fin fishes, crustaceans and cephalopods resources in Indian EEZ collected by FSI to guide sustainable fisheries.**
- **percentage of Pelagic fisheries much higher than Demersal fisheries. See Figure 5.13**

Figure 5.13



Source: Annual Report 2016-17, Central Marine Fisheries Research Institute (CMFRI)

- Semi – Pelagic Trawl System developed by CIFT. It has comparatively low adverse impact on benthic biota.
- In both 2015 and 2016, catch per hour of multiday trawlers were more or less the same.

ii. Trends in Sustainable Fishing Practices:

- **Trends in Sustainable Fishing Practices:**
- Central Marine Fisheries Research Institute (CMFRI), helps States in designing guidelines for minimum legal size (MLS) to ensure sustainable produce of commercially important fish stocks. Minimum legal size (MLS) of 58 commercial species adopted by the state of Kerala for commercial species. Consultations with other coastal states are in process.
- **Ashtamudi Lake** received the MSC certificate. See case study in Section II.
- Collaborative responsible luxury initiative of CMFRI – World Wildlife Fund (WWF) and India Tobacco Company (ITC) hotel by offering a special menu to enable a luxury of responsible choices for its guests.
- Self-regulatory fishing ban seasons imposed by fishing communities after CEPA initiatives

- **Closed Season** imposed either in the breeding and spawning season or in the recruitment season to allow generation of larvae/ juveniles enough time to grow. Very often such closed season demanded and enforced by fishermen themselves. Table 5.5 for detail

Table 5.5: Closed season for mechanised sector

State	Months	Days
Gujarat	June-August	45
Maharashtra	June-August	45
Goa	June-August	60
Karnataka	June-August	45
Kerala	June-August	45
mil Nadu	April – May	45
Andhra Pradesh	April – May	45
Odisha	April – May	45
West Bengal	April – May	45

iii. Trends in number of Fishing Boats/Fishing Capacity

- Craft, Gear and Fishing methods for marine, inland and aquaculture fisheries developed and updated by CIFT regularly with emphasis on resource conservation and sustainability besides increase in productivity

Relevant websites, links, and files

DARE-ICAR Annual Reports
PPV&FRA Annual Reports
Directorate of Economics and Statistics, Department of Agriculture, Cooperation and farmers Welfare
IPM at Glance, Directorate of Plant Protection, Quarantine & Storage
The World of Organic Agriculture, Statistics and Emerging Trends 2017, FIBL IFOAM- Organics International
Dept. of Animal Husbandry
Central Institute of Fisheries Technology
Central Marine Fisheries Research Institute
Central Institute of Brakishwater Aquaculture,
Directorate of Coldwater Fisheries Research
Central Institute of freshwater Aquaculture
Central Inland Fisheries Research Institute
Central Institute of Fisheries Education
http://www.nbfgr.res.in/
Forest Survey of India
Coastal Aquaculture Authority
Central Institute of Fisheries Nautical and Engineering Training
Central Institute of Coastal Engineering for Fishery

Other relevant information

I. Awards enable collection of information and best practices and expand the possibilities of wider conservation and protection of genetic diversities. Some representative cases from Plant Genome Saviour Community Awards capture the contribution of the local communities including women in this regard.

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a. Farming community of village of Sagam and Danwathpora (District Anantnag, J&K):

The farming community in the Western Himalayan agro-biodiversity hotspot area conserves and cultivates rice varieties, especially Mushkbudgi and Kamad that have high aroma, high cold tolerance, better cooking quality and great market

value. The community is also involved in postharvest value addition through processing and marketing.

b. Chengalikodan Banana Growers Association, Erumapetty (Thrissur, Kerala):

This community, located in the Malabar agro-biodiversity hotspot area, is engaged in the conservation of Banana varieties with special emphasis on Chengalikodan nendran Banana known for its taste, bunch shape and fruit colour. The community also conserves other crops like mango, coconut, jackfruit, timber trees and vegetables etc. adopting traditional practices.

c. Sagar Krishnanagar Swami Vivekananda Youth Cultural Society (South 24 Parganas, West Bengal):

Located in the Gangetic Delta agro-biodiversity hotspot area the community is involved in the conservation of traditional landraces of rice and medicinal species. It conserves about 39 indigenous varieties of rice and 34 types of medicinal species. Some of the rice varieties

viz

. Badshabhog, Durgabhog, Dudheswar, Harinakhuri, Kalajira, Kartikbhog and Kanakchur are aromatic in nature. The community did some extension work as well be distributing seeds of indigenous rice varieties among the farming communities in the gangetic delta region of West Bengal.

d. Khola/ Canacona Chilli Cultivators Groups, Khola (Shirothi, South Goa):

This community from the Konkan agro-biodiversity hotspot area is actively involved in the conservation of the traditional local variety of chilli known as Khola/ Canacona chilli, tuber crops and vegetables. This chilli has brilliant red colour with medium pungency.

e. Karen Welfare Association, Webi (Mayabunder, Andaman& Nicobar Islands):

Located in the islands of Andaman & Nicobar, an agro-biodiversity hotspot area, the community is actively involved in conservation and cultivation of 6 traditional varieties of rice

viz

. Khushbayya, Black Burma, White Burma, Mushley, Nyawin and Red Burma. It has conserved these varieties since 1925 in North & Middle Andaman using traditional methods for maintaining the genetic variability for long term conservation.

f. Society for Conservation of Mango Diversity (SCMD),

Malihabad, Lucknow, Uttar Pradesh is working in Upper Gangetic Plains, an agro-biodiversity hotspot. The community is involved in conservation, maintenance and multiplication of traditional mango varieties and diversity 149 including forty two (42) traditional varieties that are commercially important.

g. Dharohar Samiti Muria/ Bhatra Adivasi and Tribal community, Golaband Bastar, Kondagaon, Chattisgarh, in Bastar, which is an agro-biodiversity hotspot area, is engaged in conservation of traditional landraces of various crops including rice. Nearly 267 traditional rice varieties, including red rice varieties like Meher and Kanta Meher having medicinal properties; scented varieties like Kadamphool and improved farmers' varieties like Shiv Dharohar-1 and Lazni Super etc. are cultivated and conserved by Dharohar Samiti. Seeds and panicles of these indigenous rice varieties are conserved in a community seed bank and varieties are cultivated through organic methods.

h) **Community of Kharchi Village,** Pali, Rajasthan, in Arid Western agro-biodiversity hotspot area, cultivates locally adapted, landrace of wheat, known as Kharchia and other agricultural crops like Moong, Til, Cluster Beans, Barley, Cumin, Chickpea etc. This wheat variety is important for development of improved, salinity tolerant 150 wheat varieties. The local community is able to earn livelihood by cultivating Kharchia wheat in salinity affected soils with minimal inputs.

i) **Siddharudh Savayav Krushikar Balag,Gudenatti, Bailur, Khanapura, Belgam, Karnataka in Western Ghat** cultivates traditional varieties of rice, pulses, vegetables, millets and fruit crops etc. This community has conserved 68 different types of rice varieties collected from different areas having unique morphological features; They maintain a community seed bank and seeds are exchanged among local farmers.

II. Fishing in Ashtamudi Lake – A Case of Restoration and Sustainable Fishery through Scientific Management

Ashtamudi Lake (Lat. 8°45'- 9°28'N and Long. 76°28'-77°17'E) is the second largest lake estuary of Kerala, situated in the Kollam district. It lies 145 kms south of Kochi and has an area of 6,140 ha (61.4km^2 / 23.7 m^2). It remains connected with the Arabian Sea throughout the year, and the Kallada River which empties into the lake is the main source of freshwater. About 173 ha (1.73 km^2) of area near the bar mouth is the clam fishing area. Clam fishery forms the livelihood of more than 500 families in and around the estuary. Approximately 40-50 kg of clams are collected per fisher within 3 to 4 hours daily.

Till the middle of 1981, clams were collected from Ashtamudi backwaters mainly for local consumption. Export market developed in 1981 and fish processors started cooking, freezing and exporting the clam meat to Vietnam, Thailand and Malaysia. Fishery for the short-necked clam intensified during period 1982-1992. The catch rose to 6800 tonnes with peak of 10,000 tonnes in 1991. But the catch declined to about 5000 tonnes in 1993, mainly due to unregulated fishing practices.

The fishermen then demanded action against indiscriminate fishing in the estuary, particularly mechanical dredging, especially during spawning seasons. Spawning of clams commences by December and lasts till February. Clam beds abundant young clams from January to March.

CMFRI had been conducting studies on the fishery and biology of short-neck clam of Ashtamudi Lake since the late nineteen seventies. In response to the dwindling catch scenario and aimed at sustainable short-neck clam fisheries, the following regulations were brought in:

- A closed season was introduced from October to January,
- Mesh size restrictions were applied for nets used in fishing,
- A minimum export size was set at 1,400 clam meats per kg.
- Mechanical clam fishing methods were prohibited.

Clam fishery, thereafter, has sustained landings of around 10,000 tonnes per year during the last decade, with relatively stable CPUE over the same period.

The Ashtamudi estuary short-necked clam fishery has been certified as compliant with the standards of the Marine Stewardship Council (MSC), since 5th November 2014 and the Certificate Code is F-ACO-0055.

Ever since it got MSC, constantly practices are streamlined to account for ground reality. For example:

1. Minimum Legal Size (MLS) of 20mm shell length was introduced in July 2015 on the basis of the stock and the catch size composition.
2. Opening area for fishery for 2016 season was delayed until 1st March at the request of the fishermen, to allow time for the clams to grow in the early part of the year.
3. Fishery is now open for 5 rather than 6 days per week. Weekend closure was introduced in response to the change in stock distribution and decline in biomass observed during 2015.
4. In response to the southward movement of stock distribution, a new management area was established during the 2015 fishing season. This has remained in place during 2016 and 2017.

III. Indian National Centre for Ocean Information Services (INCOIS) provides bi-weekly alerts on coral bleaching based on satellite-based imageries. These alerts, which are disseminated through the web, contain information on the hotpots, degree of heating weeks and the variation of SST anomalies. During 2016-17, 18 such warnings were issued to indicate the stress on the corals in the Gulf of Mannar. Coral bleaching was recorded during field investigations in the summer months (April-May) of 2016.

NBT-6: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Initiation of *in situ* conservation through legal measures in India dates back to early 20th century. The decades of 1970s and 1980s saw the emergence of several powerful legislations which directly and indirectly promote strong area-based conservation. As a result of these and the cultural and spiritual traditions of the country. India had a reasonably good base for implementing CBD when it entered into force. Legislative, policy and programme measures have since been further strengthened. The Biological Diversity Act, 2002 strengthened India's commitment to increase the quality and quantity of *in situ* conservation with the constructive involvement of local communities, women and other stakeholders establishing equity and participation in governance. India has already exceeded its quantitative target of bringing over 20% of the geographical area under area-based conservation measures. Management effectiveness evaluation (MEE) of protected areas, which has become a regular institutionalised feature of protected areas management strategy gives an encouraging picture of management effectiveness of PAs. With the inclusion of Other Effective area-based Conservation Measures (OECMs) such as – biosphere reserves, community conserved areas, known sacred groves and notified eco-sensitive zones, the total conservation area comes to nearly 27% of the geographic area of the country. Connectivity and integration into wider landscape and seascapes is being promoted. "Achievement of Aichi Biodiversity Target 11 and 16- Success stories from India" publication to commemorate 15 years of CBD, highlights India's achievements in pursuit of NBT 6 and Aichi 11.

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Main Measures:

- **National Forest Policy 1988 (as amended)** emphasises maintenance of environmental stability through protection and conservation of pristine forest and restoration of disturbed and depleted forest to main ecological integrity of the forest areas by enlisting the participation and cooperation of local communities and forest dwellers. New updated policy is under development.
- **National Environment Policy, 2006** *inter alia* emphasizes landscape and seascape approach for conservation.
- **Wetlands (Conservation and Management) Rules, 2017 -** These replaced earlier Wetlands (Conservation and Management) Rules, 2010 and make states responsible for conservation and management of wetlands in their respective jurisdictions.

(http://envfor.nic.in/sites/default/files/Wetlands%20(C&M)%20Rules,%202017.pdf)

- **Water (Prevention and Control of Pollution) Act, 1974 last amended in 2003**

(http://envfor.nic.in/sites/default/files/Wetlands%20(C&M)%20Rules,%202017.pdf)

- **Biological Diversity Act, 2002:** Section 37 provides for declaration of Biodiversity Heritage Sites (BHS) in consultation with local governance bodies and BMCs.
- **Noise Pollution (Regulation and Control) Rules, 2000**

  (http://www.envfor.nic.in/legis/noise/noise.html)
- **The Air (Prevention and Control of Pollution) Act enacted in 1981 and amended in 1987 (**http://www.envfor.nic.in/legis/air/air1.html)
- **Environment (Protection Act), 1986**

  (http://envfor.nic.in/legis/env/env1.html)
- **Forest Conservation Act, 1980,** provides for the conservation of forests and for matters connected therewith. A Decision Support System (DSS) has been created as an online tool to help in efficient implementation of the Forest Conservation Act 1980. The Web based GIS System, Operational since 2014, is developed and maintained by the Forest Survey of India and uses 15 spatial layers. DSS helps in informed and unbiased decisions on diversion of forest land based on qualitative and administrative characteristics of forests. The system is widely used by MoEF&CC, its regional offices and also by senior officers from State Forest Departments and others concerned.
- **Wildlife Protection Act, 1972,** provides for designating four categories of Protected Areas i.e., National Parks, Wildlife Sanctuaries, Community Reserves and Conservation Reserves.
- **Indian Forest Act, 1927,** empowers States/UTs governments to notify any forest or waste land as reserved/protected forest.

Other Measures:

- **National Afforestation Plan (NAP) is aimed at** ecological restoration of degraded forest areas with peoples' participation, through JFMCs at the village level, Forest Development Agency (FDA) at the forest division level and State Forest Development Agency (SFDA) at State level, while simultaneously improving livelihoods of forest fringe communities especially the poor.
- **Green India Mission (GIM)**, a mission under NAPCC is mandated to increase forest/ tree cover.
- **Eco-Sensitive Zones (ESZs)** notified around National Parks and Wildlife Sanctuaries to help conservation-friendly environment around the notified areas, contribute to landscapes/seascapes improvement and conservation.
- **India's National Action Plan for Conservation of Migratory Birds (INAPCMB),** to meet national commitments related to protection and conservation of migratory birds and their habitats under the Convention on CMS, CBD, and CITES.
- **Sacred Groves,** known by different names in different parts of the country, often harbour unique and endemic biodiversity.
- **National Plan of Action for the Conservation and Management of Sharks (NPOA- Sharks**) takes stock of the status of and issues relating to shark conservation and creates plans for action.
  - **National Marine Fisheries Policy, 2017** is aimed to ensure health and ecological integrity of marine living resources through sustainable harvests for the benefit of present and future generations.
- **Protection of Plant Varieties and Farmers' Rights Act, 2001** establishes a system for protection of plant varieties, farmers' and plant breeders' rights including rights in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties and conservation of genetic diversity. The farmers are encouraged to maintain areas under landraces and traditional varieties.
- Measures for gender mainstreaming include- Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50 %. This ensures large-scale participation of women in planning decision making, implementation and governance. Gender Budgeting as part of the Annual Central Government budget. Specific provisions for participation and representation of women in government programmes and schemes.
  - **Maritime Zones of India (Regulation and Fishing by Foreign vessels) Act, 1981:** provides for regulation of fishing by foreign vessels and matters connected therewith.
- **Recourse to Judicial System through the National Green Tribunal, Supreme Court and other courts**

· **For Coastal and Aquatic Ecosystem other measures** refer to Section I-Sustainable Fisheries under NBT 5.

National Target(s)

National Biodiversity Target (NBT) - 6 : Ecologically representative areas on land and in inland waters, as well as coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, on the basis of protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20 % of the geographic area of the country, by 2020.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Legally protected areas in India fall into four categories - (1) Reserved/ Designated Forest Areas declared as such under the Indian Forest Act, 1927. (2) Protected Areas declared under any of the four categories of the Wildlife Protection Act, 1972– National Parks, Wildlife Sanctuaries, Community Reserves and Conservation Reserves. The difference between the Community and Conservation reserve is that the former comprises community or private land and the latter comprises government land. (3) Biodiversity Heritage Sites notified under the Biological Diversity Act, 2002. (4) Wetlands identified and notified under Wetland (Conservation and Management) Rules, 2017.

- India has already substantially exceeded its target of bringing 20% of geographic area under conservation thereby contributing substantially to global target of Aichi Target 11 of bringing 17% of world's terrestrial and 10 % of inland water area under biodiversity conservation.
- India's PAs are shown as 1.38 lakh km^2 in World Database on Protected Areas (WDPAs). This does not take into account the protected areas under Indian Forest Act, 1927, Biological Diversity Act, 2002 and Wetlands (Conservation) Rules, 2017. The total protected area after taking into account all the above cited measures is 9,14,074 km^2 , which is 27% of India's geographical area. Refer to "Achievement of Aichi Biodiversity Target 11 and 16- Success stories from India".
- Indicators for measuring the impleme^{n}tation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs. Indicators and assessment of progress against them with rega^{r}d to NBT 6 follows.

1.Trends in PA Coverage under four legal categories under Wildlife Protection Act, 1972 (as amended from time to time)

· Four PA categories under Wildlife Protection Act (1972) has steadily increased over the years. See Table 6.1

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Table 6.1: Number and Area covered by four categories under Wildlife Protection Act (1972)

Category	Nos.	Area (km^2)
National Parks	103	40,500
Wildlife Sanctuaries	544	118,932
Community Reserves	46	72.61
Conservation Reserves	77	2,594.03
Total Protected Areas	**770**	**1,62,098.57**

· These cover all the 10 biogeographic zones of India. .

Figure 6.1 Shows 10 biogeographic zones of India.

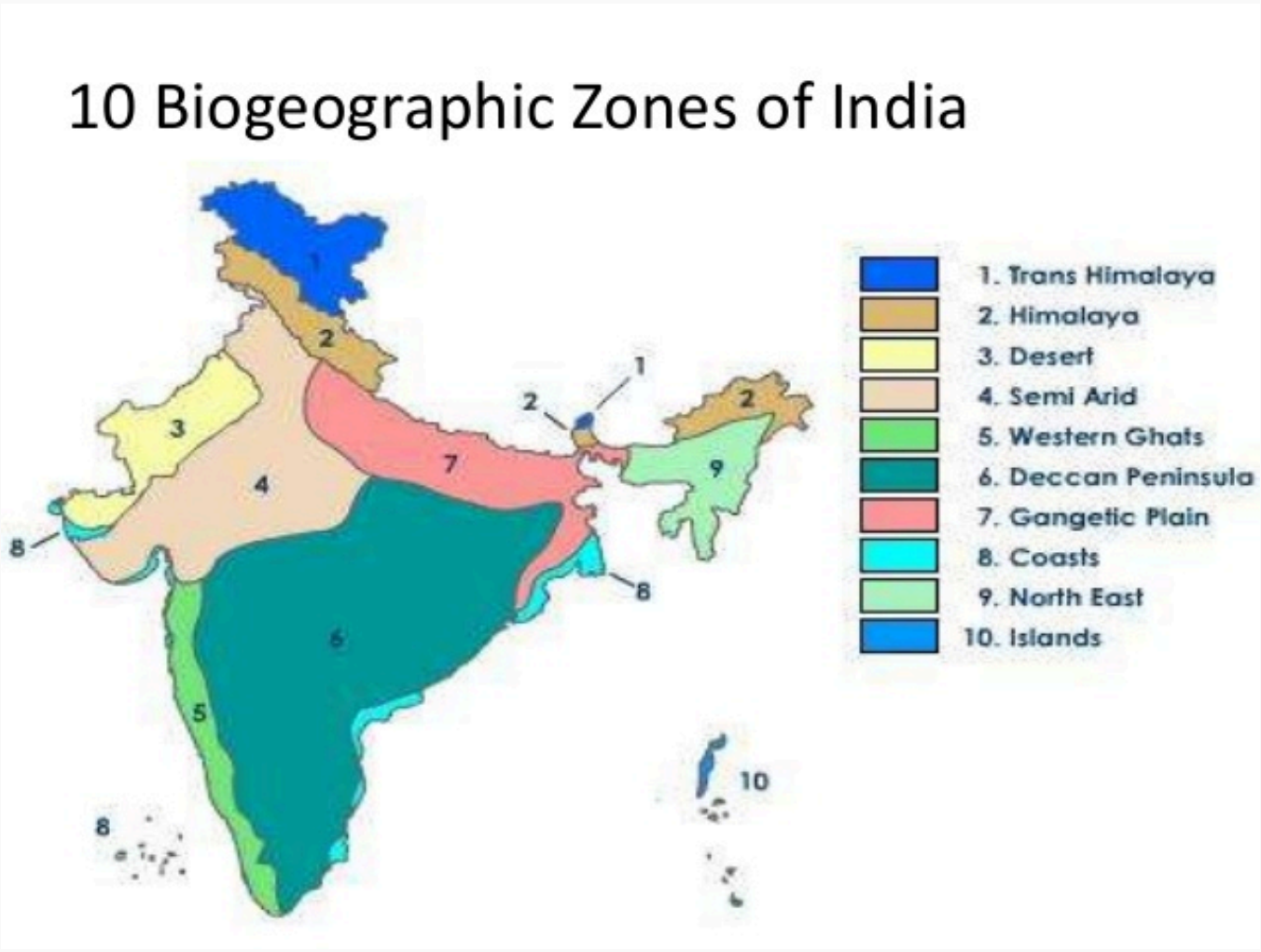
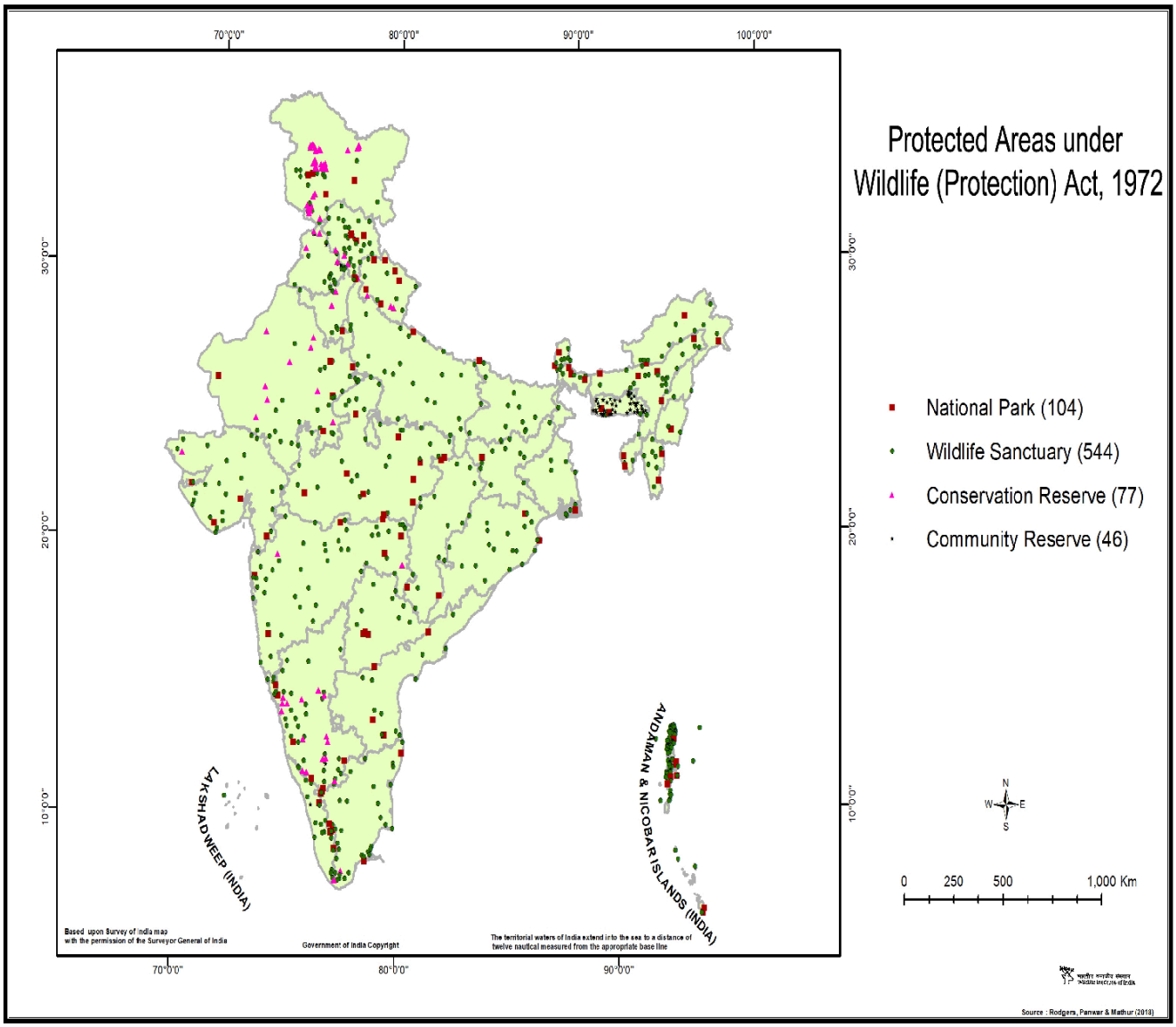
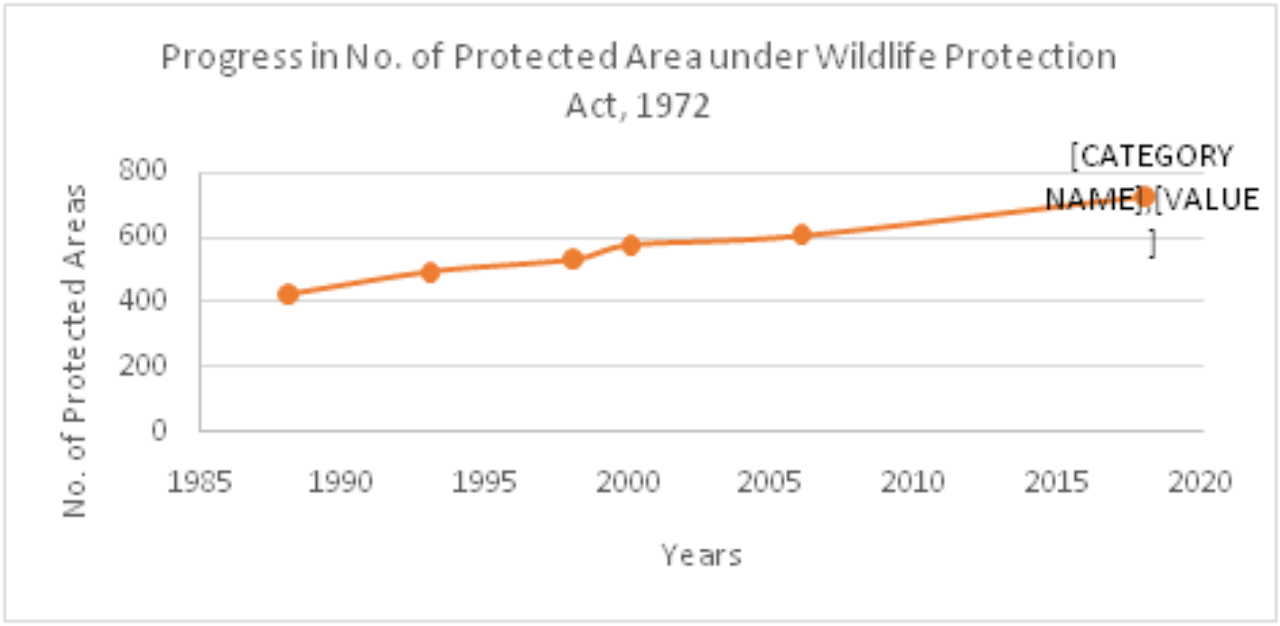


Figure 6.2 Shows the Protected Areas of India



· Year-wise progress in declaration of these conservation areas since 1988 to 2018 is shown in Figure 6.3

Figure 6.3: Progress in No. of Protected Area under Wildlife Protection Act, 1972

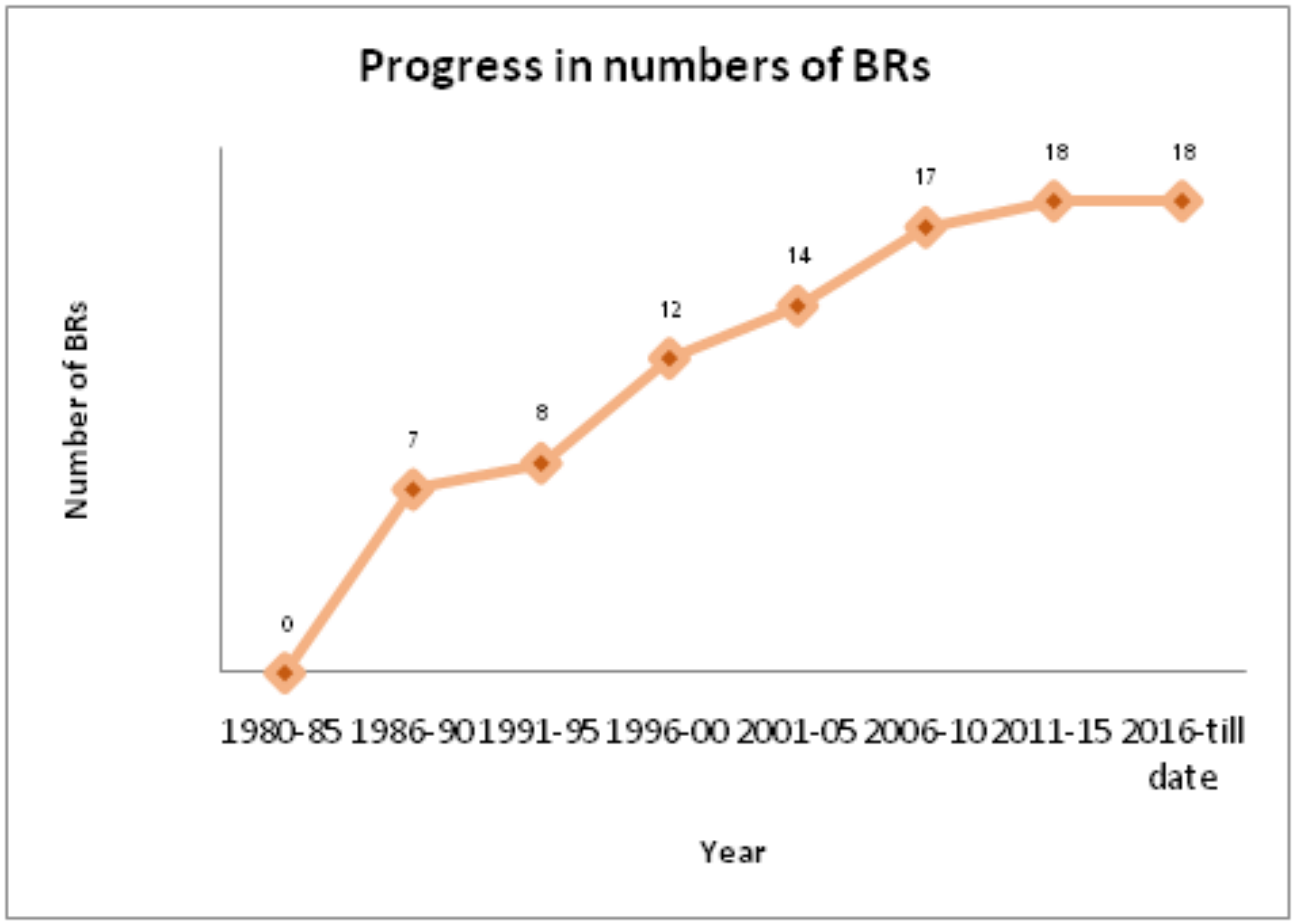


- 25 Marine Protected Areas covering 6200 km^2 in peninsular India and 106 Island Marine Protected Area covering 1569.63 km^2 in islands form part of PAs under Table 6.1
- WII has identified Important Coastal and Marine Areas (ICMA) covering 10,773 km^2 for integrated management with the participation of local communities in their governance.
- Management of all protected areas has increasingly moved towards inclusionary management and governance by recognizing the legitimate roles and responsibilities of the local and traditional communities including women and involving them in conservation and management. Co-management for rehabilitation of degraded forests through Joint Forest Management Committees (JFMCs) and involvement of *Gram Sabhas* in management of forests under The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, management of biological resources through Biodiversity Management Committees (BMCs) at local level has helped establish principles of equity in conservation and sustainable use. The new Wildlife Action Plan 2017-2020 aims at equitous and inclusionary management and governance of protected areas in participation with the fringe traditional and local communities.
- Two hundred and eighty three (283) PAs have been given protection and buffer area of 30,349.63km^2 declared as ESZs. Integrity and quality of biodiversity conservation receives a strong positive support through these which also help in achieving landscape and seascape approach to conservation. More cases are in the pipeline.

1. Trends in Other Effective Area Based Conservation measures (OECMs):

- OECM has been defined under the CBD as "a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the *in situ* conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic and other locally relevant values." India has a variety of such areas conserved for varying aims and governed through equally varying mechanisms.
- Eighteen (18) Biosphere Reserves have been designated which cover 89,531 km^2 area. Ten of these are included in World Network of Biosphere Reserves.
- Year wise progress in declaration of these conservation areas since 1980 to 2018 shown in Figure 6.4 demonstrates that the number has increased by more than 100 % after CBD entered into force.
- Other OECMs include Community Conserved Area (CCAs) recorded through various studies. These are conserved by communities for cultural, religious, livelihoods purposes using customary practices. Some states have specific legal/ administrative arrangements for these e.g., CCAs under the Village Council Act in Nagaland, under the Panchayat Proclamation Act in Arunachal Pradesh, under the Van Panchayat Act in Uttarakhand. 'Sacred Groves' known by different names in different parts of India constitute another important category of CCAs.
- Over 7000 sacred groves preserved through generations, most of them in pristine form have been documented. Actual number is estimated to be 0.1 million to 0.15 million by experts.

Figure 6.4 : Progress in numbers of BRs from 1980 to 2018



2. Trends in coverage under Biodiversity Heritage Sites under the Biodiversity Act 2002

- Twelve sites covering 941.44 km2have been notified. For details refer to http://nbaindia.org.
- Increased sense of ownership of local biodiversity generated through communication, education and public awareness (CEPA) and people's biodiversity registers (PBRs) is expected to lead to designation of more such sites.

3. Trends in wetlands brought under Integrated Management

- Management plans for seven Ramsar Sites have been updated to Integrated Management Plans covering an area of 0.305 MHa.
- Several sites under implementation of restoration plans have shown positive impacts ontheir ecological status e.g., open water surface area and the forest cover within the direct catchment increased in Loktak Lake; salinity gradient underpinning rich fisheries and ecological processes maintained in Chilika Lake.
- Asian Waterbird Census (AWC) under Citizen-Science programme is jointly coordinated by the Bombay Natural History Society and Wetlands International in India. Total 313 AWC sites were identified in India in 2015. Chilika Lake in India reported the maximum number of water bird species with 8,00,000 species in the census.
- The State of Uttar Pradesh has notified all wetlands exceeding an area of 2.24 ha falling outside the protected forest area under the Rules 2017 and uploaded the information on website www.sacup.org to secure their protection.

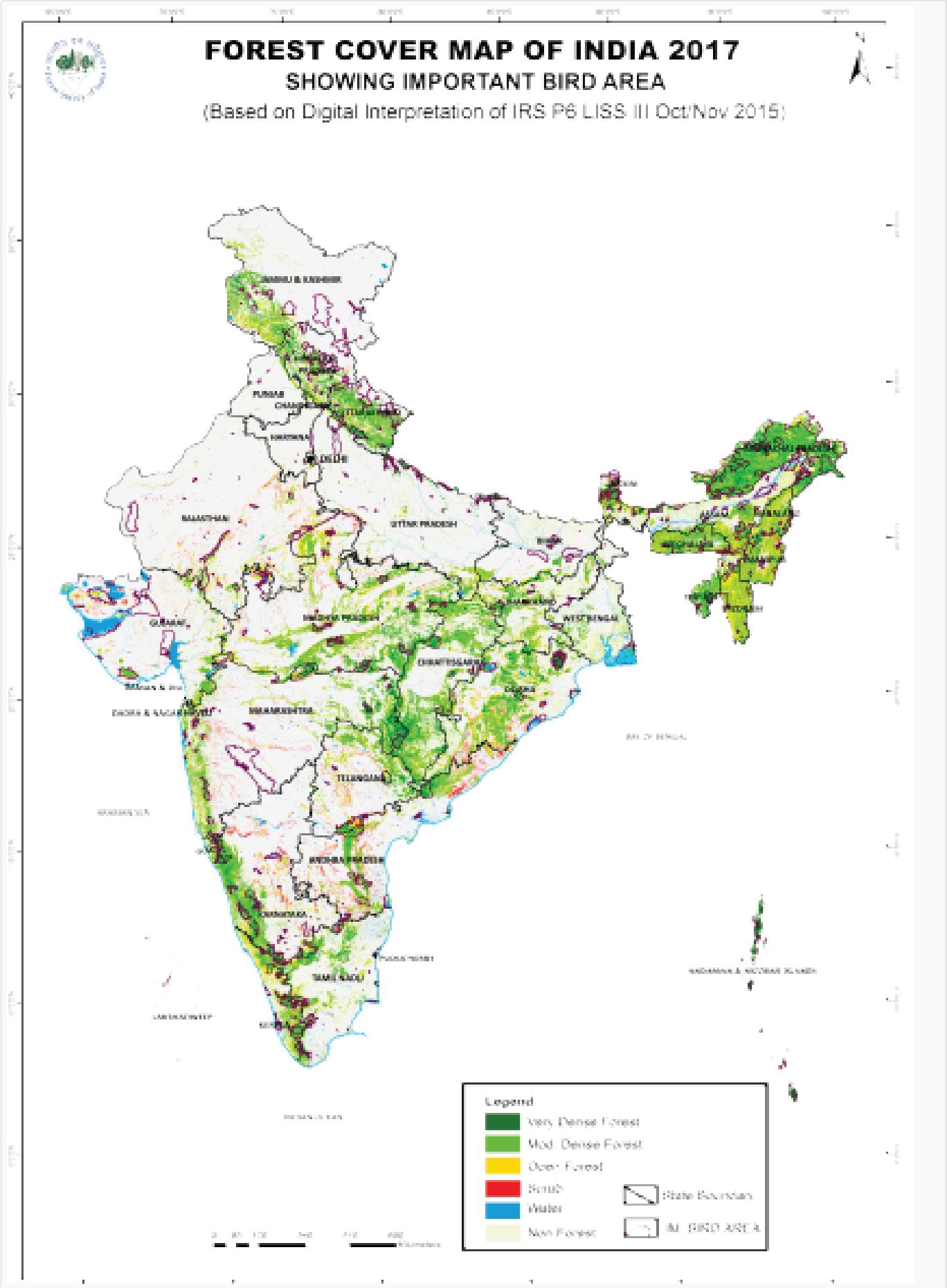
4.Trends in Important Bird Areas (IBAs):

· 554 IBAs have been identified in India. 245 of these IBAs are outside PA Network. Figure 6.5 gives the map depicting important bird areas in the PAsin India as on Oct/Nov 2015.

· Some of these 245 areas are protected through community participation.

· A study has been initiated by Sálim Ali Centre for Ornithology and Natural History (SACON) to develop comprehensive and participatory management plans for selected IBAs.

Figure 6.5 gives the map depicting important bird areas in the PAs in India as on Oct/Nov 2015.


FOREST COVER MAP OF INDIA 2017
SHOWING IMPORTANT BIRD AREA
(Based on Digital Interpretation of IRS P6 LISS III Oct/Nov 2015)
Legend
Very Dense Forest
Mod. Dense Forest
Open Forest
Scrub
Water
Non Forest
State Boundary
IBA BIRD AREA

5. Trends in selected Integrated Development of Wildlife Habitat species:

Ongoing Integrated Development of Wildlife Habitat (IDWH) programme, extended up to 2020, includes three components namely Project Tiger, Project Elephant and Development of Wildlife Habitats. It covers 18 tiger range states distributed in five landscapes, 23 elephant range states and wild habitats in the entire country for integrated and concerted action. Adopting a wider landscape and seascape approach, 17 species of wild habitats spread across the country were identified for monitoring the populations and restoration actions wherever needed. The species include Asian wild buffalo, Asiatic lion, brow-antlered deer or sangai, dugong, edible nest swiftlet, Gangetic river dolphin, Great Indian Bustard, hangul, Indian rhino or great one-horned rhinoceros, Jerdon's course, Malabar civet, marine turtles, Nicobar megapode, Niligir tahr, snow leopard, swamp deer, vultures.

The project has begun to show positive achievements in raising the populations of identified species as shown hereunder:

- Sustainable populations of tiger and elephants have been restored with increase in the number of tigers from 1,827 in 1972 to 2,226 in 2014, and number of elephants from 12,000 in 1970s to 27,000 in 2015.
- Manipur Brow-Antlered Deer, Edible Nest Swiftlet and Lion population shows an increasing trend. Population of lion in Gujarat has shown an increase from177 in 1978 to 523 in 2015.
- Decline in population of vultures has been arrested. Conservation breeding of vultures started with success.
- Significant growth in the population of the Swiftlet has been registered after in situ and ex situ conservation measures in Andaman and Nicobar Islands.
- The number of one horned Rhinoceros has increased nearly to 2,900 in 2016

6. Trends in forest cover of four designated categories

- Total declared forest cover of the country is 7,08,273 km^2. There has been an increase of 16,246 km^2 in the last two years.
- The total forest area includes legally protected reserved forest and other legally protected reserved and other forests. Figure 6.6 total forest area and Figure 6.7 depicts the legally protected forest area.

Figure 6.6 Total Forest Cover

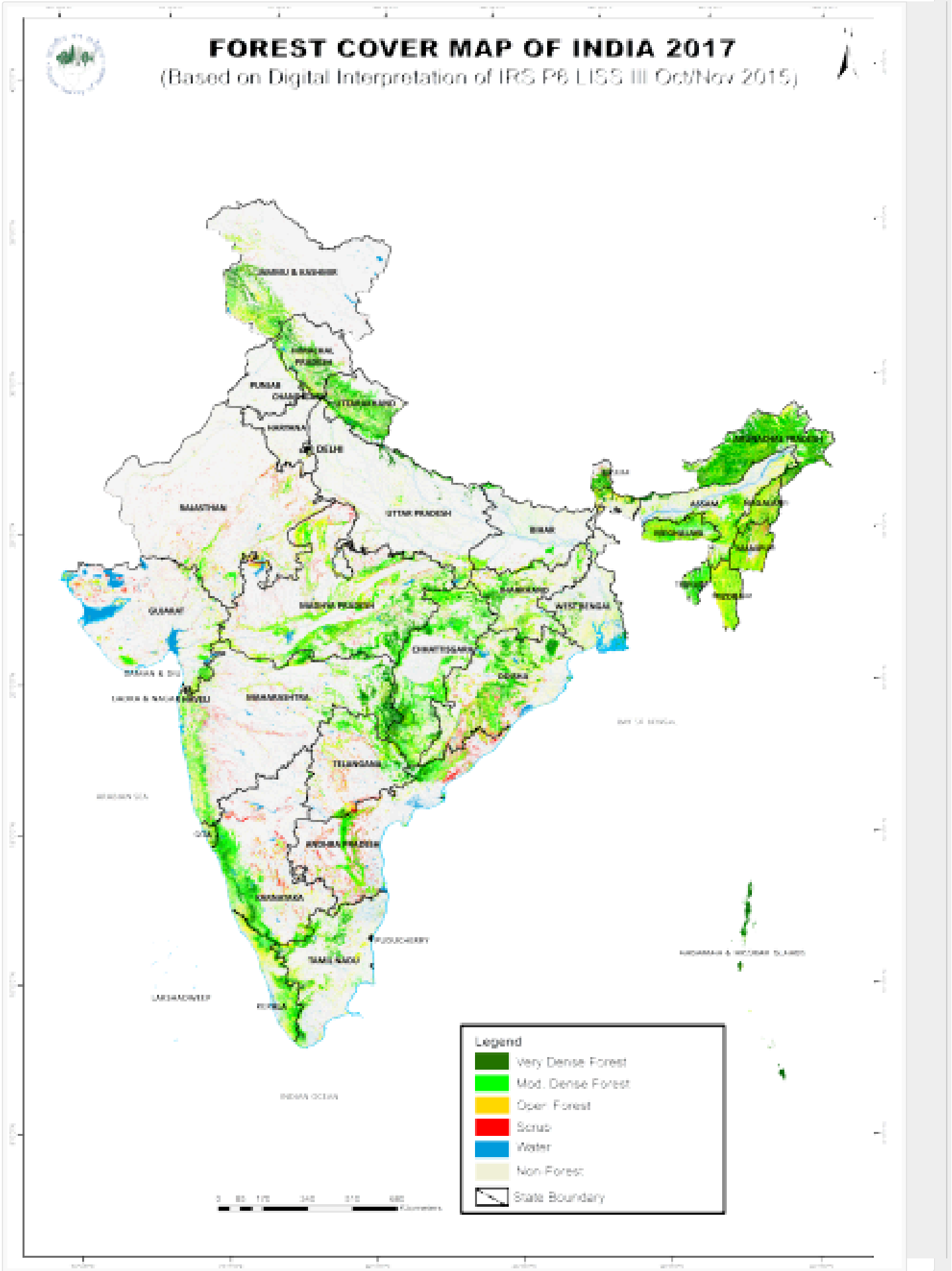
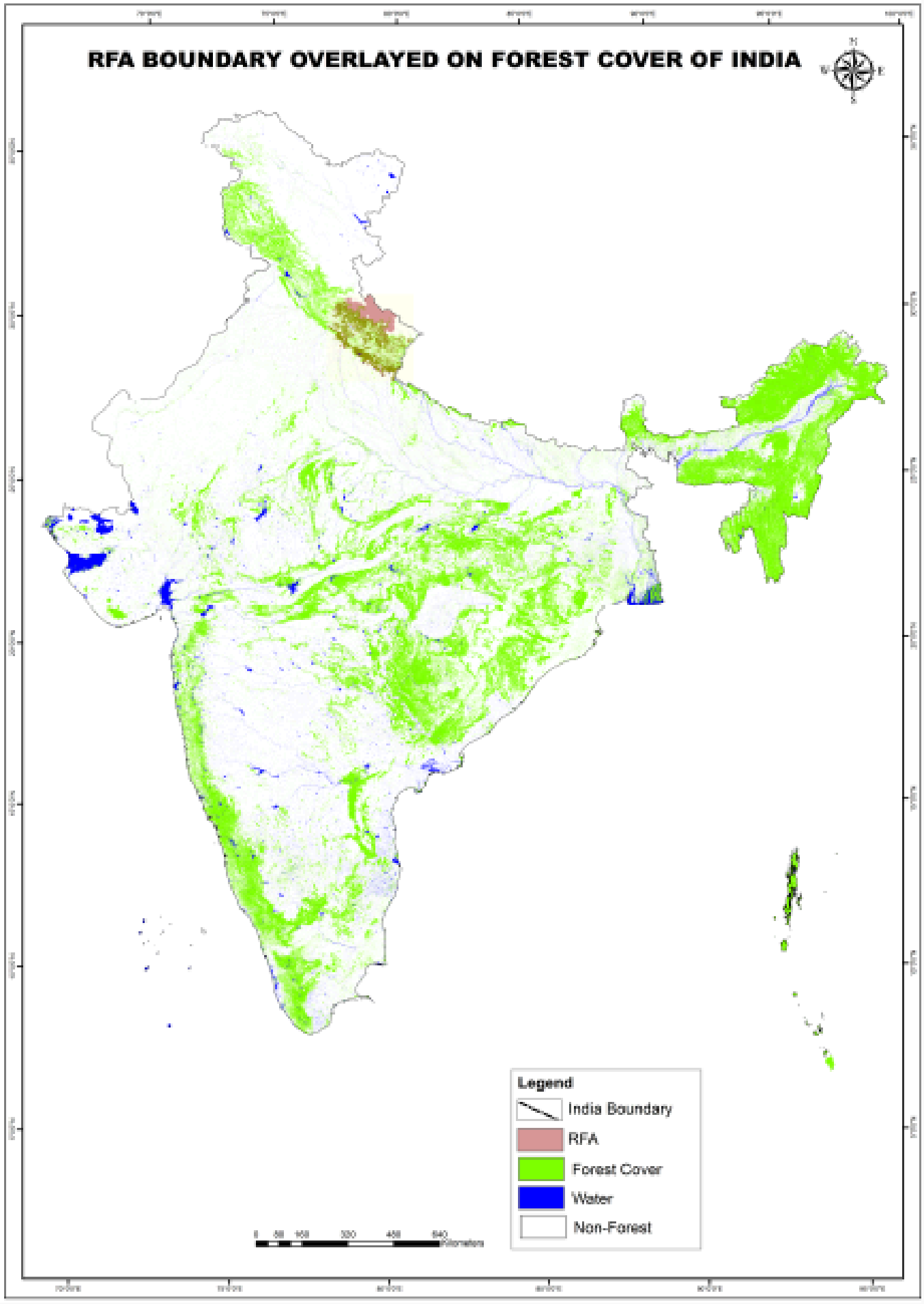

FOREST COVER MAP OF INDIA 2017
(Based on Digital Interpretation of IRS P6 LISS III Oct/Nov 2015)
Legend
Very Dense Forest
Mod. Dense Forest
Open Forest
Scrub
Water
Non Forest
State Boundary

Figure 6.7 Legally protected forest area


RFA BOUNDARY OVERLAYED ON FOREST COVER OF INDIA
Legend
India Boundary
RFA
Forest Cover
Water
Non-Forest

- Forest cover is classified in four categories based on canopy density, as shown below

Category	D**escription**
Very Dense Forest (VDF)	Forest with tree canopy density of 70% and above
Moderately Dense Forest than 70%	Forests with tree canopy density of 40% and more but less than 70%
Open Forest	Forests with tree canopy density of 10% and more but less than 40%
Scrub	Degraded forest lands with canopy density less than 10%

- VDF has shown an increase over the last six years. For details refer to Trends in forest cover under NBT 3,Section II - Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes.

7.Trends in status of Indian plant and animal species included in IUCN Red Data Book

- In compliance of Section 38 of the Biological Diversity Act, 2002, 159 plant and 175 animal species have been notified as threatened in states. SBBs take action for regulation of extraction of the species, promote R&D and measures for rehabilitation and restoration of these species.
- DBT's pan India project 'Preventing Extinction and Improving The Conservation Status of Threatened Plants through application of Biotechnological Tools' has demonstrated that ecological niche modelling (ENM) can be an economical and effective tool to guide surveys. It helps in overcoming the constraints regarding the availability of primary data on the distribution and population of species and problems in the correct categorisation of the threatened species. The project led to the discovery of characterization of 38 new populations of threatened species.
- Action to assess and rehabilitate 156 threatened floral species in different ecosystems has been taken through a pan- India initiative of Department of Biotechnology named 'Preventing Extinction and Improving the Conservation Status of Threatened Plants through Application of Biotechnological Tools'. The project has demonstrated that Ecological Niche Modelling (ENM) can be an economical effective tool to guide surveys.It helps in overcoming the constraints regarding the availability of primary data on the distribution and population of species and problems in the correct categorisation of the threatened species. The project led to the discovery of characterisation of 38 new populations of threatened species.
- 683 species fall in the category of globally threatened species (vulnerable + endangered+ critically endangered) which is about less than 1% (i.e, 0.5%) of species documented in India. Table 4 gives the detailed picture.

Category	**Critically Endangered**	**Endangered**	**Vulnerable**	**Near Threatened**	**Conservation Dependent**	**Data Deficient**	**Least Concern**	**Total**
No. of Species	78	209	396	336	2	787	3,814	5,623

Table 4: Number of evaluated species (5,623) known from India in different IUCN categories

- ZSI has conducted the status surveys of more than 20 species of mammals, 10 species of birds, 25 species of reptiles,4 species of amphibians, 3 species of arthropods, 45 species of echinoderms and 2 species of molluscs in more than 150 PAs in the last ten years to map their status.
- An Expert Committee constituted by NBA in 2014 for reviewing the implementation status of Section 38 of the Biodiversity Act 2002 including strategies to conservation of medicinal plants gave recommendations in 2016. Greater involvement of all stakeholders in identification of threatened species and devising strategies for their rehabilitation, particularly the species that lie outside the PAs was recommended by the Expert Committee NBA is taking further action on the recommendations of the Expert Committee.
- **BSI has evaluated threatened orchid species as per IUCN Categories -** 17 species are critically endangered, 26 species are Endangered, and 122 species are vulnerable.

· Species facing threats are protected through diverse strategies including restriction on trade in conformity with India's commitments under CITES as shown in Table 6.2.

Table 6.2 Species included in Appendices for regulation of Trade (CITES)

Taxonomic Groups	CITES Appendices			Total
	Number of Species			
	I	II	III	
Mammal	57	47	30	134
Aves	26	81	1	108
Reptilia	18	21	9	48
Amphibia	0	2	0	2
Pisces	27	12	0	39
Echinodermata	5	0	0	5
Colenterate	0	627	0	627
Lepidoptera (Butterflies)	0	2	0	2
Total	**133**	**792**	**40**	**965**

Table 6.3 shows species with their IUCN status getting protection through PAs declared protected under Wildlife Protection Act-1972 are shown with their IUCN status in Table 6.3

***Table 6.3* Species protected in Protected Areas under Wildlife Protection Act 1972**

Taxonomic Group	CR	DD	EN	EW	LC	Total
Mammal	5	20	30	0	131	**252**
Aves	14	2	13	0	637	**777**
Reptilia	4	13	9	1	56	**350**
Amphibia	0	2	1	0	16	**33**
Pisces	5	7	3	0	20	**47**
Bettle	0	0	0	0	0	**38**
Butterfly	0	0	0	0	5	**454**
Coelenterates	1	47	8	0	222	**682**
Dragonfly	0	0	0	0	0	**1**
Porifera	0	0	0	0	0	**10**
Echinodermata	0	5	2	0	13	**32**
Arthropoda	0	3	0	0	0	**3**
Mollusca	0	0	0	0	4	**24**
TOTAL	29	99	66	1	1,104	**1,299**

- **BSI has evaluated threatened orchid species as per IUCN Categories -** 17 species are critically endangered, 26 species are Endangered, and 122 species are vulnerable.

8. Trends in Air and Water quality and in Noise pollution

Water Quality

· Refer to section II – Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes -Trends in river water quality under NBT 3.

Air Quality and Noise Pollution

· **National Air Quality Monitoring Programme (NAMP**): CPCB, SPCBs, PCCs and National Environmental Engineering Research Institute (NEERI), Nagpur monitor ambient air quality at 691 locations covering 303 cities/towns in 29 States and 6 Union Territories across the country.

· **Ambient air quality data of 2016** showed that air pollution with respect to PM 10 was a matter of concern. Local bodies and

communities are informed and educated about maintaining its standards.

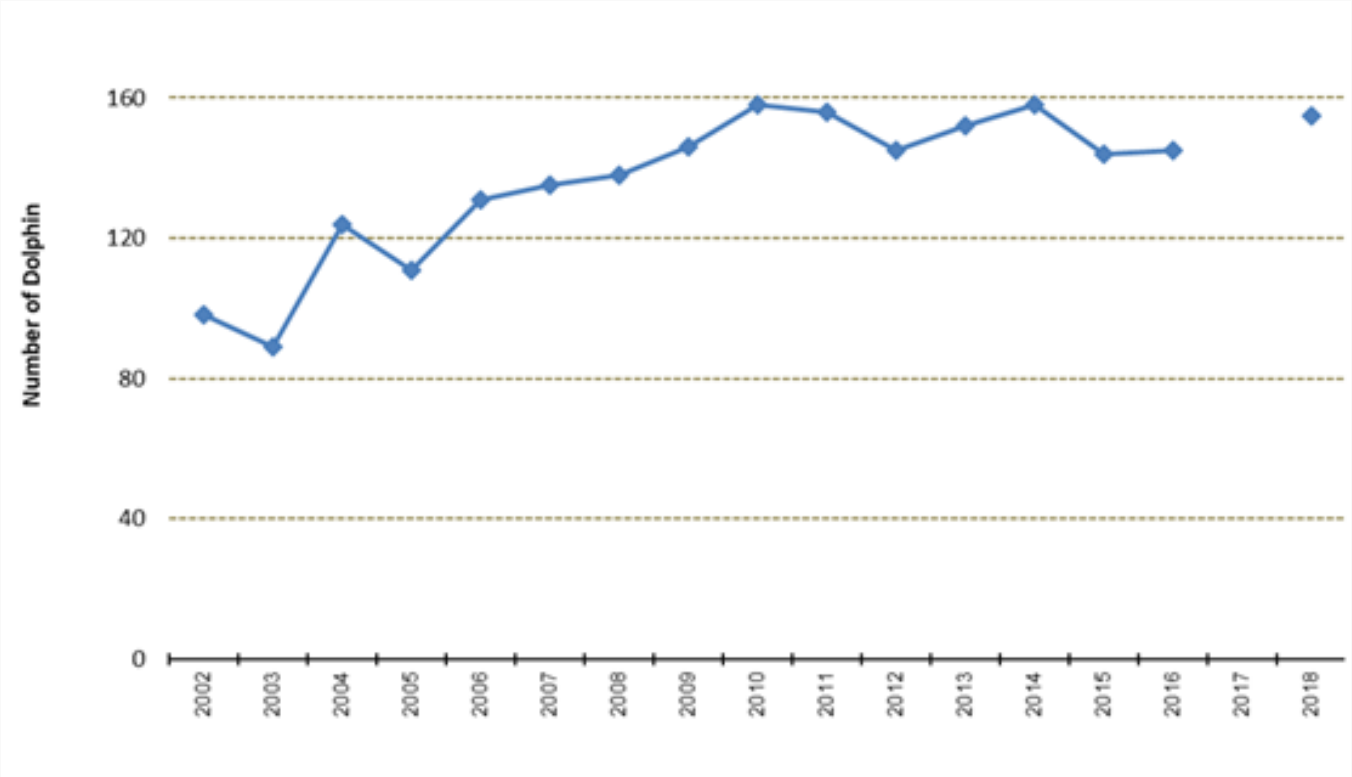
- CPCB issued **"Directions under Section 18(1) (b) of the Air (Prevention and Control of Pollution) Act, 1981 regarding prevention, control or abatement of air pollution and improvement of Ambient Air Quality in Delhi and National Capital Region (NCR)"** in December 2015 which prescribes action points for control of air pollution.
- **National Ambient Noise Monitoring Network (NANMN)**: CPCB in association with SPCBs installed 70 Noise Monitoring Systems in Mumbai, Delhi, Kolkata, Chennai, Bangalore, Lucknow and Hyderabad (10 stations in each) under Phase-I and Phase-II of the NANMN programme.

9. Status of Ecological Services of selected Ecosystems including Agricultural Landscapes

Already 27% of the geographical area has been covered as protected area under this NBT against the target of 20%. Effective implementation of laws and policies, concerted actions of conservation with the involvement of local communities and women have had strong positive outcomes for improvement in status of ecological services. See the following examples.

- Three cycles of MEE of 28 Tiger Reserves in 2006, 39 Tiger Reserves in 2010 and 43 Tiger Reserves in 2014 have given a mean MEE score of 60.80 % for PAs and 69 % for tiger reserves, which is higher than the global mean of 56 %. The fourth cycle is under implementation for 50 tiger reserves. This is indicative of enhancement of ecological services of forest ecosystems.
- Designation of eco-sensitive zones acts as buffer for the PAs and contributes to landscape / seascape approach.
- Increase in VDF, MDF (refer to NBT 3 Section II) enhances ecological services.
    - Restoration measures have led to several positive changes in wetlands. For example Chilika lake's biodiversity ecological and ecosystem services have shown improvements as indicated below
    - Salinity gradient within the lagoon has been re-established.
    - The Irrawaddy Dolphin population has increased from 89 to 158 individuals between 2003 and 2014, along with increase in habitat use, improved breeding and dispersal, and decline in mortality rates.
    - Sea grass meadows have expanded from 20 km^2 in 2000 to 80 km^2 in 2014.
    - Improvement of Chilika habitat, in particular the increase in dolphins, has led to a resurgence of wetland eco-tourism.
    - Annual number of tourists visiting the wetland during 2000–2014 averaged 0.3 Million – an increase of over 60 % as compared to arrivals during 1994 –1999.
    - Livelihood base of 200,000 fishers and 400,000 farmers improved.
    - Based on the positive changes in ecological character, Chilika was delisted from Montreux Record and the intervention recognized with the Ramsar Wetland Conservation Award.

Figure 6.3: Trends in Irrawaddy Dolphin in Chilika



Source – Wetland International

- Sustainable agricultural practices help to restore the ecological integrity of the landscape and improve the status of ecological services. For sustainable agricultural practices – Refer to Section II, NBT 5.
- Scientific management of Ashtamudi lake has helped restore the ecological health and integrity of clam fishing area of this lake. For details refer to “Fishing in Ashtamudi Lake – A Case of Restoration and Sustainable Fishery through Scientific Management”, Section II- Other relevant information under NBT 5.
- Amelioration of the urban environment through wise use of wetlands and creation and maintenance of urban green spaces contribute to improvement of ecological status of various ecosystems and complements landscape and seascape approach to conservation. Smart cities project, rehabilitation of degraded areas, rainwater harvesting, use of solar energy are being increasingly encouraged in urban areas. Establishment of Aravalli and Yamuna biodiversity parks under Delhi Development Authority are examples of the restoration action. For details see “Restoration of mined out area in urban locale”- Refer to Section II- Other relevant information under NBT 3.

10.Trends in areas of Exceptional Agricultural Biodiversity and their Threat Status

Refer to section II – Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes - **Trends in enhanced use of landraces -**under NBT 5.

Other relevant information

Mainstreaming Coastal and Marine Biodiversity Conservation into Production sectors in Sindhudurg coast in Maharashtra.

In the fishing district of Sindhudurg in the state of Maharashtra, the lives of thousands of people are inextricably linked with the sea for sustenance and livelihood. A pilot project co-funded by GEF, Ministry of Environment, Forest and Climate Change and UNDP (2012-2017) was taken up in Sindhudurg maintaining the livelihood-ecosystem balance. It aimed at mainstreaming biodiversity conservation in production sectors. The project *inter-alia* adopted four key areas of intervention namely conservation, capacity-building, alternative livelihoods promotion and planning.

The project has several positive outcomes, these include 100 % adoption of by-catch removing square mesh nets developed by CIFT by fishers’ community of Sindhudurg, mangrove eco-tourism through Self-Help Group of women on a pilot mud crab-farming model on private lands by fisher women and men for which 28.5 acres of land in 15 villages has been used and 149 beneficiaries trained, oyster and mussel (bivalve) farming as alternative livelihood option for fishing communities, system of rice intensification (SRI) comprising set of practices for plant, soil, water and nutrient management to revive native species of rice that fetches higher price than the hybrid varieties.

Cleaning of the seabed of debris such as ghost nets and marine waste through the newly trained scuba divers including women divers has been another major achievement which has created an environment of not dumping litter or waste in the sea. An expedition of living marine resources in Angria Bank has identified 160 species including 153 coral species, 18 fish species, 9 seaweed species and 9 echinoderms.

The State Government of Maharashtra has established Mangrove and Coastal and Marine Biodiversity Conservation Foundation for long term sustainability and for expanding the project approach to the rest of the coastal areas in the state.

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Transformation from hunting ground to safe haven - Amur Falcon case

Amur Falcons which make a round-trip of 20,000 km every year from south-east Russia and northern China to southern Africa through India arrive in large numbers in Nagaland and a few other places in the north-east India. Tens of thousands of Amur Falcons roost in Pangti in Nagaland. They used to be harvested for sale and consumption by the local people.

A comprehensive campaign to protect the Amur Falcons was launched in 2013 in the area. The campaign revolved around nature education, creation of Amur Falcon Eco-clubs, patrolling and enforcement and scientific study of the birds.

The Village Council imposed a ban on their hunting. The erstwhile hunters now protect Amur Falcons for the entire span of Amur Falcon visit. The protection squad gets honorarium from the State Government and Wildlife Trust of India. Employment opportunities opened by the Tourism Department in the form of tourist guides and home-stay providers enhance livelihood of local communities. This safe haven for birds now has earned the epithet of Amur Falcon capital of the world **Citrus Sanctuary**

India set up its first gene sanctuary in the Garo Hills of Assam for wild relatives of citrus in 1980s.The distinct microclimate with a combination of tropical and temperate seasons and heavy rainfall, offers an environment conducive to citrus plants. Rare varieties such as Citrus macroptera (Melanesian sour orange), Citrus aurantifolia (lemon) and Citrus grandis (pummelo) grow abundantly in the region.

Obstacles and scientific and technical needs related to the measure taken

The national target of over 20% geographical area under area based conservation measures is inclusive of terrestrial, inland and coastal water ecosystems which has been exceeded already in terms of area. India has done systematic planning to cover all the ten biogeographic zones and ecosystem types through PAs and designated forests. Representativeness has thus been ensured to a large measure. To what extent is the richness of the diversity of biomes and provinces reflected in these is not yet fully analysed and understood. Much more work is needed to establish their extent of coverage and to incorporate measures to strengthen this aspect in area based conservation. Establishing corridors and connectivity between PAs is a work that requires active peoples’ participation and

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scientific planning. WAP 2017-2030 has taken this as one of the focal areas.

Control and eradication of invasive alien species in PAs and conservation areas is a serious issue which needs to be attended to enhance and maintain ecological integrity of the ecosystems. Additional financial, technical and human resources are needed to tackle this problem.

Community Conserved Areas (CCAs) and sacred groves are significant area/ species/ faith-based practices that contribute to conservation. In addition, private conservation areas are maintained by corporates and other institutions. Systematic identification and mapping of these is needed to create correct understanding of their numbers, total areas and nature of biodiversity harboured by them to move towards strategies to sustainably conserve them and tap their possible potential to contribute to connectivity and corridors between PAs and appreciate their role in realising seascape/landscape approach. This could substantially contribute to local commitment to conservation.

Relevant websites, web links and files

Ministry of Environment Forests and Climate Change
Environmental Information System (ENVIS),
Forest Survey of India
National Biodiversity Authority
Central Pollution Control Board
Zoological Survey of India
Botanical Survey of India
Wildlife Institute of India

NBT-7: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Measures:

National Bureaux under the Indian Council of Agricultural Research (ICAR) system supported by legislative, policy and programme measures identify and prioritise genetic resources for *in situ* and *ex situ* conservation. This section identifies the important diverse measures and the next section maps the achievements.

Main Measures (policy and legislative):

1. **Biological Diversity Act 2002:** to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto.
2. **Protection of Plant Varieties and Farmers' Rights Act, 2001:** for protection of plant varieties, farmers' and plant breeders' rights including rights in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties.

Other Measures:

1. **National level Bureaux/ Organisations** created under ICAR system for conservation of agriculturally important genetic diversity. See Figure 7.1 for details.

Figure 7.1: Bureaus and their mandates under ICAR system

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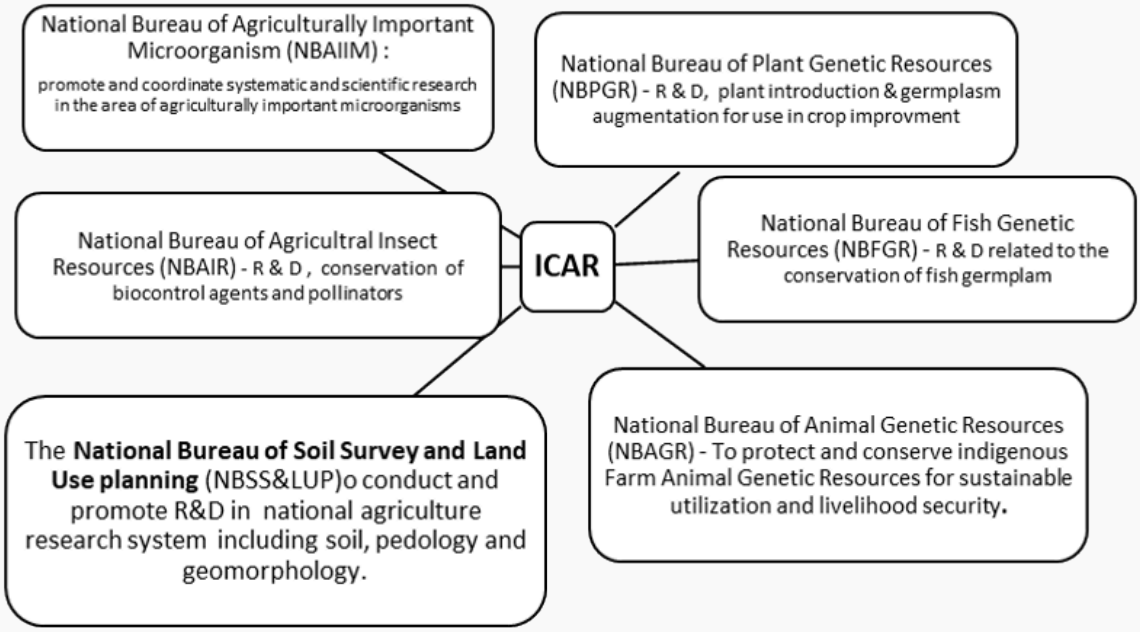

2. National Innovations on Climate Resilient Agriculture (NICRA) enhances resilience of agriculture to climate change and climate vulnerability through strategic research and technology demonstration.

3. National Herbarium of Cultivated Plants (NHCP), New Delhi holds collections mainly of cultivated taxa and wild/ weedy relatives of crop taxa of both native and exotic origin; besides keeping seed and carpological samples of plant genetic resources (PGR) as complementary collections.

4. All India Coordinated Research Network on Potential Crops (AICRNPC) to explore and domesticate new plant sources of food, fodder, fuel, fibre, energy and industrial uses; to collect/ introduce and characterize available germplasm and its wild relatives; to identify superior genotypes of these new plants and to develop improved varieties for different agro-climatic regions.

5. My Village My Pride (*Mera Gaon Mera Gaurav*) is an initiative to provide doorstep technical services by making scientists/ officers adopt villages and provide information to farmers on technical and other related aspects in regulated time-frame through personal visits.

6. Rashtriya Gokul Mission launched in 2014 for development and conservation of indigenous breeds, selective breeding in the breeding tract and genetic upgradation of non -descript bovine population.

The mission has two components:

a.) **National Mission on Bovine Productivity** for enhancing milk production and productivity to make dairying more remunerative to farmers. Two of its five components directly address issues concerning genetic diversity through:

- **'E Pashu Haat Portal,** launched for linking farmers and breeders of indigenous breeds
- **Establishment of National Bovine Genomic Centre for Indigenous Breeds (NBGC-IB),** being established for enhancing milk production and productivity through genomic selection among indigenous breeds.

b.) National Programme for Bovine Breeding by establishing mechanism to conserve and develop indigenous breeds in scientific and holistic manner through **National *Kamdhenu* Breeding Centres** - Two Centres of Excellence, one each in North and South for conservation of Indigenous Bovine Breeds (41 cattles and 13 buffaloes) to enhance productivity and upgrade genetic makeup. Will act as a repository of germplasm of all indigenous breeds and supply certified germplasm to farmers.

Activities of the *Gokul Mission* include:

a) Establishment of Integrated Indigenous Cattle Centres viz "*Gokul Gram*";

b) Strengthening of bull mother farms to conserve high genetic merit Indigenous Breeds;

c) Establishment of Field Performance Recording (FPR) in the breeding tract;

d) Assistance to Institutions/Institutes which are repositories of best germplasm;

e) Implementation of Pedigree Selection Programme for the Indigenous Breeds with large population;

f) Establishment of Breeder's Societies: *Gopalan Sangh*;

g) Distribution of disease free high genetic merit bulls for natural service;

h) Incentive to farmers maintaining elite animals of indigenous breeds;

i) Heifer rearing programme; award to Farmers ("Gopal Ratna") and Breeders Societies ("*Kamadhenu*"); 22 *Gopal Ratna* awards and 21 *Kamdhenu* awards have been given till 2017-18.

j) Organization of Milk Yield Competitions for indigenous breeds, and

k) Organization of Training Programme for technical and non-technical personnel working at the Institute/Institutions engaged in indigenous cattle development.

7. Breed Conservation Award instituted to recognize efforts for conserving and maintaining the registered breeds of livestock and poultry. Annually four breed conservation awards are given.

8. Plant Genome Saviour Community Awards by PPVFRA: Refer to Section II- Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes- under NBT 5.

9. Biennial India Biodiversity Awards instituted by MoEFCC in association with UNDP during CoP 11 in 2012 and continued during India's Presidency. These have now been institutionalised in the NBA. Till 2018, forty seven (47) awards have been given under different categories. Categories under the awards include restoration and conservation of plant and animal breeds and species. The best practices identified under the Award are captured in the publication 'India Naturally'. Four editions have already been published.

10. **National Medicinal Plants Board, Ministry of AYUSH** has decided to award Certificates of appreciation to various Ayurveda, Siddha and Unani (ASU) manufacturing units for online submission of record of Herbal Raw Materials Consumed by ASU Manufacturers.

11. Measures for gender mainstreaming include- Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50 %. This ensures large-scale participation of women in planning decision making, implementation and governance. Gender Budgeting as part of the Annual Central Government budget. Specific provisions for participation and representation of women in government programmes and schemes.

National Target(s)

National Biodiversity Target (NBT) - 7 : By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Local communities and traditional practitioners including women play an important role in restoring and conserving genetic diversity and helping the government institutions in identifying, exploring and conserving these as well.

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs. Indicators and assessment of progress against them with regard to NBT 7 follow.

A. Trends in Animal Genetic Diversity

Diversity of domesticated livestock and poultry breeds has been a result of years of evolution within specific ecological niche. Indigenous breeds are robust, resilient and suited to the climate and environment of the country. Their milk is high in solids-not-fat (SNF) and fat content and studies suggest that they perform better in the face of the challenge of climate change. Government agencies, Universities and other technical institutions encourage and provide support to restoration and conservation of indigenous breeds.

1. Trends in number of Indigenous/Domesticated Breeds *(in situ)* and
Effectiveness of initiatives/measures taken to Conserve Indigenous Diversity

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· Table 7.1 shows the number of extant indigenous domesticated breeds.

Table 7.1 (*the number of extant indigenous domesticated breeds*)

Indigenous Domesticated Breed	No. of breeds
Cattle	37
Buffaloes	13
Sheep	38
Goat	23

Pig	2
Horses & Ponies	6
Camels	6

- Effective measures have been taken to create awareness among farmers, livestock owners and masses, especially children through exhibitions at local and national levels and through extension activities, personal visits and counselling by scientists in the field of agriculture and animal husbandry. All queries of farmers related to different topics are also addressed in these visits.
- Projects from 28 states approved and funds released to States under Rashtriya Gokul Mission.

o Establishment of 14 Gokul Grams with an aim to develop and conserve existing indigenous breeds recognised by NBAGR is under progress.

o 35 Bull Mother Farms have been modernized and 3,629 Bulls inducted for genetic upgradation.

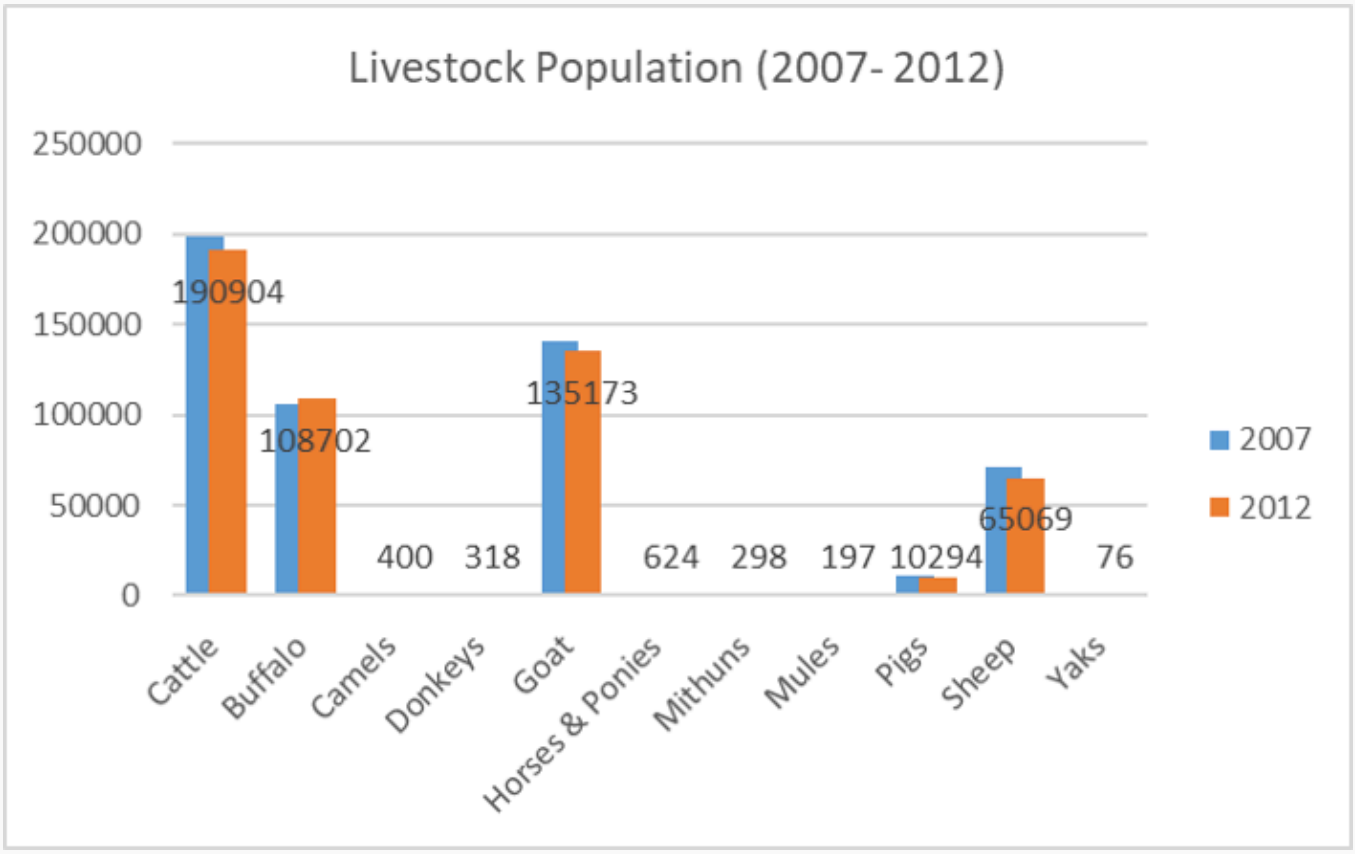
- Two National Kamdhenu Breeding Centres, one in northern region Madhya Pradesh and other in Southern region Andhra Pradesh are being established.

2. Trends in population of Domesticated Breeds (*in situ*)

- **Total Livestock population** consisting of cattle, buffalo, sheep, goat, pig, horses and ponies, mules, donkeys, camels, mithun and yak shows a decline by 3.33% in 19th Census of 2012 from 18th Census of 2007. Figure 7.2 shows the details.

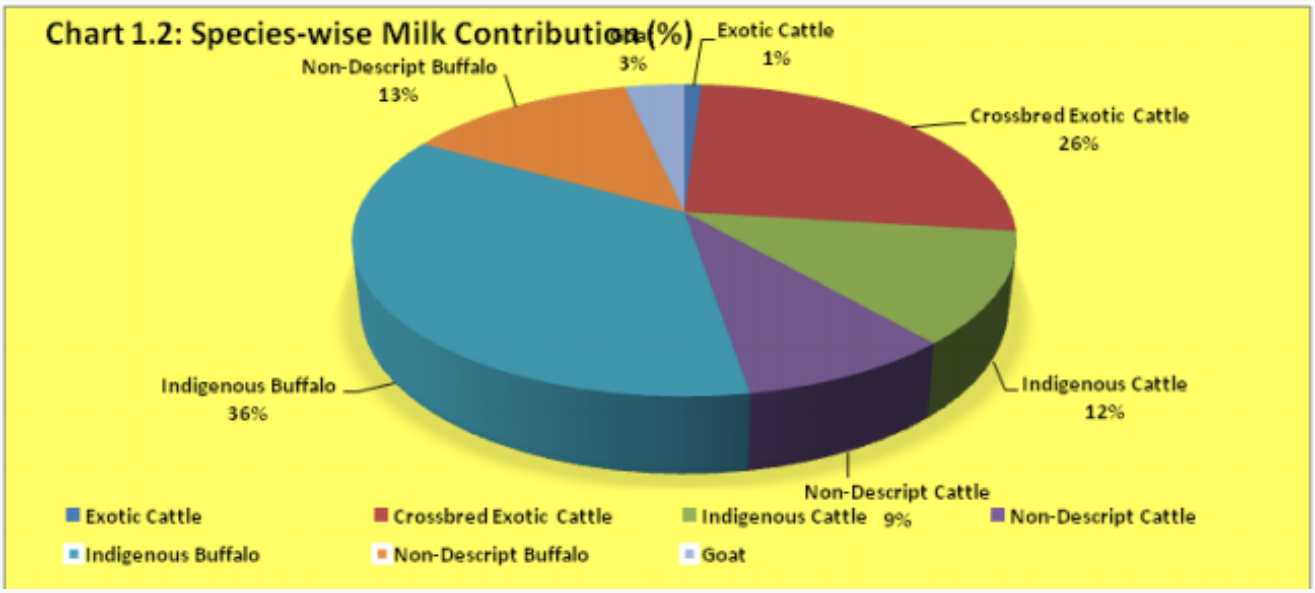
Figure 7.2

Trends of Livestock Population (2007-12)



- Despite a decline in cattle/buffalo, major share in milk production continued to be from indigenous breeds despite comparatively low rate of yield per unit as compared to crossbreed/exotic cattle/buffalo population, the milk production in the country increased from 107.9 million tonnes in 2007-2008 to 132.4 million tonnes in 2012-13 indicating that indigenous breeds vastly outnumber the crossbreed/exotic breeds. See Figure 7.3.

Figure 7.3



- Breed-wise estimated number of domesticated animals under indigenous varieties in 2018.

Table 7.2: Breed-wise estimated number of animals under indigenous domesticated animals

Indigenous Domesticated Breed	Pure	Graded	Total
Cattle	1,78,48,967	2,00,70,265	15,11,72,295
Buffaloes	1,85,33,185	4,30,23,385	10,87,02,122
Sheep	2,37,82,848	1,23,29,396	6,12,88,098
Goat	3,64,56,323	1,59,06,160	13,51,73,093
Pig			78,37,306
Horses & Ponies			6,24,732
Camels			4,00,274

· **169 indigenous breeds of livestock and poultry registered (till 2018) by NBAGR**; cattle - 41, buffalo -13, goat - 28, sheep -42, horses & ponies-7, camel-9, pig-7, chicken–18, 1 each for donkey, yak, duck and geese.

- Of the above 25 species of indigenous livestock and poultry registered during 2014-2018

5 each of goat and pig, four cattle, 3 each of sheep and chicken and 1 each of horse, camel, yak, geese and duck.

3. Trends in Germplasm Accessions in *ex situ* collections

- National Animal Gene Bank holds 1,51,228 frozen semen doses from 340 breeding males preserved for *ex situ* conservation.
- Somatic Cell Banking for indigenous varieties of Manipuri and Marwari Horse; Kachchhi and Double Humped Camel to preserve genetic resources for genomic, post-genomic and somatic cell cloning research established.

A. Trends in Plant Genetic Diversity

1.Trends in number of indigenous variety (*in situ*)

· To manage conservation and collection of plant genetic resources including Crop Wild Relatives (CWR) scientifically 168 agri-horticultural crop species have been prioritised for CWR mapping through exploration and germplasm collection by NBPGR.

· Prioritization criteria include economic importance of crops *per se*, level of closeness of CWR to crops, CWRs possessing traits of breeders' interest/need, extent of distribution and threat to survival of CWR. Narrow endemics and threatened CWRs have more weightage in prioritization.

· 817 taxa belonging to 730 species, including wild/weedy form(s) or populations of 142 crop species have been identified through explorations. See Table 7.3.

Table 7.3: Summary of crop-group-wise native CWR identified

S.No.	Crop-group	No. of	Taxa

	(crops**)	CWR species*	
1.	Cereals and millets (13)	72 (2)	83
2.	Pseudocereals (3)	13 (1)	13
3.	Grain legumes (10)	49 (4)	57
4.	Oilseeds (4)	9 (1)	10
5.	Fibres (5)	18 (3)	20
6.	Forages (16)	58 (14)	63
7.	Fruits and nuts (36)	127 (12)	144
8.	Vegetables (25)	76 (11)	87
9.	Spices and condiments (12)	50 (7)	54
10.	Ornamentals (13)	141 (61)	152
11.	Medicinal & aromatic plants (20)	70 (19)	81
12.	Plantation crops (3)	12	14
13.	Others (8)	35 (7)	39
	Crops:168	**730 (142)**	**817**

**Figures in parenthesis are crop species with wild/weedy form(s) or populations occurring in India, which are also included for counting as CWR; **One crop may involve more than one species*

· 41 taxa from the vulnerable ecosystem of coastal off-shore area identified with *Gossypium stocksii*, *Lablab purpureus* (semi-wild), *Sesamum prostratum*, *Cajanus scarabaeoides*, *Porteresia coarctata*, *Solanum arundo, Vignaluteola* and *V. marina* as the most important prioritized species.

· Protection of Plant Variety and Farmers Authority (PPVFRA) has identified 22 agro-biodiversity hotspots in the country. Farmers are encouraged to cultivate and conserve landraces, traditional varieties through various incentives. For details please refer to NBT 5, Section II, Assessment of the effectiveness of the implementation measure takin in achieving desired outcomes, Trends in enhanced use of landraces.

2. Trends in area under Cultivation/Production/Yield (*in situ*)

· Table 7.4 shows the trends in Area, Production and Yield in major crops.

***Table 7.4:* Area, production and yield of major crops**

Area, production and yield of major crops

Crops	Area (Lakh hectare)			Production (Million Tonnes)			Yield (kg/hectare)		
	2014-15	2015-16	2016-17*	2014-15	2015-16	2016-17*	2014-15	2015-16	2016-17*
Rice	441.10	434.99	431.94	105.48	104.41	110.15	2391	2400	2550
Wheat	314.65	304.18	305.97	86.53	92.29	98.38	2750	3034	3216
Coarse cereals	251.70	243.89	247.71	42.86	38.52	44.19	1703	1579	1784
Pulses	235.54	249.12	294.65	17.15	16.35	22.95	728	656	779
Foodgrains	1243.00	1232.18	1280.26	252.02	251.57	275.68	2028	2042	2153
Oilseeds	255.96	260.87	262.06	27.51	25.25	32.10	1075	968	1225
Sugarcane	50.66	49.27	43.89	362.33	348.45	306.72	71512	70720	69886
Cotton@	128.19	122.92	108.45	34.80	30.01	33.09	462	415	519
Jute & Mesta#	8.10	7.82	7.66	11.13	10.52	10.60	2473	2421	2490

* 4th advance estimates @ Production in million bales of 170 kg each.

Production in million bales 180 Kg. each.

4. Effectiveness of initiatives/measures taken to Conserve Indigenous Crop Varieties (ICVs) and their Wild Relatives

Policies, programmes, sustainable management (NBT 3), explorations, extension services, CEPA and recognition through awards have created a positive environment in favours of IVCs and CWRs.

Following are some of the examples of effectiveness of measures.

· Rehabilitation of Spine gourd (*Momordica dioica*): Through farmers education and distribution of seedlings on-farm cultivation of this nearly extinct wild vegetable achieved.

· Sweet gourd/ Gac (*Momordica cochinchinensis*):

o Popularised among farmers as a nutritional vegetable for homestead cultivation.

o Over 600 seedlings distributed to progressive farmers during 2014-2017 and feedback confirmed regarding establishment and spread of the crop.

o 100 seedlings distributed among and accepted by 'Malayarayan' tribe in Peechi-Vazhani Wildlife Sanctuary as part of the Station's initiative on ensuring nutritional security of tribal homesteads.

· Collecting and conserving CWRs of banana: More than 20 accessions of seeded endemic species of banana (*Musa spp.*) from North-eastern region and Andamans & Nicobar Islands collected, protocols for their conservation under development.

· National Herbarium of Cultivated Plants maintained at ICAR-NBPGR:

o Over 500 taxa of CWR made available as herbarium specimens with digital images.

o Important taxa belonging to CWR maintained in the National Herbarium of Crop Plants (NHCP). The collections include wild *Vigna* from north-western Himalaya, wild *Allium* from high altitude areas of western and eastern Himalaya; wild *triticeae* from cold arid tracts of western Himalaya, some neglected groups: less-known domesticated species and taxa of potential/commercial value.

· 350 Botanic Gardens serve as referral model centers for *ex situ* conservation of endemic and threatened plants, in different phytogeographic region.

· 20 Lead Botanic Gardens located in different phyto-geographic zones create awareness about plant diversity and facilitate rehabilitation of threatened plants.

· 11 Botanic Gardens attached with regional centers of BSI do *ex situ* conservation and promote biodiversity education.

· More than 2,00,000 living plant accession belonging to 15,000-16,000 plant species are housed in these Botanic Garden.

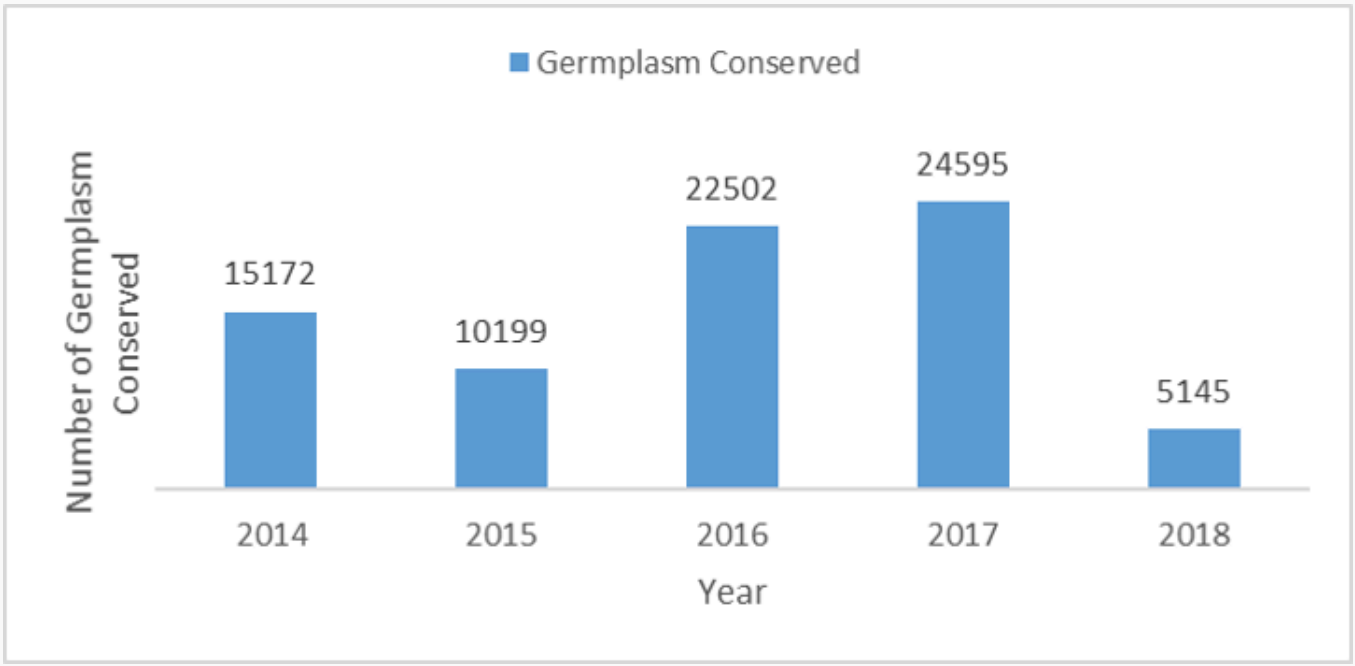
· Medicinal Plant Cultivation Areas: 110 MPCAs contribute to *ex situ* conservation of indigenous species. See NBT 11 for details.

· BMCs take initiatives to save and cultivate ICVs and CWRs.

5. Trends in Germplasm Accessions in *ex situ* collections

· Significant increase in the number of accessions of major crops registered in National Gene Bank for plants during 2014-2018.The numbers have increased to 4,36,779. See Figure 7.4

Figure7.4: Status of Germplasm of Major Crops Conserved at National Gene bank



Source : NBPGR

Other relevant information

CASE STUDIES

Some examples of case studies in animal breed conservation are cited here.

i.Conservation of Kilakarsal sheep

Kilakarsal sheep is one of the important sheep breeds native to Tamil Nadu. Their number had gone down alarmingly. Some sheep were procured from the few flocks having kilakarsal sheep in the field. A nucleus for Kilakarsal flock was established at Tamil Nadu Veterinary and Animal Sciences University (TANVASU) regional station Veterinary University Training and Research Centre (VUTRC), Tirunelveli (T N). After the efforts of rehabilitation, present flock strength is 29 males and 93 females. The farm produces elite pure Kilakarsal breeding Rams.

Achievements in the field:

- **More than 100 Rams have been supplied to shepherds for breeding in the field.**
- **1,504 progenies have been produced in farmers' flocks and are being followed.**
- **Farmers have become aware of the Kilakarsal adaptive qualities and value.**
- **The breed is now revived in its area.**

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ii.Conservation of Bargur cattle

Bargur Cattle is native to the Bargur forest hills in Anthiyur Taluk of Erode District in Western Tamil Nadu . They are best known for their endurance, speed and trotting ability. Their numbers were declining rapidly and no measures to save them could be taken in the past owing to non-accessibility of the tract. Twenty male calves of the breed were procured in 2013 and raised in an organized herd and semen has been collected from 15 bulls. Now Artificial Insemination (AI) services are provided in the tract and on an average 40 to 50 AIs are performed per month. 10,000 semen doses have been added to gene bank at NBAGR.

iii. Conservation of Vechur Breed Cow

The Vechur breed of cow is a native breed of Kerala important for medicinal value of its milk and ghee was a popular cow about 60 years ago. However, the Government. policy to promote high yielding cattle through breeding programs led to decline of this breed in the state. Ms. Sosamma Iype, a faculty member of Kerala Agriculture University along with her students, undertook voluntary work to halt the loss and initiated conservation efforts in year 1998. Farmers raising Vechur cattle were identified and a breeding program was initiated by selecting good pure breed bulls. CEPA about the species was carried out along with research and farmers were motivated to rear the cattle. The cattle is easy to rear with low incidence of disease. It can withstand hot sun and rain and the dung and urine is used as natural fertilizer. As a result of the work of the group the population of the breed has increased from 41 to around 3,000 in 26 years. This has also resulted in conservation of breeds like Kasargod and Cherubally cattle and Attappady goat.

Obstacles and scientific and technical needs related to the measure taken

Genetic diversity in the country is vast and dispersed. It is a challenge to tap all of it for conservation. Prioritization for CWR was hence necessary for a pragmatic and feasible approach. The identification and conservation of CWRs can be expanded to cover additional areas through BSI and ZSI.	EN

NBT-8: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Measures:

The subject of ecosystems services including their enumeration the ecosystem services, restoration and wise use strategies have been comprehensively dealt with in NBTs 2, 3, 5 and 6. This NBT focuses on policies and programmes that help ease unsustainable pressures on ecosystems and identifies the connection between human needs and well-being and the need for people to understand the importance of conservation and contribute to it while using them sustainably. Basic elements of Human Development Index such as education, health, water and energy, connectivity and urban green environment play an important role in making populations, local communities and traditional practitioners understand and discharge their role in conservation and sustainable use. Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all NBTs. Indicators and assessment of progress against them with regard to NBT 8 follows.

1. Major Livelihoods Programmes

- **MNREGA** provides livelihood resource base for the poor, vulnerable, local communities and women. The MNREGA mandates that women from Scheduled Castes/Scheduled Tribes and Other Backward Classes (OBC) category must constitute at least one third of the beneficiaries under the scheme.
- **Deendayal Antyodaya Yojana -National Rural Livelihoods Mission (DAY-NRLM)** promotes diversified and gainful self-employment and skilled wage employment, social mobilization and sustainable community institutions such as SHGs, which are composed of 5 to 10 women each from poor households. SHGs facilitate discussion on issues of poverty and deprivation, undertake saving and inter-lending, access bank credit and technical support to improve livelihoods and quality of life.

1. Urban Greenspaces

- **Nagar Van Udyan Yojana** to develop at least one city forest in 200 cities having Municipal Corporation / Class I status.
- **Smart City Initiative** includes objectives of preserving and developing open spaces- parks, playgrounds, and recreational spaces in order to enhance the quality of life of citizens, reduce the urban heat effects and generally promote eco-balance. City Biodiversity Index is integrated as a monitoring tool for biodiversity and ecosystem health in the Smart City project.

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Hyderabad became the first city to calculate CBI in 2012, when CoP-11to CBD was hosted there.

- **AMRUT** *inter alia* protects and enhances basic civic amenities for ensuring a better and healthier quality of life by developing greenery and well-maintained open spaces such as parks.

2. Promotion of Green Energy

- **National Solar Mission** has been set up as one of the eight missions under NAPCC to promote the development and use of solar energy for power generation and other uses with the ultimate objective of making solar energy competitive with fossil-based energy options.
- **Deendayal Upadhyaya Gram Jyoti Yojana,** for rural electrification and continuous power supply to villages and **SAUBHAGYA – Pradhan Mantri Sahaj Bijli Har Ghar Yojana** to achieve universal household electrification by March 2019. It includes provision of solar photo voltaic standalone systems to un-electrified households in remote inaccessible villages.
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)** includes energy (street light) audit as one of the parameters of cities. AMRUT provides incentives for green buildings by offering rebates in property tax or building permission and development charges covered under the scheme.
- **The Energy Conservation Act (EC Act) 2001** provides for efficient use of energy and its conservation and for matters connected therewith or incidental thereto.
- **National Mission for Enhanced Energy Efficiency (NMEEE),** one of the eight missions under NAPCC promotes market for energy efficiency. It has developed innovative polices and business models *inter alia* through:
- **Perform Achieve and Trade Scheme (PAT)** a market based regulatory instrument to reduce energy consumption in energy intensive industries.
- **Market Transformation for Energy Efficiency (MTEE)** to accelerate shift to energy efficient appliances.
- **Energy Efficiency Financing Platform (EEFP)** to provide platform to interact with financial institutions and project developers for implementation of energy efficient projects.
- **Framework for Energy Efficient Economic Development (FEEED)** for development of fiscal instruments for energy efficiency.
- **Energy Conservation Building Code (ECBC) 2017** prescribes norms and standards for building design, including envelope, lighting, heating and air-conditioning. Minimum energy standard for new commercial buildings has been given.
- **Guidelines for Energy Efficient Multi-storey Residential Buildings** issued in 2014.
- **Indian Green Building Council (IGBC),** a part of the Confederation of Indian Industry (CII) for developing new green building rating programmes, certification services and green buildings training programmes.
- **National Tariff Policy 2016**, mandates purchase of 8% solar energy by State Electricity Regulatory Commissions (SERCs) and procurement of 100% power produced from all Waste-to-Energy plants. Incentives for shift from non-renewable to renewable sources of energy include Generation-Based Incentives (GBIs), capital and interest subsidies, viability gap funding, concessional finance, fiscal incentives etc. The ultimate policy objective is to make solar energy compete with fossil-based energy options. Measures include:

- Setting up of exclusive solar parks and giving infrastructure status to solar projects.
- Development of power transmission network through Green Energy Corridor project.
- National Offshore Wind Energy Policy.
- Waiving Inter State Transmission System charges and losses for interstate solar and wind power sale from projects commissioned by March 2019.
- Identification of large government complexes/ buildings for rooftop project.
- Amending building bye-laws for making solar roof tops mandatory in new construction or for higher Floor Area Ratio.
- Mandatory share of 10% renewable energy under Smart Cities project.
- Measures for Integrated Power Development Scheme (IPDS) to encourage distribution companies and to make net-metering compulsory.
- Raising funds including through Green Climate Fund to achieve the target.

3. Road Connectivity

- ***Pradhan Mantri Gram Sadak Yojana*****,** to provide all-weather access to unconnected habitations, has special relaxation in population norms for eligibility of road connectivity for villages of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Himachal Pradesh, Jammu & Kashmir and Uttarakhand, desert areas, tribal areas and 88 selected tribal and backward districts and special problem areas. Women are engaged from PRIs and SHGs to prepare detailed project reports for these roads.

4. Education

- Education is the foundation for overall growth and employability of human beings and empowers them to make informed choices about the use of natural resources and lifestyles. Important measures for this are given below:
- **The Right of Children to Free and Compulsory Education Act, 2009** provides for free and compulsory elementary education to all children of the age of six to fourteen years, mandates inclusion of parents from disadvantaged groups and

at least 50% women members in School Management Committees responsible for developing school plans and monitoring utilization of government grants.

- **National Policy on Education 1986,** as modified in 1992, *inter alia* recognizes education to be the basic change agent in women's status and seeks to promote women related studies as part of curricula at different levels of education, eliminate sex stereotyping in vocational and professional courses, encourage women's participation in non-traditional occupations, prescribe support services for girls to enable their attendance in schools, promotes educational development of vulnerable groups equalization of education of Schedule Castes/ Schedule Tribes with the rest of the population and mandated EE at all levels of school education.

5. Health Services

- **National Health Mission (NHM)** – It encompasses:
- **National Rural Health Mission (NRHM)** and **National Urban Health Mission (NUHM)** to strengthen health systems in rural and urban areas for universal access to equitable, affordable and quality health care services.
- **National Disease Control Programmes** for communicable and non-communicable diseases.
- **Special focus on women** through special programmes catering to reproductive-maternal, new born, child and adolescent health, health issues due to gender-based violence through *Janani Shishu Suraksha Karyakaram* (JSSK), *Rashtriya Kishor Swasthya Karyakram, Rashtriya Bal Swasthya Karyakram.*
- **Health programmes and advisories** e.g., National Tobacco Control Programme (NTCP), National Programme for Health Care of Elderly and National Programme for Prevention and Control of Fluorosis.
- **National Nutritional Programmes** such as National Iodine Deficiency Disorders Control Programme.
- **Health insurance** provided under Ayushman Bharat Yojana – National Health Protection Mission (AB- NHPM): these cover over 100 million poor and vulnerable families (approximately 500 million beneficiaries) providing coverage for secondary and tertiary care hospitalization.

Other major health programmes include

- ***Pradhan Mantri Swasthya Suraksha Yojana*** **(PMSSY)** to correct regional imbalances in availability of affordable/ reliable tertiary healthcare services.
- **Mid-Day Meal Programme** and **Integrated Child Development Services (ICDS)** for supplementary nutrition, immunization and pre-school education to children.

6. Drinking Water :

-
  - **National Rural Drinking Water Programme** to provide adequate and safe drinking water to rural population with focus on sustainability of water availability in terms of portability, adequacy, convenience, affordability and equity in rural areas.
  - **Namami Gange (NG): Ganga Conservation Mission,** is a flagship programme of the Government for effective abatement of pollution, conservation and rejuvenation of river Ganga. The Ganga basin, of India houses about 40% of India's population. Municipal sewage from urban centers, effluents from industries and polluting waste from several other non-point sources get discharged into the river through its 2,525 kms journey from the hills to the sea. With an outlay of Rs. 20,370 million and involving several Ministries, NG aims at Ganga rejuvenation by consolidating the previous Ganga Action Plan (GAP) Phase-I launched in 1987, GAP Phase- II started in 1993 and National Mission on Ganges implemented in 2011.
  - **National River Conservation Plan,** in operation since 1995, aims to reduce pollution load of rivers, improve water quality through pollution abatement works.
  - Measures for gender mainstreaming include- Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50 %. This ensures large-scale participation of women in planning decision making, implementation and governance. Gender Budgeting as part of the Annual Central Government budget. Specific provisions for participation and representation of women in government programmes and schemes.

National Target(s)

National Biodiversity Target (NBT) - 8 : By 2020, ecosystem services especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified taking into account the needs of women and local communities particularly the poor and vulnerable section.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

Other relevant information

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all NBTs. Indicators and assessment of progress against them with regard to NBT 8 follows:

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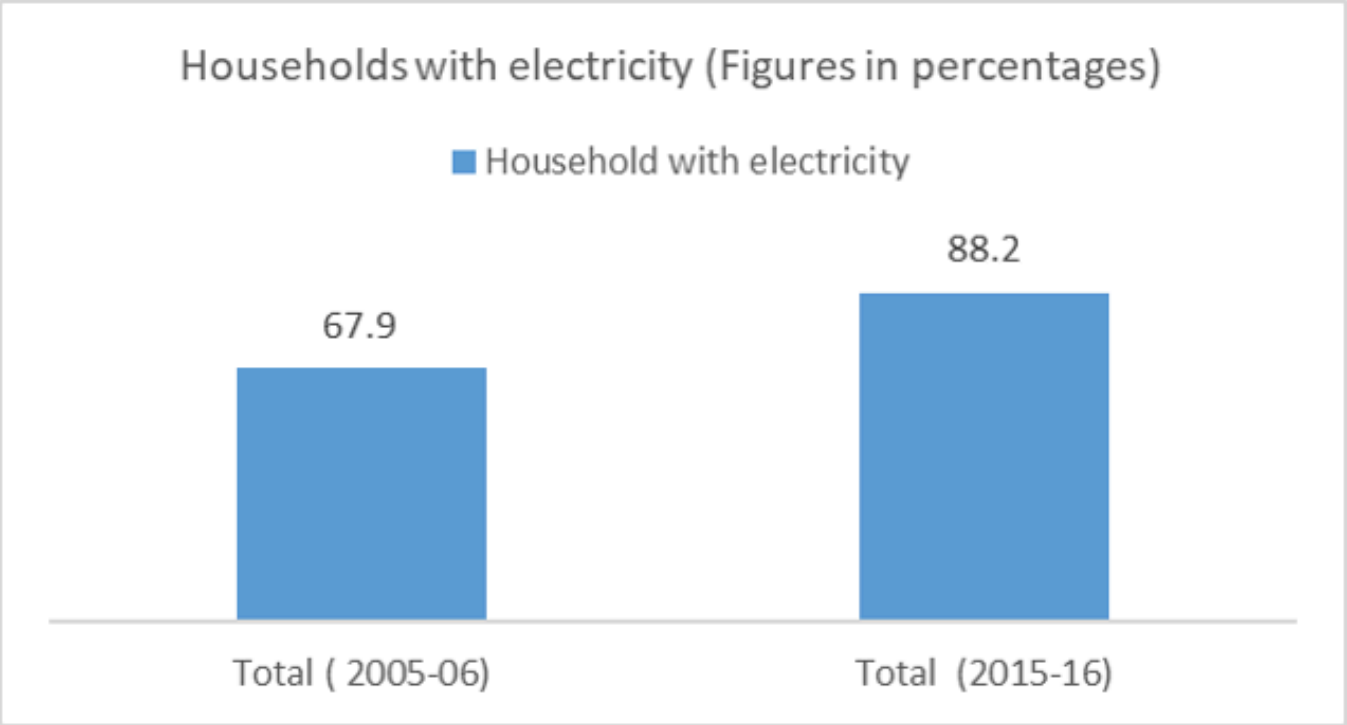
- **Extent of restored forest cover in India**
- Refer to Trends in forest cover, afforestation and restoration, Section II, NBT 3
- **Trends in wetlands significant for delivering freshwater being brought under integrated management**
- Refer to Section II, NBT 3
- **Trends in number of people with access to electricity**
- Figure 8.1 shows increase in percentage of households with access to electricity over 2005-06 to 2015-16.

Figure 8.1



Source: National Family Health Survey 3 & 4

d. Trends in level of toxic contaminants in wetlands/ rivers/aquatic fauna:

Various initiatives and media campaigns seek to promote sanitation and solid waste management. The terms of reference of the current fifteenth Finance Commission include consideration to progress made in sanitation, solid waste management and behavioural changes brought in to end open defecation.

e. Trends in pollution status of wetlands of international (Ramsar Sites) and national (identified by State Government) importance

- CPCB monitors 15 sites out of 26 Ramsar sites in association with SPCBs/PCC under National Water Quality Monitoring Programme (NWPM) (Refer to NBT 3 for details)
- Five sites monitored by CPCB under NWMP fulfil requirement of water quality status and 10 sites are yet to reach the criteria/ parameters such as BOD, Dissolved Oxygen and Faecal Coliform.

f. Area under greenspaces in urban centres (as a proxy to conservation of urban biodiversity)

- **Smart City Mission**
- 60 cities have been selected under the Mission covering a total of 9,152 km^2 of urban area.
- **AMRUT**
- State Annual Action Plans of 36 States/UTs approved and include action plan to progressively increase green cover in cities to 15% in 5 years.
- Some **City Development Authorities** have taken action to create greenspaces for cities. See case study on Restoration of mined out area in urban locale, Section II, NBT 3.

g. Achievements of Livelihoods Programmes

i.Self Help Groups

Under DAY-NRLM scheme, 38.7 lakh SHGs of which 34.4 lakh are women SHGs have been formed covering 457 lakh households and 583 districts.

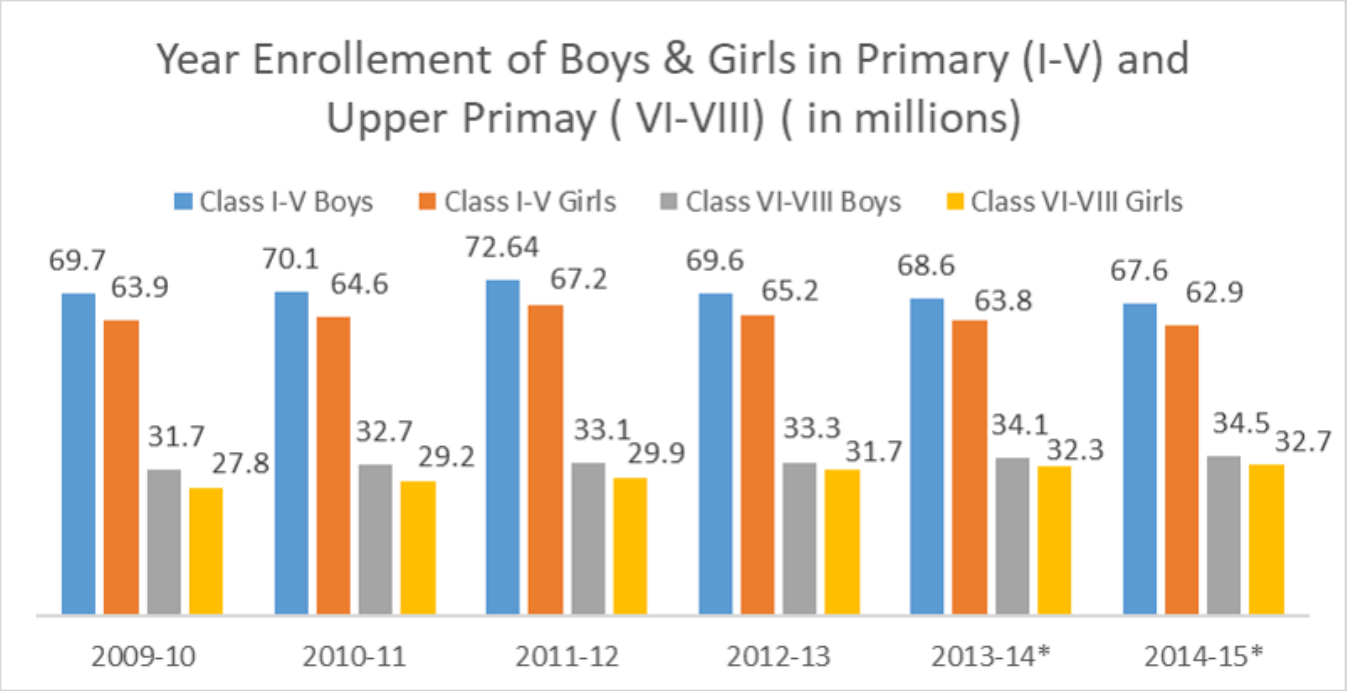
ii. MGNREGA

- In the year 2017-18, 1794.4 million people benefited from MNREGA of which 53.93% were women.
- 14.3 MHa of land improved through NRM interventions.

h. Trends in number of people with access to Primary/ Secondary Education

- States/UTs and Central Government lay special emphasis on education of girl children and children from vulnerable populations to ensure their inception in education through various positive incentives including scholarships and other aids. Enrolment of children is ensured at Primary and Upper Primary level through free and compulsory 6 and14 years age children. Figure 8.2 shows the trend in number of students enrolled.

Figure 8.2 Enrolment of Students in Primary and Upper Primary for 2009- 2016

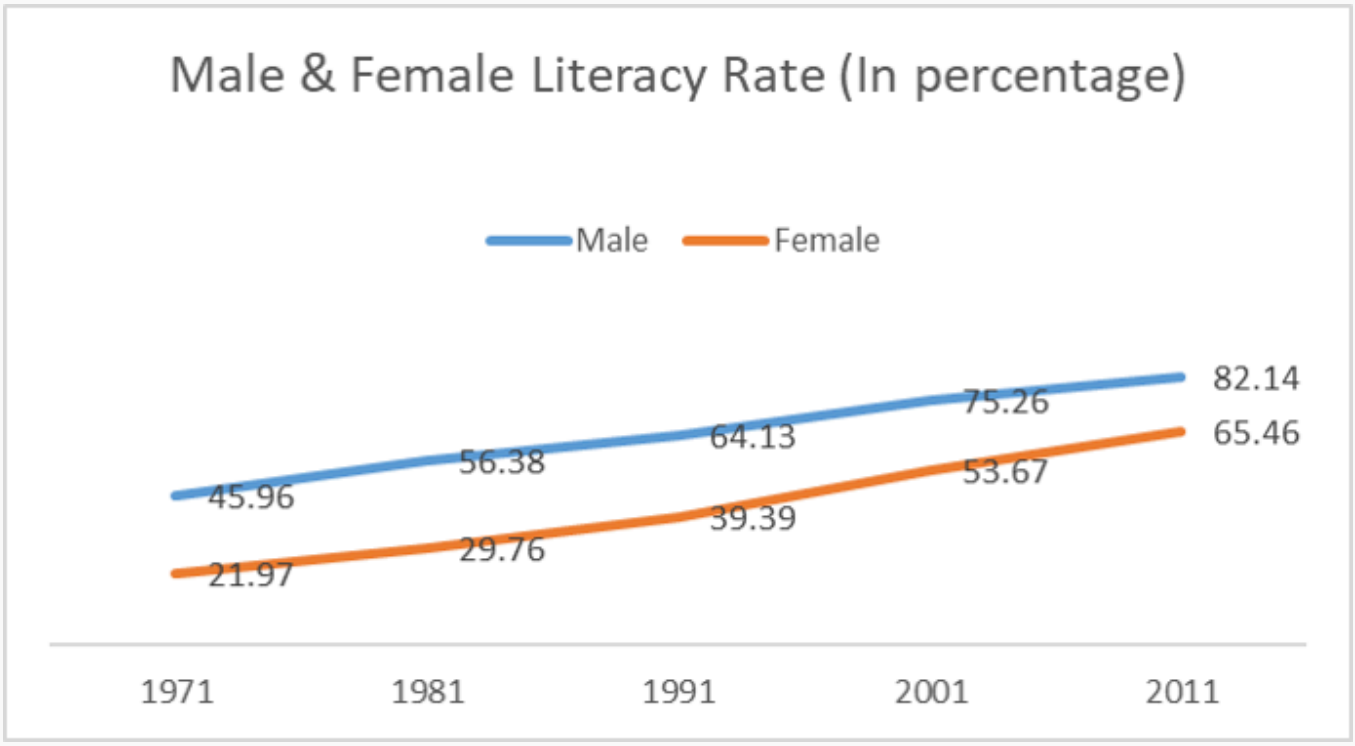


* Figures related to School Education are provisional

Source: Educational Statistics at a glance 2016, Ministry of Human Resource Development

- The goal of universalisation of elementary education along with formal education and adult education has been pursued consistently over decades. Fig 8.3 shows the movement in literacy rates from 1971 to 2011. There has been increase in both male and female literacy rates.

Figure 8.3



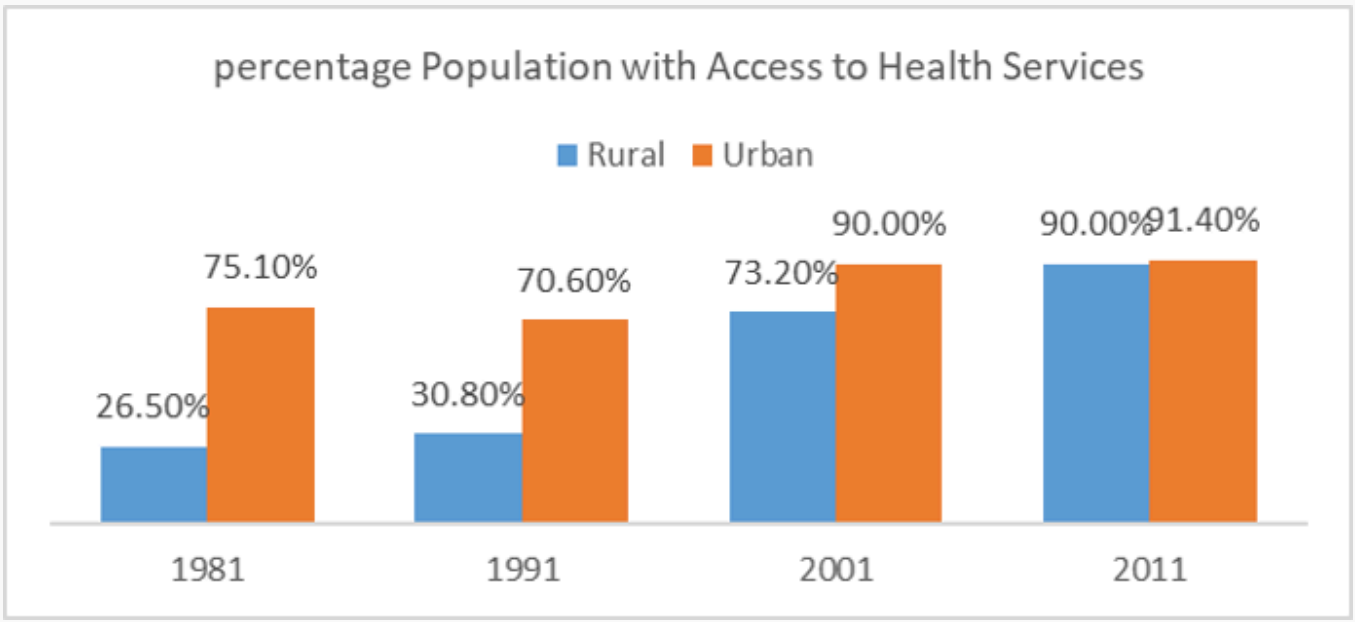
Source: Census of India 2001 and 2011, Office of Registrar General

- Girls education is receiving required attention to bridge the gap.

i. Trends in number of people with access to health services

- Considerable improvement in percentage of rural and urban population getting access to health services has been recorded. Figure 8.4 shows that by the year 2011 the gap between rural and urban access to health services was nearly bridged.

Figure 8.4



Source: Census of India 1981 to 2011

j. Renewable energy:

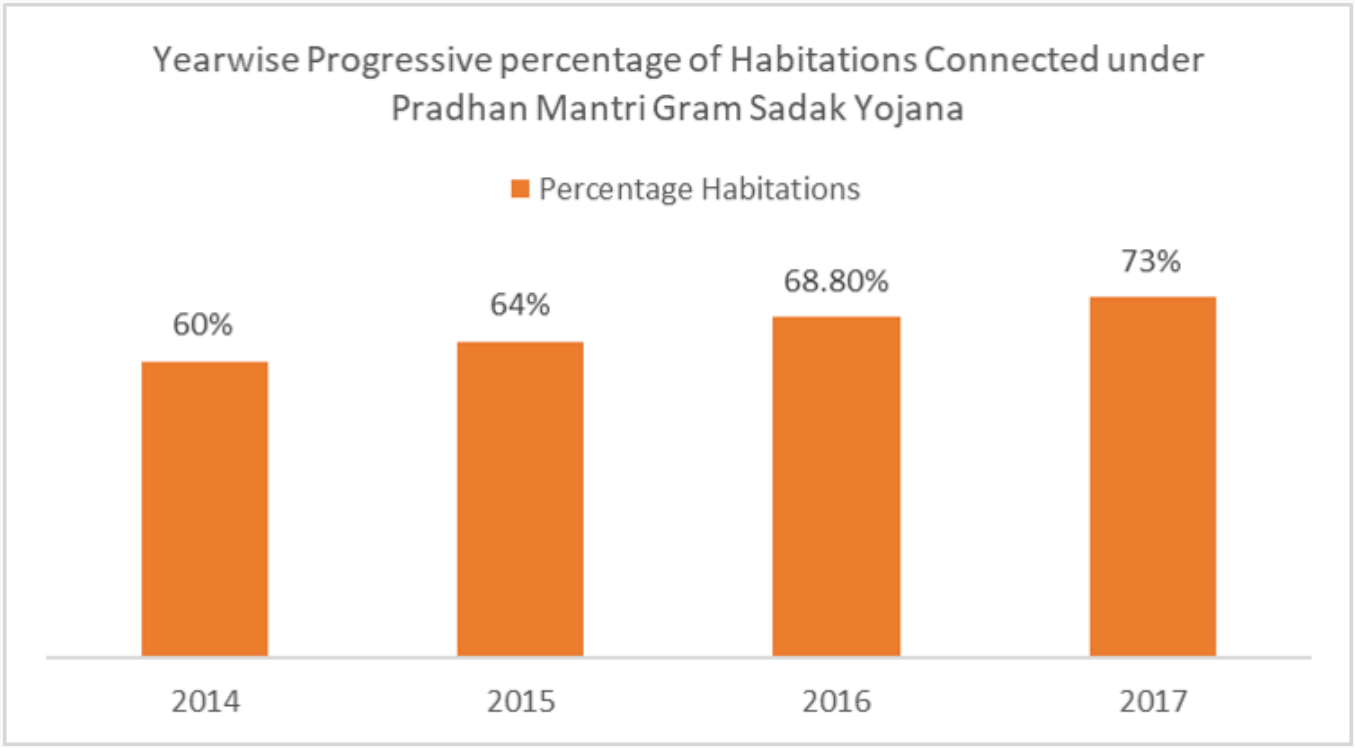
1. Against renewable energy target of 175 gigawatt (GW) by the year 2022, addition of 27.07 GW of renewable energy has been reported in the last three and a half years under Grid Connected Renewable Power.

2. The renewable power has a share of about 18.37 % to the total installed capacity.

K. Trends in number of people with Access to Road Connectivity

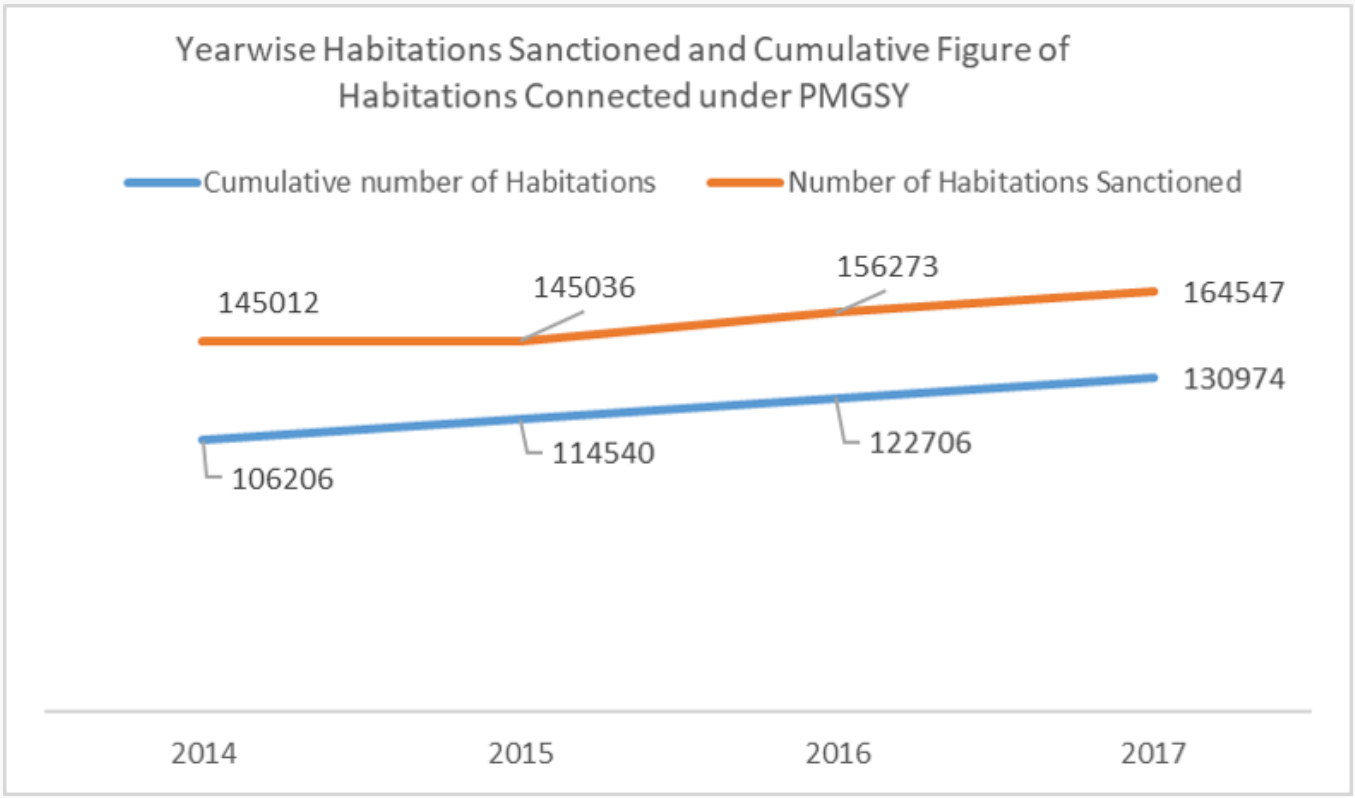
- Figure 8.5 shows increasing trend of year wise percentage of habitations connected by rural roads built and upgraded under PMGSY. Figure 8.6 shows the progress in number of households connected by rural roads under the PMGSY scheme.

Figure 8.5



Source: Annual Report 2014-15 to 2017-18, Ministry of Rural Development

Figure 8.6



Source: Annual Report 2014-15 to 2017-18, Ministry of Rural Development

I. Level of toxic contaminants in river that provide fresh water for human use

- Refer to Trends in river water quality, Section II, NBT 3.

m. Extent of groundwater pollution and groundwater

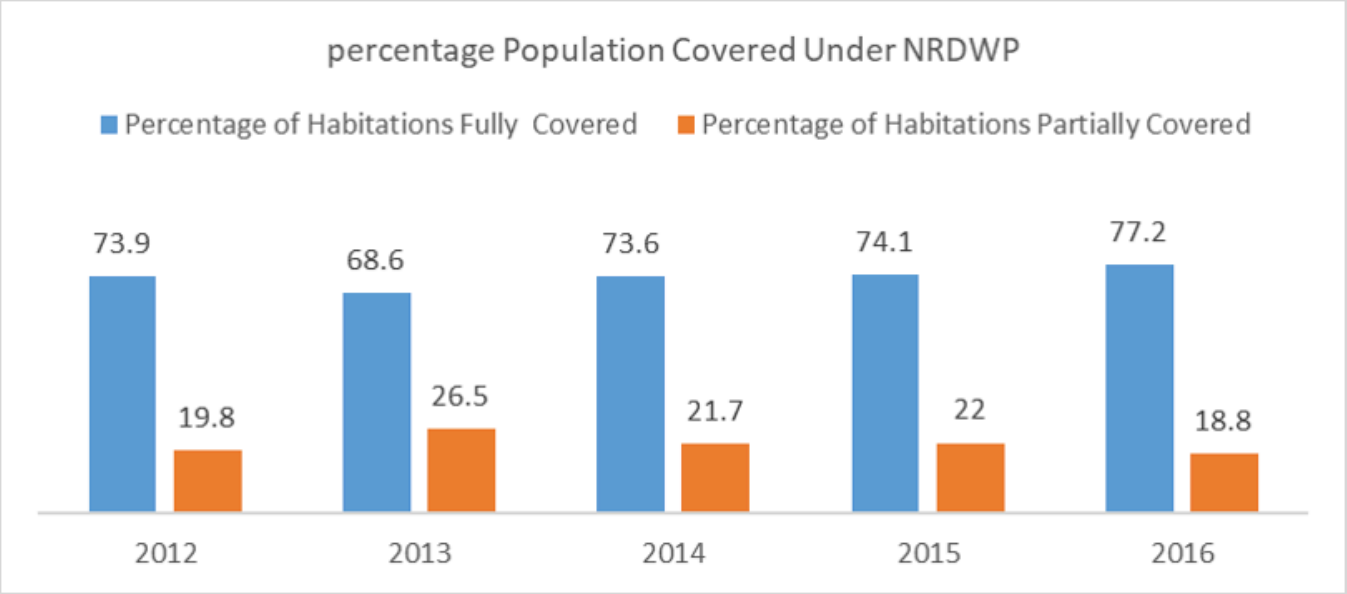
- Refer to Combating desertification, Section II, NBT 3

n. Trends in proportion of people using improved water services

1. Number of people with access to potable wate

- Marked improvement in percentage of rural population with access to safe drinking water has been achieved over the years. Figure 8.7 shows the increase in habitations covered under NRWDP from 2012 to 2016.

Figure 8.7

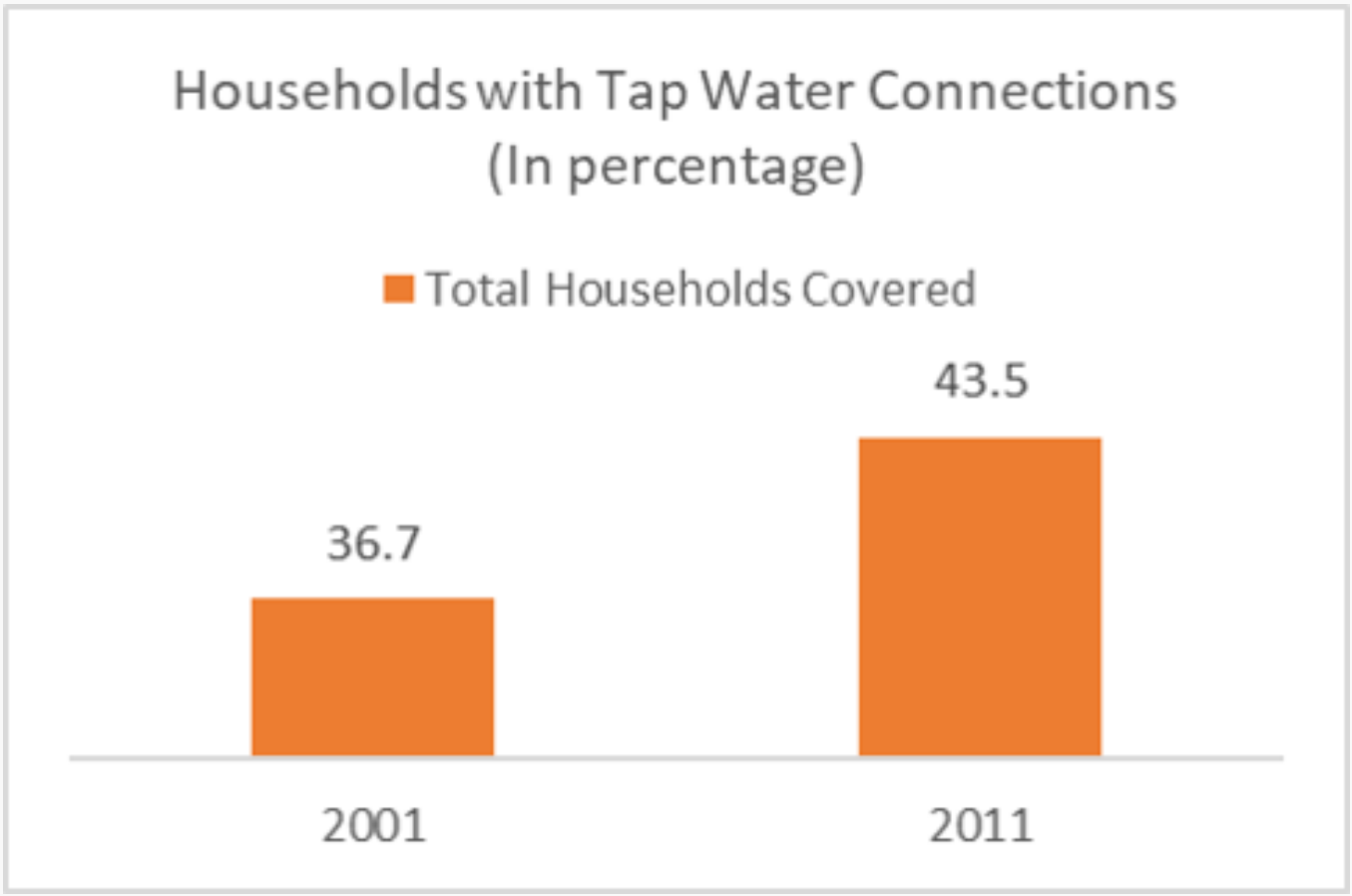


Source: Annual Report 2017-17, Ministry of Drinking Water and Sanitation

2. Trends in number of households with tap water connections

- Figure 8.8 shows the percentage increase in tap water connections.

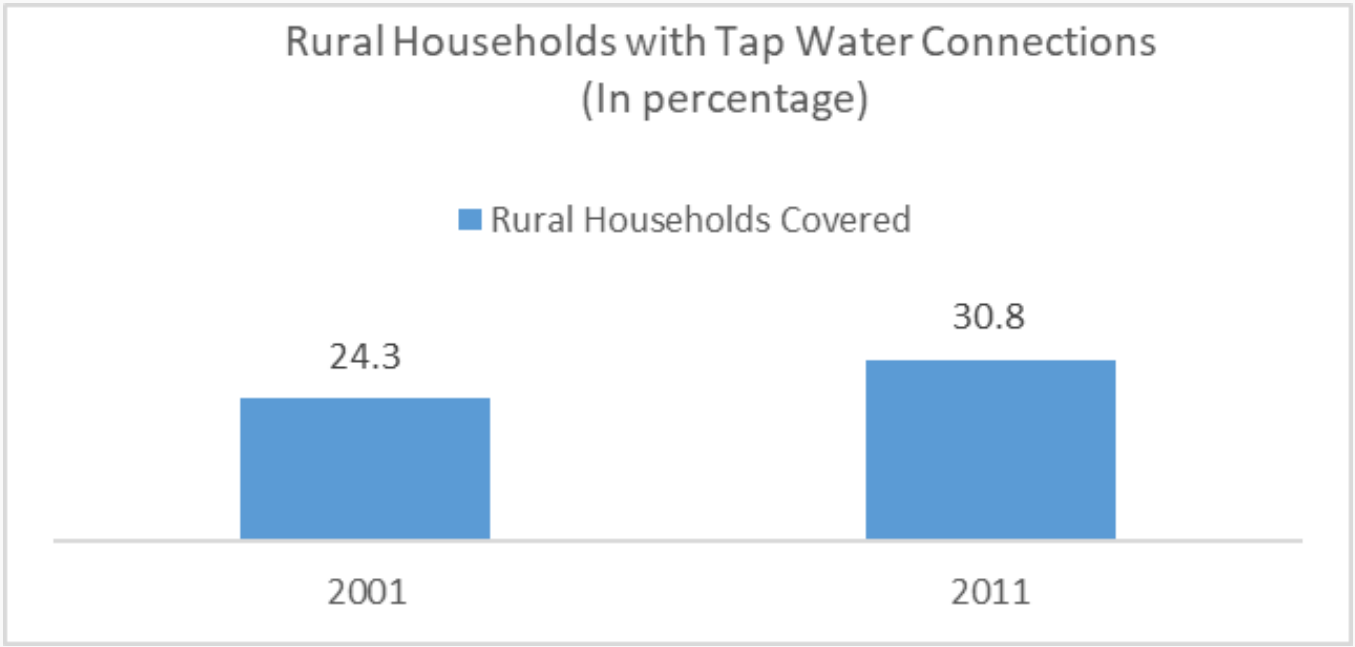
Figure 8.8



Source: Census of India, 2001 and 2011

- Figure 8.9 shows the percentage increase in tap water connections in rural India

Figure 8.9



Source: Census of India, 2001 and 2011

All Human Development Index (HDI) indicators show substantial improvement which has a positive impact on conservation and sustainable use of biological diversity.

Obstacles and scientific and technical needs related to the measure taken

Ecosystem services relating to water, human health, livelihood and human wellbeing of different ecosystems have been enumerated broadly at macrolevel through nearly 150 valuation studies mentioned under NBT 2. Coherence at policy and legislative level has largely been affected to integrate concerns regarding these in planning and decision making. TEEB-TII has done site specific enumeration on studied location with the involvement of local communities and women. The local capacities particularly the capacity of institutions of local governance, BMCs and cutting-edge functionaries of line departments need to be created to identify and enumerate the services to take informed decisions regarding their use, conservation and other biodiversity related issues at the local level. Additional financial, technical and human resources are required for this capacity building. Substantive progress has been made in enhancing indicators of HDI, but a lot more needs to be done on this front to ensure the positive interconnect between maintenance of ecosystem services and human wellbeing.

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NBT-9: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

India's Biological Diversity Act, 2002 had created mechanisms for implementing the objective of fair and equitable sharing of benefits arising from the utilization of GR and TK. Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014 (Guidelines 2014) were notified which align ABS provisions and procedures with the Nagoya Protocol (NP). Together they spell out procedures and provide template and terms for benefit sharing for implementation of Nagoya Protocol.

1.Main Policy and Legislative Measures include:

- **Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, (Guidelines 2014)**
- **Biological Diversity Act, 2002 and Biological Diversity Rules, 2004**
- **Protection of Plant Variety and Farmers' Rights Act, 2001** establishes a system for protection of plant varieties, farmers' and plant breeders' rights including rights in respect of their contributions made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties.
- **The Patents Act, 1970** as amended from time disallows grant of patent on "an invention which in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components."
- **Guidelines for Examination of Biotechnology Applications for Patent** to establish uniform and consistent practices in the examination of patent applications in the field of biotechnology and allied subjects under the Patents Act, 1970.

2. Other measures including institutional mechanisms:

Institutional Mechanisms

- **Fig 9.1 shows the implementation architecture for ABS at various levels.**

Figure 9.1: Implementation Architecture for Nagoya Protocol in sync with the Biological Diversity Act 2002

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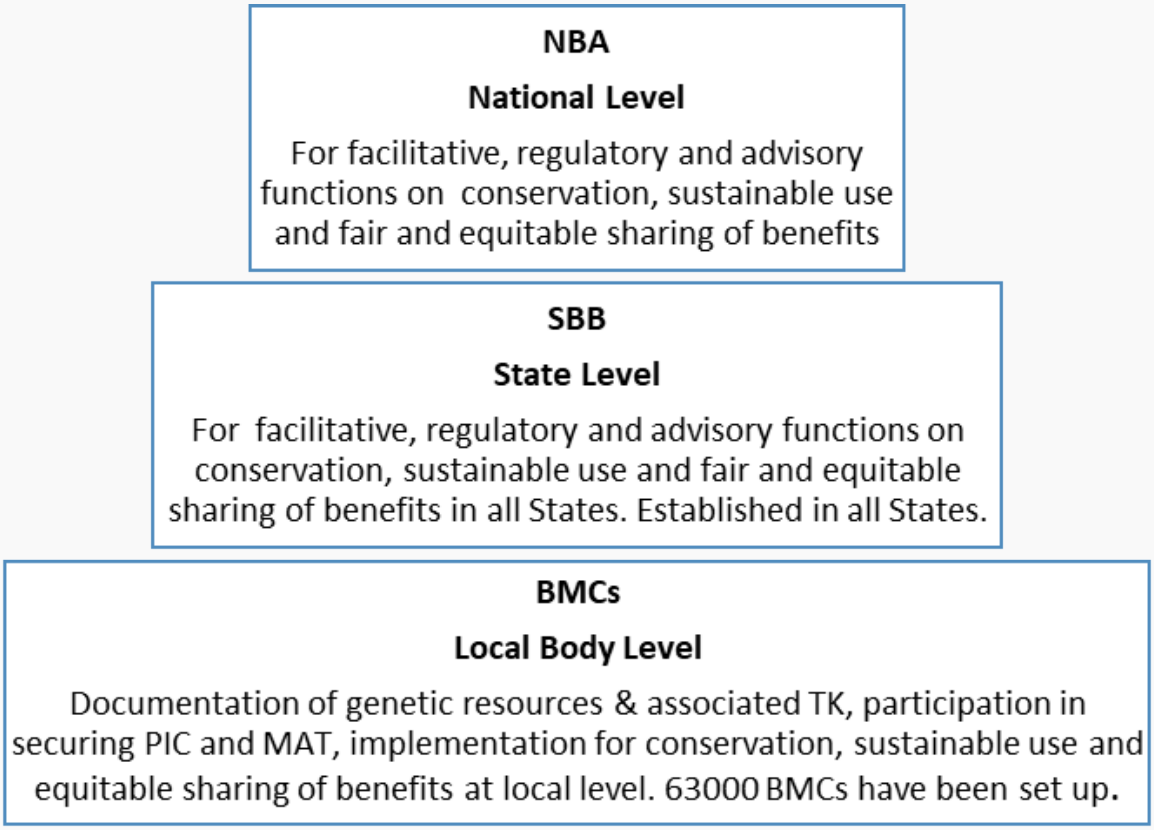

Following have been designated as mandated by NP

- MoEFCC as the National Focal Point.
- NBA as the Competent National Authority.
- MoEFCC as the National Publishing Authority and NBA as the National Authorised User for ABS Clearing House.
- All relevant information on legislative, administrative and policy measures for implementation of the NP has been made available on ABS Clearing House and NBA's website http://nbaindia.org/.
- Deposition of microorganisms in repositories outside India facilitated by NBA.
- Seven hundred and sixty four (764) benefit sharing agreements on mutually agreed terms with the applicants signed by NBA.
- India has so far published 216 out of 300 IRCCs on ABS Clearing House India was the first country to publish IRCC on ABS Clearing House.
- India's Interim National Report on NP submitted to the Secretariat. Also available on the link https://absch.cbd.int/search/nationalRecords?schema=absNationalReports
- Online systems of filing of ABS applications providing access to all relevant information and procedures for users and providers activated.
- Provisions for Women and ILCs membership: Not less than one third members of BMCs have to be women and at least 18% people must belong to SC/ST communities.

National Target(s)

National Biodiversity Target (NBT) - 9 : By 2015, Access to Genetic Resources (GRs) and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislation.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs.

Indicators and assessment of progress against them with regard to NBT 9 follows:

The target of making Nagoya Protocol operational consistent with national legislation for ABS has already been achieved.

Biological Diversity Act 2002, Rules 2004 and Guidelines 2014 provide procedures for filing applications for different purposes through Forms I, II, III and IV. Filed applications are examined by NBA and deserving cases cleared. These cleared applications get in the category of Approved once MAT agreements are signed between applicant and NBA.

i. Trends in number of proposals for Intellectual Property Rights

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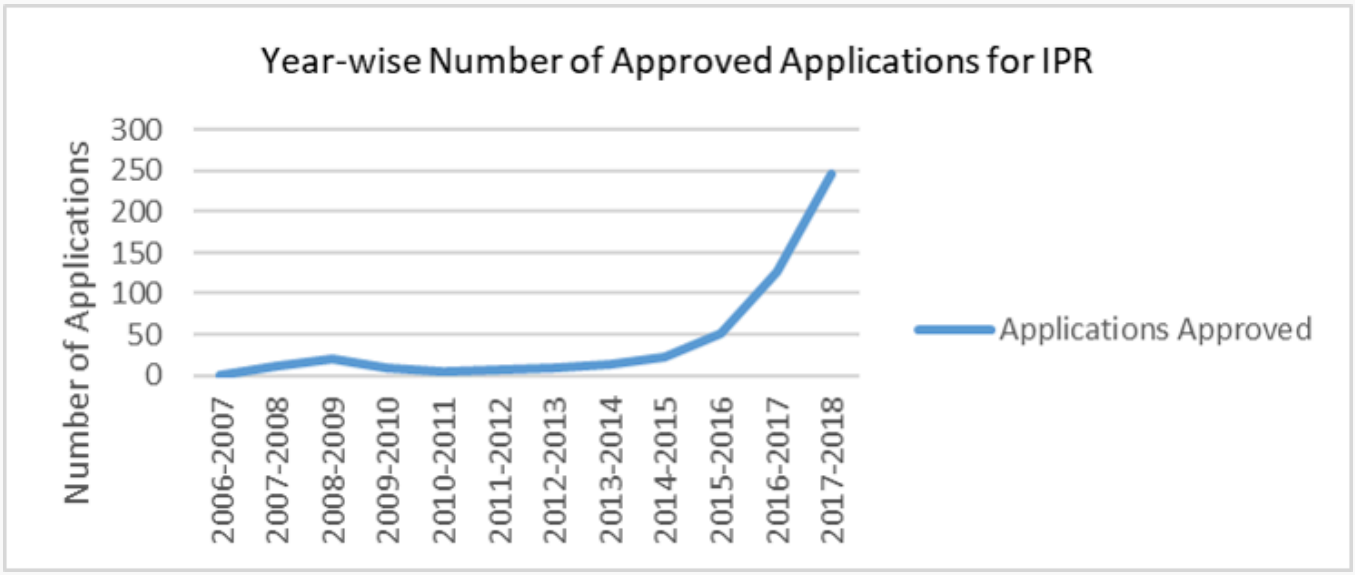
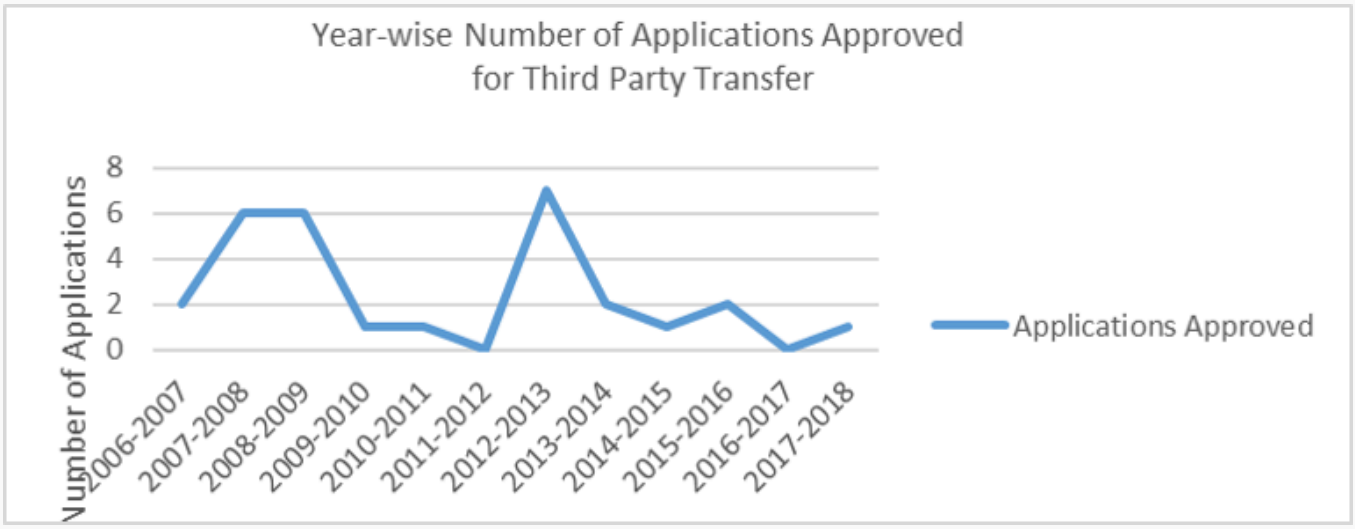
- Four hundred and seventy six (476) applications stand approved from 2006-7 to 2017-18. See Figure 9.2 for year-wise applications approved.

Figure 9.2 Year-wise Number of Approved Applications for IPR



- **Trends in number of cases seeking third party transfer for accession of biological resources and associated TK**
- Twenty nine (29) applications stand approved from 2006 to 2017-18. See Figure 9.3 for year-wise applications approved.

Figure 9.3 Year-wise Number of Applications Approved for Third Party Transfer

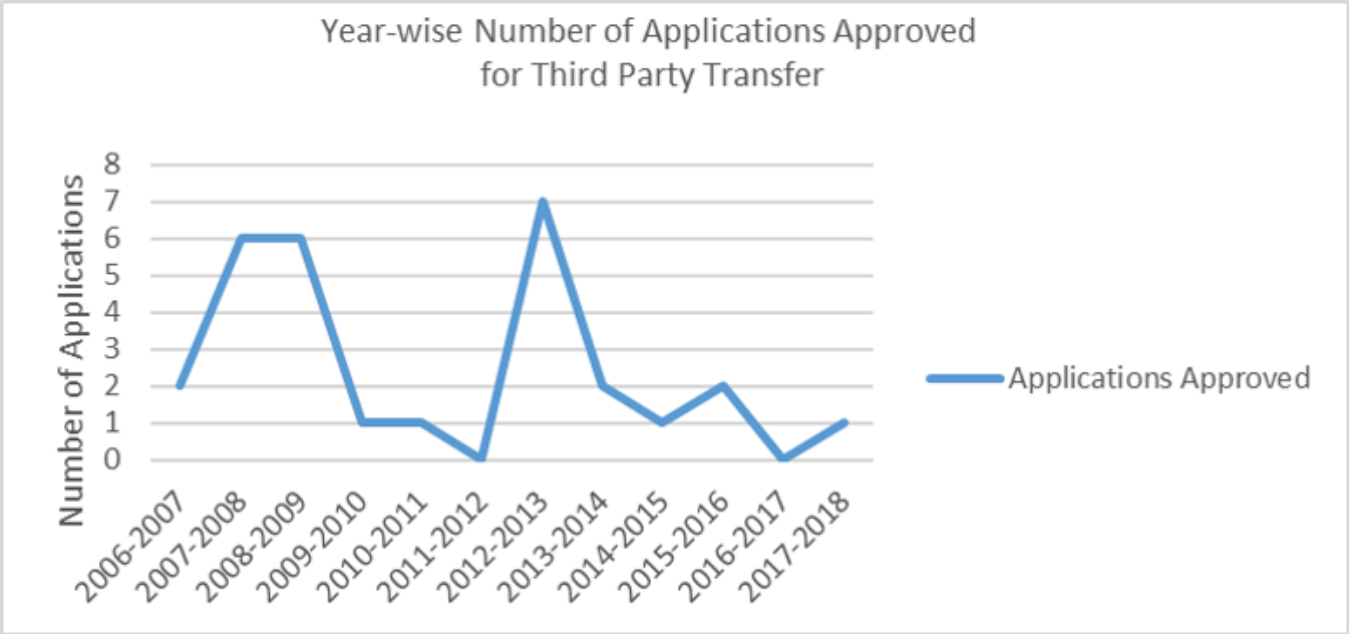


Source: National biodiversity authority

iii. Trends in number of cases for seeking prior approval of NBA for transferring the results of research to foreign nations, companies, NRIs for commercial purpose

- Seventeen (17) applications stand approved from 2006-07 to 2017-18. See Figure 9.4 for year-wise applications approved.

Figure 9.4 Year-wise Number of Applications Approved for Third Party Transfer

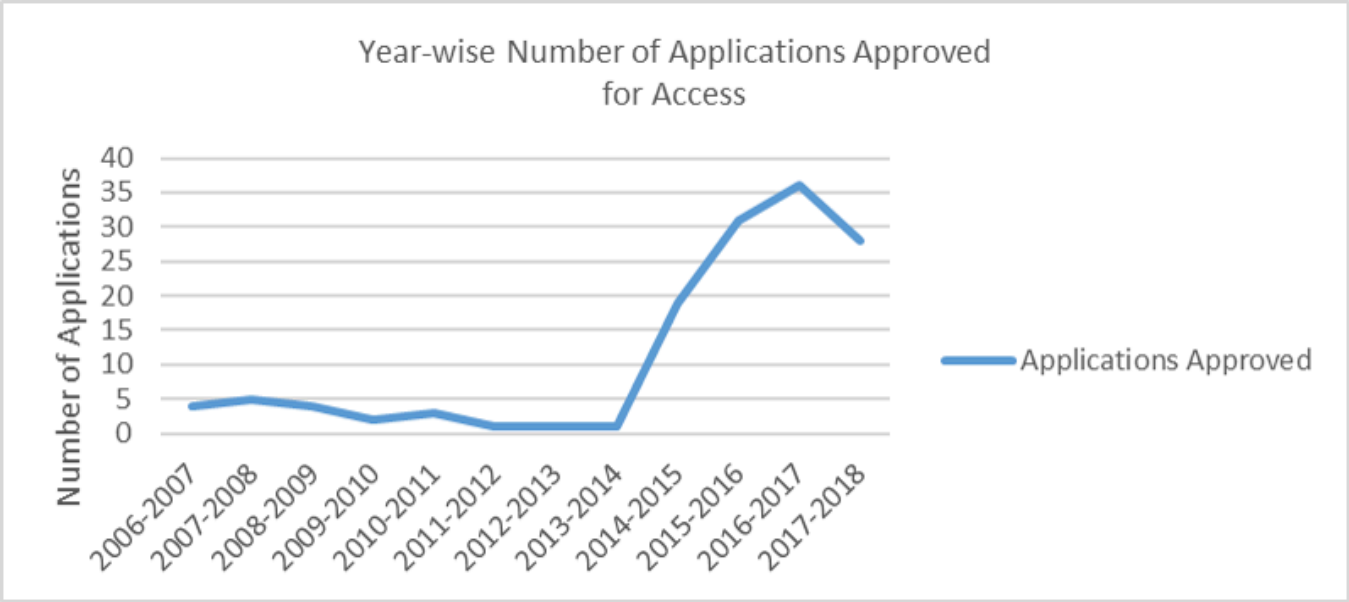


Source: National Biodiversity Authority

iv. Trends in number of cases seeking approval to bio-resources and associated TK for commercial utilization

- One hundred and thirty five (135) applications approved from 2006-07 to 2017-18. See Figure 9.5 for year-wise applications received, cleared and approved.

Figure 9.5 Year-wise Number of Applications Approved for Access



Source: National Biodiversity Authority

Other relevant information

I. ABS Agreement by Raipassa BMC

It is an example of a successfully concluded ABS agreement for sale of Broom Grass (Thysanolaena maxima) by Raipassa BMC in a remote tribal village of North Eastern state of Assam. The ABS agreement between the BMC and the commercial user was signed after detailed discussions with the owners of the resources, which were mainly JFMC members, and commercial users to ensure sustainable harvesting and continued availability of resources. BMC was assisted by Tripura Minor Forest Producers Traders Union and Legal Advisory group (LAG) to frame the agreement, which provides for share of 5% of sale proceeds for JFMCs, 2% for proceeds BMC and Local Biodiversity Fund and 1 % for SBB. The enforcement of agreement is monitored by Tripura Biodiversity Board, Forest Department and Committees under Indo-German Development Corporation Project. Only environmentally and commercially viable extraction of limited quantities of resources is allowed to ensure sustainability. BMC and Village Council ensure that villagers continue to plant Broom Grass.

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Figure 9.6 Locals of Raipassa in process of making broom grass bunches

- For other case studies refer to India’s Interim National Report on the Implementation of NP.

NBT-10: Measures

Measures taken to contribute to the implementation of your country’s national biodiversity strategy and action plan

Major threats to biodiversity

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs.

Indicators and assessment of progress against them with regard to NBT 10 follows

A. Main Policy and Legislative measures include:

The implementation of State/UTs Biodiversity Action Plans has to be in sync with the national policies while giving due regard to state specific priorities and ground realities. The national policies and legislative measures instruments that govern the broad contours of SBAPs and their implementation include are given below.

Key policy statements and legislations that emphasize sustainable use of biodiversity

- **National Policy on Marine Fisheries, 2017** ensures health and ecological integrity of marine living resources through sustainable harvests for the benefit of present and future generations.
- **Green Highways (Plantation, Transplantation, Beautification & Maintenance) Policy, 2015** to promote greening of Highway corridors with participation of the community, farmers, private sector, NGOs, and government institutions. It helps in conservation of environment by making India pollution free and also provides dignified employment to local people and communities. It promotes strong monitoring mechanism through the use of ISRO’s Bhuvan and GPS Aided GEO Augmented

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Navigation (GAGAN) satellite systems.

- **National Biotechnology Development Strategy, 2015-2020,** calls for promotion of mass use technologies for sustainable utilization of bio-resources.
- **National Environment Policy, 2006**
- **Comprehensive Marine Fishing Policy, 2004,** aims to maximize yield from marine fishery resources while balancing the development needs of the various categories of fishing communit1ies
- **Biological Diversity Act, 2002 and Biological Diversity Rules, 2004:** Sec 36(1) of Biological Diversity Act mandates Central Government to develop national strategies, plans, programmes and for the conservation and promotion and sustainable use of biological diversity. Section 36(5) states that the Central Government shall endeavour to respect and protect the knowledge of local people relating to biological diversity.
- **National Agriculture Policy, 2000,** seeks to actualize the vast untapped growth potential in Indian agriculture, rural infrastructure and value addition to secure a fair standard of living for the farmers and agricultural workers and discourage migration to urban areas.
- **National Conservation Strategy and Policy Statement for Environment and Sustainable Development, 1992,** provides the basis for integration and internalization of environment for considerations in the policies and programmes of different sectors. It also emphasizes sustainable lifestyle and proper management and conservation of resources.
- **National Forest Policy, 1988** stipulates that projects involving diversion of forest land for non-forest purpose should provide in their investment funds for regeneration/compensatory afforestation.
- State specific laws/ policies and SBAPs in the follow up to national policies and NBSAP.

B. Other Measures

- **Measures that directly incentivise sustainable use and conservation of biodiversity**
- **Implementation of Access and Benefit Sharing (ABS)** through streamlined process of NBA/ SBBs provides positive incentives for biodiversity conservation. This is being done through legislative, administrative and policy mechanisms.
- **Biodiversity friendly incentives** promoted in farming through:

i. Organic farming promoted across the country through PKMY, MOVCDNER, Participatory Guarantee System (PGS – India) and Third-Party Certification. Refer to NBT 5 for details.

ii. Use of quality bio-fertilizers encouraged through amendment of Fertilizer Control Order, 1985. Refer to NBT 5 for details.

iii. Promotion of sustainable agriculture through NMSA, NMOOP, NMAET, MIDH. Refer to NBT 5 for details.

- **Promotion of sustainable fisheries** through NETFISH. Refer to NBT 5 for details.
- **Forest communities incentivised** for conservation and sustainable use of biodiversity through NAP, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. Refer to NBT 3 for details.
- **Promotion of use of clean fuels** and reduction in dependence on kerosene and environment unfriendly fuels through:

i. PMUY Refer to NBT 3 for details.

ii. Sub-Mission on Agricultural Mechanization (SMAM) Financial assistance given under for installing solar photovoltaic water pumping system.

iii. National Solar Mission under NAPCC to create strong base for solar energy production and making solar energy competitive with fossil-based energy options.

- **Employment Generation** to promote restoration, rehabilitation and conservation of natural resources through Mahatma Gandhi National Rural Employment Guarantee Act, 2005. Refer to NBT 3 for details.
- Measures for gender mainstreaming include- Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50 %. This ensures large-scale participation of women in planning decision making, implementation and governance. Gender Budgeting as part of the Annual Central Government budget. Specific provisions for participation and representation of women in government programmes and schemes.
- **Direct Benefit Transfer under** welfare schemes including cooking gas directly to farmers with the aim of poverty elimination, inclusive growth and delivering better welfare measures.
- **Awards** to incentivise and encourage communities for conservation and sustainable utilization: India Biodiversity Award, E.K. Janaki Ammal National Award. Refer to Section II, NBT 1 for details.

b. Measures that encourage stakeholders for sustainable production and consumption are given below.

- **Industry:**

i. India Biodiversity and Business Initiative promotes awareness and green action to minimize environmental harm within the industry and business. Refer to NBT 1 for details.
ii. Federation of Indian Chambers of Commerce and Industry (FICCI) and Earthwatch Institute India promote the concept of 'Citizen Science' for conservation and protection of urban water bodies.
iii. Funding support to NGOs from Government, Industry.
iv. CSR: Two % of the average net profits made by the company during every block of three years are to be used for CSR activities. Ensuring environmental sustainability is identified as one of the nine eligible activities under CSR activities**.**

- **Agricultural sector**:
- **Water resources:**
    - *Namami Gange*- Ganga Conservation, National Plan for conservation of Aquatic Ecosystem (NPCA Mission, Jal

Kranti Abhiyaan are on-going. Refer to NBT 3 for details.

- **Sustainable marine resources:**
  - NETFISH 2007, Integrated Coastal Zone Management Program (ICZMP). Refer to NBT 5 for details.
- **Releasing stress on Forests:**
- **Grant-in-aid scheme, Development and Promotion of Clean Technologie**s, 1994 to optimize consumption of raw materials and minimize waste generation through adopting suitable production techniques. Over 25 projects already completed, 18 projects ongoing and six new under examination.
- **Monitoring of quality water and soil**

i. National Water Quality Monitoring Programme, Development of Desertification and Land Degradation Atlas of India 2016. Refer to NBT 3 for details.
ii. Soil quality monitoring through Soil Health Management and Soil Health Card Scheme. See NBT 5 for details.
iii. EIA and EMP management tool to foresee and address potential environmental problems/concerns at an early stage of project planning and design.

CEPA for different stakeholders to encourage sustainable production and consumption (Refer to NBT 1 for details)

National Target(s)

National Biodiversity Target (NBT) - 10 : By 2020, an effective participatory and updated national biodiversity plan is made operational at different levels of governance.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Indicators and assessment of progress with regard to NBT 10 follows:

1. Trends in preparation of SBAPs

- SBAPs have been prepared by 24 States through participatory processes.
- Other States follow NBSAP policies and priorities in sectoral departments' programme.

2. Trends in implementing the activities envisaged under SBAPs

- Each State/UT implements the objectives through sectoral departments, State agencies, NGOs and CSOs.
- JFMCs, BMCs as the local communities' and peoples' organisations, SHGs of women participate in the implementation at grassroots level.
- MoEFCC and NBA as the national level drivers of NBSAP provide continuous support and guidance for augmentation and updating of plans and actions and monitor implementation.

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Obstacles and scientific and technical needs related to the measure taken

NBSAP and SBAPs have been made after vast stakeholder consultations and hence have the involvement of local communities, women and people in general. The challenge is that of ensuring effective implementation, coordination and monitoring. To collect full information is a challenge because people and institutions in dispersed areas take actions which mostly do not get reflected in official monitoring channels. In a democratic decentralised system of governance that is practised in India, collection of data at a central place has time and cost demands which are a big constraint. Mainstreaming of biodiversity has been largely affected but creation of human and technical resource, to compile and analyse data has been a gap area which requires additional resources.

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NBT-11: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

Main Measures

MoEFCC, Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, Ayurved, Yoga, Unani (AYUSH), Ministry of Science and Technology and Ministry of Commerce and Industry are directly involved in the implementation of this NBT. Figure11.1. shows main measures:

Figure 11.1 Main measures

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LAWS & RULES

Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006: specifically, Section 3(k) recognises that that forest dwelling Scheduled Tribes and other traditional forest dwellers have the right to intellectual property and TK related to biodiversity and cultural diversity included in the act.

Biological Diversity Act, 2002: grant of access to biological resources and associated knowledge and TK governed by sections Sec. 3, 4, 6, 19, 20 and 41 of the Act.

Geographical Indications of Goods (Registration and Protection) Act, 1999 (GI Act) for the registration and better protection of geographical indications relating to goods, can serve as a tool for protecting TK. **The Patents Act, 1970 as amended from time: disallows** TK invention under section 2(1)(j) of Act. Section 3 (p) provides that an invention which, in effect, is or on aggregation or duplication of known properties of traditionally known component or components.

POLICIES

National Intellectual Property Right Policy (2016): emphasis on documenting oral TK maintaining its integrity and that of traditional lifestyle aims at supporting along with the expansion through R&D under 'Creative India, Innovative India.

National Environment Policy, 2006

Other Measures:

Other measures include protection through documentation, regulation of access and promotion of R&D to advance TK. Fig 2 shows the agencies and institutional measures.

Fig 2: Agencies and Institutional measures

NBA and SBBs : to guide, create capacities of BMCs to get PBRs made, and to grant access to BRs and associated TK ensuring PIC, MAT and equitable sharing of benefits and maintain liaisons and maintain liaison with other relevant bodies to ensure protection of rights of TK holders.

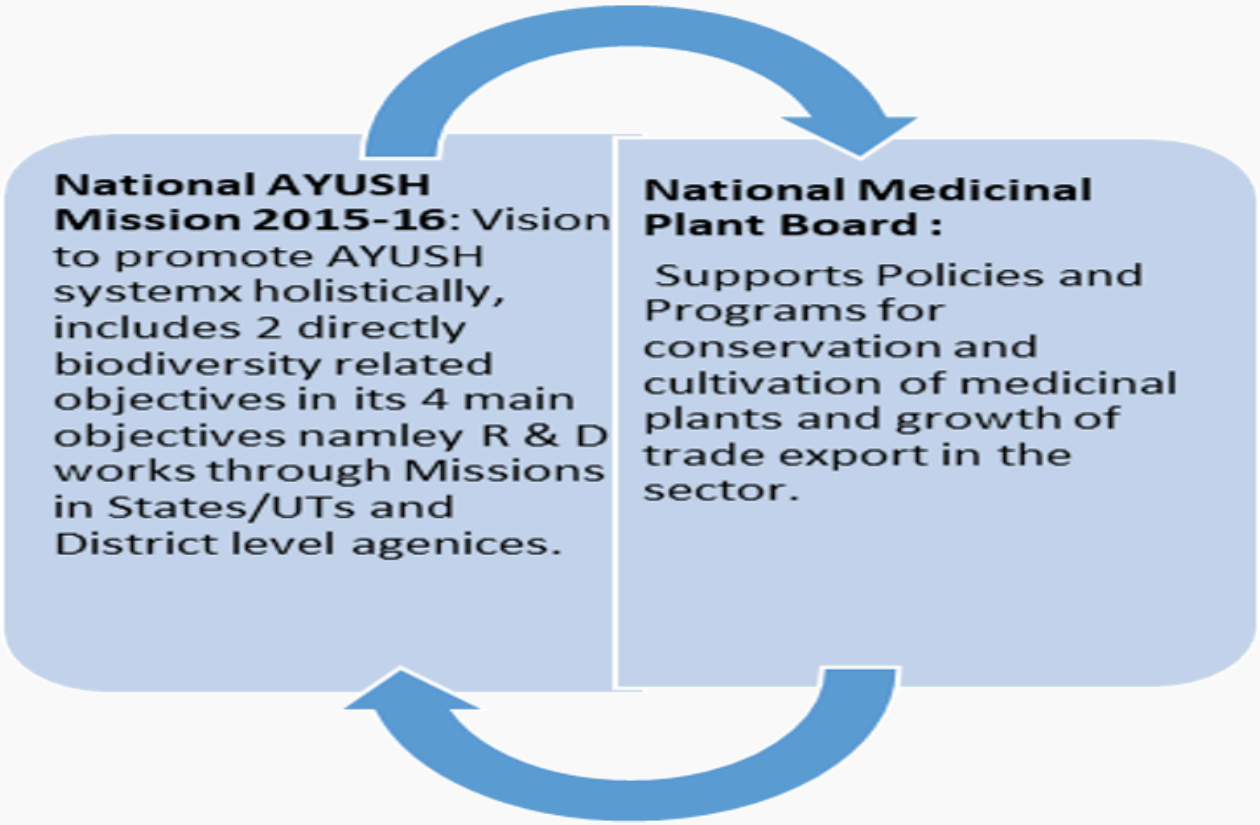
Guidelines for processing Patent Applications relating to Traditional Knowledge and Biological Material (2012), to help Patent examiners to analyze what constitutes novelty and inventive step in TK related invention.

Traditional Knowledge Digital Library (TKDL), established by Ministry of AYUSH in collaboration with National Council for Scientific & Industrial Research (CSIR) to transcribe coded TK for wider use and protection.

The National Innovation Foundation (NIF) India (2010), for grassroots technology innovations by documenting , adding value, protecting them including through IPRs disseminating them on commercial and non-commercial basis.

SRISTI works as an arm of NIF to strengthen the creativity of/at/for grassroots communities, including individual innovators and supports eco-friendly solutions to local problems, nurtures ecopreneurs engaged in conserving biodiversity, common property resources and cultural diversity among others.

· Institutional Mechanism and programmes under Ministry of AYUSH directly concerned with the use of medicinal plants



Schemes under Ministry of AYUSH

- **Conservation, Development and Sustainable Management of Medicinal Plants Scheme** survey, inventorization, *in situ* conservation through development of Medicinal Plants Conservation and Development Areas (MPCDAs), *ex situ* conservation through establishment of herbal gardens, linkage with JFMCs / Panchayats / BMCs for value addition activities like drying, grading, storage, primary processing and Research & Development etc.
- **Medicinal Plant Conservation Areas,** for *in situ* conservation, sustainable management and development of the medicinal plants by increasing awareness, promoting and engaging local communities in related activities.
- **National Raw Drug Repository (NRDR),** under development along with eight region-based Regional Raw Drug Repositories (RRDR).

Actors involved: National Government, Sub-national Government, Autonomous organizations under the Governments, CSOs.

The target is being monitored through indicators. The time period for monitoring of each target is fixed.

- Measures for gender mainstreaming include- Article 243 D and 243 T of the Constitution which mandate that not less than one-third seats in Panchayats in rural areas and municipal bodies in urban areas respectively "shall be" reserved for women. Most states have raised this reservation to 50%. This ensures large-scale participation of women in planning decision making, implementation and governance. Gender Budgeting as part of the Annual Central Government budget. Specific provisions for participation and representation of women in government programmes and schemes.

National Target(s)

National Biodiversity Target (NBT) - 11 : By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been effective

tools or methodology used for the assessment of effectiveness above

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBTs. Progress is monitored through the respective indicators of all the NBTs. Indicators and assessment of progress against them with regard to NBT 11 follows

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1. **Trends in documentation/ data abstraction and management**

- Table 1 gives information on the ancient books and formulations transcribed in Traditional Knowledge Digital Library (TKDL) in

five international languages. More than 2.90 lakh of medical formulations of Ayurveda, Unani and Siddha are covered in this transcription.

Table 1: **Transcription of the coded TK through TKDL**

Discipline	No. of texts (including volumes) used for transcription	Transcribed
Ayurveda	75 books	97,337
Unani	10 books	1,75,150
Siddha	50 books	23,016
Yoga	15 books	1,680
Total	**150 books**	**2,97,183**

- International Access Agreements signed with United States Patent & Trademark Office, European Patent Office, Canada Patent Office, Germany Patent Office, Japan Patent Office, United Kingdom Patent Office, Australia Patent Office, Malaysia Patent Office, Chile Patent Office and Indian Patent Office allow TKDL's use by them in patent application examination.
- Pre-grant opposition showing prior art evidences from TKDL are submitted on a regular basis.
- TKDL has so far succeeded (i) in preventing the grant of 220 wrong patents and(ii) facilitating scrutiny for such prevention at International Patent Offices (IPOs).
- Over10,000 of PBRs prepared so far.

2. Trends in access agreements related to TK

- Refer to Section II- Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes under NBT 9.

3. Trends in grassroots innovations and traditional practices

- Validation of 168 technologies and products validation supported by National Innovation Foundation (NIF).
- 63 patents filed by entrepreneurs with support of NIF.
- About fifty nine (59) human health related herbal claims of traditional healers have been validated during the year 2015-16 under collaboration between NIF and ICMR.
- Honey Bee Network has documented more than 1,00,000 ideas, innovations and traditional knowledge practices.

4. Trends in conservation and sustainable use of medicinal plants used by India's medical heritage

- Taxonomic surveys conducted by BSI have mapped 8,000 medicinal plants under use. Out of these, 53 species were reported to be facing various categories of threat.
- Action to protect, conserve, rehabilitate is underway in accordance with Section 38 of the Biological Diversity Act, 2002 in respect of these 53 species.

National AYUSH Mission and NMPB have created/promoted establishment of 110 MPCAs of average size of 200 ha each

covering 34 forests types in 7 biogeographical zones.

These MPCAs harbour wild breeding populations of the *intra* and *inter* specific genetic diversity of regionally occurring medicinal plants, including breeding population of a flagship threatened species.

New scheme of Conservation, Development and Sustainable Management of Medicinal Plants (2013-14):

This successor to previous scheme of establishing MPCAs advances the work of expanding medicinal plants, cultivation, conservation use and advancement of knowledge relating to them. Under this scheme:

· 57 Medicinal Plant Conservation Development Areas covering an area of 10,702.15 ha have been set up.

· Augmentation of Medicinal Plants resources over an area of 25,737.18 ha supported.

· 77 NGO Institutional herbal gardens, 3,177 School herbal gardens and 14,503 Home

herbal gardens have been established.

· 1,172 JFMCs/VFMC and BMCs supported for livelihoods creation.

· R&D support for bio-prospecting, conservation, bioassays, identification of substitutes, adulterants, isolation of active ingredients, substitutes for RET listed medicinal plants and validation of traditional knowledge of medicinal plants provided.

5. Collection of plants providing raw drug used in Indian systems of medicine:

- **A demand and supply study conducted by ICFRE supported by NMPB found that** of 1,178 plants species traded for medicinal value, 242 species were traded in large quantity of more than 100 million tonnes per year.

· NMPB succeeded in augmenting their supply getting 50 species under cultivation, of which around 20 species are widely cultivated raising the share of medicinal plants raw materials from cultivation source from 20 to 40% on volume basis from 2004-05 to 2014-15.

- **Sustainable Collection of medicinal plants from natural resources is being done** through development of training modules and master trainers on Good Field Collection Practices. Sustainable harvest is being ensured by NMPB through certification of collected produce to help collectors in fair price for their produce.
- **Surveys conducted by National Councils to identify valuable medicinal plants to identify, promote cultivation, conservation of medicinal plants:**
- **Central Council of Research in Ayurveda Science (CCRAS)**:

o 40, 000 Medicinal Plants collected through 98 survey tours covering more than 38 Forest areas conducted

o 1,100 folk claims collected

o 424 Museum samples preserved

o 15,000 Herbarium sheets documented

ii.Central Council of Research in Homeopathic Science (CCRHS):

o 75 plant (61 exotic plants and 14 indigenous plants) species cultivated under experimental cultivation for conservation cum germplasm collection for seed multiplication at demonstration plots.

o 202 surveys conducted, and 542 raw drugs supplied to research units supplied for carrying out standardisation studies.

o 9,384 herbarium sheets have been prepared with voucher specimen.

iii. Central Council of Research in Unani Science (CCRUS):

o 1,02,680 botanical specimens comprising 34,481 plant species of medicinal plants identified.

o 88,155 such herbarium sheets prepared.

o 16,155 folk claims for treating diseases and conditions including other economic uses recorded and published.

6. Trends in documentation and awareness conservation of the conservation traditions in TK and Trends in capacity building related to TK and PBRs

· Refer Section II Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes- Capacity and Awareness Building under NBT 1

Relevant websites, links, and files

http://envis.frlht.org/.
http://www.nmpb.nic.in/
http://bhuvan-staging.nrsc.gov.in/events2/forest/frlht

Other relevant information

TK is a dynamic process and grows over time. PBRs document this knowledge at local level and also open a standing opportunity to add to the existing documentation. It is a participatory instrument which achieves the objectives of conservation and application of the

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knowledge for wider use giving due recognition to the creators of knowledge and ensuring fair and equitable share in benefits to them arising out of the use if their knowledge.

Obstacles and scientific and technical needs related to the measure taken

Creation of toolkits in local dialects for building capacities of traditional communities for equipping them with skills to negotiate with users seeking access of traditional knowledge. It needs funding and support. EN

NBT-12: Measures

Measures taken to contribute to the implementation of your country's national biodiversity strategy and action plan

- The Biological Diversity Act, 2002, National Environment Policy, 2006 and respective sectoral policies together emphasise mainstreaming of biodiversity in all development planning and programmes including poverty alleviation programmes.
- Policies' and programmes' reviews from time to time make analytical assessment of the funding and actions relating to biodiversity make out cases for needed additional budgetary allocations.
- Implementation of Biodiversity Finance Initiative (BIOFIN) involves regular consultations with all the central line ministries and departments, analysing their biodiversity relevant activities and allocations, thereon, examinations of the scope of, deepening and widening the integration of biodiversity in sectoral planning, analysis of the current and potential avenues of raising resources with the help of national, financial and technical institutions and creating a wider constituency for raising resources.
- National Biodiversity Action Plan, 2008 and its Addendum, 2014.

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National Target(s)

National Biodiversity Target (NBT) - 12 : By 2020, opportunities to increase the availability of financial human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.

Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

Measure taken has been partially effective

tools or methodology used for the assessment of effectiveness above

The detailed assessment of the budgets and documents of 5-year planning period (2012-13 to 2016-17) followed by extensive consultations at Central Government level has identified 116 public schemes from 24 Ministries and 29 Departments as biodiversity relevant in Government of India. Technical work is under progress to identify workable solutions for raising additional resources for biodiversity.

Indicators for measuring the implementation of NBTs were determined along with timeframe for monitoring in consultation with Ministries and Departments concerned at the time of finalization of NBSAP and NBTs. Progress is monitored through the respective indicators of all the NBTs.

Indicators and assessment of progress against them with regard to NBT 12 follows:

· **Trends in financial resources, human resources and technical resources made available for implementing Aichi and National Biodiversity targets**

1. Several state and national level consultations and training programmes have been held for government functionaries and other stakeholders from time to time for mainstreaming of biodiversity and for identifying current levels of funding along with possible sources of additional funding.
2. Technical and technological capacities and resources are being harnessed to strengthen scientific planning for conservation and use of elements of biodiversity.
3. Central ministries and states have been encouraged to create special cells for monitoring and tracking biodiversity related actions and expenditures.
4. Application of geo-spatial technologies has been encouraged to monitor the status of ecosystems and also to provide requisite alerts and guidance for timely actions to save biodiversity, eg, bi-weekly alerts on coral bleaching based on satellite imageries are issued by Indian National Centre for Ocean Information Services (INCOIS);
5. The attributable expenditure in respect of all biodiversity relevant schemes for the period of 2012-13 and 2016-17 has been carried out under the BIOFIN project. The following picture has emerged of the biodiversity attributable expenditure over 2012-13 and 2016-17. See fig 12.1.

Fig 12.1

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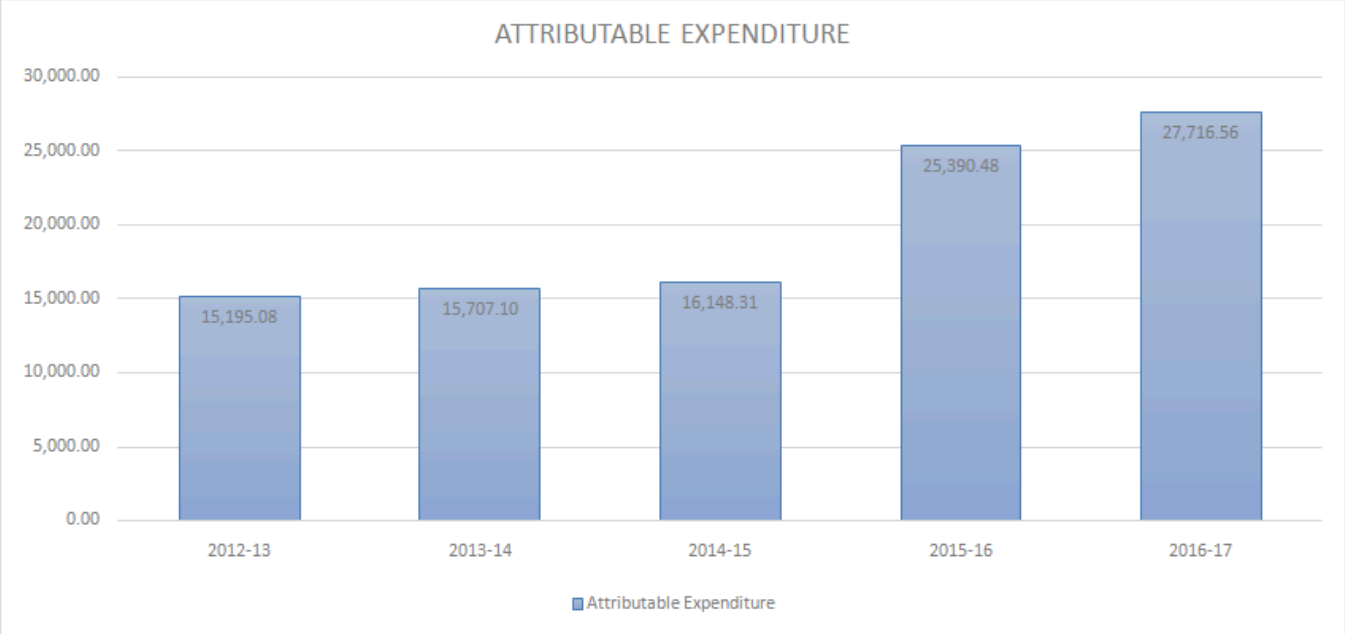
No. of Ministries	No. of Departments	No. of Schemes	Average of Total Expenditure (2012-13 to 2016-17)	Average of Biodiversity Attributable Expenditure (2012-13 to 2016-17)
24	29	116	INR 1,07,961.18 crores USD 14,651.00 Million	INR 20,031.51 crores USD 2,718.92 Million
				Conversion rate 1 USD = ₹ 73.67

Source: Biodiversity Finance Initiative (BIOFIN), India

Further work is under progress.

1. Analysis of Year-wise attributable biodiversity expenditure over the five years 2012-13 to 2016-17 shows a significant increase of 82.40% in 2016-17 over the figure in 2012-13. See fig. 12.2.

Fig. 12.2



7. State budgets are important players in funding of biodiversity related actions. A methodology has been standardised through consultative process involving different sectoral departments and experts for integrating identification and allocation of financial resources plan in State Biodiversity Action Plans (SBSAPs).

Other relevant website address or attached documents

BIOFIN India
MoEFCC
National Biodiversity Authority
The Wildlife Institute of India

Obstacles and scientific and technical needs related to the measure taken

- Along with the Central government States/UTs are important players in biodiversity management in India. Collection of data at national and state level is a challenge considering the multidimensional and multidisciplinary nature of biodiversity. It was after several rounds of consultations with central ministries and departments that 116 biodiversity relevant schemes in 29 departments were identified as biodiversity relevant. However, devising a scientific and standard methodology which is easily replicable at the state government and sub-state levels has been a challenge because of the diversity of management systems and situations that prevail at these levels.
- The examination and assessment of the sectoral budgets and actions has identified the following areas that need substantial additional funding and other resources– strengthening and integration of in-situ conservation; effective check on management of invasive alien species; development and integration of biodiversity databases; valuation of goods and services and use of economic instruments in decision making processes; international cooperation as areas requiring substantial additional financial, human and technical resources.

EN

Section III. Assessment of progress towards each national target

National Biodiversity Target (NBT) - 1 : By 2020, a significant proportion of the population especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 1 : By 2020, a significant proportion of the population especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably. EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

18 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till August 2018.

Collection of data and information from such a widespread area is a challenge. EN

Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process.
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs. EN

Other relevant website address or attached documents

India's NBSAP, Addendum 2014 to NBSAP 2008
India's Fifth National Report to the CBD

National Biodiversity Target (NBT) - 2 : By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 2 : By 2020, values of biodiversity are integrated in national and state planning processes, development programmes and poverty alleviation. EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

18 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report the process of assessment started in 2017 and continued till August 2018. EN

Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs. Monitoring is done accordingly.

EN

National Biodiversity Target (NBT) - 3 : Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 3 : Strategies for reducing rate of degradation, fragmentation and loss of all natural habitats are finalized and actions put in place by 2020 for environmental amelioration and human well-being. EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

20 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till August 2018.

Refer to Section II **“Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes”**

EN

Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Level of confidence of the above assessment

FSI Surveys and Assessment, Real time data monitoring by CPCB and SPCBs, Open forums for data displayed in public, Green Tribunal, Achievements with respect to programs in each indicators, Legal Measures and Policies, Improvement in trends suggested as indicators.

EN

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process.
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs.

EN

National Biodiversity Target (NBT) - 4 : By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed.

2018 - Progress towards target but at an insufficient rate

Targets

National Biodiversity Target (NBT) - 4 : By 2020, invasive alien species and pathways are identified and strategies to manage them developed so that populations of prioritized invasive alien species are managed.

EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

Progress towards target but at an insufficient rate

Date the assessment was done

20 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this, the process of assessment started in 2017 and continued till August 2018.

EN

Level of confidence

Level of confidence of the above assessment

Based on expert opinion

Adequacy of monitoring information to support assessment

Monitoring related to this target is partial (e.g. only covering part of the area or issue)

Monitoring system for the target

The frequency of monitoring / reporting for each composite indicator is fixed and the agency responsible for each target has been specified. Monitoring is done accordingly. EN

National Biodiversity Target (NBT) - 5 : By 2020, Measures are adopted for Sustainable Management of Agriculture, Forestry and Fisheries.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 5 : By 2020, Measures are adopted for Sustainable Management of Agriculture, Forestry and Fisheries. EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

21 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till October 2018.

Please refer to section II. EN

Indicators and Activities

Indicator(s)used in this assessment

Refer to Section II for details. EN

Any other tools or means used for assessing progress.

Process for Preparation of India's Sixth National Report to the Convention on Biological Diversity

MoEFCC being the nodal Ministry for implementation of CBD in India, initiated action for preparation of NR6 in early 2017 in association with the NBA and with support from GEF through United Nations Development Programme (UNDP). The process for preparation of NR6 involved extensive consultations with multiple stakeholders at National and State levels. The stakeholders included representatives of concerned Ministries/Departments of the Central and State governments, SBBs, other relevant government organisations, academia, CSOs and industry. A brochure comprising information on India's NBSAP, NBTs and their linkages with ABTs and SDGs, and requirement of national reporting was prepared and widely circulated to provide background information for seeking relevant inputs from stakeholders. The brochure initially prepared in English was also translated into eight different Indian languages. A dedicated web portal for receiving inputs online for NR6 (www.nationalreport6.in) further facilitated wider outreach to stakeholders. Six regional consultations covering all States were organised between July-September 2017.

The above initiatives were supplemented with consultations organized by SBBs within the states and NBT specific consultations hosted by national level technical institutions for receiving focused inputs, personal interviews with subject matter experts, group discussions with experts, industry and other users. Oral and written inputs were further matched with maps and documents created through geo-spatial technologies by the Ministries and technical institutions concerned. Some of these maps have been included in the relevant NBTs. While all the five previous National Reports to CBD were prepared with involvement of stakeholders, consultations for preparation of NR6 are so far the most extensive and elaborate. EN

A video on ‘Preparation of India’s NR 6: Process and Status’ was presented during the ‘Workshop on the preparation of the Sixth National Report’ in Montreal on December 9, 2017, which was well received and appreciated. The video can be viewed at the link: http://www.nationalreport6.in/.

A ‘Zero Draft’ of NR6 was prepared by a team led by a Senior Consultant, Ms. Amarjeet Ahuja, based on the information collected from various stakeholders, and other relevant sources such as official websites and annual reports and published case studies. The ‘Zero Draft’ was shared with all central ministries, departments, organizations and divisions of MoEFCC for review, endorsement and suggestions. A ‘National Consultation’ on NR6 was organized on July 17, 2018 by the MoEFCC with the representatives of 23 Central Ministries and National level lead agencies such as BSI, ZSI, Wildlife Institute of Indian (WII), Indian Council of Forestry Research and Education (ICFRE), etc. The zero draft was revised by incorporating comments/inputs received during the National Consultations and thereafter the first draft of NR6 was circulated to a group of five experts for their comments/inputs. These are: Dr. V.B.Mathur, Mr A.K.Goyal, Mr. C.A.Reddy, Dr. Vibha Ahuja and Dr. Pratibha Brahmi. This first draft was also examined internally in MoEFCC and NBA. A series of meetings of a core group led by Dr Sujata Arora were held during September and October 2018 to consider inputs received, revise and edit the draft Thereafter, approval of competent authority was obtained.

Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

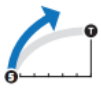
Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process.
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs.

EN

National Biodiversity Target (NBT) - 6 : Ecologically representative areas on land and in inland waters, as well as coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, on the basis of protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20 % of the geographic area of the country, by 2020.



2018 - On track to exceed target

Targets

National Biodiversity Target (NBT) - 6 : Ecologically representative areas on land and in inland waters, as well as coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, on the basis of protected area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20 % of the geographic area of the country, by 2020.

EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to exceed target

Date the assessment was done

20 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till August 2018.

EN

Refer to Section II **“Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes”**

Indicators and Activities

Indicator(s)used in this assessment

Following are the indicators used for the assessment of this NBT:

The progress towards the target is assessed through indicators mentioned in Section II- Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

MoEFCC being the nodal Ministry for implementation of CBD in India, initiated action for preparation of NR6 in early 2017 in association with the NBA and with support from GEF through United Nations Development Programme (UNDP). The process for preparation of NR6 involved extensive consultations with multiple stakeholders at National and State levels. The stakeholders included representatives of concerned Ministries/Departments of the Central and State governments, SBBs, other relevant government organisations, academia, CSOs and industry. A brochure comprising information on India’s NBSAP, NBTs and their linkages with ABTs and SDGs, and requirement of national reporting was prepared and widely circulated to provide background information for seeking relevant inputs from stakeholders. The brochure initially prepared in English was also translated into eight different Indian languages. A dedicated web portal for receiving inputs online for NR6 (www.nationalreport6.in) further facilitated wider outreach to stakeholders. Six regional consultations covering all States were organised between July-September 2017.

The above initiatives were supplemented with consultations organized by SBBs within the states and NBT specific consultations hosted by national level technical institutions for receiving focused inputs, personal interviews with subject matter experts, group discussions with experts, industry and other users. Oral and written inputs were further matched with maps and documents created through geo-spatial technologies by the Ministries and technical institutions concerned. Some of these maps have been included in the relevant NBTs. While all the five previous National Reports to CBD were prepared with involvement of stakeholders, consultations for preparation of NR6 are so far the most extensive and elaborate.

A video on ‘Preparation of India’s NR 6: Process and Status’ was presented during the ‘Workshop on the preparation of the Sixth National Report’ in Montreal on December 9, 2017, which was well received and appreciated. The video can be viewed at the link: http://www.nationalreport6.in/.

EN

Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Level of confidence of the above assessment

FSI Surveys and Assessment, Real time data monitoring by CPCB and SPCBs, Open forums for data displayed in public, Green Tribunal, Achievements with respect to programs in each indicators, Legal Measures and Policies, Improvement in trends suggested as indicators.

EN

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process.
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs.

EN

National Biodiversity Target (NBT) - 7 : By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 7 : By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity. EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

20 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

Refer to Section II **“Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes”** EN

Indicators and Activities

Indicator(s)used in this assessment

The progress towards the target is assesses through indicators mentioned in Section II- "Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes" EN

Any other tools or means used for assessing progress.

Process for Preparation of India’s Sixth National Report to the Convention on Biological Diversity

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Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs.

EN

Other relevant website address or attached documents

https://www.cbd.int/doc/world/in/in-nbsap-v3-en.pdf

National Biodiversity Target (NBT) - 8 : By 2020, ecosystem services especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified taking into account the needs of women and local communities particularly the poor and vulnerable section.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 8 : By 2020, ecosystem services especially those relating to water, human health, livelihoods and well-being, are enumerated and measures to safeguard them are identified taking into account the needs of women and local communities particularly the poor and vulnerable section.

EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

20 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicator. For the purpose of report the process of assessment started in 2017 and continued till early August 2018.

Refer to Section II **“Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes”.**

EN

Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs.

EN

National Biodiversity Target (NBT) - 9 : By 2015, Access to Genetic Resources (GRs) and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislation.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 9 : By 2015, Access to Genetic Resources (GRs) and the Fair and Equitable Sharing of Benefits Arising from their Utilization as per the Nagoya Protocol are operational, consistent with national legislation.	EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

21 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till August 2018. Major challenge is to make legal, academic and research communities aware of the ABS regulations. This requires further intensification of awareness and capacity building efforts.	EN

Indicators and Activities

Indicator(s)used in this assessment

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Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Level of confidence of the above assessment

Detailed information is tracked through the indicators. EN

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

- Indicators and monitoring frameworks with required periodicity for NBTs were put in place to facilitate monitoring of progress in their implementation through a consultative process.
- Agencies for monitoring implementation were identified based on their mandate, domain expertise and geographical coverage in achieving the NBTs.

EN

National Biodiversity Target (NBT) - 10 : By 2020, an effective participatory and updated national biodiversity plan is made operational at different levels of governance.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 10 : By 2020, an effective participatory and updated national biodiversity plan is made operational at different levels of governance. EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

21 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till August 2018. EN

Indicators and Activities

Indicator(s)used in this assessment

Please provide a list of indicators used for the assessment of this target

Refer to Section II EN

Any other tools or means used for assessing progress.

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Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

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National Biodiversity Target (NBT) - 11 : By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.

2018 - On track to achieve target

Targets

National Biodiversity Target (NBT) - 11 : By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, with the view to protecting this knowledge in accordance with national legislations and international obligations.

EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

On track to achieve target

Date the assessment was done

21 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicators. For the purpose of this report, the process of assessment started in 2017 and continued till August 2018.

Refer to Section II **“Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes”**

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Indicators and Activities

Indicator(s)used in this assessment

The progress towards the target is assesses through indicators mentioned in Section II- Assessment of the effectiveness of the implementation measure taken in achieving desired outcomes

EN

Any other tools or means used for assessing progress.

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Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

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National Biodiversity Target (NBT) - 12 : By 2020, opportunities to increase the availability of financial human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.

2018 - Progress towards target but at an insufficient rate

Targets

National Biodiversity Target (NBT) - 12 : By 2020, opportunities to increase the availability of financial human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified and the Strategy for Resource Mobilization is adopted.

EN

Category of progress towards the implementation of the selected target

Rate of progresses toward the implementation of the selected target

Progress towards target but at an insufficient rate

Date the assessment was done

28 Dec 2018

Summary of the assessment of progresses toward the implementation of the selected target

It is a continuous process and is done in accordance with the time frame given against the indicator. For the purpose of report the process of assessment started in 2017 and continued till early August 2018.

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Indicators and Activities

Indicator(s)used in this assessment

Trends in financial resources, human resources and technical resources made available for implementing Aichi and National Biodiversity targets

Refer to Section II

EN

Any other tools or means used for assessing progress.

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Level of confidence

Level of confidence of the above assessment

Based on comprehensive indicator information

Level of confidence of the above assessment

Detailed information is tracked through the indicators

- All data collected were from authentic and verified Government sources which is used for assessments at all levels.

The process was consultative and participative backed by verification through multiple rounds of iterations with the concerned ministries, line departments and agencies.

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Adequacy of monitoring information to support assessment

Monitoring related to this target is adequate

Monitoring system for the target

The frequency of monitoring/ reporting for each composite indicator is fixed and the agency responsible for each target has been specified.

- Based on 117 indicators a format was prepared to assess the progress of every sectoral department and their contribution was recorded. This will be further strengthened the process of monitoring across all states.
- A monitoring framework especially for NBT 12 is being developed under the BIOFIN project.

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Section IV. Description of national contribution to the achievement of each global Aichi Biodiversity Target

1. Awareness of biodiversity values

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

All Aichi targets have been comprehensively incorporated in 12 NBTs. This section refers to the ABTs concerned and gives relevant additional points wherever needed.

NBT 1 has covered all the elements of the implementation adequately and elaborately. Awareness building is a continuous process which has to continue to incorporate emerging new issues in communication packages to keep people's knowledge and capacity in tune with the requirement of any new challenges. Entire geographical area of the country and the population with special focus on student, youth and local communities including women are covered under the activities related to communication, education and public awareness. Enhancing the capacity of the people to take decision at their own levels is the goal of all communication material and strategies. Faced with challenges, people have shown capacity to take decisions as demonstrated by case studies given in NBT 1. Table 1 sums up the target elements and progress.

Based on comprehensive evidence presented in NBT, the progress against this ABT is on track.

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Target Elements	Progress
People are aware of the values of biodiversity. People are aware of the steps they can take to	Entire geographical area of the country and all the population with special focus on the target groups of students, youth and local

conserve and sustainably use biodiversity.	communities including women are covered under the activities. Enhancing the capacity of people to take decision at their own levels is the goal of all communication material and strategies. Faced with challenges, people have shown capacity to take decisions as demonstrated by case studies.

Table 1: Target Elements and Progress

2. Integration of biodiversity values

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

NBT 2 has comprehensively covered the implementation of ABT 2. Biodiversity values and concerns have been integrated in national and subnational planning and development and in poverty reduction strategies. Nearly 150 valuation studies of the ecosystem services provided by forest, wetlands, coastal and marine ecosystems, and some other site-specific systems have enumerated and worked out economic, financial, spiritual and other values. Findings and assessments of the studies are integrated in policy and decision making through Environmental Impact Assessment (EIA) and Environmental Monitoring Program (EMP) in respect of the projects covered under notifications issued under Environment (Protection) Act, 1986. One of the biggest policy level interventions of biodiversity valuation is inclusion of forests in the devolution criteria (Refer to NBT 2). However, integration of biodiversity value in projects and actions not covered under the notifications mentioned earlier remains an area of challenge.

At a broader level, biodiversity values have been indirectly integrated in policies and planning by sectoral Ministries which enhance ecosystem services, for example, Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (MGNREGA), a major poverty alleviation programme, and Integrated Watershed Management Programme (IWMP) promote works which directly or indirectly restore and enhance ecosystems. Incentives have been established and strengthened to reward positive contributions to biodiversity and ecosystem services.

Drivers of ecosystem change differ in terms of temporal and spatial scale. Capacity to make location specific assessments and valuation can help Biodiversity Management Committees (BMCs) and municipal bodies to integrate it at local level. The Economics of Ecosystems and Biodiversity India Initiative (TEEB-TII) studies provide methodologies and assessment tools for valuing services that ecosystems provide, capacity needs to be created to use these for which additional funding and human and technical resources are required.

Reporting systems for monitoring the target have been created through predetermined indicators. Further refinement of these is required from time to time. Work on establishing a well institutionalised national accounting system for biodiversity is still in progress. Table 2 sums up the target elements and progress

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Target Elements	Progress
Biodiversity values integrated into national and local development and poverty reduction strategies.	Studies have resulted in promoting devolution of funds by the Centre at sub-national level based on parameters that include forest cover. Values have been integrated in policies and planning by sectoral Ministries. MGNREGA and IWMP are effective measures for protection an enhancement of ecosystem services. Incentives have been identified, established and strengthened to reward positive contributions to biodiversity and ecosystem services.
Biodiversity values integrated into national and local planning processes.	
Biodiversity values incorporated into reporting systems.	Indicator wise progress is monitored through reporting systems.

Table 2: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the progress in this ABT is on track and India is contributing substantially towards the achievement of the global target through establishing methodologies of valuation studies, integration of their results in policies and actions to ameliorate ecosystems.

3. Incentives

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Incentives and subsidies in India are driven by the goal of providing health, social and economic security to the disadvantaged, underdeveloped and under privileged sections of society. These have increasingly become biodiversity conservation supportive. Subsidies and incentives that have positive externalities for minimising poverty, promoting use of renewable and clean fuels and reducing pressure on forests are being provided. The positive incentives have encouraged activities beneficial to biodiversity through better targeting. Reform and streamlining process of these is a continuing process.

These incentives and subsidies include Market Transformation for Energy Efficiency (MTEE) of the Ministry of Power to bring accelerated market transformation for superefficient appliances by providing financial stimulus innovatively at critical points of intervention. The Ministry's National Tariff Policy 2016, mandates purchase of 8% solar energy by State Electricity Regulatory Commissions (SERCs) and procurement of 100% power produced from all Waste-to-Energy plants. Incentives for shift from non-renewable to renewable sources of energy include Generation-Based Incentives (GBIs), capital and interest subsidies. (Refer to NBT 10 for details).

Ministry of New and Renewable Energy's (MNRE) has launched a Capital Subsidy Scheme for promoting solar photovoltaic water pumping systems for irrigation and other purposes with the objective to replace diesel pump sets to reduce dependence on grid power and encourage use of clean energy. Ministry's other initiatives include Lighting Scheme 2016 which has a Capital Subsidy Scheme for Installation of Solar Photovoltaic Lighting Systems, and the Perform, Achieve and Trade Scheme under National Mission for Enhanced Energy Efficiency (NMEEE) which incentivise activities beneficial to biodiversity. (Refer to NBT 2 for details). Deregulation of fossil fuel prices effected in (2014) encourages rational and economical use of these fuels.

One of the major streamlining initiatives has been 'Direct Benefit Transfer' to intended target population since 2013-2014 to bring efficiency and efficacy in programmes. Figure 1 shows the progress on this.

Figure 1: Year wise Direct Benefit Transfer Beneficiaries

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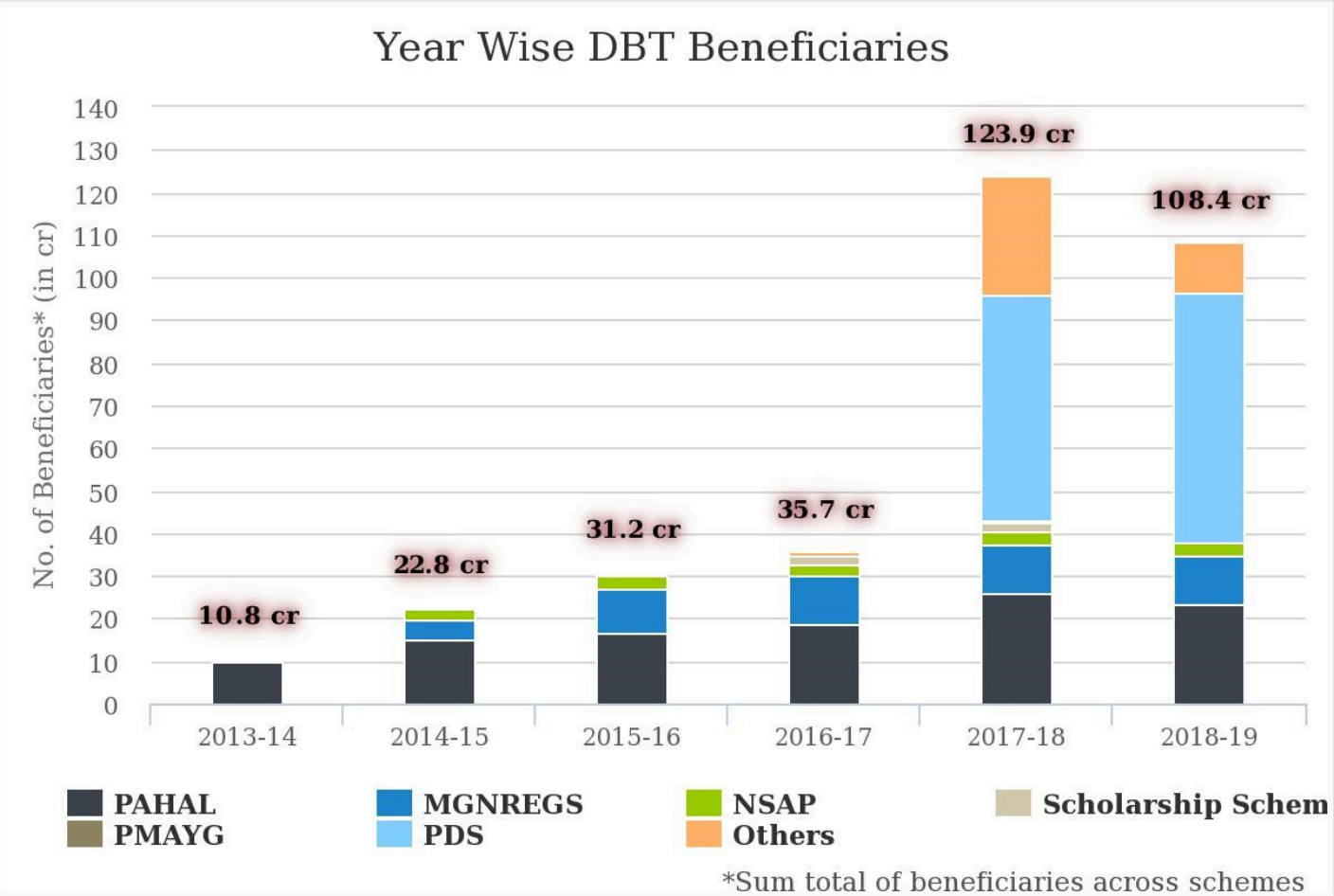

Awards such as Plant Genome Saviour Community Award, Plant Genome Saviour Farmer Reward, India Biodiversity Award recognize and reward conservation efforts undertaken by people.

For detailed analysis of related scheme refer to Refer to NBT 2, NBT 5, NBT 8, NBT 9 & NBT 11. Table 3, sums up the target elements and progress.

Target Elements	Progress
Incentives, including subsidies, harmful to biodiversity, eliminated, phased out or reformed in order to minimize or avoid negative impacts.	Subsidies and incentives that have positive externalities for minimising poverty, promoting use of renewable and clean fuels, reducing pressure on forests are being been provided.
Positive incentives for conservation and sustainable use of biodiversity developed and applied.	The positive incentives have encouraged activities beneficial to biodiversity through better targeting.

Table 3. Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the progress in this ABT is on track.

4. Use of natural resources

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Forestry, fisheries, agriculture and allied sectors have been identified as the main production sectors for biodiversity related actions. NBTs 3, 5, 6, 8 and 10 deal with these comprehensively. Elaborate strategies have been institutionalised by the Government with the participation of local communities, women, industry, business and all other stakeholders to move towards and ensure sustainable management of these production sectors, substitute goods and services drawn from these whenever possible and wherever possible and necessary to serve the object of conservation and maintaining integrity of the ecosystems and biodiversity.

The Scheduled Tribes And Other Traditional Forest Dwellers (Recognition Of Forest Rights) Act, 2006, The Forest (Conservation) Act, 1980, Panchayats (Extension to Schedule Areas) Act (PESA), 1996 and allocation of responsibilities to institutions of local governance mandated under Article 243G of the Constitution empowers local and traditional communities to take actions for sustainable management of these production sectors at decentralised level.

Sustainable management of agriculture is being promoted through soil health management, water efficiency in irrigation, integrated nutrient and pest management, encouragement to organic farming and support to farmers to promote environment friendly practices in agriculture. Development of Medicinal Plant Conservation Development Area (MPCDA) and encouragement for cultivation of medicinal plants on farmers field has raised the share of medicinal plants raw material from cultivation source from 20 to 40% on volume basis from 2004-05 to 2014-15.

Efforts are being by industry in general and India Business and Biodiversity Initiative (IBBI) in particular to promote awareness and green action within the industry and business to minimize adverse impact on environment.

Measures for pollution control, sustainable ecotourism are supported by communication, education and public awareness (CEPA) under NBT 1, diversion of cooking fuel demand from forests to cleaner non-fossil fuel through schemes such as *Deendayal Upadhyaya Gram Jyoti Yojana*, SAUBHAGYA-*Pradhan Mantri Sahaj Bijli Har Ghar Yojana* (NBT 8) are some of the important measures to mention.

For detailed analysis of related schemes refer to NBT1, NBT 11, NBT 10, NBT 8, NBT 5 and NBT 3. Table 4 sums up the target elements and progress.

Target Elements	Progress
Governments, business and stakeholders at all levels have taken steps to achieve, or have implemented plans for sustainable production and consumption and have kept the impact of use of natural resources well within safe ecological limits.	Plans and strategies are in place on large scale and through convergence of diverse strategies and regulations.

Table 4: Target Elements and Progress.

Based on comprehensive evidence presented in NBTs the progress against the elements of this ABT is on track.

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5. Loss of habitats

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Strategies for arresting the decline and loss of habitats have been institutionalised through elaborate policy, legal and administrative mechanisms. Periodic monitoring is undertaken through organisations such as Forest Survey of India, Soil and Land Use Survey of India using latest available geospatial technologies.

Sector specific programmes targeting forest, aquatic, desert and other terrestrial habitats have been designed and are being implemented. India's positive actions under initiatives such as National Action Plan for Climate Change, REDD+ and promotion of schemes to reduce collection from forests have contributed to increase in forest cover. Also, afforestation and restoration of forests through strategies like co-management and assisted natural regeneration have yielded positive results with increase in forest cover, canopy cover, carbon stocks and growing stock of forests. NBT 3 identifies critical habitats for action in view of their strategic ecological significance to support full range of species and to provide ecosystem services. NBT 6 explains the philosophy behind creating Eco-Sensitive Zones to provide buffer zones to PAs and forests which make important contribution in helping to conserve the integrity of the habitats. Actions for sustainable forestry, agriculture and fishery covered under NBT 5 ensure that long term benefits derived from sustainable management incentivize people to arrest degradation of these habitats.

The experience on the ground has been somewhat mixed. Improvements have been witnessed in maintaining and upgrading the biodiversity status of the habitats despite the acute population pressure and problems of pollution. Though the target is on track in terms of identifying strategies and also reducing the loss of habitats, National Afforestation Plan, National Wildlife Action Plan (2017-2020) and initiatives in coastal and marine ecosystems with focused plans for conservation require much greater funding and other resources to continue and implement the strategies comprehensively.

For detailed analysis of related schemes, refer to NBT 3, NBT 6 and NBT 5. Table 5 sums up the target elements and progress.

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Target Elements	
The rate of loss of forests is at least halved and where feasible brought close to zero.	Progress
The loss of all habitats is at least halved and where feasible brought close to zero.	Afforestation and restoration of forests have yielded positive results with increase in forest cover, canopy cover, carbon stocks and growing stock of forests.
Degradation and fragmentation are significantly reduced.	Is in process through schemes targeting forest, aquatic, desert and other terrestrial habitats.

Table 5: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the process for reaching this ABT is on track, but much more funding and other resources are needed to realise the target.

6. Sustainable fisheries

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Sustainable management of aquatic resources including marine living resources is being pursued systematically. Centre for Marine Living Resources and Ecology (CMLRE) under the Ministry of Earth Sciences and other technical institutions including Central Marine Fisheries Research Institute (CMFRI), Fisheries Survey of India (FSI), National Institute of Oceanography (NIO) survey and assess the status of various facets of these ecosystems and issue guidelines and advisories for their sustainable harvesting and management. National Marine Fisheries Policy, 2017 with an overarching goal of ensuring health and ecological integrity of marine living resources through sustainable harvests promotes sustainable development, socioeconomic uplift of fishers with a sharp focus on women. Some pointers such as higher percentage of pelagic fish in comparison to demersal fish, shift in inland fisheries from capture fisheries to aquaculture in the last two and a half decades, launch of ‘Blue Revolution’ incorporating elements of Blue Growth Initiative to achieve sustainable utilization of fisheries wealth from marine and inland aquatic resources, development of Marine Fisheries Management Code on the lines of FAO Code of Conduct for Responsible Fisheries, notifying minimum legal size for fishing in maritime states, self-regulatory fishing ban by fishing communities, indicate the trends towards sustainable management and harvesting of fisheries.

For detailed analysis of related schemes refer to NBT 5. Table 6 sums up the target elements and progress.

Target Elements	
All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches.	Progress
Recovery plans and measures are in place for all depleted species	Policy and legislative framework provide a strong basis for reaching the target. Work on the ground is in progress, but needs deepening and widening of efforts.
Fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems	
The impacts of fisheries on stocks, species and ecosystems are within safe	

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ecological limits, i.e. overfishing avoided.	

Table 6: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the achievements against the elements of ABT are on track.

7. Areas under sustainable management

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

As mentioned in foregoing ABT 4, 5 and 6 conservation friendly sustainable agriculture, aquaculture and forestry practices are being promoted and adopted. National Centre for Coastal Research (NCCR) renamed as such from Integrated Coastal and Marine Area Management Project Directorate (ICMAMPD) provides scientific and technical support to coastal states for implementing ecosystem based integrated coastal and marine area management (ICMAM) for sustainable use of resources. Continuous extension activities are also organised by government and NGOs to build capacities and awareness of all the stakeholders involved. Table 7 sums up the target elements and progress.

Target Elements	
Areas under agriculture are managed sustainably, ensuring conservation of biodiversity.	Comment
Area under aquaculture are managed sustainably, ensuring conservation of biodiversity.	Comprehensive plans are in place
The impact of fisheries on stocks, species and ecosystems are within safe ecological limits, i.e., overfishing avoided.	Relevant policy, legislative and institutional mechanisms are in place. Scientific management of the resources is being encouraged.

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Table 7: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the progress in this ABT is on track.

8. Pollution

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Pollution poses a serious threat to biodiversity. Pollution control measures have been instituted through organisations such as Central and State Pollution Control Boards and implementation of programmes such as Namami Gange, National Water Quality Monitoring Programme explained in NBT 3. Nutrient loads management is being pursued through policies and actions to control these (see NBT 3 and NBT 6). Chilika Lake in Odisha (Refer to NBT 6), Loktak Lake in Manipur (Refer to NBT 3), Mangroves in Sundarbans and Aravalli Biodiversity Park (Refer to NBT 5) in Delhi are some of the examples of significant positive change. NBT 5 gives information about Monitoring of Pest Residue at National Level (MPRNL) and Integrated Pest Management (IPM) schemes to promote sustainable and balanced used of pesticides in agriculture. NBT 5 also promotes use of organic farming and use of bio-fertilizers to reduce consumption of agro-chemical fertilizers to maintain long term soil health and ensure sustainable agricultural practices. Use of non-chemical fertilizers has received substantial boost as a result of activities

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under National Mission for Sustainable Agriculture (NMSA), Parampragat Krishi Vikas Yojana, Rashtriya Krishi Vikas Yojna, National Mission on Oilseeds and Oil Palm and R&D by India Council for Agricultural Research. Additionally, Green Highways (Plantation, Transplantation, Beautification & Maintenance) Policy, 2015 helps in conservation of environment by making India pollution free (Refer to NBT 10).

For detailed analysis of related schemes, refer to NBT 3, NBT 5, NBT 6 and NBT 10. Table 8 sums up the target elements and progress.

Target Element	Progress
Pollutant from excess nutrient has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Integrated Pest Management, Integrated Nutrient Management rojects and promotion of bio fertilisers and soil health assessment-based production strategies are being implemented to bring down the nutrient load and other unfriendly loads on ecosystems and biodiversity.

Table 8: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the achievements against the elements of ABT are on track.

9. Invasive Alien Species

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

As noted in NBT 4, action to prioritise IAS for sustainable management is in progress. This target requires global cooperation in sharing of effective technologies and additional resources for control and eradication of IAS. Adequate financial, technical and human resources will be required based on priorities led management plans. Though local actions have been taken in specific areas, a large scale comprehensive approach is yet to be undertaken.

For detailed analysis of related schemes, refer to NBT 4.

The plans and priorities for achievement against this target are yet to be finalised as indicated in NBT 4

Target Elements	Comment
Invasive alien species identifies and prioritised.	Work has started.
Pathways identified and prioritized.	Work has started.
Priority species controlled and eradicated.	Though local action has been taken in specific areas, a large scale, comprehensive approach is yet to be undertaken.
Introduction an ad establishment of IAS prevented.	

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10. Vulnerable ecosystems

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

India has prioritized and implemented several climate change adaptation and mitigation strategies to address multiple impacts of climate changes on ecosystems. National Action Plan on Climate Change (NAPCC) “pulls together a number of the government’s existing national plans on water, renewable energy, energy efficiency agriculture and others – bundled with additional ones – into a set of eight missions’

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unique approach to reduce the stress of climate change". Eight national plans under NAPCC are in the area of solar energy, energy efficiency, urban habitations, water use efficiency, Himalayan ecosystem, forests, agriculture and knowledge. India has submitted Post-2020 Goals i.e., nationally determined contribution to UNFCCC in 2015 outlining eight Climate Action Goals which can be seen at http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf.

India's REDD+ strategy released in May 2018 further strengthens its efforts to contain effects of climate change. NBT 5 throws light on agriculture specific climate change actions to enable agriculture manage climate stress through National Innovations on Climate Resilient Agriculture (NICRA), a strategic research project started to enhance resilience of agriculture to climate change and climate vulnerability with the help of leading R&D and extension institutions in agriculture and related sectors, and involvement of local communities, farmers and women. National Mission on Sustainable Agriculture makes agriculture more productive, sustainable, remunerative and climate resilient through its four components- Rainfed Area Development (RAD), Soil Health Management (SHM), Agro-forestry, Climate Change and Sustainable Agriculture: Monitoring, Modelling and Networking (CCSAMMN). Monitoring of coral bleach is being done by Indian National Centre for Ocean Information Services (INCOIS) that provides bi-weekly alerts on coral bleaching based on satellite imageries.

Similar other schemes promoting use of energy efficient fuels captured under NBT 8 are also from important component of climate change strategy.

A CSIR research project titled "Indian Aquatic Ecosystems: Impact of Deoxygenation, Eutrophication and Acidification" includes the objective to establish trends in changes in sea water pH in the North Indian Ocean and evaluate the impact of acidification on biogeochemistry and ecosystems.

Valuation studies have been commissioned as brought out in NBT 2 which have indicated that tiger reserves support a wide range of economic sectors including responses to climate change crises.

For detailed analysis of related schemes, refer to NBT 2, 5 and 8. Table 9 sums up the target elements and progress.

Target Elements	Progress
Multiple anthropogenic pressures on coral reefs are minimised, so as to maintain their integrity and functioning.	Action is being taken.
Multiple anthropogenic pressures on other vulnerable ecosystems impacted by climate change or ocean acidification are minimized to as to maintain their integrity and functioning.	Plans and actions in progress. Under process.

Table 9: Target Elements and Progress

Based on comprehensive evidence presented in NBTs and forgoing discussions, the progress against the elements of ABT is on track.

11. Protected areas

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

ABT 11 and the corresponding NBT 6 relate to conservation through protected areas as well as other area-based conservation measures. India has already exceeded its national target of bringing over 20% of the geographical area under area-based conservation measures–biosphere reserves, community conserved areas, known sacred groves and notified eco-sensitive zones (For details, refer to NBT 6 and "Achievement of Aichi Biodiversity Target 11 and 16 Success Stories from India" publication. Management Effectiveness Evaluation (MEE) of protected areas, which has become a regular institutionalised feature of protected areas management strategy, gives an encouraging picture of management effectiveness of Protected Areas (PAs). With the inclusion of Other Effective area-based Conservation Measures (OECMs), the total conservation area comes to nearly 27% of the geographic area of the country. Connectivity in PAs and integration into wider landscape and seascapes is being promoted but requires much more work and greater involvement and commitment of local communities in securing these objectives. Equity in being included through co-management of degraded forest areas, recognition of rights of the traditional forest communities in forests and their involvement in management.

For detailed analysis of related schemes, refer to refer to NBT6 and publication on "Achievement of Aichi Biodiversity Target 11 and 16-Success stories from India". Table 10 sums up the target elements and progress.

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Target Elements	Progress
By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas. Other effective areas-based conservation measures, and integrated into the wider landscapes and seascapes.	Taking into account national conditions priorities and considerations, India adopted the target of covering over 20% of its geographical area, including the coastal and marine ecosystems, for area-based conservation. The target has already been exceeded. Area based conservation covers nearly 27% of the geographical area of the country. All 10 biogeographic zones are represented in this. Country laws and management effectiveness evaluation on regular basis help to serve effectiveness and equity in management. Connectivity and integration of the conserved areas in broader seascapes and landscapes is receiving attention and forms part of the on-going action plans. Target exceeded in terms of percentage and area to be brought under conservation. In terms of connectivity and other elements.

Table 10: Target Elements and Progress.

Based on comprehensive evidence presented in NBTs, the achievements against the elements of ABT are on track.

12. Preventing extinctions

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Significant steps to improve conservation status of threatened species and to prevent extinction of key threatened species have been taken. Ongoing Integrated Development of Wildlife Habitat (IDWH) programme, extended up to 2020, includes three components, namely Project Tiger, Project Elephant and Development of Wildlife Habitats. It covers 18 tiger range states distributed in five landscapes, 23 elephant range states and wild habitats in the entire country for integrated and concerted action. Adopting a wider landscape and seascape approach 17 species of wild habitats spread across the country were identified for monitoring the populations and restoration actions wherever needed. The species include Asian Wild Buffalo, Asiatic Lion, Brow-antlered Deer or Sangai, Dugong, Edible Nest Swiftlet, Gangetic River Dolphin, Great Indian Bustard, Hangul, Indian Rhino or Great one-horned Rhinoceros, Jerdon's course, Malabar civet, Marine turtles, Nicobar megapode, Niligiri tahr, snow leopard, Swamp deer, Vultures.

Action for restoration of 156 threatened plant species through scientific ecological-niche modelling and developing propagation protocol was implemented through a Department of Biotechnology (DBT) Pan-India initiative called 'Preventing Extinction And Improving The Conservation Status of Threatened Plants through application of Biotechnological Tools'. ZSI has identified faunal species from IUCN Red Data book and CITES list of fauna (see NBT 6).

The new Wildlife Action Plan 2017-2020 aims at equities and inclusionary management and governance of protected areas in participation with the fringe traditional and local communities. It includes inclusionary approach, linkage with wider landscapes and seascapes as its important focal areas. Prioritization listing and management of species through in situ and ex situ methods is being practised. Medicinal plant conservation areas harbour threatened flagship species of medicinal plant species besides other economically important plants. Refer to NBT 11 for details.

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Threatened indigenous varieties of crops are conserved and cultivated by farmer groups and farmer communities. Their efforts have been recognised and encouraged through awards such as India Biodiversity Awards, the PPVFR Authority which conferred 25 Plant Genome Saviour Community Awards to farmer communities from 2009-10 to 2014-15 and 33 Plant Genome Saviour Farmer Reward from 2012-2015 to farmers for their contribution in conserving traditional varieties. A widespread network of botanical gardens spread all over India contributes to conservation of threatened plants.

For detailed analysis of related schemes, refer to refer NBT 3, NBT 6 and NBT 11 and Biodiversity Profile. Table 11 sums up the target elements and progress.

Target Element	Progress
Extinction of known threatened species has been prevented.	Strong and effective action has been taken.
The conservation status of those specimens most in decline has been improved and sustained.	Prioritization listing and management of species through *in situ and ex situ* methods is in place.

Table 11: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the progress in the elements of ABT is on track. India is contributing significantly to global target through protection strategies.

13. Agricultural biodiversity

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Plant and animal genetic diversity is conserved mainly through six national bureaux of ICAR. Rashtriya Gokul Mission for in situ conservation of domesticated breeds, setting up of National Animal Gene Bank for conserving indigenous livestock biodiversity, conservation of plant genetic resources of Agri-horticultural crop species including their Crop Wild Relatives (CWR) through mapping and germplasm collection by NBAGR and maintenance of important taxa in National Herbarium of Cultivated Plant are some of the effective measures mentioned in NBT 7. Crops for CWR mapping have been prioritized based on economic importance of crops per se, level of closeness of CWR to crops, CWRs possessing traits of breeders' interest/need and extent of distribution, and threat to CWRs. Narrow endemics and threatened CWRs have more weightage in prioritisation. Identification, propagation and conservation of traditional and farmers' varieties and, landraces are encouraged through several initiatives taken by Protection of Plant Variety and Farmers' Rights Authority (PPV&FR). For details refer to NBT 7.

Network of Botanical Gardens and Medicinal Plant Conservation Areas (MPCAs) contribute significantly to conservation of plants. Table 13 sums up the target elements and progress.

Target Elements	Progress
The genetic diversity of cultivated plants is maintained.	Yes, strategies have been adopted and positive results achieved in this.
The genetic diversity of farmed and domesticated animals is maintained.	The diversity if major cultivated plants and their CWR are identified and maintained. Identification and conservation of genetic diversity of traditional varieties are promoted.
The genetic diversity of wild relatives is maintained.	Special Missions and awareness programmes are being implemented. CWRs have been prioritized based on economic importance of crops per se, level of closeness of CWR to crops, CWRs possessing traits of breeders' interest/need, extent of distribution and threat of CWR to narrow endemics/threatened ones have more weightage.
Strategies have been developed and implemented for minimizing genetic erosions and safeguarding genetic diversity.	Yes.

Table 13: Target Elements and Progress.

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Based on comprehensive evidence presented in NBT, the progress against the elements of ABT is on track and India is contributing significantly in identifying and conserving genetic diversity of plants and animals for human well-being.

14. Essential ecosystem services

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Pressures on major ecosystems have been identified, strategies for their amelioration are under implementation and are progressively consolidated and enriched to be effective. Aquatic, Agricultural, Forest, Riverine, and Land ecosystems have been identified through NBTs for safeguarding the essential services they provide to all, with special attention to the needs of women and local communities. All livelihoods generation programmes are meant to uplift the vulnerable and the poor sections of the society and provide means of income in sync with the environment. Some ecosystems of particular importance that provide goods and services which directly contribute to human-well-being fulfilling their daily needs of water, energy, urban greenspaces and so on have been given in NBT 8 along with these measures for their conservation.

For detailed analysis of related schemes, refer to NBTs 3, 5, 6, and 8. Table 14 sums up the target elements and progress.

Target Element	Progress
Ecosystems that provide essential services, including services related to water, and contribute to health, livelihood and well-being, are restored and safeguarded taking into account the needs of women, indigenous and local communities and the poor and vulnerable.	Yes, major ecosystems and pressures on them, have been identified, strategies for their amelioration are being implemented with the involvement of the poor, local and traditional communities and different stakeholders. Special component and representation for women are ensured in all schemes. All livelihood programmes are meant to uplift the vulnerable and aim to provide means of income in sync with environment.

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Table 14: Target Elements and Progress

Based on comprehensive evidence presented in NBT, the progress against the elements of ABT is on track.

15. Ecosystem resilience

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

NBT 3 details the measures and achievements in arresting the trends in deforestation, restoration of degraded forest habitats, conserving wetlands and other ecosystems. Legal protection and perseverant afforestation activities, restoration of degraded forests, trees outside forests (TOF) have helped increase carbon stocks and growing stocks. There is a noticeable increase in species restoration after forest and water body restoration. NBT 3 provides a list of these. Rehabilitation of mined out areas, regular monitoring of areas under degradation, concerted efforts at promoting sustainable agriculture, watershed development projects and tree cover expansion to slow down desertification are among the important steps taken in achieving goals of this ABT. NBTs 6, 7, and 8 describe measures for promotion of climate resilient agriculture, creation of eco-sensitive zones around PAs, alerts issuing systems for coral reefs and several other measures which contribute to achievement of the ABT. One area which needs considerably greater attention for ensuring health of ecosystems and resilience is control / eradication of IAS. Table 15. sums up the target elements and progress.

Target Elements	Progress
Ecosystem resilience and contribution of biodiversity to carbon stocks have been enhanced through conservation and restoration.	Yes. Strong policy, legislative, administrative mechanisms have been created. Though no numerically defined target has been fixed, the effort is to cover the largest possible area under the target.

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At least 15 percent of degraded ecosystems is restored, contributing to climate change mitigation and adaptation and to combat desertification.	

Table 15: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the progress against the elements of ABT is on track.

16. Nagoya Protocol on ABS

Interim national report on the implementation of the Nagoya Protocol

ABSCH-NR-IN-238716-2 India's interim Report on implementation of Nagoya Protocol

Additional relevant information that has not been included in the interim national report

India has achieved this target within the target deadline. Biological Diversity Act, 2002 is the core national legislation for implementation of the Convention including its third objective of Access and Benefit Sharing (ABS). After India ratified the Nagoya Protocol in 2012, India issued 'Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014' (Guidelines 2014) to bring the procedures and parameters in line with the Protocol.

For detailed analysis of related schemes, refer to NBT 9. Table 16 sums up the target elements and progress.

Target Element	Progress
The Nagoya Protocol is in force. The Nagoya Protocol is in operation, consistent with national legislation.	Biological Diversity Act, 2002, Biological Diversity Rules, 2004 and 'Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014' (Guidelines 2014), provide a comprehensive legal, institutions and procedural mechanism for implementation of Nagoya Protocol consistent with national legislation.

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Table 16: Target Elements and Progress

Based on comprehensive evidence presented in NBT 9 this ABT has been achieved.

17. NBSAPs

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

India's NBAP, a key instrument for translating the Convention and decisions of the CoP into implementation, is a comprehensive policy document prepared through extensive consultations with and participation of all stakeholders applying CEPA effectively. It is updated and added to as and when the exigencies so demand. States have prepared their own SBAPs based on this after stakeholders' consultations in the States. For detailed analysis, refer to NBT 10. Table 17 sums up the target elements and progress.

Target Elements	Progress
Submission of NBSAPs to Secretariat by end of 2015. NBSAPs adopted as effective policy instrument.	Done Done Done

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NBSAPS are being implemented.	

Table 17: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the progress against the elements of ABT is on track.

Other activities contributing to the achievement of the Aichi Biodiversity Target at the global level

India has shared its experience of the implementation of Access and Benefit Sharing (ABS) with South Asian Association for Regional Cooperation (SAARC), Association of Southeast Asian Nations (ASEAN) member countries and other countries organising visits, holding workshops for their delegates. EN

18. Traditional knowledge

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

- Mechanisms have been devised and implemented for recognising and protecting India's vast resource of Traditional Knowledge (TK). Appropriate legislative and institutional mechanisms have been established, relevant schemes are being implemented and resources have been allocated for this purpose.
- Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Ministry of Science and Technology and Ministry of Commerce, Industry and NBA, SBBs and BMCs are directly involved in the implementation of this ABT.
- Two major legislations -Biological Diversity Act, 2002 and The Patents Act, 1970, establish equity in sharing of benefits with the holder of the TK, the gains resulting from the use of such knowledge and prevent unjustified filing of patents on TK or TK based inventions.
- Traditional Knowledge Digital Library (TKDL) established by the Ministry of AYUSH in collaboration with Council for Scientific and industrial Research (CSIR) has transcribed more than 2.90 lakh medical formulations of Ayurveda Unani and Siddha in five recognised international languages.
- Medicinal plants' raw material from cultivation source has risen from 20 to 40% on volume basis from 2004-05 to 2014-15.
- Grassroots organisations like Foundation for Revitalisation of Local Health Traditions (FRLHT), a Centre of Excellence under MoEFCC, work with the local communities to document, add value and protect grassroots innovations. PBRs document oral traditional knowledge comprehensively with the active participation of TK creators/ holders and local communities. Nearly 10,309 PBRs have been created in 2017. BMCs in remaining areas are expected to create PBRs in due course.

For detailed analysis of related schemes, refer to NBT 11. Table 18 sums up the target elements and progress.

Target Elements	Progress
Traditional Knowledge, innovations and practices of indigenous and local communities are respected.	Legal protection, institutional support and support from active NGOs and CSOs ensure that TK is respected and used for wider appreciation ensuring compliance with all legal requirements. Appropriate legislative and institutional mechanisms have been established, relevant schemes are being implemented and resources have been allocated for the purpose.
Traditional Knowledge, innovations and practices are fully integrated and reflected in implementation of Convention with full and effective participation of indigenous and local communities.	Local communities are holders of TK, their consent and agreement are required before utilization of their TK. The benefits that arise from this utilization are duly shared with them.

Table 18. Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the achievements against the elements of ABT are on track.

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Other activities contributing to the achievement of the Aichi Biodiversity Target at the global level

India has shared the manner and methodology of preparing Peoples' Biodiversity Register (PBRs) with SAARC member countries and other EN

countries through workshops, organising visits and also through exchanges in transboundary projects such as through Kailash Sacred Landscape Initiative (KSLDI) across borders of India, Nepal and China, Bay of Bengal Large Marine Ecosystem Project (BOBLME) involving littoral states, promote biodiversity conservation through exchange of information with participating countries.

19. Biodiversity knowledge

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

Identification of threats to biodiversity and prioritization of conservation and sustainable use of biodiversity is a continuous process. Mainstreaming of biodiversity through various ministries and Departments, policies and other institutional mechanisms is continuously being done. BSI and ZSI create the basic data about floral and faunal biodiversity through taxonomic surveys. Their work forms the core of knowledge about species-diversity and they have launched and implemented projects for sharing this data information by providing it online. High-resolution digital photographs of 17,000 type specimens have been digitized. E-Flora of India is an open-access online database of India's plant diversity which documents over 18,000 flowering plant species of India. This portal makes the information published in the Flora of India volumes available in the digital format, which consists of more than 6,000 pages of printed material covering around 4,500 taxa belonging to 92 families. Centers of Excellence under MoEFCC provide program support and monitoring for improving the dissemination of science-based technologies and knowledge. As mentioned in NBT 1 and NBT 5 large scale awareness creating and capacity building measures have been instituted. Environmental Information System (ENVIS) mentioned in NBT 1 is an important environment related information network. Table 19 sums up the target elements and progress.

Target Element	Progress
Knowledge, science-based technologies relating to biodiversity, its values, functioning status and trends, and the consequence of tis loss, are improved.	It is a continuous and ongoing process. Science based technologies are being promoted.
Biodiversity knowledge, the science based and technologies are widely shared and transferred and applied.	

Table 19: Target Elements and Progress

Based on comprehensive evidence presented in NBTs, the achievements against the elements of ABT are on track.

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Other activities contributing to the achievement of the Aichi Biodiversity Target at the global level

Collaborative initiatives for capacity building and knowledge sharing have been taken by Government of India at the regional and multilateral level with the ASEAN, SAARC and African countries. These also include transboundary projects such as the Kailash Sacred Landscape Initiative (KSLDI) and Bay of Bengal Large Marine Ecosystem Project (BOBLME) under which regular exchange of experience of biodiversity related issue and actions takes place.

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20. Resource mobilization

Financial Reporting Framework

https://chm.cbd.int/database/record/206694 Financial Reporting Framework: Reporting on baseline and progress towards 2015

Description how and to what extent the country has contributed to the achievement of this Aichi Biodiversity Target

India joined Biodiversity Finance Initiative (BIOFIN) project in 2015. After several rounds of discussions and interactions with all the Central Government line Ministries and Departments, 116 biodiversity relevant schemes under 29 Central Government Departments have been identified. The examination and assessment of the sectoral budgets and actions has identified the following areas that need substantial additional funding and other resources– strengthening and integration of in situ conservation; effective check on management of invasive alien species; development and integration of biodiversity databases; valuation of goods and services and use of economic instruments in decision making processes; international cooperation as areas requiring substantial additional financial, human and technical resources. Along with the Central Government, States/UTs are important players in biodiversity management in India. Collection of data at national and state level is a challenge considering the multidimensional and multidisciplinary nature of biodiversity. A methodology has been

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standardized through consultative process involving different sectoral departments and experts for integrating identification and allocation of financial resources plan in State Biodiversity Action Plans (SBSAPs). The work of assessment of the funding gap has been taken up and is in progress. The assessment shows increase in funding from Rs 151950.8 million in 2012-2013 to Rs.277165.6 million in 2016-2017- an increase of 82.40 percent (Refer to NBT 12 for details)

Other activities contributing to the achievement of the Aichi Biodiversity Target at the global level

The 2030 Agenda for Sustainable Development with its 17 Sustainable Development Goals universally adopted by the countries of the world is a plan of action for people, planet and prosperity a strongly articulated goal of freeing the human race from the tyranny of poverty and want and to heal and secure the planet through a sustainable and resilient development path. The 17 Sustainable Development Goals broadly balance the three dimensions of sustainable development, namely, economic, social and environmental dimensions. Nevertheless, they have strong linkage with ABTs which in turn have been incorporated in the NBTs in India as has been shown in the Table 20 below.

Table 20: Linkage of NBTs, ABTs and SDGs

NBT description	ABT	SDG
NBT 1: Communication, Education and Public Awareness (CEPA): Population especially youth is aware of values of biodiversity and is able to take steps to conserve and use biodiversity sustainably	ABT 1: People are aware of values of biodiversity and can take steps to conserve it	SDG 4:Ensure inclusive and equitable quality education, promote lifelong learning opportunities for all
NBT 2: Integration of biodiversity values in national and state planning, development programmes and poverty alleviation strategies	ABT 2: Values of biodiversity integrated into national and local, poverty reduction strategies, planning incorporated into national accounting and reporting systems	SDG 2: End poverty in all its forms everywhere SDG 8: Promote sustained, inclusive, sustainable economic growth, full and productive employment and decent work for all SDG 9: Build resilient infrastructure, promote inclusive, sustainable industrialization, foster innovation SDG 11: Make cities, human settlements inclusive, safe, resilient and sustainable SDG 13: Take urgent action to combat climate change, its impacts SDG 14: Conserve, sustainably use oceans, seas and marine resources for sustainable development SDG 15: Protect, restore, promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and biodiversity loss SDG 17: Strengthen means of implementation, revitalize global partnership for sustainable development
NBT 3: Strategies for reducing rate of degradation, fragmentation, loss of natural habitats finalised and put in place	ABT 5: Loss of natural habitats at least halved. Fragmentation and degradation significantly reduced. ABT 15: Ecosystem resilience and carbon stocks enhanced through conservation and restoration. At least 15 per cent degraded ecosystems restored, contributing to climate change mitigation and adaptation and to combat desertification.	SDG 6: Ensure availability, sustainable management of water and sanitation for all SDG 7: Ensure access to affordable, reliable, sustainable, modern energy for all SDG 9: SDG 10: Reduce inequality within and among countries SDG 11:

EN

		Make cities and human settlements inclusive, safe, resilient and sustainable SDG 13: Take urgent action to combat climate change and its impacts SDG 14: SDG 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
NBT 4: Invasive alien species (IAS) and their pathways identified and strategies developed to prioritize and manage IAS.	ABT 9: IAS and pathways are identified, prioritized controlled and eradicated. Manage pathways to prevent reintroductions and establishment.	SDG 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
NBT 5: Measures adopted for sustainable management of agriculture, forestry and fisheries	ABT 6: All fish, invertebrate stocks, aquatic plants managed, harvested legally applying ecosystem approach to recovery plans and measures in place for depleted species, fisheries have no significant adverse impact on threatened species and vulnerable ecosystems and are carried out within safe ecological limits. ABT 7: Areas under agriculture, aquaculture and forestry managed sustainably ensuring conservation. B ABT 8: Pollution including from green nutrients brought to levels not detrimental to ecosystem function and biodiversity. E	SDG 1: End poverty in all its forms everywhere SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture SDG 3: Ensure healthy lives and promote well-being for all at all ages SDG 6: SDG 7: SDG 8: SDG 9: SDG 11: SDG 12: SDG 14: SDG 15:
NBT 6: Ecologically representative terrestrial, inland water areas, coastal and marine zones especially of particular important for species, biodiversity and ecosystem services, are conserved effectively and equitably through PAs and OECMs and are integrated into wider landscapes and seascapes covering 20% geographic area	ABT 10: Multiple anthropogenic pressures on coral reefs and other vulnerable ecosystems impacted by climate change or ocean acidification minimized to maintain integrity and functioning. ABT 11: At least 17 per cent terrestrial and inland water, 10 percent of coastal and marine areas, especially of particular importance for biodiversity and ecosystem services, conserved through effectively and	SDG 6: SDG 11: SDG 14: SDG 15:

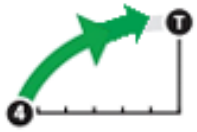
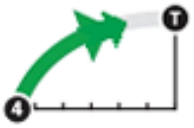
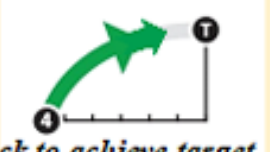
	equitably managed ecologically representative, well connected systems of PAs and OECMS and integrated into wider landscapes and seascapes. ABT 12: Extinction of known threatened species, particularly pf those most in decline prevented and conservation status improved and sustained.	
NBT 7: Genetic diversity of: cultivated plants, farm livestock, their wild relatives, socio economic and culturally valuable species maintained, strategies for minimizing genetic erosion and safeguarding genetic diversity developed.	ABT 13: Genetic diversity of: cultivated plants, farmed and domesticated animals, wild relatives, socio economic and culturally valuable species maintained. Strategies for minimizing genetic erosion and safeguarding genetic diversity developed and implemented.	SDG 2: SDG 3:
NBT 8: Ecosystem services especially those relating to water, human health, livelihoods and well-being enumerated, measures to safeguard them identified taking into account needs of women and local communities, the poor and the vulnerable.	ABT 14: Ecosystems providing essential services including services related to – water, that contribute to health, livelihoods and well-being – restored, safeguarded taking into account, needs of women, ILCs, the poor and the vulnerable.	SDG 3: SDG 5 SDG 6: SDG 7: SDG 8: SDG 9: SDG 11: SDG 13: SDG 14 SDG 15:
NBT 9: Implement ABS as per Nagoya Protocol consistent with national legislation	ABT 16: Nagoya Protocol is in force and operational, consistent with national legislation.	SDG 3: SDG 8: SDG 15:
NBT 10: As effective, participatory, updated national biodiversity action plan made operational at different levels of governance.	ABT 3: Incentives harmful to biodiversity eliminated to minimize/avoid negative impacts and positive incentives developed and applied in harmony with Convention and other international obligations taking into account national socio-economic conditions. ABT 4: Steps taken by government, business and all stakeholders to implement plans for sustainable production and consumption, keeping impacts of use of natural resources within safe ecological limits. ABT 17: An effective, participatory and updated national biodiversity strategy and action plan developed and adopted as a policy instrument by 2015.	SDG 2 SDG 8 SDG 9 SDG 11 SDG 12 SDG 14 SDG 15

National initiatives using traditional knowledge of communities for biodiversity strengthened to protect the TK in accordance with national legislations and international obligations.	ABT 18: Conservation and sustainable use relevant TK, innovation and practices of ILCs and the customary use of biological resources- respected, subject to national and international legislation are fully integrated and reflected in implementation of Convention with effective participation of ILCs at all relevant levels.	SDG 10 SDG 5 SDG 3 SDG 2
Opportunities to increase financial, human and technical resources for State Biodiversity Action Plans identified and adopted.	ABT 19: Knowledge, the science base and technologies relating to biodiversity values, status improved, widely shared transferred and applied. ABT 20: Financial resources for implementing Strategic Plan for Biodiversity mobilized and increased substantially from all sources according to Strategy for Resource Mobilization.	SDG 9 SDG 10 SDG 13 SDG 14 SDG 15 SDG 17

The actions and the progress listed under the NBTs and ABTs in the analysis under the relevant sections also indicate India’s contribution to the achievement of SDGs. NITI Ayog is responsible for coordinating action and achievements on 2030 Agenda of Sustainable Development with its 17 SDGs. MoEFCC contributes to reporting in relation to elements common with NBTs and ABTs.

Based on comprehensive evidence presented in NBTs, the progress against the elements of ABT is on track.

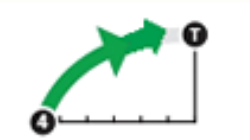
Assessment of the Progress towards India’s Aichi Biodiversity Targets (ABTs)

Target 1 - By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	 *On track to achieve target.*
Target 2 - By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriates, and reporting systems.	 *On track to achieve target*
Target 3 - By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.	 *On track to achieve target*
Target 4 - By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	 *On track to achieve target*
Target 5 - By 2020, the rate of loss of all-natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	 *On track to achieve target*
Target 6 - By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	 *On track to achieve target*

Target 7 - By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

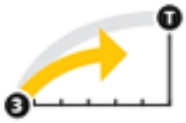
On track to achieve target

Target 8 - By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.



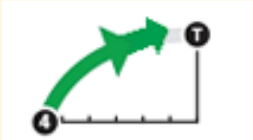
On track to achieve target

Target 9 - By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.



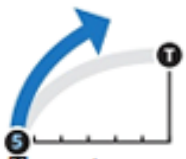
Progress made towards target

Target 10 - By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

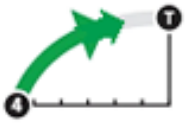


On track to achieve target

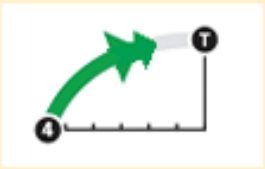
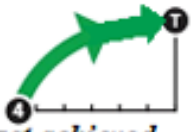
Target 11 - By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes. India adopted the target of achieving over 20% of geographical area under area-based conservation.

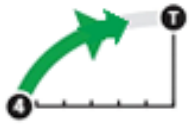
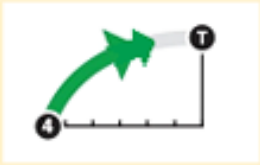
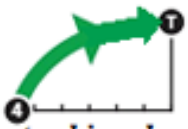


Area Target exceeded



Other parameters on track

Target 12 - By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	 *On track to achieve target*
Target 13 - By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	 *Target achieved*
Target 14 - By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	 *On track to achieve target*
Target 15 - By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	 *On track to achieve target*
Target 16 - By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	 *Target achieved*

Target 12 - By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	 *On track to achieve target*
Target 13 - By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	 *Target achieved*
Target 14 - By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	 *On track to achieve target*
Target 15 - By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	 *On track to achieve target*
Target 16 - By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	 *Target achieved*

India has national targets related to the GSPC Targets

Details on the specific targets

India has not adopted national targets under GSPC. Plant conservation work through various strategies has however been an integral part of India's natural resources conservation strategies EN

Information on any active networks for plant conservation

- A strong nationwide network of Botanic Gardens, Herbaria, Gene Banks and Conservation Areas has been established for plant conservation in India. These are maintained and managed by diverse organisations and identified hereafter.

Maintained by BSI

- BSI, established in 1890, with the objective to survey, research, inventorise and describe flora of India, and conserve endangered plant species took over management of India Botanic Garden, Kolkata (IBGK) in 1963. The IBGK houses 12,000 trees and shrubs belonging to 1,400 species held in cultivation in glass houses, green houses and germplasm collections. This was a pace setter in promoting interest in study of plants and conservation thereof in the country.
- Now 11 botanic gardens (BGs) are managed by BSI. These include BGs at its Regional Centres in different phyto-geographic regions of India. These BGs include medicinal plants section set up on the basis of indigenous/ traditional knowledge (TK) and practice. Five such main thematic garden sections include Charak Udyan (AJCBIBG), Ayur Vatika (BGIR), Manav Conservatory (CIMAP), Ayush Garden etc. See Table 1 for the details of these BGs.

Sl No.	Name	Location	Area (Ha)	No. of Holdings (Species/ individuals)	
1	Indian Botanic Garden	Howrah	212	1200 / 14000	
2	Botanic Garden of Indian Republic	Noida	80		
3	Experimental Botanic Garden Andaman Nicobar Circle	Dhanikheri	30	250 / 2000	
4	Experimental Botanic Garden Arunachal Field Station	Sankie View	48	195 / 2000	
5	Experimental Botanic Garden Arid Zone Circle	Jodhpur	4	185 / 1500	
6	Experimental Botanic Garden Central Circle	Allahabad	3	570 / 3000	
7	Experimental Botanic Garden Eastern Circle (Shillong)	Barapani	10.4	750 / 8000	
8	Experimental Botanic Garden Northern Circle	Pauri	14	750 / 9000	
9	Experimental Botanic Garden Northern Circle	Khirsu	8		
10	Experimental Botanic Garden Northern Circle	Dehradun	2	350 / 1000	
11	Experimental Botanic Garden Sikkim Himalayan Circle	Gangtok	1.5	200 / 800	
12	Experimental Botanic Garden Southern Circle	Yercaud	18.6	1200 / 20000	
13	Experimental Botanic Garden Western Circle	Mundhwa (Pune)	17.8	500 / 3000	

Source: Botanical Survey of India,

https://bsi.gov.in/Center/209_7_Botanic-Gardens-Under-The-Botanical-Survey-of-Indi.aspx

BGs maintained by other institutions/ organisations:

- Universities, R&D institutions and other educational institutions set up their own gardens for education and conservation.
- Nearly 350 BGs have been assisted by MoEFCC through its scheme "Assistance to Botanic Gardens" since 1992, provided funds to promote *ex situ* conservation and propagation of threatened and endemic plants in different phyto-geographic regions to strengthen the network of BGs and Centres of *ex situ* conservation. These are maintained by Department of Botany/ Life Sciences in Universities & Colleges, Research Institutions/ Organisations/ State Forest, Environment/Science and Technology, Agriculture, Horticulture, Social

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Forestry Departments, Local Self Governments, Municipal Corporations, Municipal Committees, Town Areas, NGOS/ Voluntary Organisation.

- Of these BGs, 18 have been designated as lead gardens**.** These exist in 11 phyto-geographic regions of the country. These are equipped with laboratory facilities and expertise to develop capacity, create awareness about plant diversity and facilitate rehabilitation of threatened plants. See Table 2 for details.

Table 2: Lead Botanic Gardens

S.no	Name of the lead garden	Location
1.	Botanic Garden, Dept. of Botany, Shivaji University, Kolhapur	North Western Ghats
2.	Van Vigyan Kendra (State Forest Research Institute), Chessa	Easter Himalaya
3.	Department of Forest Products, Dr Y.S Parmar University of Horticulture and Forests, Solan	Western Himalaya
4.	Centre of Biodiversity Studies, Baba Ghukam Shah Badshah University, Rajouri, Jammu & Kashmir	Western Himalaya
5.	G.B. Pant Institute of Himalayan Environment & Development, Kosi, Almora	Central Himalaya
6.	Central Arid Zone Research Institute, Jodhpur	Arid Zone
7.	Botanic Garden, National Botanical Research Institute, Lucknow	Gangetic Plain
8.	Jawharlal Nehru Tropical Botanic Garden and Research Institute, Thirvanathanpuram	South Western Ghats
9.	Rapinat Herbarium, St.Joseph College, Tiruchillapalli	Western Ghats
10.	Botanic Garden, University of Agroculture Science, GKVK , Bengaluru	Western Ghats
11.	Institute of Forest Prodcutivty , Ranchi	Chotanagpur Plateau
12	Malabar Botanic Garden, Kozikode	Southern Western Ghats
13.	Department of Boatany, Aligarh Muslim University	North India
14.	Calicut University, Kerala	South Western Ghats
15.	Sylvan Botanic Gardem, COGCEHR, FEEDS Hengbung , Manipur	North East India
16.	Department of Botany, Yogi Vemana Univeristy, Andhra Pradesh	South Western Ghats
17.	IHBT, Palampur	Western Himalayas
18.	Shivarama Karanth Pilicula Nisarga Dhama, Mangalore, Karnatka	South Western Ghats

Ten Largest BGs

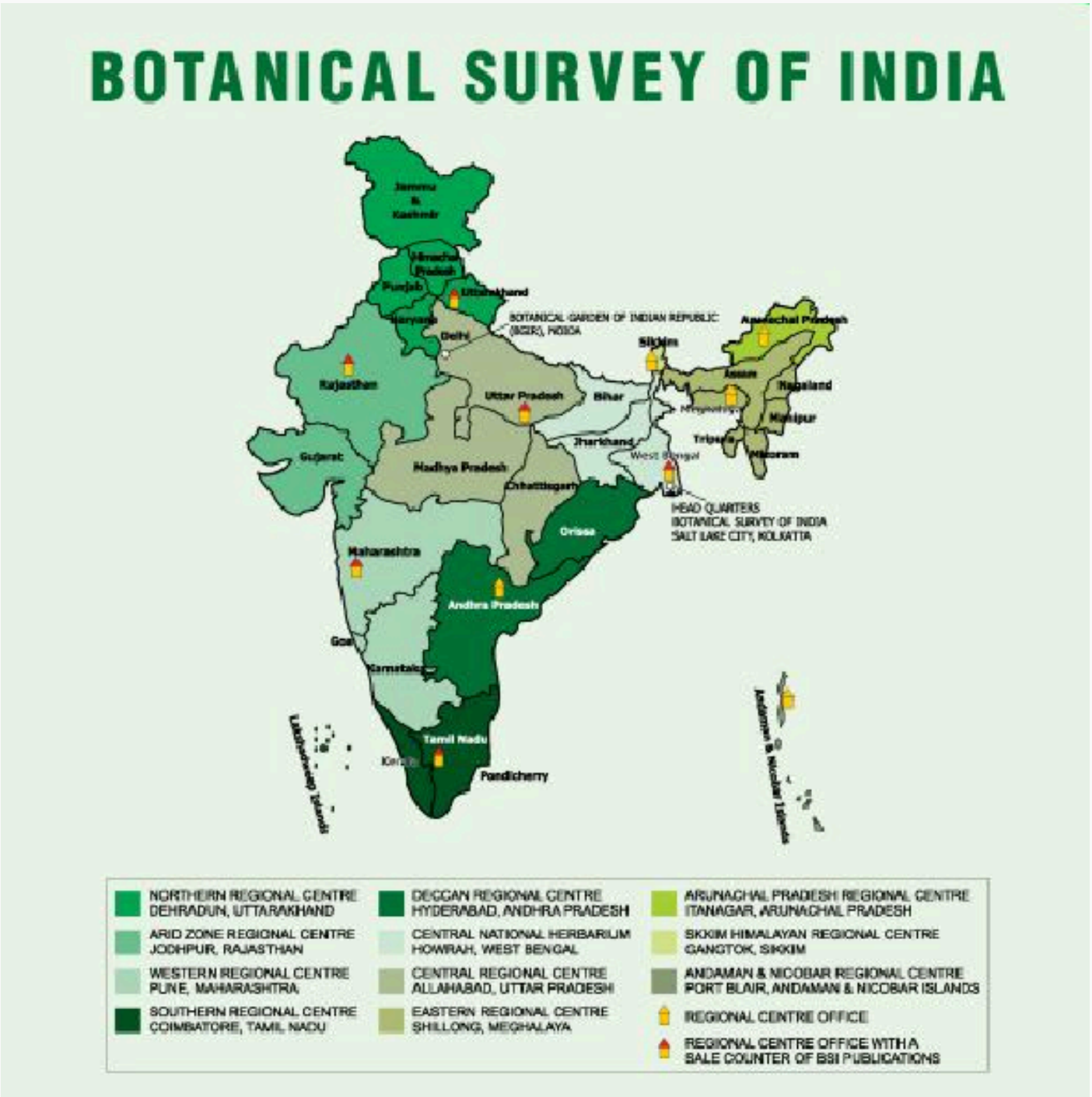
- More than 200,000 living plant accessions belonging to 15,000-16,000 plant species found are conserved in BGs. Ten largest botanic garden harbour more than 30,000 plants. See Table 3 for details.

Table 3: Ten Largest Botanic Gardens:

S.no	Name of the garden	Number of holdings
1.	AJC Bose Indian Botanic Garden, Howrah	14122
2.	Botanic Garden, National Botanic Garden Research Institute, Lucknow	5000
3.	Botanic Garden, Guru Nanak Devi University, Amritsar	4000
4.	Botanic Garden, Calicut University	4500
5.	Kerala Govt. Botanic Garden	4000

6.	Jawaharlal Nehru Tropical Botanic Garden and research Institue, Thiruvanthapuram	3219
7.	Botanic Garden, Kukbhasker Ashram Post Graduate College	2500
8.	State Forest Research Institute, Jabalpur	2200
9.	Botanic Garden, Sagar University, Sagar	2000
10.	Botanic Garden, Kerala University	1650

- 71 BGs are on BGCI database (BGCI –DATA)



Conservation of Medicinal Plants:

- 110 Medicinal Plant Conservation Areas (MPCAs) established across the country in seven biogeographical zones. For details refer to

Section II, NBT 11.

Conservation of Agriculturally important plants:

- National Bureau of Plant Genetic Resources (NBPGR) has a National Gene Bank with a capacity to house 600,000 seed samples for safe, long-term storage, in vitro conservation and cryopreservation. Refer to genebank.nbpgr.ernet.in and Section II, NBT 7, Trends in germplasm accessions in *ex situ* collections for detailed information)

Conservation Areas

· Wildlife and forest protected areas, community conserved areas and sacred groves conserve significant number of endemic and other important plants. Refer to Section II, NBT 6 for details. Complete survey and inventorization of these would yield valuable information on plants conserved therein. Orchid sanctuary at Sessa in Arunachal Pradesh and Rhododendron Sanctuary at Singba Kissim (*in situ* measures).

- Important taxa belonging to CWR is maintained in the National Herbarium of Crop Plants (NHCP) at ICAR-NBPGR (Indian Council of Agricultural Research- National Bureau of Plant Genetic Resources) (Refer to Section II, NBT 7 for details)
- National Fungal Culture Collection of India (NFCCI), Pune maintained by Agharkar Research Institute, is an exclusive repository holding 5,000 fungal strains belonging to 318 genera.

· Interventions are in place to expand protected areas to sites with high concentrations of threatened plants include delineating and safeguarding PAs, captive breeding of mammals (*ex situ* measure).

Major measures taken by your country for the implementation of the Global Strategy for Plant Conservation

In addition to details given in Section II, III and IV, following is noted:

- *Ex situ* conservation of special plant groups such as ornamental plants, orchids, timber yielding species, endemic plants being done by several agencies including through BSI and schemes of Ministry of AYUSH such as MPCAs and Medicinal Plant Conservation and Development Areas (MPCDAs).
- SBBs are empowered to notify threatened species under Sec 38 of The Biological Diversity Act, 2002 and regulate their collection from wild, take action for their rehabilitation and conservation.

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1. An online flora of all known plants

Explanation on category of progress towards the target of the Global Strategy for Plant Conservation at the national level

India’s contribution to global strategies for plant conservation is important and substantial.

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Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

· Taxonomic surveys have been regularly conducted since 1890 by BSI and Flora of India is published regularly.

· A national / regional flora that provides descriptions of the plant species found in the country available.

- Online portal - eFlora of India (efloraindia.gov.in) established

a) It is an open access online database of India’s plant diversity documents over 18,000 flowering plant species of India. Provides information by family, genus, species and scientific name, Produces real time and useful information for conservation management in specific regions.

b) Consists of more than 6,000 pages of printed treatment covering around 4,500 taxa belonging to 92 families. Taxonomic treatment of another 9,000 taxa has already been prepared.

- All State, District and Regional Flora are being digitized. More than 25,000 pages of rare books and 50,000 archival materials have been digitized.
- BSI is in the process of signing MoU with *World Flora Online Consortium* to share its database
- BSI hosted a side event on online flora at CoP 11 to advance this field of work.
- In addition to government actions, there are many online databases on flora being maintained by NGOs, academic institutions and civil society organisations.

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2. An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

a) A project to develop a National Red List of India Orchids has been started by BSI following latest IUCN guidelines and criteria. About 800 Himalayan species, 100 Western Ghats species and 22 *Diospyros* species taken up for evaluation in first phase.

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b) Book on endemic vascular plants detailing distribution of 4,381 endemic species of India is under publication.

c) Work on all endemic species is under progress.

d) Assessment of about 50 % of threatened species already done and 27% threatened endemic species are being taken up on priority basis for consumption.

1. Action for restoration of 156 threatened plant species through scientific niche modelling and developing propagation protocol initiated through DBT initiative, 'Preventing Extinction and Improving the Conservation Status of Threatened Plants through Application of Biotechnological Tools'
2. Action to notify, protect, conserve, and rehabilitate threatened species which are on the verge of extinction is taken in accordance with Section 38 of The Biological Diversity Act, 2002
3. Floral species are being conserved under Forest Conservation Act, 1980, Chapter IIIA and Schedule VI of Wildlife Protection Act, 1972 and Appendix I, II and III of CITES.
4. Inventorisation of Endangered Plant Species: Under MoEFCC sponsored project, revalidation of rare taxa listed in Red Data Book (1 – 5) has been taken up by BSI in order to revise their status as per the latest IUCN - 2001 categories.

· *How is data from conservation assessments being used to guide conservation actions? In reporting on progress towards this target, countries may wish to make use of information available from the IUCN Red List of Species (http://www.iucnredlist.org/), and from Botanic Gardens Conservation International's ThreatSearch (http://www.bgci.org/threat_search.php) and PlantSearch (http://www.bgci.org/plant_search.php) databases.*

1. DBT's project , 'Preventing Extinction and Improving the Conservation Status of Threatened Plants through Application of Biotechnological Tools', for restoration of 156 threatened plant species through scientific niche modelling and developing propagation protocol initiated.

3. Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

assessments and sustainable offtake guidelines available for plant species harvested commercially?

Survey identification and description of flora has been a continuous activity of BSI since 1890. As a result, the plant diversity of the country has been fairly well surveyed. Only some parts of North-East India and islands are yet to be surveyed by BSI.

· Survey of Protected Areas, National Parks, Biosphere Reserves has been started on priority by BSI since 2010.

· Agro-biodiversity and Crop Wild Relatives (CWR) are surveyed and identified by NBPGR though exploration. For details refer to (NBT 7, Section II).

· Central Council of Research in Ayurveda Science (CCRAS), Central Council of Research in Homeopathic Science (CCRHS), Central Council of Research in Unani Science (CCRUM) carry out medico-ethno botanical survey. (For details refer to NBT 11, Section II).

· Reports published by BSI, checklist of Indian Lichens, Algae of India, Gymnosperms of India, Macro fungi of India, Aphyllophorales of northwest Himalaya, Fern and fern allies of India under publication.

· Online flora of India also started by BSI.

- *Ex situ* propagation techniques and case studies on species reintroduction are available, http//www.currentsceince.ac.in/Volume/114/03.
- Case studies are available in Annual Reports of NBPGR, DBT and ICAR.
- *Are these records available for conservation assessment and land use planning?*

Records are available for conservation assessment and land use planning.

- *What proportion of the flora has been revised since 1970?*

Continuous explorations and taxonomic work undertaken by BSI and it has started the work of revision of Indian flora.

· Indian herbaria hold more than 4 million herbarium specimens belonging to more than 18,000 species. Digitization of all types of species of major herbaria is under progress.

· National Herbarium of Cultivated Plants under ICAR has digitised data of 500 taxa of CWR, which are available as herbarium specimen with digital images.

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4. At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

The conservation network covers all 10 biogeographic regions and 11 phyto-geographic regions.

- Refer to NBT 3, Section II on Assessment of the effectiveness of the implementation measure taken in achieving desired

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outcomes, Species restoration after forest and water body restoration.

- Refer to NBT 6, Section II on Assessment of the effectiveness of the implementation measures taken in achieving desired outcomes
- Refer to NBT 11, Section II on Measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets, Trends in conservation and sustainable use of medicinal plants used by India's medical heritage

5. At least 75 per cent of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

Conserved forests, PAs, CCAs and sacred groves are the most important areas for plant diversity. These well protected areas are effectively managed. For details refer to Section II, NBT 3 and NBT 6 and GSPC target 4. EN

6. At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

· Sustained and focussed action is taken for all production lands in accordance with national policies.

· For details, refer to Section II of NBT 5, 6 and Trends in conservation and sustainable use of medicinal plants used by India's medical heritage under NBT 11. EN

7. At least 75 per cent of known threatened plant species conserved in situ

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

a) Network of PAs established comprising 103 National Parks, 544 Wildlife Sanctuaries, 76 Conservation Reserves and 46 Community Reserves. For details refer to Section II, NBT 6.

b) Also refer to Section II of NBT 11.

c) NBT 6 promotes integration of PAs into wider landscapes and seascapes. For details refer to NBT 6. EN

8. At least 75 per cent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

- Action for restoration of 156 threatened plant species through scientific niche modelling and developing propagation protocol initiated through DBT initiative, 'Preventing extinction and improving the conservation status of threatened plants through application of biotechnological tools'
- Recovery work taking place in Western Ghats, Eastern Ghats, Eastern Himalaya, Western Himalaya and North-east India by BSI
- Many gardens of BSI are members of Ecological Restoration Alliance of Botanic Gardens. EN

9. 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

· India has a national strategy for conservation of crop wild relatives/medicinal plants. Refer to NBT 7 and 11 for details.

· Refer to NBT 7, Section II on Trends in Plant Genetic Diversity; NBT5, Section II, Sustainable Agriculture and NBT 11, Section II on Trends in conservation and sustainable use of medicinal plants used by India's medical heritage.

· One of the five Bureaus created under ICAR system for conservation of agriculturally important genetic diversity carry out national R&D and national programmes. For further details to NBT 7 on Implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets. EN

10. Effective management plans in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

- Destructive Insect and Pests Act, 1914 and the Insecticides Act, 1968 provide the legal framework for the regulatory function.
- Directorate of Plant Protection, Quarantine and Storage addresses entry, establishment and spread of exotic pests in India as per the provisions of The Destructive Insects & Pests Act, 1914.
- Plant Quarantine (Regulation of Import into India) Order, 2003 regulates import and prohibition of import of plants and plant products into India. Order has 15 clauses describing various aspects and conditions of import of agricultural articles (plants and plant products) into India, 16 forms and 12 Schedules for various plant quarantine regulatory functions.
- Sub Mission on Plant Protection and Plant Quarantine (SMPP) is aimed to minimize loss to quality and yield of agricultural crops from the ravage of insect pests, diseases, weeds, nematodes, rodents etc. and to shield our bio-security from the incursions and spread of alien species. One of the components of SMPP is Strengthening and Modernization of Plant Quarantine Facilities (SMPQF). (For details refer to NBT 5 on Section II on Sustainable Agriculture.

Strengthening and Modernization of Plant Quarantine Facilities (SMPQF)

- Objective of Plant Quarantine is primarily to prevent introduction of exotic pests, diseases and weeds which are likely to be introduced through import of agricultural commodities or plant material into India and similarly fulfil obligation of the International Plant Protection Convention (IPPC) carrying out phytosanitary certification to prevent introduction of pests, diseases and weeds in other countries through exports of such material.
- The Plant Quarantine (Regulation Import into India) Order, 2003 issued under provisions of Destructive Insect and Pest Act, 1914 (DIP Act) regulates imports. Post entry quarantine inspection is undertaken in case of propagating plant material. Phytosanitary Certificates (PSC) are issued for exports as per International Plant Protection Convention (IPPC), 1951 of the Food and Agricultural Organization (FAO). These functions are being discharged by 57 Plant Quarantine Stations (PQS) functioning under Directorate of Plant Protection Quarantine & Storage (DPPQ&S), Faridabad at various international airports, seaports and land customs stations across the country to facilitate international trade in agricultural products. To bolster the Plant Quarantine infrastructure, 16 New Plant Quarantine Stations have been proposed at the notified points of entry.
- During 2017-18, Pest Risk Analysis (PRA) of 50 agricultural commodities was carried out and technical information provided for export of 35 commodities to the 10 concerned National Plant Protection Organizations. About 78,915 Import Release Orders (IROs) were issued for seed and plant material and screening of 111 lakh Metric tons of imported agricultural commodities was undertaken. Phytosanitary inspection for export of 153 lakh Metric tons of plant and plant materials was conducted and 2,38,870 Phytosanitary Certificate (PSC) issued. Six hundred and four (604) Pest Control Agencies have been accredited for undertaking fumigation with methyl bromide as on 31.10.2017 including 27 new agencies and 453 agencies have been accredited for Forced Hot Air Treatment (FHAT) for wood and wood packing material including 35 new agencies.
- Four hundred and thirty nine (439) Pest Control Agencies have been accredited for undertaking fumigation with Aluminium Phosphide under NSPM-22 including 36 new agencies.
- The web- based Plant Quarantine Information System (PQIS) is now providing plant quarantine services relating to online issuance of Import Release Orders (IRO) and Phytosanitary Certificate (PSC) to the traders. PQIS is fully operational at 51 Plant Quarantine Stations (PQSs). The restructuring of remaining PQSs and integration of PQIS with customs is underway.
- Refer to NBT 4, Section II, Plant Quarantine Regulation, Number and Coverage of Management plans.

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11. No species of wild flora endangered by international trade

12. All wild harvested plant-based products sourced sustainably

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

a) For details, refer to Section II, NBT 5 on Sustainable Forestry and NBT 11 on Trends in Conservation and sustainable use by India's medical heritage.

b) National Medicinal Plant Board since 2000 and National AYUSH Mission since 2015-16 and State/UT governments and administration encourage *in situ* conservation and cultivation of plants to ease pressure on forests. Indian Council of Forestry Research and Education study has shown the share of medicinal plant raw materials from cultivation sources has increased from previously recorded 20% in 2004-05 to 40% in 2014-15.

c) Nearly 39% of wild-harvested commercially traded plants have resource assessments, management plans and sustainable offtake guidelines (information included based on BSI's reply to the format). Wildlife Protection Act, 1972 provides for protection of specified plants by prohibiting picking, uprooting, etc, and their cultivation of specified plants.

d) Biological Diversity Act, 2002 and Rules 2004 thereunder provide for sustainable use and conservation of biological diversity.

e) Under organic farming certification some of the products are sourced from forest areas. For further details, refer to Section II on Implementation measures taken, assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets, NBT 5.

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f) Various legislative and policy measures for ensuring sustainable harvest and use of plant species have been adopted. For details, refer to Section II on Implementation measures taken. assessment of their effectiveness, associated obstacles and scientific and technical needs to achieve national targets NBT 3 and NBT 5.

13. Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

- India has a well-conceived and effectively implemented system of recording, encouraging use of and promoting advancement of TK for conservation and sustainable use of resources and for promoting well-being and sustainable livelihoods of local communities dependent on these resources.
- BMCs help in documentation of PBRs that reflect the traditional knowledge of the local communities.
- For details, refer to Section II, NBT 11.
- The Protection of Plant Variety and Farmers Right Act, 2001 (PPVFR Act) establishes an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants. For details, refer the NBT 7 and NBT 5.

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14. The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

- CEPA includes this element. Refer to Section II under NBT 1 for details.
- Provides for the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants

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15. The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

I. For details, refer to Green Skill Development Programme (GSDP), case study on Village Botanists to Conserve, Grow and Sustainably Use Medicinal Plants: a case study under NBT1, and extension programmes under NBT 5.

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16. Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy

Please describe how and to what extent your country has contributed to the achievement of this GSPC Target and summarize the evidence used to support this description

- For details of active networks in the country, refer to GSPC Target 1.
- ICAR along with its four Deemed Universities, 64 Institutions, 15 National Research Centres, 6 national bureaus, 13 Directorates and Project Directorate located in various parts of the country works for finding solutions for known and emerging issues relating to sustainable agriculture, and plant conservation through R&D.
- Seven institutions deal with sustainable forestry. Refer to Sustainable Forestry under Section II of NBT 5 for details.
- Seven Council of Scientific and Industrial Research (CSIR) laboratories address this target.

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Section VI. Description of the national contribution to the achievement of the targets of indigenous peoples and local communities

Most of the information has been captured in NBTs. Some additional information about ILCs contribution is given in this section.

- **ABT 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably**
- Local and tribal communities enrich Communication, Education and Public Awareness (CEPA) by willingly sharing their knowledge and experience about the elements of biodiversity around them with students, experts and others vising their area under programmes like eco-clubs.

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- Traditional knowledge of tribal communities has been included in courses on ethnobotany and medicinal plants for Green Skill Development Programme (For details refer to Section II, NBT 1).
- To increase literacy rate among tribal students, residential schools called "*Ashram* Schools" have been established in tribal districts under Ministry of Tribal Affairs' Tribal Sub-Plan (TSP) scheme. The TSP scheme is a strategy for the rapid socio-economic development of tribal people.

ABT 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions

- Tribal and local communities and other economically disadvantaged groups are given free fuel gas connections as cooking medium to improve their health conditions and minimise pressures on fuel collections from forests. This along with several other measures relating to land and soil resources management, Integrated Pest Management (IPM), Integrated Nutrient Management (INM) increase their contribution to use of resources by them within safe ecological limits.

ABT 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits

- Role of local communities has been acknowledged as integral to success of sustainable eco-tourism. Criteria for assessing the best State under Eco-tourism Awards scheme takes into account the efforts of State Governments in educating the local communities about the significance of the nation's cultural heritage and environment.

ABT 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced

Contributions and involvement of local and tribal communities in the increase of forest cover and density through Joint Forest Management Committees (JFMCs), Forest Right Committees are significant. Recognizing the influence that forests and natural ecosystems have on environmental and livelihood security of tribal and forest dwellers specifically in the context of climate change, Tribal Development Framework has been prepared under Green India Mission (GIM) that ensures further inclusion of tribal groups in beneficiaries.

Co-management for rehabilitation of degraded forests through JFMCs and involvement of *Gram Sabhas* in management of forests under The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, management of biological resources through Biodiversity Management Committees (BMCs) at local level has helped establish principles of equity in conservation and sustainable use.

- Refer to Section II, NBT 1 and NBT 3

ABT 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

- Using their own experience of practical reality and knowledge gained through ongoing CEPA activities conducted by organisations like Central Marine Fisheries Research Institute (CMFRI), National Fisheries Development Board (NFDB) and research institutes, and CSOs like ATREE Foundation, PLANT, coastal and fisher communities voluntarily impose conditions that lead to sustainable resource use.

ABT 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity

- Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) for promoting organic farming in North East India is implemented essentially by local communities. Refer to Section II, NBT 5.
- Convergence schemes under MGNREGA have led to watershed management, water conservation, irrigation, traditional water bodies, afforestation, improvement of land productivity, development of fallow lands/ waste lands, promoting of livestock and fisheries which benefits tribal and local communities though giving them employment on works.
- The Tribal Cooperative Marketing Development Federation of India (TRIFED) under MoTA promotes sustainable harvesting of resources through capacity building and awareness programmes of tribal communities.

ABT 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and

functioning.

- Vulnerable local fisher communities have been actively involved in artificial coral reef projects for diverting pressures from natural coral reefs resources and ensuring their livelihoods. Refer to list of NGOs, NBT 1.
- Their contribution to agri-ecosystems through cultivation, restoration of traditional varieties and land races is important which is encouraged and recognised through Plant Genome Saviour Community Award and Plant Genome Saviour Farmer Reward. See Section II, NBT 5.

ABT 11: By 2020, at least 17 % of terrestrial and inland water, and 10 % of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

- As mentioned under ABT 5, contributions and involvement of local and tribal communities in the increase of forest cover and density through JFMCs, Forest Right Committees are significant. (Refer to Section II, NBT 3 and NBT 11).

ABT 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity

- Local genetic diversity has been conserved by local and tribal communities in the past and continues to be conserved with their active involvement and practices today. Government laws and programmes encourage and facilitate them through extension and other support services and provide incentives to restore the dwindling and lost diversity. See ABT 10.

ABT 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable

- Refer to NBT 3, 5, 6 and 8 for detailed information. Involvement and role of local/tribal communities and women is further strengthened by specifically designed projects to achieve this. For example, Jharkhand Tribal Empowerment and Livelihoods Project and Livelihoods Improvement Programme under World Bank Assisted Projects and International Fund for Agricultural Development (IFAD) aim at fostering community- based institutions, empower local people especially women to secure their entitlements along with sustainable NRM and sustainable livelihoods.
- Under MGNREGA, women from SC/ST and OBC category must constitute at least one third of the beneficiaries.
- The National Rural Drinking Water Programme (NRDWP) and the Swachh Bharat Mission have special funds earmarked for tribal populations. (For details, refer to Section II, NBT 8 and NBT 1)

ABT 15:

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 % of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification

- Local communities, including women through JFMCs and FRA communities are drivers of this entire programme. Fisheries management in coastal areas and in inland fisheries has a strong participation of local communities including women in ameliorating and maintaining the health of these eco-systems. See NBT 3 for details.

ABT 18:

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

- Traditional knowledge is a dynamic process and grows over time. PBRs document this knowledge at local level and also open a standing opportunity to add to the existing documentation. It is a participatory instrument which achieves the objectives of conservation and application of the knowledge for wider use giving due recognition to the creators of knowledge and ensuring fair and equitable share in benefits to them arising out of the use of their knowledge.
- The national AYUSH Mission supports cultivation of culturally important medicinal plants.

- Biennial India Biodiversity Awards recognise and reward biodiversity conservation efforts by stakeholders including the tribal communities. Categories under the awards include conservation of wild and domesticated species, sustainable use of biological resources, replicable mechanism for access and benefit sharing and best biodiversity management committees. The best practices of award-winning entries are captured in the publication “India Naturally”. One of these includes a case study on the successfully concluded ABS agreement for sale of Broom Grass (*Thysanolaena maxima*) by Raipassa BMC in a remote tribal village of North Eastern state of Assam. Refer to the case study “ABS Agreement by Raipassa BMC” under NBT 9.

ABT 19: Sharing information and knowledge

Cuts across all schemes of NBTs. ILCs contribute in sharing of information and knowledge through PBRs.

- Anthropological Survey of India (AnSI) pursues anthropological research to study tribes and other communities that form the population of India both from the biological and cultural point of view. Eight AnSI regional centres have been established to disseminate knowledge through permanent galleries and through thematic exhibitions, film shows, both in urban and rural areas of the country.(Source: https://ansi.gov.in/profile/)

ABT 20: Mobilizing resources from all sources.

- Funding of biodiversity related projects is especially sensitive to the needs of local communities.
- The Tribal Sub-Plan Scheme under the Ministry of Tribal Affairs requires that funds must be earmarked for the tribal development and welfare under all schemes of the Government in proportion to the %age of population of tribal people in states/UTs.

Section VII. Updated biodiversity country profile

Biodiversity facts : Status and trends of biodiversity, including benefits from biodiversity and ecosystem services and functions:

Biodiversity Profile - Update

With mere 2.4 per cent of the area of the world India hosts nearly 8 % of the globally known floral and faunal species. It is an acknowledged centre of crop diversity and crop wild relatives (CWRs). People of India, including its nearly 4635 ethnic communities spread all across the country have protected and maintained its rich cultural and spiritual heritage of living in harmony with nature over centuries. Livelihoods of millions of people depend on biodiversity and conservation of biodiversity is a national priority which the National Environment Policy (NEP), 2006 reflects.

1. Forests

India has sixteen forest (Champion and Seth’s 1968). Of these nearly 38.2 % constitute tropical dry deciduous forests and another 30.3 % are tropical moist deciduous forests. Forest Survey of India (FSI) prepares India State of Forest Report (ISFR) every two years based on nationwide survey of forests. Reserved/ designated forests are legally protected under the Indian Forest Act, 1927. The forest Conservation Act, 1980 makes diversion of such forests subject to stringent scrutiny, recovery of net present value (NPV) and compensatory afforestation on equal amount of area. India ranks 10th among the 12 mangrove-rich countries in the world with about 4921 km^2 geographical area under mangrove cover that constitutes over 2 % of the global total. ISFR (2017) shows net increase in very dense forest (VDF), mangroves, growing stock and in carbon stock as shown in table 1:

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Table 1- Increase in Forest area, VDF, Mangroves, carbon stock and growing stock.

FORESTS	2015	2017	INCREASE
Forest Area (in sq. km)	692,027	708,273	16,246

Very Dense Forest (in sq. km)	85, 904	98,158	12, 254
Magroves	4,740	4,921	181
Growing Stock (in million cum)	5768	5821.990	53.990
Carbon Stock (in million tonnes)	7044	7083	39

1.1 Trees Outside Forests

Trees outside Forests (TOF) are important for reaching the national goal of bringing 33 % of India's geographical area under tree cover. TOF in ISFR 2017 has been estimated to be 93,815 km^2 an increase of 1,243 km^2 over 2015.

2. Wetlands

The freshwater ecosystems cover nearly four per cent of India's geographical area. These hosts 9.46 % (9,456 species) of the total faunal diversity of India. Nearly 60 % of these wetlands fall in protected forests. Their area has increased by 2,647 km^2 during 2005-2015 (ISFR 2017). Conservation and other measures including biodiversity related works taken up under Mahatma Gandhi Rural Employment Guarantee Act (MNREGA) have helped achieve this.

Conservation of wetlands outside PAs has been strengthened through Wetland (Conservation and Management) Rules, 2017 which make states responsible for concerted action on wetlands. Many states have now constituted 'State Wetland Authority' for conservation and integrated management of wetlands. The state Government of Uttar Pradesh has notified all wetlands outside PAs exceeding 2.24 ha under the Rules, 2017. Similar initiatives are afoot in other states. National Plan for Conservation of Aquatic Ecosystem (NPCA) has covered 115 wetlands and 65 lakes under integrated management.

During 2015-17 management plans for seven Ramsar sites got updated to integrated management plans.

3. Coastal and Marine Ecosystems

India's coastal and marine habitats encompass 7517 km long coastline, 2.02 km^2 exclusive economic zone, island ecosystems, and a wide continental shelf. These ecosystems host nearly 20,444 faunal species communities. Of these1180 species have been listed under different categories of threat for immediate conservation measures.

4. Agrobiodiversity and Agroecosystems

India has fifteen different agroclimatic zones. Different farming practices have evolved over centuries in different regions suited to their local climatic, edaphic and landscape features. India is the centre of origin of rice. It is fourth globally in coarse warm-weather annual cereal production of short duration crops such as sorghum, pearl millet, maize, and finger millet in rain-fed agroclimatic regions. It is the first in the world in the production of millets.

5. Conserving Genetic Diversity

Six national bureaux, namely, National Bureau of Animal Genetic Resources (NBAGR), National Bureau of Plant Genetic Resources (NBPGR), National Bureau of Fish Genetic Resources (NBFGR), National Bureau of Agriculturally Important Microbes (NBAIIM) and National Bureau of Agricultural Insect Resources (NBAIR) and National Bureau of Soil Survey and Land use Planning (NBSS & LUP) implement and coordinate

explorations, identifications and conservation of genetic resources.

Nearly, 437, 000 accessions of plant germplasm of major crops were registered and preserved in the National Gene Bank during 2014 to 2018. Table 2 shows the current status of crop diversity and their identified crop wild relatives (CWRs) by NBPGR.

Table 2. : Crop-group-wise diversity and CWRs

S.No.	Crop-group (crops**)	No. of CWR species*	Taxa
1.	Cereals and millets (13)	72 (2)	83
2.	Pseudocereals (3)	13 (1)	13
3.	Grain legumes (10)	49 (4)	57
4.	Oilseeds (4)	9 (1)	10
5.	Fibres (5)	18 (3)	20
6.	Forages (16)	58 (14)	63
7.	Fruits and nuts (36)	127 (12)	144
8.	Vegetables (25)	76 (11)	87
9.	Spices and condiments (12)	50 (7)	54
10.	Ornamentals (13)	141 (61)	152
11.	Medicinal & aromatic plants (20)	70 (19)	81
12.	Plantation crops (3)	12	14
13.	Others (8)	35 (7)	39
	Crops: 168	**730 (142)**	**817**

*Figures in parenthesis are crop species with wild/weedy form(s) or populations occurring in India, included for counting as CWR; **One crop may involve more than one species

Established institutionalized mechanisms safeguard crop diversity, CWRs, land races and traditional varieties. The Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA) constituted under the Protection of Plant Varieties and Farmers' Rights Act, 2001 has identified 22 agrobiodiversity hotspots in India. Farmers and farmer communities contributing to conservation of plant genetic resources (PGR) landraces and wild relatives of economic plants in these hotspots receive recognition through awards instituted in 2010, Plant Genome Saviour Community Awards numbering 25 and Plant Genome Saviour Farmer Reward numbering 33 have already been given. See details at http://www.plantauthority.gov.in/annualrpt.html. The material of the awarded cases is selected, preserved and used as gene donors in varieties registerable under the Act, 2001.

6.Indigenous breeds of Animals

NBAGR has registered 169 indigenous breeds of livestock and poultry till mid 2018, represented in the table 3.

Table 3: Breed wise domesticated animals under indigenous varieties (2018).

Indigenous Domesticated Breed	Pure	Graded	Total	Breeds' number
Cattle	1,78,48,967	2,00,70,265	15,11,72,295	37
Buffaloes	1,85,33,185	4,30,23,385	10,87,02,122	13
Sheep	2,37,82,848	1,23,29,396	6,12,88,098	38
Goat	3,64,56,323	1,59,06,160	13,51,73,093	23
Pig			78,37,306	2
Horses & Ponies			6,24,732	6
Camels			4,00,274	6

National Animal Gene Bank has conserved 1,29,174 deep frozen semen doses of 311 breeding males (Bulls/ Rams/Bucks/Stallions) from 44 breeds representing Cattle, Buffalo, Sheep, Goat, Camel, Yak and Equine.

7. Medicinal and Aromatic Plants

Nearly, 8000 medicinal plants are used for health and other purposes. Sourcing of medicinal plants from the wild has steadily come down in response to *in situ* conservation and *ex situ* cultivation strategies progressively since 1980s. Nearly 110 Medicinal Plant Conservation Areas (MPCAs) inside protected forests secure *in situ* conservation in natural habitats. *Ex situ* cultivation and conservation outside forests meets nearly 40 % of the medicinal plants' demand on volume basis.

8. Hotspots

Four out of 35 biodiversity hotspots of the world are represented in India viz. (i) the Western Ghats as part of the Western Ghats-Sri Lanka global hotspot, (ii) the Nicobar Islands as part of the Sundarland hotspot, (iii) parts of Assam and Meghalaya in the North-eastern region as part of Indo-Burma hotspot, and (iv) the Eastern Himalaya comprising North-eastern Himalayas of India, Bhutan and Nepal. Initiatives by government and non-government sectors have been taken for maintaining the integrity of the ecosystems of these. The Economics of Ecosystems and Biodiversity India Initiative (TEEB-TII) has involved local communities in enumeration of ecosystem services in valuation studies in the Western Ghats. The National Mission for Sustaining the Himalayan Ecosystems has under taken studies and initiatives for conservation, rehabilitation and sustainable use of biodiversity in Himalayan hotspot. Local solutions for conservation and sustainable use based on traditional knowledge are encouraged in hotspots areas.

9. Species Diversity

Discovery of new species by BSI and ZSI has increased India's floral and faunal species to 48655 and 100693 respectively - an increase of 3655 in floral and 1693 in faunal species from the previous figures. They constitute 11.2 % of floral and 6.7 % of the known faunal species of the world. Nearly 28.2 % of the floral species and 28.7 % of the faunal species of these are endemic to India.

10. Protection of Habitats and species - Protected Areas (PAs), Biodiversity Heritage Sites, Ecologically sensitive zones (ESZ)

The number and area of PAs under the Wildlife Protection Act, 1972 has increased from 690 PAs covering 16,685 km^2 in 2014 to 770 PAs covering 1,62,098.57 km^2 in 2017. These include 25 marine protected areas covering 6200 km^2 in peninsular India and 106 Important Coastal and Marine Areas (ICMBAs) covering 1,569.63 km^2 in the islands.

Wildlife Institute of India (WII) has identified 106 more sites for prioritized conservation as Important Coastal and Marine Areas (ICMBAs). Of these 22 ICMBAs are listed for immediate conservation as Conservation or Communities Reserve with the participation of the local communities in governance. Twelve Biodiversity Heritage sites covering 941.44 km^2 have been notified under the Biodiversity Act, 2002. Ecologically sensitive zones (ESZ) comprising of 30349.63 km^2 have been notified around 283 PAs. These provide them protection as buffer zones.

11. IUCN Red Listed threatened species in India

Number of species in India with extinction risk assessment published on The IUCN Red List (Version 2016-2) is 7020 of which total known threatened species in 1065. Taxonomic group wise picture is depicted in figures.

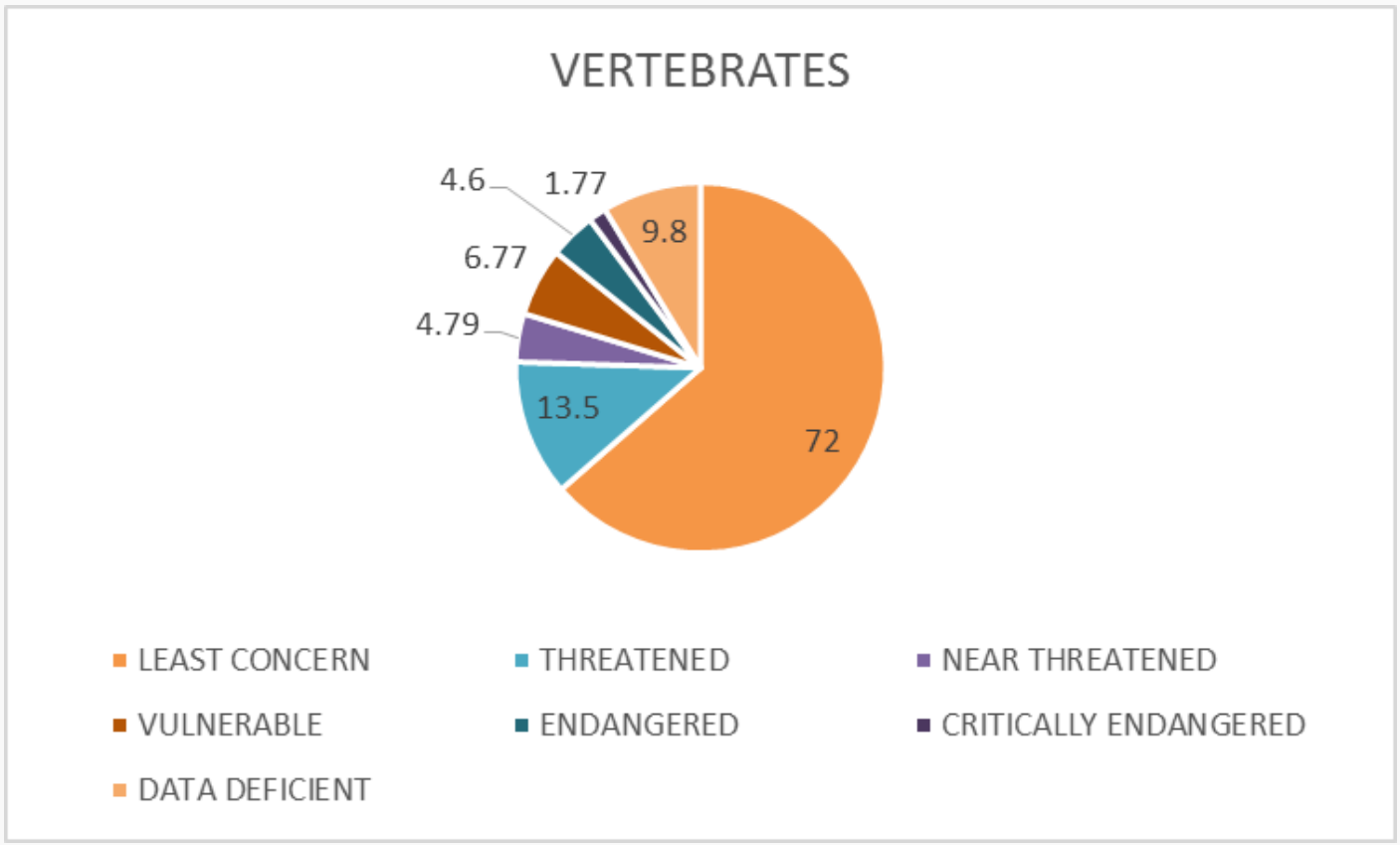


Figure 1

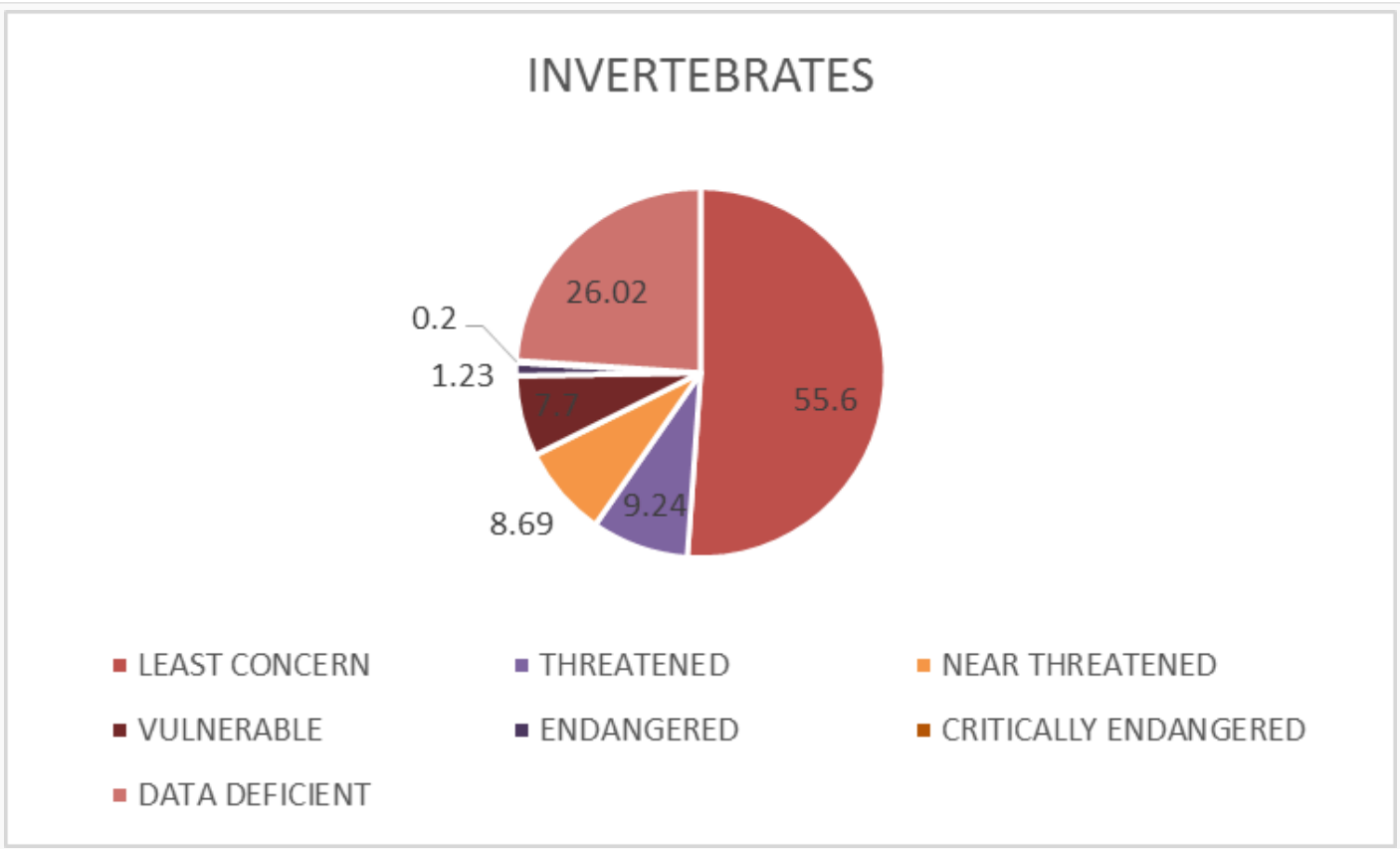

INVERTEBRATES
26.02
0.2
1.23
7.7
55.6
8.69
9.24
LEAST CONCERN
THREATENED
NEAR THREATENED
VULNERABLE
ENDANGERED
CRITICALLY ENDANGERED
DATA DEFICIENT

Figure 2

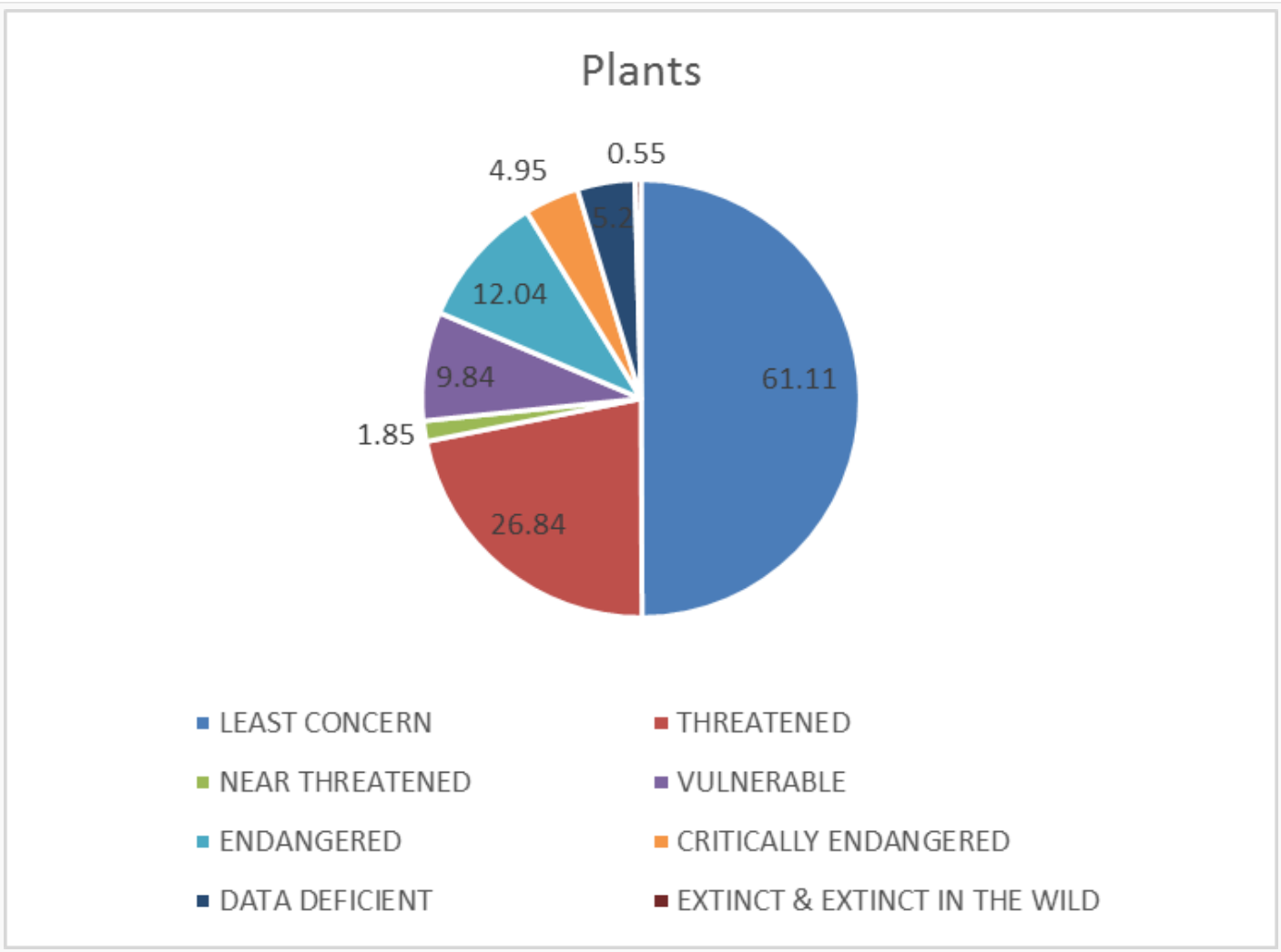


Figure 3

12.Species Restoration through protection strategies

Species facing threats are protected through diverse strategies including restrictions on trade exhibition strategies. The figure 4 shows major faunal species restored/rehabilitated.

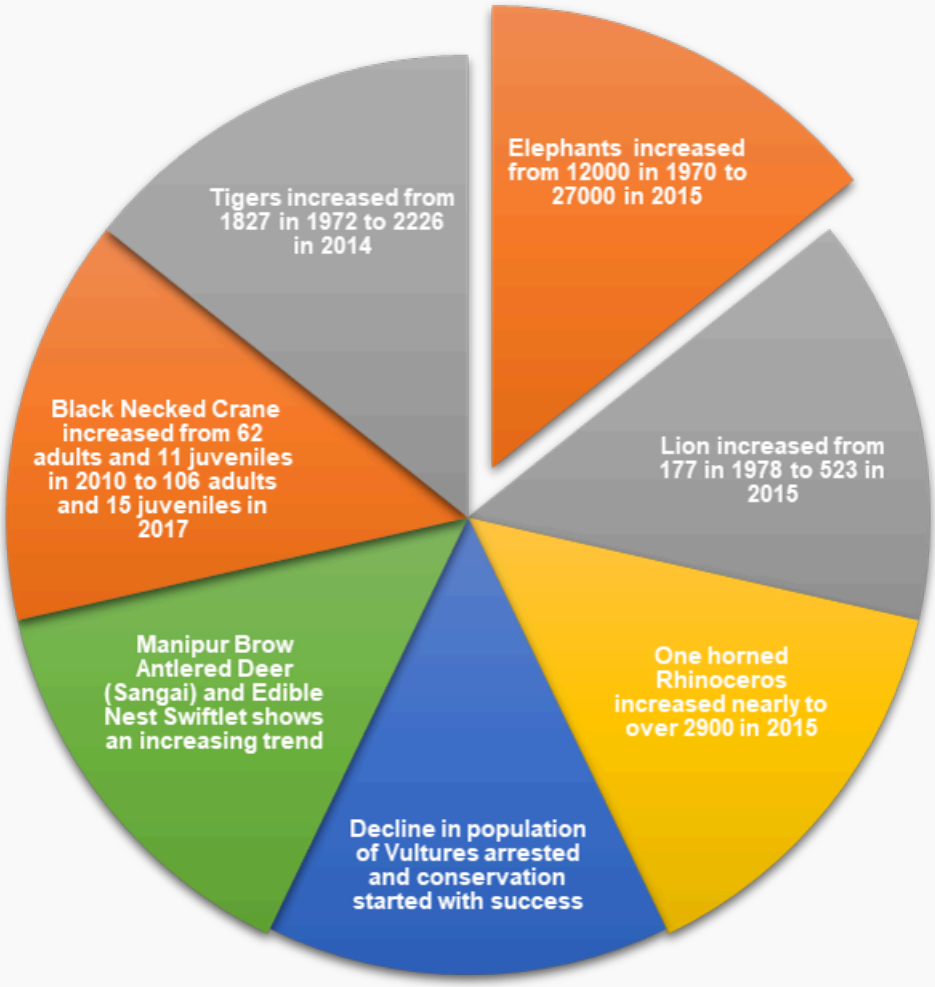
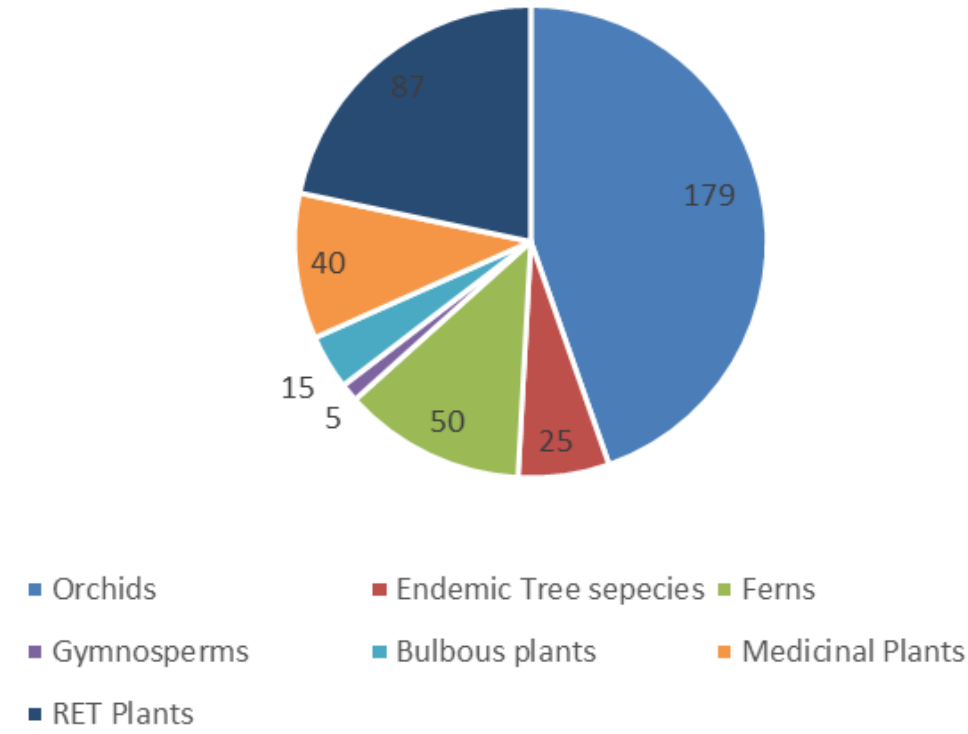


Figure 4- Major Faunal Species Restored

Restoration of 156 threatened plant species through scientific ecological niche modelling has been done under a pan India project sponsored by department of biotechnology. The figure 5 shows major floral species conserved.

Figure - 5 Plants Conserved by BSI and other concerned organisation



13. Main pressures and drivers of change in biodiversity

India has registered a drop in fertility rate from 2.6 in 2004 to 2.3 in 2014. It will, however, be sometime before the population of India stabilizes. Balancing the development and livelihoods needs of the growing population and enhancing conservation of biodiversity is a serious challenge. Historically fragmentation and change in habitat use, over exploitation and technological change to meet the development needs have been the major drivers of change in biodiversity status. Climate change, invasive alien species and pollution have also emerged as the major threats now. Coherent policy, legislative and administrative measures have been developed for biodiversity conservation. Implementation at times proves a challenge because of multi-disciplinary nature of biodiversity and pressure of development needs.

Effective and sustained measures are being taken for adaptation to and mitigation of adverse climate change effects through eight national missions (refer to NBT 3).

Enforcement of Forest Conservation Act 1980, Notifications under Environment Protection Act, 1986 such as notifications for regulation of activities in coastal zone areas, encouragement to organic agriculture, soil health based application of inputs in agriculture, diversion of demands from forests and natural habitats to alternative sources have made a positive difference to biodiversity conservation. Constant review and re-alignment of strategies to meet the emerging requirements is a continuous exercise.

14. Measures to Enhance Implementation of the Convention

Biological Diversity Act 2002, Biodiversity Rules 2004, Guidelines 2014 and the National Biodiversity Action Plans in conjunction with the pre-existing measures such as Wildlife (Protection) Act, 1972, The Forest Conservation Act, 1980, Amended Wetland (Conservation and Management) Rules, 2017 create infrastructure and measures for the implementation of the Convention. Mainstreaming of biodiversity in

all sectors of governance and development is being increasingly ensured in compliance with NEP 2006. Biodiversity attributable expenditure increased by 82.4 % in 2016-2017 compared to 2012-13 giving impetus to NBSAP implementations. Programmes and policies provide for participation of stakeholders, particularly, local and traditional communities, women in biodiversity related strategies and actions. Rehabilitation of rural poor, and tribal communities displaced due to conservation needs of species and habitats, discouragement to monocultures, encouragement to agroforestry, rehabilitation of mined-out and degraded areas, efforts for creation of corridors and connectivity between PAs contribute to the enhancement of the implementation of the Convention and to moving towards seascape/landscape approach to conservation.

Main pressures on and drivers of change to biodiversity (direct and indirect)

The main threats to biodiversity include: habitat fragmentation, degradation and loss; over-exploitation of resources; shrinking genetic diversity; invasive alien species; declining forest resource base; climate change and desertification; impact of development projects; impact of pollution. In the backdrop of the varying socio-cultural milieu and often conflicting demands of various stakeholders, there is an urgent need for augmenting and accelerating the efforts for conservation and sustainable use of biodiversity, and for the fair and equitable sharing of benefits arising from the utilisation of genetic resources.	EN

Implementation of the NBSAP

Pursuant to the CBD, a first major step was the development of the National Policy and Macrolevel Action Strategy (1999) that called for consolidating existing biodiversity conservation programmes and initiating new steps in conformity with the spirit of the Convention. This was followed by implementation of a UNDP/GEF-sponsored NBSAP Project (2000-2004) that yielded micro-level action plans adequately integrating crosscutting issues and livelihood security concerns. Some of the major programmes that contribute to its implementation include: Protected Areas (PA) network and its steady growth over the years, consolidation of Biosphere Reserves (BRs) (15), establishment of more species-specific reserves, growth in designated Ramsar sites, augmentation of ex situ efforts through the establishment of the network of Lead Gardens and initiatives in the conservation of genetic resources, etc. Subsequent to the approval of the National Environment Policy (NEP) in 2006, preparation of the National Biodiversity Action Plan was taken up by revising the 1999 document in consonance with the NEP, using the NBSAP project report as one of the inputs. The National Biodiversity Action Plan (2008) defines targets, activities and associated agencies for achieving the goals, drawing upon the main principle in the NEP that human beings are at the centre of concerns of sustainable development and they are entitled to a healthy and productive life in harmony with nature. Work is currently in progress to develop national targets within the framework of the Strategic Plan for Biodiversity (2011-2020). Following the ratification of CBD and after widespread consultations, India also enacted the Biological Diversity Act in 2002 and notified the Rules in 2004, to give effect to the provisions of the CBD, including those relating to its third objective on Access and Benefit Sharing (ABS). India was one of the first few countries to enact such legislation. The Act is to be implemented through a three-tiered institutional structure: National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), Biodiversity Management Committees (BMCs) at the local level, in line with the provisions for decentralized governance contained in the Constitution. The Biological Diversity Act is a path-breaking and progressive legislation which has the potential to positively impact biodiversity conservation in the country.	EN

Overall actions taken to contribute to the implementation of the Strategic Plan for Biodiversity 2011-2020

The protected area network in India has been used as a tool to manage natural resources for biodiversity conservation and for the well-being of resource-dependent populations. So far, India has established a network of 679 Protected Areas (PAs), extending over 1,62,365.49 km2 (4.9% of the total geographic area) and comprising 102 National Parks, 517 Wildlife Sanctuaries, four Community Reserves and 56 Conservation Reserves. These wildlife protected areas also include 39 Tiger Reserves and 28 Elephant Reserves, along with 6 World Heritage Sites within UNESCO's framework. Scientific monitoring and traditional observations confirm that depleted natural resources are being restored and/or pristine ecological conditions have been sustained in well-managed PAs. So far, 115 wetlands have been identified under the National Wetland Conservation Program and 25 wetlands are already classified as Ramsar sites. Particular attention is also drawn to forest protection, with numbers of programs, projects and vast regulation aimed at reforestation (the National Forest Policy aims to maintain a minimum of 33% of the country's geographical area under forest and tree cover), conservation and sustainable development, eco-development of degraded forests, development of community conservation reserves outside PAs, economic valuation of ecosystem services and climate change, and finally inculcating awareness and imparting training to a range of stakeholders, including school students, ex-servicemen, farmers, Panchayati Raj Institutions (PRIs), extension workers, community groups, etc. In parallel, recovery programs have been initiated for critically endangered species, and reintroduction of threatened species into their natural habitats has been carried out for crucial species, such as pitcher plants, rhinoceros and mangroves. As a result of improved conservation effectiveness, some positive trends have already been reported for several species. Tiger and elephant populations have been increasing in recent years, and the Indian rhino's endangerment level has been modified from endangered to vulnerable. In terms of ex situ conservation, several national gene banks were created for plants, animals, insects, fish and agriculturally-important micro-organisms (which notably hold 366,933 unique accessions of plant genetic resources and 2,517 microorganisms). Moreover, India, being a CITES Party, actively prohibits the international trade of endangered wild species and several measures are in place to control threats from invasive alien species (e.g. certificates for exports, permits for imports, etc.). Towards achieving Aichi Biodiversity Targets 11 and 14, 106 coastal and marine sites have been identified and prioritized as Important Coastal and Marine Areas (ICMBA). Along India's west coast, 62 ICMBAs have been identified, and an additional 44 ICMBAs identified along the east coast. These sites have also been proposed as Conservation or Communities Reserves with the participation of local communities. Efforts are currently underway to secure and strengthen community participation in the management of the marine protected area network in India. India has six natural World Heritage Sites having 'Outstanding Universal Values' (e.g. Kaziranga National Park, Manas National Park, Keoladeo National Park, Nandadevi National Park (including Valley of Flowers), Sundarbans National Park and Western Ghats serial site). More natural sites of India are tentatively listed for assessment and evaluation in regard to consideration of	EN

their inscription as World Heritage Sites. Further, India has identified 12 Transboundary Protected Areas through bilateral and/or multilateral cooperation that has been initiated with neighbouring nations. India's contribution to crop biodiversity has been impressive with repositories of over 50,000 varieties of rice, 5,000 of sorghum, 1,000 varieties of mango, etc. The National Genebank, primarily responsible for ex situ conservation of unique germplasm on a long-term basis, holds nearly 400,000 unique accessions of plant genetic resources. India's National Gene Bank is considered among the most dynamic and prominent systems in the world.	

Support mechanisms for national implementation (legislation, funding, capacity-building, coordination, mainstreaming, etc.)

The conservation and sustainable use of biodiversity, based on local knowledge systems and practices, are engrained in Indian ethos and enshrined in the Constitution of India (Article 48A and Article 51(g)). Key laws, strategies and policies related to biodiversity include the Biodiversity Act (2002), National Wildlife Action Plan (2002-2016), National Environmental Policy (2006), NBAP (2008) and NAP for Climate Change (2008). In addition, India has recently strengthened implementation mechanisms in policy, legislative and administrative measures for biodiversity conservation and management. In this context, major positive initiatives include: (i) Biological Diversity Act and Rules; (ii) Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights Act, 2006); (iii) Wildlife Crime Control Bureau; (iv) Green India Mission; (v) Mahatma Gandhi National Rural Employment Guarantee Act; (vii) setting up the National Fisheries Development Board (2006). Biodiversity has been mainstreamed in the agricultural sector (e.g. National Policy for Farmers (2007); Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act; International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Ministry of Agriculture), in forestry policies (e.g. Forest Rights Act), in planning and development (e.g. EIA Notification 2006), in tourism (e.g. National Wildlife Action Plan (NWAP)), and in the fishery sector (e.g. National River Conservation Programme, National Lake Conservation Plan, National Wetland Conservation Programme). Preparation of an easily navigable database of codified traditional knowledge on Indian systems of medicine (Ayurveda, Sidha and Unani), in the form of a Traditional Knowledge Digital Library (TKDL), has been a pioneering initiative of India so as to prevent misappropriation of India's traditional knowledge at international patent offices. Non-disclosure agreements on TKDL have been entered into with the patent offices of the USA, EU and some EU countries. Following this, citation of TKDL references as prior art has led to setting aside of decisions to grant patents, or cancellation of intent to grant patents, or withdrawing of patent applications in over 50 cases in European patent offices in recent years. India has made remarkable progress regarding capacity-building in several areas such as: (i) forest-based enterprises; (ii) development of Self Help Groups for synergy of Joint Forest Management with other schemes of the Government; and (iii) CEPA. The involvement of diverse stakeholders is enhanced through partnerships with NGOs, community groups, government, entrepreneurs and industry while regional and international cooperation for conservation and management of biodiversity is promoted through various extant and evolving bilateral agreements and MEAs. India hosted COP-11 in Hyderabad from 1-19 October 2012. As the first Champion under the Hyderabad Call for Biodiversity Champions launched during CoP-11, India has earmarked a sum of USD $50 million during India's Presidency of COP to strengthen institutional mechanisms, enhance the technical and human capabilities for biodiversity conservation in India, and to promote similar capacity-building in other developing countries.	EN

Mechanisms for monitoring and reviewing implementation

Various monitoring programs have been put in place in several ecosystems as well as for particular species (e.g. monitoring of the Illegal Killing of Elephants (MIKE); participatory natural resource monitoring in selected villages in Uttara Kannada district; monitoring of climate change and forests; monitoring of genetic variation using techniques such as DNA fingerprinting under LaCONES; pollution monitoring and control; monitoring for Success in World Natural Heritage Sites under the UNESCO-IUCN project 'Enhancing Our Heritage: the management effectiveness evaluation of Keoladev National Park, Rajasthan and Kaziranga National Park'; and water quality monitoring stations which have been further upscaled to over 158 in 10 rivers). Finally, a crucial task is completed by the monitoring committee of the National Wildlife Action Plan (NWAP) which periodically assesses the status of the establishment and management of Indian PAs. India has advanced a forests mapping programme. The Forest Survey of India undertakes a biennial assessment of forest and tree cover.	EN