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INNOVATIVE FINANCIAL MECHANISMS TO ACHIEVE ADDITIONAL 2.5–3.0 BILLION TONNE OF CO_2E THROUGH ADDITIONAL FOREST AND TREE COVER IN INDIA BY 2030



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ABBREVIATIONS

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BAU	Business-as-usual
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CER	Certified emissions reduction
CO_2e	Carbon dioxide equivalent
CSR	Corporate Social Responsibility
EXIM Policy	Export–Import Policy
GDP	Gross domestic product
GHG	Greenhouse gas
HH	Household
IBRD	International Bank for Reconstruction and Development
IFC	International Finance Corporation
IP	Industrial processes
IREDA	Indian Renewable Energy Development Agency Limited
IRFC	Indian Railway Finance Corporation
IWMP	Integrated Watershed Management Programme
LPG	Liquefied petroleum gas
LUCF	Land-use change and forestry
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoEFCC	Ministry of Environment, Forest and Climate Change
MSP	Minimum support price
NDCs	Nationally Determined Contributions
NFAP	National Forestry Action Programme
NTFPs	Non-timber forest products
PES	Payment for ecosystem services
PFC	Power Finance Corporation
PMUY	Pradhan Mantri Ujjwala Yojana
REDD+	Reducing emissions from deforestation and forest degradation
SDGs	Sustainable Development Goals
SERB	Science and Engineering Research Board
UNFCCC	United Nations Framework Convention on Climate Change
UT	Union territory
VER	Voluntary emissions reduction
WBI	Wood-based industry

KEY FINDINGS

- In India, 350 million people derive their full or partial livelihood and sustenance needs from forests.
- A substantial financial allocation to the tune of around ₹60,000 crore per annum will be required for sustainable forest management.
- A financial gap of ₹48,744 crore needs to be filled to achieve Nationally Determined Contributions' (NDCs) target of achieving additional 2.5–3.0 billion tonne of carbon dioxide equivalent (CO_2e) through additional forest and tree cover by 2030.
- There is an urgent need of recalibration of national financial requirement by establishing an innovative financial mechanism for achieving the aforementioned target.
- Carbon finance approximately worth ₹65,025 crore per annum can be obtained against sequestered CO_2 by deploying 50% subsidy on liquefied petroleum gas cylinders to further reduce the fuelwood demand by forest-depended communities.
- The need to develop Minimum Support Price Scheme for agroforestry produce has been highlighted to accrue financial gain worth ₹12,748 crore against sequestered CO_2 through plantations in 25 million hectares potential agroforestry land area. This can help double the current income by providing compensation for carbon sequestration in the form of carbon finance as motivational source of income.
- Indigenously grown timber reduces fiscal pressure (currently economic burden of over ₹38,000 crore per annum) and avoids import of wood and wood products.
- The need to formulate national-level carbon neutrality policy for greenhouse gas emission (beyond permissible limit) has been highlighted as the need of the hour.
- Creation of national market for carbon trading will be required to achieve the target of sequestering additional 2.5–3.0 billion tonne of CO_2e.
- It has been envisaged that combining all the innovative financial mechanisms, a total revenue of ₹74,736 crore can be generated annually.
- Additional gains from various other mechanisms favouring the NDC targets are highlighted including payment for environmental services, green bonds, corporate social responsibility, and objectives of Compensatory Afforestation Fund Management and Planning Authority.
- In the 14th Finance Commission (2015–20), no funds were transferred to the states. However, 15th Finance Commission (2020–25) has recommended for allocation of funds to the forestry sector: 7.5% for forest cover and 10% for forest and ecology. States need to earmark grant for the purpose of forest development.

INNOVATIVE FINANCIAL MECHANISMS TO ACHIEVE ADDITIONAL 2.5–3.0 BILLION TONNE OF CO_2E THROUGH ADDITIONAL FOREST AND TREE COVER IN INDIA BY 2030

Overview

In India, forests are primarily considered as social and environmental resources from which more than 350 million people derive their full or partial livelihood and sustenance needs.[1]

Major drivers for forest degradation are unsustainable harvest of fuelwood and minor forest produce. Forests are home to 80% of the country's biodiversity (FAO 2010), provides 40% of energy needs, 30% of fodder supply, and 50% of grazing requirement along with other non-timber forest products (NTFPs). The sector provides livelihood support to one-fourth of the population living in 173,000 forest-fringe villages. It immensely contributes in meeting the targets outlined under the Sustainable Development Goals (SDGs).

India's mandate of high economic growth, Make in India, House for All, Electricity for All, and 1.5 billion population by 2030 will also impact the quality of the forests. In view of this, it is evident that the anthropogenic pressure endured by nation's forest is enormous. With the rapidly growing population, this pressure is set to rise in future. This will seriously affect the quality of forests and their sequestration potential. In this context, to develop additional carbon sequestration sink of 2.5–3.0 billion tonne of carbon dioxide equivalent (CO_2e) through forestry sector is an exceedingly difficult and ambitious task that requires immediate reforms as well as strong political and financial commitment from the government.

These impending challenges in attaining the desired Nationally Determined Contribution (NDC) goals through forestry, possible recommendations, and a road map for achieving the NDC objectives form the subject matter of this policy brief.

To achieve the target of 2.5–3.0 billion tonne of CO_2e through additional forest and tree cover in an inclusive manner, it is imperative to focus on the following parameters:

1. The amount of money needed to achieve the NDC target.
2. The amount of money being already spent for achieving the NDC target.
3. Is the money spent enough to achieve the NDC target?
4. The need for more funding for achieving the NDC target.
5. The need for innovative financial mechanism for achieving the NDC target.

For being able to answer the aforementioned concerns, we need have a precise estimate of the expenditure being spent on conserving forest in a sustainable manner. This will further highlight the annual investment made under various state and centrally sponsored schemes, taking into account the existing financial gap to

[1] Details available at worldbank.org/en/topic/forests. Last updated on 16 April 2020.

achieve the NDC target. **Thus, there is a need to bridge the gap between what is being spent and what is needed for conserving forests.**

A substantial financial allocation to the tune of around ₹60,000 crore per annum will be required to the forestry sector.[2] Similarly, if we validate this figure with the National Forest Action Plan, 1999 with the help of discounted value factor, the estimated value will be around ₹69,342 crore per annum which will be required for achieving sustainable forest management on a national level. It is nearly five times of the current-level investments. Mobilization of funds of this magnitude is a real challenge before the country.

The financial figure of ₹60,000 crore is estimated for carrying out the gap analysis for achieving the NDC target.[3]

Funds Received under State and Centrally Sponsored Schemes

This section will elaborate on the funds received under various state and centrally sponsored schemes. While the Ministry of Environment, Forest and Climate Change (MoEFCC) is the principal ministry for conservation of forest, however, there are other ministries also working towards forest conservation. These ministries are reviewed, from time to time, regarding the schemes pertinent to forest conservation and human well-being. To highlight, there are certain schemes in Ministry of Rural Development which have got a much higher allocation in comparison to the MoEFCC. The top big budget schemes with upto ₹400 crore expenditure are Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), National Rural Drinking Water Programme, Nirmal Bharat Abhiyan/ Swachh Bharat Abhiyan, Integrated Watershed Management Programme (now under PMKSY-WC), Prevention and Control of Pollution, Rashtriya Krishi Vikas Yojana. This also includes the grants allocated to state governments under various programmes/schemes.

The expenditure for 2012–17 was of the value of around ₹56,279 crore, for a five-year plan (roughly, ₹11,256 crore annual expenditure) under the state and centrally sponsored schemes relating to forest conservation (Figure 1, Annexure I and II).

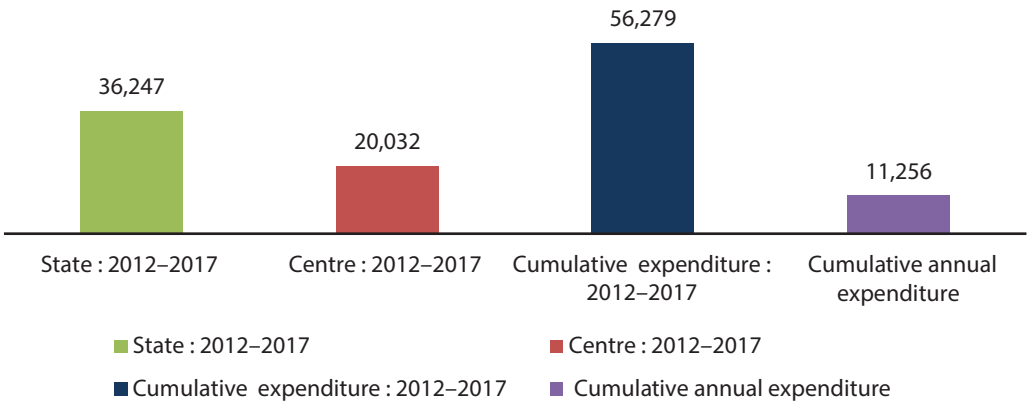


Figure 1: Expenditure made under state and centrally funded schemes

[2] Sharma, J. V. and Priyanka, T . 2019. Roadmap for achieving additional 2.5-3.0 billion tons CO2e sequestration from forestry sector by 2030. *Int. J. Adv. Res.* 7(9)

[3] Ibid

Budget Gap Against Money Required Versus Money Spent

A substantial financial allocation, to the tune of around ₹60,000 crore per annum, will be required to fulfil the policy objective of bringing 33% of the country's total area under forest and tree cover and NDC target of creating carbon sink of 2.5–3.0 billion tonne of CO_2e by 2030. Elaborating on the findings from Figure 2, it clearly explicates the financial gap calculated on the basis of deducting the annual money spent (₹11,256 crore) under various state and centrally sponsored schemes from the total money required, amounting to ₹60,000 crore. Therefore, there is a gap of around ₹48,744 crore to achieve 2.5–3.0 billion tonne of CO_2e through additional forest and tree cover. It is worth mentioning here that external finance to fill this gap can be vital of importance.

The allocation of plan budget to the forestry sector at the central government level remains around 1% of the total outlay since Independence. This percentage has further reduced, notably after devolution of tax share to the state governments. The budget for forestry sector including the expenditure made by the state governments in India is 0.7% of gross domestic product (GDP).[4]

In the light of the above facts, it can be established that there is an urgent need of recalibration of national financial requirement by establishing an innovative financial mechanism for achieving 2.5–3.0 billion tonne of CO_2e through additional forest and tree cover. A possible way to address and meet the financial gap could be by merging poverty alleviation schemes with forestry schemes to cater the income-generating activities in 173,000 forest-fringe villages, covering more than 350 million people.[5]

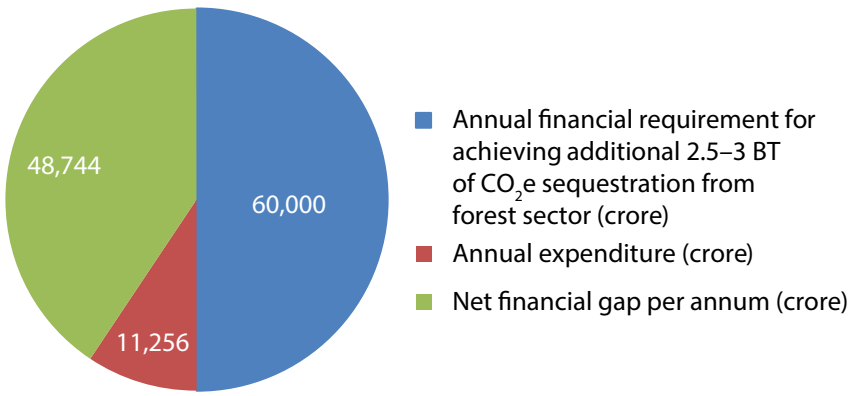


Figure 2: Annual financial requirement for achieving additional 2.5–3.0 billion tonne of CO_2e sequestration from forestry sector

Innovative Financing Mechanisms for Forestry

The innovative financial mechanisms can be helpful in generating new sources of revenue and support to make investments in achieving the NDC targets. A substantial financial allocation to the tune of around

[4] Details available at http://moef.gov.in/wp-content/uploads/2019/06/Pacific.pdf

[5] Details available at worldbank.org/en/topic/forests, last updated on 16 April 2020

₹48,744 crore per annum (Figure 2) to the forestry sector is needed. Hence, the following promising financial opportunities can bridge the gap between what is being spent for NDC goals and what is needed.

I. Deployment of liquefied petroleum gas connection to the forest-dependent community

India is home to more than 24 crore households, out of which about 10 crore households are still deprived of liquefied petroleum gas (LPG) as cooking fuel and have to rely on firewood, coal, dung cakes, etc. as primary source of cooking.[6] The Pradhan Mantri Ujjwala Yojana (PMUY) is an ambitious social welfare scheme that focuses on replacing the unclean cooking fuels, mostly used in rural India, with the clean and more efficient LPG, focusing primarily on below poverty line (BPL) households.

The PMUY has made noteworthy contribution in conserving forests in a sustainable manner by providing LPG connections. Some of the objectives achieved after introduction of Yojana are as follows:

- Reduction in fuelwood demand
- Improvement in carbon sequestration potential
- Community can get carbon price as motivational income

While adopting LPG by 10 crore households as a source of cooking, it is estimated to save trees and fuelwood demand, in a large extent, accounting to 1377 million tonne of fuelwood, this can yield sequestration of nearly 1734 million tonne of CO_2e per year. In addition, carbon finance can be obtained of approximately ₹65,025 crore per annum against sequestered CO_2. For achieving the aforementioned mode of financial mechanism, the government needs to annually spend ₹1600 crore for providing 50% subsidy per cylinder for about 10 crore households, as described graphically in Figure 3.

CHALLENGE: Refilling of cylinders by the households still remains a challenge. As per a survey done by CRISIL in 2015, 86% of the people who received LPG cylinders as a part of Ujjwala Scheme said they had not shifted from biomass to LPG because the price of refilling the cylinder was too high (CRISIL 2015). While official figures state that 80% of PMUY beneficiaries opt for at least one refill, field-based media reports suggest that number of refills is far from sufficient to meet the cooking needs of the households. According to a June 2017 study undertaken by Centre for Science and Environment (CSE) in Uttar Pradesh, many of the families have not opted for LPG connection despite being eligible, since refilling was not affordable. While it is argued that PMUY is an access-centric scheme and not refill centric, the effectiveness of the Scheme is dependent on whether people refill their cylinders or revert to previous fuels, including fuelwood chips.

6 *Source:* PMUY

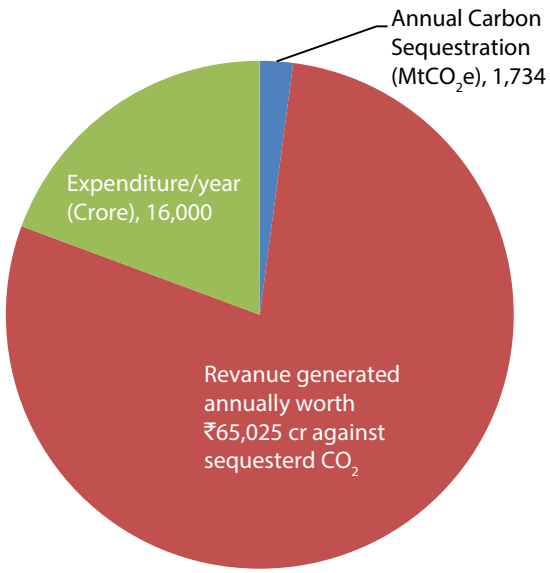


Figure 3: Reduction of fuelwood consumption by providing subsidized LPG connection under PMUY for 10 crore households

With the annual expenditure of ₹16,000 crore, India has the potential to optimize the financial gain for achieving the NDC targets. The gained capital can be further utilized in implementing and supporting other financial mechanisms for successful achievements.

II. Implementing Minimum Support Price Scheme for agroforestry

Agroforestry can play a pivotal role to overcome timber and fuelwood demand, livelihood generation, enable risk reduction, and effectively contributing towards climate resilience. In India, the current culturable non-forest area is estimated to be 218.8 Mha as identified by *India State of Forest Report 2003*. This implies that there is a potential of covering the entire culturable non-forest area into agroforestry plantation; however, only a subset of this vast area—equivalent to 25 Mha—is considered for potential agroforestry area. The point to emphasize here is that, it still would lead to an addition of 8% to tree outside forest area (TOF) and would be a milestone in achieving the target of 33% area under forest as per National Forest Policy, 1988.

As regards, in addition to carbon sequestration potential, there is a need to develop a scheme for minimum support price (MSP) for agroforestry produce so that farmers can be compensated for carbon sequestration.

It is imperative to note that apart from adding to the tree cover, the 25 Mha potential agroforestry areas can sequester 34 $MtCO_2e$ per annum which is worth ₹1275 crore. The average combined annual productivity in TOF is considered as $10m^3$/ha/year for calculating carbon sequestration potential (*India State of Forest Report 1987*).

To achieve carbon sequestration potential, the government needs to provide a budgetary allocation of approximately ₹20,000 crore per annum: (i) for quality planting material, (ii) a statutory and institutional mechanism for certification of planting stock and clonal plants, (iii) regular timber markets to ensure

It is alarming to see that 216.42 million tonne of fuelwood is being used for energy requirement, out of which 58.75 million tonne comes from natural forests (FSI 2011). In 2019, 274.36 million tonne of fuelwood was used to meet the energy requirement annually, of this 85.29 million tonne of fuelwood were collected from natural forests (*India State of Forest Report 2019*). The use of fuelwood in future will keep on increasing, considering the population growth, demand of rural energy, energy requirement of brick kilns due to increase in urbanization. The emissions from fuelwood have been calculated using these parameters. The total CO_2 emissions from the fuelwood consumption in 2020 have been estimated as 503.45 million tonne of CO_2e, based on which a projection has been made on the values for 2030. The emissions in 2030 will increase to 579.01 million tonne of CO_2e.

GHG Emission

India: 3,202 $MtCO_2e$*
Total GHG emissions (6.55% of world total)

World: 48,892.37 $MtCO_2e$

Source: *World Resources Institute Climate Analysis Indicators Tool (WRI CATT) 4.0, 2017, FAOSTAT, 2018*

The total estimated CO_2 emissions from forestry sector itself (fuelwood, pulp and paper, and forest fire) in 2020 is 539.14 million tonne of CO_2e. The CO_2 emissions will increase upto 626.91 million tonne of CO_2e in 2030. However, the total greenhouse gas emissions in India is accounted to 3202 $MTCO_2e$ annually, dominated by emissions released from land-use change and forestry (122.5 $MTCO_2e$), agriculture (626.86 $MTCO_2e$), waste (61.05 $MTCO_2e$), industrial processes (193.19 MT CO_2e), and energy (2198.71 MT CO_2e)

Sources: World Resources Institute Climate Analysis Indicators Tool (WRI CAIT) 4.0 (2017), FAOSTAT (2018)

transparent timber trade and prevent exploitation of farmers, (iv) provisions for harvesting and transportation of agroforestry produce should be made less stringent, (v) an accreditation system should be developed for nursery planting stock, and (vi) working plans should be prepared for agroforestry.

India is a net importer of wood and wood products. To elaborate this, the demand for raw wood by different industries increased from 52 million m^3 in 1998 to 95 million m^3 in 2010 and is projected to increase further due to economic growth and a rise in population (Vanam 2019).[7] This increasing demand, on the one hand, leads to an addition in the economic burden of over ₹388 billion (₹38,000 crore approximately) due to lack of proper financial mechanisms for the production of timber in subset of 25 Mha potential agroforestry area of the total culturable non-forest area of the country. On the other hand, it adds to fiscal pressure due to import of wood and wood products from other countries.

Based on the aforementioned, it is the need of the hour to promote and support farmers in implementation of MSP schemes and creation of markets. In this regard, wood-based industries (WBI) can be made self-reliant for

[7] Vanam, B. 2019. Timber Trade in India—Challenges and Policies. *EPRA International Journal of Multidisciplinary Research,* 5(12): 119–122

procuring the indigenously grown timber through agroforestry plantations. This would not only strengthen the livelihood opportunities of the farmers but also help to doubling their income by providing compensation for carbon sequestration in the form of carbon finance as motivational source.

In addition to this, there is a necessity to relook at the EXIM policy of India for wood imports. Increasing import duty on wood and wood-based products is likely to result in increased share of domestic market and promoting farmers to grow more wood through agroforestry practices. Such impetus to agroforestry sector would enhance forest and tree cover of the country, contribute to achieve 2.5–3.0 billion tonne of CO_2e sequestration, enhance ecosystem services, sustain and develop livelihood options for farmers including more than 100 million small and marginal farmers across India.

III. Innovative financial mechanism to obtain forest carbon finance through formulating carbon neutrality policy at national level

Creation of a national market for carbon trading and carbon neutrality for corporate/ industrial sector on priority can substantially help achieve the target of sequestering additional 2.5–3.0 billion tonne of CO_2e. A need to formulate national-level carbon neutrality policy for GHG emissions has been recently realized as the need of the hour. This can establish a direct link between the GHG emissions of a product or process beyond permissible limit and the tax that must be paid on it by purchasing offsets. There exists a potential to purchase the offsets from the financial gains accrued from business-as-usual (BAU) and over and above BAU (Table 1).

Carbon offset markets have been promoted as an important part of the solution to the climate crisis and there is huge potential to sell carbon offsets through augmenting carbon neutrality policy at the national level.

Table 1 explicates on the statistics that forests in India can sequester CO_2e 31.87 billion tonne by 2030 as BAU. In the first scenario, there is an increment of carbon stock 2.25 billion tonne of CO_2e from benchmark year (2015), which costs around ₹84,375 crore @ US$5 per CER. In the second scenario, which is over and above BAU, carbon increment will be 4.75 billion tonne of CO_2e (worth ₹178,125 crore) and 5.25 billion tonne of CO_2e (worth ₹196,875 crore) against 2.5 billion tonne of CO_2e and 3.0 billion tonne of CO_2e in addition to BAU, respectively. This huge potential can be achieved by formulating carbon neutrality policy at the national level.

Table 1: Projection of NDC targets in different (indicative) baseline years

BAU (BTCO_2e)		**Carbon increment in 2030 if consider 2015 baseline year**		
2015	2030	**Scenario1: BAU** Carbon stock increment from benchmark year (2015) (BT CO_2e)	**Scenario 2: Over and above from BAU (BT CO_2e)**	
			Additional 2.5 BT CO_2e increment from BAU	Additional 3.0 BT CO_2e increment from BAU
29.62	**31.87**	**2.25**	**4.75**	**5.25**
Value of CER (in ₹ crore) by 2030		84,375	178,125	196,875
Annual value of CER (in ₹ crore)		84,36	17,813	19,688

In the 14th Finance Commission (2015–20), no funds were transferred to the states. However, 15th Finance Commission (2020–25) has recommended for allocation of funds to the forestry sector (7.5% for forest cover, 10% for forest and ecology). States need to be proactive to earmark grant for the purpose of forest development.

Comparative Assessment

Combining all the innovative financial mechanism such as deployment of LPG connection, implementing MSP scheme for agroforestry, and formulating carbon neutrality policy at national level, a total revenue of ₹74,736 crore can be accrued annually. To further increase the financial gains and to meet the NDC targets, it is essential to consider the over and above BAU scenario. Carbon increment of 4.75 BT CO_2e (worth ₹17813 crore/annum) and 5.25 BT CO_2e (worth ₹19,688 crore/annum) against 2.5 BT CO_2e and 3.0 BT CO_2e in addition to BAU, respectively can be achieved by formulating carbon neutrality policy at the national level.

Some More Financial Mechanisms

In order to promote sustainable forest management and invite financial capital in the country, it is advisable to lay emphasis on various financial mechanisms. The following are some of the financial mechanisms, which when coupled with other schemes, can attract large extent of financial gains to achieve the NDC targets.

Incorporating payment for environmental services in forest-financing strategies

More recently, payment for environmental services (PES) has emerged as a viable financing mechanism for sustainable forest management. The PES will significantly act as a new source of finance that can be utilized to implement sustainable forest management. States with large forest cover have now realized that their efforts in maintaining and conserving good forests is paying in the form of enhanced allocation in taxes from the divisible pool. The PES encourages individual Indian states to retain high-forest cover and provide stronger livelihood support to forest-dependent communities. The funds will also support in covering the increased cost of delivering desirable social and developmental services to people living inside or near the forest areas. This forward-looking move of the Government of India will go a long way in ensuring that a living tree is more valuable than a dead one. The PES can make a significant impact when bundled with other sources of financing.

Green bonds

Financial instruments can play a crucial role in mobilizing climate finance and investment by leveraging existing financial mechanisms. Leveraging the debt market, green bonds have emerged as a successful bridge between capital markets and addressing climate change. Since its first issuance in 2007, by two multilateral development banks—World Bank and European Investment Bank—green bonds have grown exponentially as a key tool to raise climate finance, with cumulative issuances pegged at over $180 billion globally by the end of 2016. India' green bond market is currently pegged at $10.3 billion worth of transactions in the first half of 2019, with the majority of it being allocated to renewable energy projects, contributing directly towards achieving India's NDCs.

Only recently, India witnessed a range of green bonds issued by government entities, including the three major green bonds issued in the second half of 2017 by Indian Renewable Energy Development Agency Limited (IREDA), Power Finance Corporation (PFC), and Indian Railways Finance Corporation (IRFC); however most of these were primarily focussed on the renewable energy sector alone. In 2018, State Bank of India entered the green market with $650 million certified climate bonds.

There is still a large untapped potential for green bonds in sectors besides renewable energy. The more unconventional investment sectors, such as water, agriculture, forestry and marine conservation, waste, and land, need public interventions to make them attractive and financially viable for private investments.

The financial sector, both public sector including the development banks and the private sector, is playing a vital role in driving the green bond market and pioneering innovative models across the world.

The experiences of other countries like Kenya, Mexico, and China in implementing green bond under forestry sector can provide useful insights into operationalization of India's green bond adoption strategy.

- One such example is that of the forest bond amounting US$152 million, issued by International Finance Corporation (IFC) in Kenya where reducing emissions from deforestation and forest degradation (REDD+) and price support mechanisms were combined to ensure project sustainability. In Indian green bonds market too, since 50% of the green bonds have been issued by the financial sector, it provides a good opportunity to adopt and experiment with some of these models.
- Two more examples relating to the issuance of green bonds can be cited from Mexico and China. In the first, the International Bank for Reconstruction and Development (IBRD, World Bank) under the criterion of adaptation and mitigation included strengthening Mexico's forest management to reduce the net deforestation and forest degradation (US$350 million).[8] Second relates to China's noteworthy efforts to increase forest cover, specifically in areas prone to wind and/or water erosion. It also aims to supplement the incomes of forest-dependent rural communities and reduce the vulnerability to climate impacts (US$100 million).[9] Another such example from China relates to the Hunan Forest Restoration and Development for which green bonds were issued by the World Bank to increase the resilience of forests and promote reforestation and rehabilitation of ice storm-damaged ecological forest plantation areas with diversified local adapted species and long-term forest management (amount: US$80 Million).[10]

Thus, highlighting the importance and benefits of green bonds, it is imperative to note that green bonds serve the dual purpose of bridging the financial gap for sustainable development and establishing feasibility of investment in new sectors.

Corporate social responsibility

Financing for ecological conservation can also be obtained through the private sector's corporate social responsibility (CSR) funds, usually earmarked for long-term investments in sustainable development. According to Section 135 of the Companies Act, 2013, companies with a net worth of ₹500 crore or turnover of ₹1000 crore or a net profit of ₹5 crore in any financial year have been mandated to set aside CSR funds equivalent to

[8] Details available at http://www.worldbank.org/projects/P123760/mexico-forests-climate-change-project?lang=en

[9] Details available at http://www.worldbank.org/projects/P105872/integrated-forestry-development-project?lang=en

[10] Details available at http://www.worldbank.org/projects/P125021/hunan-forest-restoration-development-project?lang=en

no less than 3% of their net profit. These funds have non-profit-driven obligations, since they are utilized for the welfare of the society. However, the current lack of adequate knowledge in terms of existing societal issues and policy measures hinders the channelling of CSR into appropriate projects. Often companies choose their CSR activities based on vested interests, often aligning them to their area of business, instead of serving the greater needs of the society.

Between FY 2014/15 and FY 2018/19, a total of ₹6019 crore (Figure 4) has been spent on environment, animal welfare, and conservation of resources; while an approximately ₹4,842 crore has been spent towards environmental sustainability through CSR funds.[11]

It is noteworthy to mention that the Government of India mandated 60% of CSR expenditure of central public sector organizations on health, nutrition, and education in 2018. Underlining the aforementioned facts on sector-specific funding, it thus becomes important to emphasize that diverting even a small portion of this corpus towards leveraging technological solutions for effective forest management will help to solve many existing critical issues.

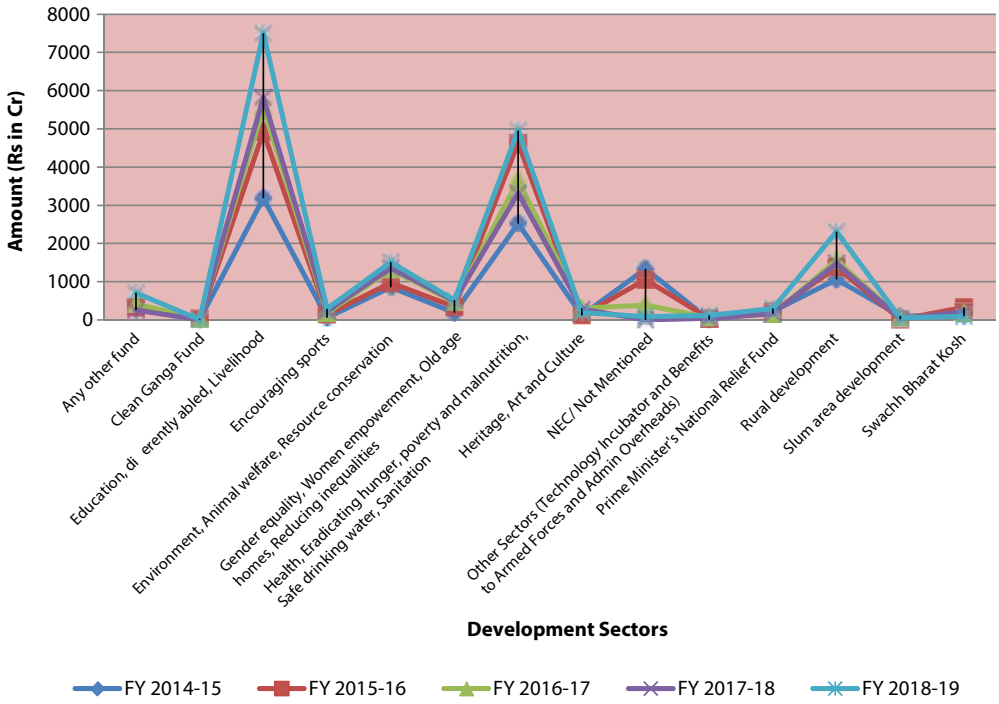


Figure 4: Development sector-wise CSR spending: from FY 2014/15 to FY 2018/19

Source: Details available at https://csr.gov.in

Compensatory Afforestation Fund Management and Planning Authority

India, in the recent past, has innovated new and additional financial resources such as compensatory afforestation fund and allocation of financial resources on the basis of forest cover through Finance Commission.

[11] Details available at https://csrbox.org /CSR-in-India)

A compensatory afforestation fund has been created and managed by Adhoc Compensatory Afforestation Fund Management and Planning Authority (CAMPA). The money received from user agencies towards compensatory afforestation, additional compensatory, afforestation, penal compensatory afforestation, catchment area treatment plant, etc., in lieu of forest land diversion for various non-forestry activities/projects, is deposited in this fund. A sizeable amount of the fund is available under the Compensatory Afforestation Fund for undertaking activities such as artificial regeneration (plantations), assisted natural regeneration, protection of forest, wildlife protection and other activities, and for matters connected therewith or incidental thereto as per extant guidelines.[12]

The purpose of CAMPA is to promote forestry activities and when applied with other innovative mechanisms by ways of tree plantations, it would support in creating an additional carbon sink equivalent to 2.5–3.0 billion tonne of CO_2e by 2030. The recent state-/union territory (UT)-wise data depicts that in 2009–12, a total of ₹2896 crore of funds under CAMPA were released, out of an expenditure of ₹1776 crore was incurred. It is important to note that the funds under CAMPA can be only utilized for compensatory afforestation, catchment area treatment, wildlife management, assisted natural regeneration, forest fire prevention and control operations, soil and moisture conservation works in the forest, improvement of wildlife habitat, management of biological diversity and biological resources, research in forestry and monitoring of CAMPA works, etc. but not for payment of salary, travelling allowances, medical expenses, etc.

At present, CAMPA has ₹54,685 crore in the corpus (as on 28 January 2019) and so far 27 states/UTs have created accounts for receiving the funds from Union Government to the tune of ₹47,436 crore, based on land diverted to respective state and such funds shall be kept in interest-bearing non-lapsable public account.

Conclusion

India has the potential of achieving additional 2.5–3.0 billion tonne of CO_2e sequestration by 2030 with conservation and afforestation approach on forests and non-forest land. Around ₹60,000 crore per annum is needed till 2030 for forest development, livelihood activities, implementing MSP scheme for agroforestry, and providing LPG to the forest-dependent communities. Innovative financial mechanism to obtain forest-based carbon finance through carbon neutrality policy will boost the efforts towards achieving the target. It is not possible to achieve this target without the involvement of people, private sector, and other government departments. The most important is to have political commitment to achieve this target which needs to be strengthened. There is gap in the means of implementation for achieving NDC target which could be bridged through PES scheme and carbon neutrality policy at national level.

The Policy Brief has delved into highlighting the impending challenges in attaining the desired NDC goals through forestry and possible recommendations along with a road map for achieving the NDC objectives. Further, it has delivered upon the monetary funds already spent and funds required by 2030 to achieve the NDC targets by optimizing various innovative financial mechanisms which include providing LPG cylinders at a subsidized rate to the forest-dependent communities, implementing MSP scheme for agroforestry, obtaining forest carbon finance through formulating carbon neutrality policy at national level. Apart from these, some more financial mechanisms would also contribute in achieving the NDC targets such as PES, green bonds, CAMPA, and CSR.

[12] FSI. 2019.Technical Information Series, Volume I, No. 3

ANNEXURE(S)

Annexure I

A1: Expenditure during 2012–17 under state-sponsored schemes

Expenditure (in ₹ crore) (2012–17)	Annual expenditure (in ₹ crore)
181,236	36,247

Sources: CBD Fifth Report13, UNDP Report14, JICA Projects Report15

A2: List of state-sponsored schemes (2012–17)

S No.	State-sponsored schemes
1	Funding under schemes and programmesoutside forest department: Nimami Gange Scheme under Ganga VriksharopenAbhiyan) (for plantations activities)
2	Submission on Agroforestry
3	Development of Economically Viable and Integrated Agroforestry Models for Arid Region
4	Productivity and Biometrics Studies on Some Important Species in Semi-arid Regions of Rajasthan for Their Sustainable Management
5	Enhancing Productivity of Saline Wastelands in Kachchh through Improved Tree Planting Techniques and Silvipastoral Study
6	Plantation and Green Belt Development Around Chandrapura Thermal Power Station, Chandrapura, Dhanbad
7	Sustainable Land, Water and Biodiversity Conservation and Management for Improved Livelihoods in Uttarakhand Watershed Sector
8	Integrated Land and Ecosystem Management to Combat Land Degradation and Deforestation in Madhya Pradesh
9	Swan River Integrated Watershed Management Project, Una Himachal Pradesh
10	Gujarat Forestry Development Project: Phases I and II

[13] Details available at https://www.cbd.int/doc/world/in/in-nr-05-en.pdf

[14] Details available at https://info.undp.org/docs/pdc/Documents/IND/00076208_Project%20Document-cum-AWP%20-%2087718.pdf

[15] Details available at https://www.jica.go.jp/india/english/office/others/c8h0vm00004cesxi-att/brochure_03.pdf

S No.	State-sponsored schemes
11	Sikkim Biodiversity Conservation and Forest Management Project
12	Tripura Forest Environmental Improvement and Poverty Alleviation Project
13	Odisha Forestry Sector Development Project: Phase II
14	Sustainable Participatory Management of Natural Resources to Control Land Degradation in the Thar Desert Ecosystem
15	Centrally Sponsored Programme of Soil Conservation in the Catchments of River Valley Project and Flood-prone River
16	Integrated Watershed Management Project: Mahabubnagar District, Andhra Pradesh
17	Natural Resource Management along Watershed Lines
18	Participatory Natural Resource Management Project, Madhya Pradesh
19	Reversing Environmental Degradation and Rural Poverty through Adaptation to Climate Change in Drought-stricken Areas in Southern India: A Hydrological Unit Pilot Project Approach
20	Uttarakhand Decentralised Watershed Development Project
21	Nationwide Mapping of Land Degradation at 1:50,000 Scale
22	Identification of Soil Vegetation Relations and Indicator Species for Assessment and Rehabilitation in Lower Aravalli of Rajasthan
23	Effect of Fertilizer Application on Growth and Yield of 10-Year-Old *Salvadorapersia* and *Aaciaampliceps* Plantations under Silvipastoral System on Arid Salt-affected Soil
24	Efficacy and Economics of Water Harvesting Devices in Controlling Run-off Losses and Enhancing Biomass Productivity in Aravalli Ranges
25	Study of Characteristic Features Pertaining to Bio-drainage Potential of Some Selected Tree Species
26	Poverty Reduction through Community-based Natural Resource Management for Livelihood Opportunities in Rural Areas
27	Wasundhara Sunaharakal Participatory Village Development Project Based on Natural Resource Management
28	Rajasthan Forestry and Biodiversity Project: Phase II
29	Sustainable Rural Livelihood Security through Innovations in Land and Ecosystem Management
30	Capacity Development For Forest Management and Personnel Training Project (Executed by MoEF)
31	Uttar Pradesh Participatory Forest Management Project
32	Odisha Forestry Sector Development Project

S No.	State-sponsored schemes
33	Mycorrhizal Dependency and Productivity of Economic Important Medicinal Plants (Mehandiand Ashwagandha) of Arid Zones
34	Characterization and Classification of Forest Soils of Rajasthan
35	Impact of *Prosopisjuliflora* on Biodiversity, Rehabilitation of Degraded Community Lands and as a Source of Livelihood for People in Rajasthan State
36	Enrichment of Land Degradation Datasets with Soil Datasets of Different States of India
37	Policy and Institutional Reform for Mainstreaming and Up-scaling Sustainable Land and Ecosystem Management in India
38	GRAMODAYA Sustainable Livelihood Project
39	Participatory Natural Resource Management and Village Development Project, Rajasthan
40	Sukhi Baliraja Initiative
41	Climate Change Adaption in Rural Maharashtra
42	Integrated Watershed Management Project: Kurnool District, Andhra Pradesh
43	Public–Private–Civil Society Partnership (PPCP) under MGNREGA in Jalna District, Maharashtra
44	Public–Private–Civil Society Partnership (PPCP) under MGNREGA in Amravati District, Maharashtra
45	Participatory Natural Resource Management along Watershed Lines in Rajasthan
46	Watershed Development Fund
47	Climate Change Adaptation in Rural Maharashtra
48	Community Mobilization for the Poverty Alleviation through Integrated Watershed Development
49	National Afforestation Programme
50	Integrated Watershed Management Programme
51	Centrally Sponsored Programme of National Watershed Development Project for Rainfed Areas
52	Sustainable Rural Livelihood Security Through Innovations in Land and Ecosystem Management
53	Indo–German Watershed Development Programme: Phase III

Annexure II

A3: Expenditure during 2012-17 under centrally sponsored schemes

Ministry/ department	Name of the scheme	Five-year plan	Average expenditure (₹ crore)
Rural Development	Pradhan Mantri Krishi Sinchai Yojana: Watershed Component (erstwhile IWMP)	2012–17	11,236.31
	Integrated Watershed Management Programme (now under PMKSY-WC)		
	Mahatma Gandhi National Rural Employment Guarantee Act		
Drinking Water and Sanitation	National Rural Drinking Water Programme	2012–17	2,415.93
	Nirmal Bharat Abhiyan/ Swachh Bharat Abhiyan		
Environment, Forest and Climate Change	Secretariat (MoEFCC)	2012–17	1,928.56
	Education and Training		
	Research		
	Ecology and Environment		
	Survey and Utilization of Forest Resources		
	Forest Conservation Development and Regeneration		
	Communications and Buildings		
	Wildlife Preservation		
	Zoological Parks		
	International Cooperation		
	National Afforestation and Eco-development Programme		
	Grants to North Eastern Areas under Various Programmes		
	Botanical Survey of India		
	Zoological Survey of India		

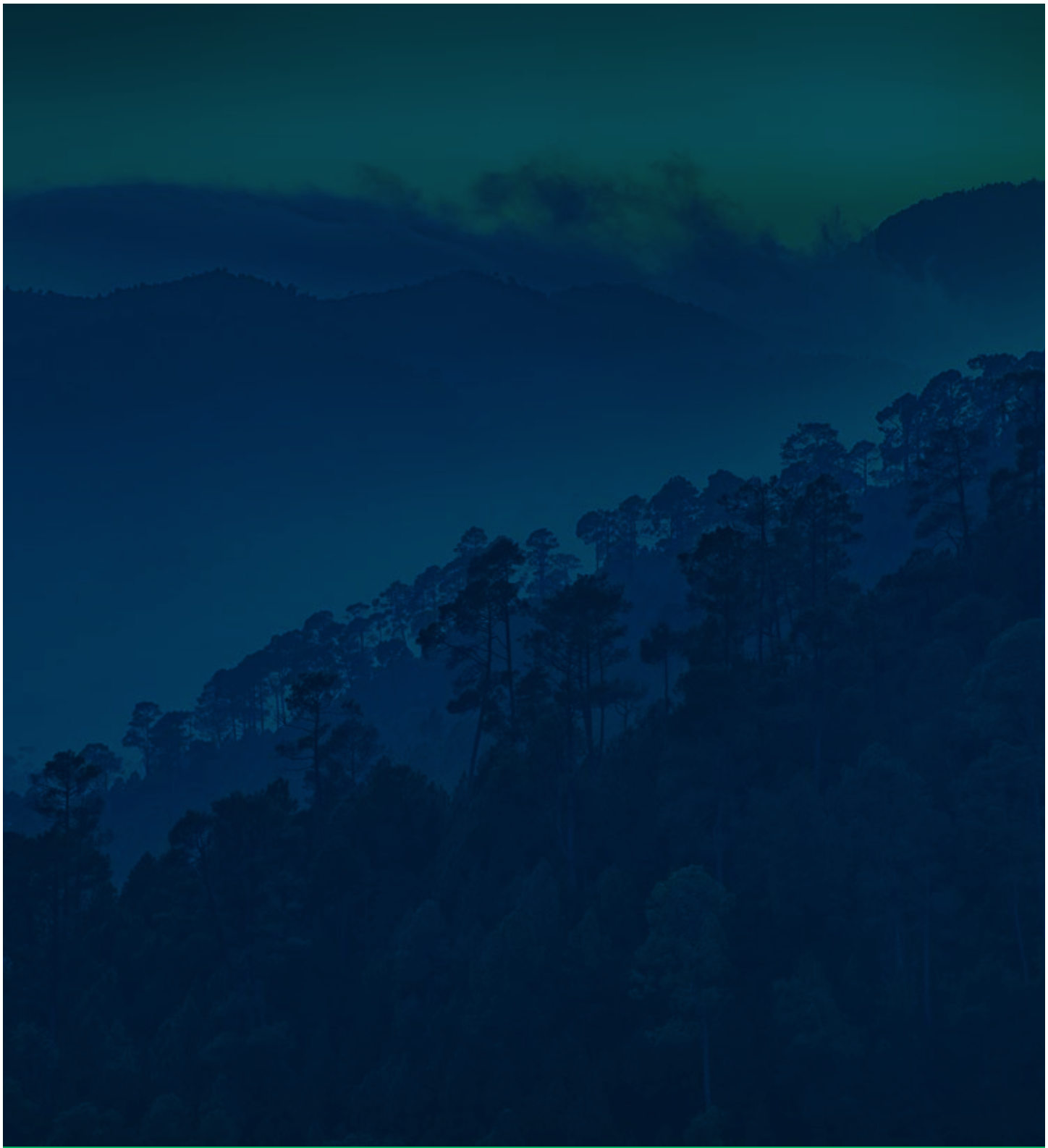
Ministry/ department	Name of the scheme	Five-year plan	Average expenditure (₹ crore)
	Ecological Research and Ecological Restoration		
	Prevention and Control of Pollution		
	Other Programme of Forestry and Wildlife		
	Grants to State Governments Under Various Programmes		
	Grants to Union Territory Governments Under Various Programmes		
Agriculture & Farmers Welfare	National Project on Promotion of Organic Farming	2012–17	1,869.44
	Seeds		
	Strengthening and Modernization of Pest Management Approach in India		
	National Project on Management of Soil Health and Fertility		
	Monitoring of Pesticides Residues at National Level		
	National Food Security Mission		
	National Mission for Sustainable Agriculture		
	Central Institute of Horticulture		
	Rashtriya Krishi Vikas Yojana		
	Pradhan Mantri Krishi Sinchai Yojana		
	National Rainfed Area Authority		
	Cattle Development		
	Poultry Development		
	Sheep and Wool Development		
	Fishery Survey of India		
	National Fisheries Development Board		
	Other Programmes of Crop Husbandry		
	Other Natural Resource Management Institutes including Agro-forestry Research		
	Climate-resilient Agriculture Initiative		

Ministry/ department	Name of the scheme	Five-year plan	Average expenditure (₹ crore)
	Animal Husbandry		
	Fisheries		
Housing and Urban Affairs	Jawaharlal Nehru National Urban Renewal Mission	2012–17	714.81
	Atal Mission for Rejuvenation and Urban Transformation		
	Swach Bharat Mission		
	University Grants Commission		
Home Affairs	Jawaharlal Nehru National Urban Renewal Mission	2012–17	456.81
	Rashtriya Krishi Vikas Yojana		
	Department of Agriculture (all 5 UTs)		
	Department of Rural Development (all 5 UTs)		
	Department of Higher Education (all 5 UTs)		
	Department of Environment and Forest (all 5 UTs)		
	Department of Water Resources (all 5 UTs)		
Water Resources, River Development and Ganga Rejuvenation	Ground Water Management and Regulation	2012–17	382.87
	R&D Programme in Water Sector		
	River Management: Border Areas		
	Development of Water Resources Information System		
	National River Conservation Plan		
	Works for Beautification of River Front		
	National Ganga Plan		
	Pradhan Mantri Krishi Sinchai Yojana (Har Khet Ko Pani)		

Ministry/ department	Name of the scheme	Five-year plan	Average expenditure (₹ crore)
AYUSH	National Medicinal Plants Board	2012–17	232.51
	National Mission on Medicinal Plants		
	National Mission on AYUSH		
	TKDL and AYUSH Intellectual Property Rights (now under other programmes of Ayush)		
Human Resource Development	University Grants Commission	2012–17	212.75
Science and Technology	S & T Programmes for Socio-economic Development	2012–17	174.68
	Autonomous Institutes and Professional Bodies		
	Science and Engineering Research Board		
	Alliance and R& D Mission		
	Council of Scientific and Industrial Research: Research Schemes, Scholarships and Fellowships		
	Council of Scientific and Industrial Research: National Laboratories		
	Programmes for Promotion of Excellence and Innovation		
	Provision for Projects/Schemes for the Benefit of North-eastern Areas and Sikkim		
	Biotechnology for Societal Development		
	Research and Development		

Ministry/ department	Name of the scheme	Five-year plan	Average expenditure (₹ crore)
Commerce and Industry	Marine Product Export Development Authority	2012–17	92.29
	Agricultural Product Export Development Authority		
	Plantations		
Earth Sciences	Oceanographic Survey(ORV and FORV) and Marine Living Resources(MLR)	2012–17	89.35
	Ocean Science and Services (INDOBIS, Marine Microbiology, Centre for Marine Living Resources & Ecology, Integrated Coastal and Marine Area Management)		
	Ocean Survey and Mineral Resources		
	Polar Sciences and Cryosphere		
	Ocean Technology: Marine Biotechnology		
	Research Education and Training		
Tribal Affairs	Market Development of Tribal Products/ Produce	2012–17	67.03
	Minimum Support Price for Minor Forest Produce		
	Vanbandhu Kalyan Yojana		
New and Renewable Energy	Grid Interactive Renewable Power	2012–17	61.74
	Off Grid/Distributed and Decentralized Renewable Power		
	Renewable Energy For Rural Application		
	Research, Design and Development in Renewable Energy		
	Renewable Energy for Urban, Industrial and Commercial		
Development of North Eastern Region	Organic Farming in North Eastern States	2012–17	39.7
	Schemes for North Eastern Council		

Ministry/ department	Name of the scheme	Five-year plan	Average expenditure (₹ crore)
Space	Resources at -2A- Provide Continuity of Data: Natural Resource Management	2012–17	19.87
	North-eastern Space Applications Centre		
	Earth Observation Application Mission		
	National Natural Resources Management		
	Indian Institute of Remote Sensing		
	Space Application Centre		
	National Remote Sensing Centre		
	Disaster Management Support		
Atomic Energy	Bhabha Atomic Research Centre	2012–17	15.94
Communication and Information Technology	National Knowledge Network	2012–17	6.19
Culture	National Council of Science Museum, Kolkata	2012–17	4.81
	Science Cities		
Tourism	Product/Infrastructure Development for Destinations and Circuits/Rural Tourism	2012–17	4.24
Planning	National Rainfed Area Authority	2012–17	2.46
Chemical and Fertilizers	Other New Schemes of Petrochemicals	2012–17	1.43
Power	Bureau of Energy Efficiency	2012–17	1.42
	Energy Conservation		
Coal	Conservation, Safety and Infrastructure Development in Coal Mines	2012–17	1.34
	Research and Development Programme		
Total			20032.48



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