Developmental Disability Index for Hill States in India

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DEVELOPMENTAL DISABILITY INDEX FOR HILL STATES IN INDIA

1. Objectives and Rationale of the Study

1.1 Hill states in India are uniquely situated in terms of the large amount of land area designated as forest land in these states. Although these states derive substantial local benefits from the forest ecosystem services[1] they also tend to face certain developmental disadvantages. In economic terms, these can be conceptualized as opportunity costs - for not being able to use the land in alternative use that would yield the highest marginal economic value for the land.

The economic rationale for this lies in the fact that forest ecosystems provide a range of services, many of which are either "intangibles" or "non-marketed" and thereby do not lend themselves to easy quantification using available valuation techniques and tools. Also, the forest ecosystem services accrue at different scales – international, national and local implying substantial uncompensated positive externalities. The net economic value of maintaining forested land in its present state of use is therefore likely to be much less than in alternative use. There has been some progress on addressing this challenge through inter-governmental devolution of funds and other policy measures, which can at best be termed partial compensation measures[2].

Another challenge in this context, arises from the fact that the need to protect and conserve forests, wildlife and other biodiversity, besides restricting the land use choices and thus causing developmental disadvantages, adversely affects the unit cost of providing public services. The cost of providing public services also varies across states/regions due to a large number of factors such as geographic location, population density, extreme and variable climatic conditions, and terrain. In the literature these are referred to as 'cost disabilities'. When 'cost disabilities' arise from factors that are considered exogenous to a state's control, it is argued that states need to be compensated through an additional allocation due to these disabilities, by incorporating

[1] The services can be classified in various ways – provisioning, regulating, supporting and cultural services.

[2] For instance, the formula for distribution of a fund of Rs. 5000 crores as recommended by the XIII Finance Commission and the NPV for use or diversion of forestland for non-forestry purposes currently being charged by state forest departments, both seek to address this.

these in the formulae for intergovernmental grants. In a number of developed countries such cost disabilities have been in-built in the design of intergovernmental grants. In India however, in most cases the central government schemes and the central government supported schemes do not take these costs into account thereby adversely affecting the development projects/financial position of these states.

Thus the first objective of this study is to construct a cost disability index in provision of developmental infrastructure e.g. roads, railway, bridges, air connectivity, health and education related infrastructure, power, telecommunication etc.

1.2 The second objective is rooted in the poor state of developmental infrastructure in hill states reflected in widening gaps when compared with non- hill states. The environment and forest clearances have been identified as the largest source of delays in development projects. This study attempts an analysis of the relevant legislation, rules and procedures and identifies specific measures to speed up the process of environmental and forest clearances[3].

2. Methodology: Constructing a Developmental Disability Index

2.1 Conceptual frame

The hill states in India are uniquely situated in terms of the large amount of land area designated as forest land in these states. Given that a full accounting of the value of the services provided by forest ecosystems in national GDP or SDP is not achievable within a foreseeable time frame, it becomes important to evolve mechanisms that can achieve twin objectives of incentivizing conservation alongside meeting developmental objectives of the hill states.
Opportunity costs when expressed in terms of forgone developmental alternatives, restrictions on livelihood options, and mark ups on costs of developmental projects are likely to be higher for forested areas of hill states than their corresponding costs in non-forested areas of hill states and non-forested states. The operationalization of such concepts can be achieved through developing a cost disability index that forms a basis for compensation.

[3] GoI 2002, and 2010.

Factors contributing to 'cost disability' in forested areas of hill states vis-à-vis non-hill states and/or non-forested areas in hill states can be identified as: Cost escalation[4] in terms of time and institutional costs due to legal requirements and federal restrictions (e.g. Supreme Court rulings on diversion of forestland for non-forest purposes and associated ranges for NPV charges; requirement for central clearances for non-forest activities).

The other factors adversely affecting the unit cost of providing public services in hill states vis-à-vis non-hill states and or flat areas in hill states would be traced into unique characteristics of hill sates e.g. difficult terrain, extreme climatic conditions, fragile ecosystems, creating strategic infrastructure in border areas on strategic considerations. Specific factors contributing to increase in unit price can be identified as: higher technological and material requirements for meeting specific rules and regulations, and coping with variable climatic conditions; need to minimize damage to forest ecosystems and environment (e.g. variant technology for developing infrastructure such as roads, bridges, need to maintain wildlife corridors); higher costs of transporting materials and supplies through difficult terrain[5].

As the nature and contribution of inputs that are required to produce a particular service vary across sectors, the factors affecting 'cost disability' are specific to each sector. The focus in this report in constructing a cost disability index is provision of developmental infrastructure e.g. roads, railway, bridges, air connectivity, power, telecommunication etc. It is important to note that contribution of various factors affecting cost disability of a service/sector may also vary and would need identification and assigning of appropriate weights in constructing a cost disability index.

Estimation of cost disabilities would require data on unit cost of providing various services along with a measure of gap/deficit in the level of services/level of services. This data is not directly available and thus there is a need to find alternative ways to estimate cost disabilities.

[4] Any developmental project which falls within the forest area gets delayed by 2-3 years because of obtaining clearances for the forested area, which increases the total project cost by 20-25% (unplanned expenditure) which has its direct repercussions on the state's financial position (Source: a communication from Chief Minister of Uttarakhand to the Deputy Chairman of the Planning Commission, November 2011).

[5] Shri Prem Kumar Dhumal, Chief Minister of Himachal Pradesh at 56th Meeting of National Development Council, October 2011, New Delhi, pitched for changing the wage cost to material cost ratio from 60:40 (present scheme of MNREGA) to 40:60 due to high cost of material and transportation in hill areas.

2.2. Components of the Index

In constructing an index that captures the developmental or opportunity cost of maintaining forestlands for hill states in India as well as increase in unit costs of providing public services in hill sates several aspects need to be recognized.

- Accounting for the flows of Ecosystem Services from these forests at various levels:
    - *global level*: e.g. Carbon sequestration, biodiversity[6]
    - *national, regional and local level:* e.g. watershed services, timber, tourism
    - *local level:* e.g. fuel wood, fodder, NTFPs, micro climatic stabilization, cultural
- Provision for Cost escalation factor on developmental projects in forested areas due to:
    - *unique geo-physical conditions*
    - *higher transaction costs*
- Criteria for Inclusive development and equity for states *linked to* forested land in hilly terrain states

While there has been some progress on incorporating the first factor in the existing devolution mechanisms, the last two are yet to receive full attention in the existing institutional mechanisms partly perhaps due to the fact that these pose problems both conceptually and empirically. The formula for distribution of a fund of Rs. 5000 crores as recommended by the XIII Finance Commission, and the NPV for use or diversion of forestland for non-forestry purposes currently being charged by state forest departments, both seek to address the requirements for the first criteria listed above.

However, existing mechanisms for compensating states fall short of expectations with regard to criteria two and three. While in theory one can argue against the parallel incorporation of all three criteria, the fact is that

[6] Note that definitionally and depending on the specific empirical context, these classifications of services may change or overlap. The important point to note here is that these exist and need to be accounted for.

current knowledge on both ecosystem services and valuation methodologies does not permit complete valuation and accounting for ecosystem services, which could have by itself been an adequate basis (at least theoretically) for distributing resources among states.

Considering costs, the compensation can potentially incorporate distinct cost aspects. These can alternatively be considered as transaction costs which manifest themselves in various ways. They include a range of factors that lead to cost escalations such as increased time and institutional costs due to legal requirements and federal restrictions. These include the laws and rules that govern the states, such as clearances from MoEF for non-forest activities and Supreme Court rulings on diversion of forestland for non-forest purposes that impose specific ranges for charging NPV. Cost mark-ups due to technological and material requirements for meeting specific rules and regulations also occur due to the terrain in forested areas of hill states (e.g. variant technology for developing infrastructure such as roads, maintaining wildlife corridors, minimizing damage to forest ecosystems and environment).

Mostly, the formula proposed and used for devolution of funds among states has used the percentage share of forested lands in a specific state to address distributional considerations. However, the emphasis has been on using this as a proxy for approximating the extent of forest ecosystem service benefits, rather than to push the notion of achieving equity in developmental status of populations residing in forested areas with those in non- forested areas. The former approximates more to an efficiency criterion while the latter calls for a focus on equity based criterion in defining human welfare. This gains importance in view of the Eleventh and Twelfth Plan's focus on inclusive development. The Planning Commission (2003) had proposed a forest disability index which sought to incorporate disadvantage faced by hill states in terms of agricultural productivity. Thus, the value for forest land was evaluated in terms of farming as a primary alternative activity and the potential loss in revenue projected accordingly. Alternative criteria which helps incorporate disparities such as those in per capita state GDP may however be considered as more appropriate since in most hill regions, farming may not be the most economically viable alternative at par with plains for instance. This is especially true of those areas (in terms of both feasibility and incentive effects unless one is assuming availability of latest technology, various other material inputs and human skills) which suffer from poor connectivity. As a general point low connectivity is an important issue

for hill areas and impedes development of economic activity in most sectors. Although farming has traditionally been practiced in most areas, meeting some self-consumption needs of the poor, it is an inadequate vehicle for poverty alleviation as data on poverty among Scheduled Tribes and other forest dwelling communities has shown. This would lead to a more comprehensive measure for judging the economic losses involved and the disparity that requires to be addressed through a distributional formula which can be used to devolve funds across states with this specific objective of achieving development with equity in mind.

2.3. Formula

Component 1: Endowment effect (geographical factor): Geographical Area of the state under forest

Component 1 = {FCAi/GAi}/ {FCA/GA}

- FCA=Forest Cover Area(km^2)
- GA=Geographical Area(km^2)

Component 2: Transaction costs (topographical factors and federal regulations):

Component 2= [HTi]*[IDPRi]

- HTi=Proportion of land under hilly terrain
- IDPRi= Infrastructure Deficit (Power Index + Road Index+ Tele density Index)
- The first two components of the infrastructure deficit have been calculated on the basis of the state-wise infrastructure index estimated by the IDFC (2010). The deviation of each state from the maximum value of the index attained at present was taken as the measure of the deficit. The combined index in IDFC (2010) which considers infrastructure in three sectors, power, road and telecom, could not be used since the telecom index does not provide state-wise details for

the north-eastern states. Instead, we opt to use index of the infrastructure deficit in the power and road sectors since state-wise data is available for these two indicators. For the telecom, we have used data on tele-density which is obtained from Annual Report 2010-11 of the Department of Telecommunication, Government of India. A combined index of the infrastructure deficit in the power, road and telecommunication has been derived using equal weights.

The forest disability index is thus calculated as a summary measure of the above two dimensions.

Base Case Formula: Developmental Disability Index (Dd_i) with equal weightage across components

Ddi_1 = (0.5) Component 1 + (0.5) Component 2

[The index for each state can be subsequently used for ranking states (after normalization)].

Alternative Formula 2: Developmental Disability Index (Dd_i) with higher weightage to forest cover area as indicator of federal obligations.

Ddi_2 = (0.6) Component 1 + (0.4) Component 2

This formulation captures the fact that in forested regions, there are federal obligations and legal or executive orders that need to be complied with. For instance, the NFP's policy that 66% of the area should be under forest cover in hill states. Developmental projects in forested areas require clearances which lead to delays and consequent cost escalations. 20-25% increase in project costs (unplanned expenditure) due to an average delay of 2-3 years as compared to project sin non-forested areas has been accounted for in this formulation. Subsequently a higher weightage is accorded to the first component in the formula.

Alternative Formula 3: Developmental Disability Index (Fd_i) with higher weightage to transaction costs in forested areas in hilly terrain

Ddi_3 = (0.40) Component 1 + (0.60) Component 2

In addition to cost escalations from meeting federal requirements, higher material costs and higher transportation costs have been claimed for hill areas in particular. In order to incorporate this aspect, a third formulation was also done giving relatively higher weightage to the first and third components. Assam and Jammu and Kashmir for instance see some improvement in building their case for compensation based on such an index. Yet another formulation is used where component is given weight 0.30 and component 2 has higher weight 0.70.

3. Forest Policy and Governance in Indian Context: Implications for development of infrastructure

3.1 India's forest typology and distribution

Forest cover of India is shown in three density classes viz., very dense forest (VDF) with more than 70% canopy density, moderately dense forest (MDF) with canopy density between 40% and 70% and open forest (OF) with canopy density between 10% and 40%.

There are 10 major bio-geographic zones of India ranging from Trans-Himalayan to Desert further to Western Ghats Mountains and the islands. However, in terms of volume per hectare (density of growing stock) the hill states are in a good position with leading states like Himachal Pradesh, Jammu & Kashmir, Uttarakhand, Arunachal and Assam (Table 1).

3.2 Status of forests in hill states

The total forest cover of the country as per 2009 assessment is 692027.25 sq. km and this constitutes approximately 21 percent of the geographic area of the

country (Table 1). Of this, 83427.76 sq. km. is very dense forest; 320238.27 sq. km. is moderately dense forest.

In India, forest ownership is mainly with the government. Private companies, corporations, individuals, clans and communities own significant areas of unclassified forest. The seven northeastern states of Meghalaya, Mizoram, Nagaland, Tripura, Arunachal Pradesh, Manipur and Assam have the largest areas of unclassified forest in India, and these are controlled by local communities with very little State control[7].

Hill States in India with only 18 percent of geographical area of the country account for 34 percent of the total forest cover (Table 2). The total forest cover in the region is 234,933 km^2 which is 39.58 percent of the geographical area as against the national average of 21.05percent.The hill districts (124 districts in 2009) constitute 21.53 percent geographical area in the country, with 40.65 percent of the total forest cover in the country. Over 80 per cent of these are in hill states (Table 3).

The net change in any class of forest cover may be the result of improvement somewhere and degradation elsewhere. There could be several reasons for this change. FSI in consultation with the state Forest departments has ascertained important reasons of changes in forest cover in some states (Table 4). Among the hill states, decrease in forest cover is mainly due to shortening of shifting cultivation cycle and biotic pressure, departmental felling, and encroachment.

[7]Unclassified forests provide the backbone for livelihood generation, as these are the areas where most shifting cultivation takes place. Village, community and private forests are used mainly for meeting the subsistence needs of communities in terms of fodder and fuel wood, and other non-timber products.

3.3 Forest Management Policies and Laws

There are a number of laws and policies which impact forestry sector and forest management in India. The different laws related to the forests and biodiversity include Indian Forest Act (IFA), 1927; Forest (Conservation) Act (FCA), 1980; Wildlife (Protection) Act, 1972; and Biological Diversity Act, 2002. However, the key policies and laws which have brought paradigm shift in forest management include National Forest Policy (NFP), 1988; Joint Forest Management Resolution (JFMR), 1990; National Environment Policy (NEP), 2006; Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 along with the recently adopted National Action Plan on Climate Change (NAPCC). A brief analysis of these is given below.

The present legislative framework for environmental protection is broadly contained in the umbrella NEP 2006, Environment Protection Act 1986, the Water (Prevention and Control of Pollution) Act, 1974, the Water Cess Act 1977 and the Air (Prevention and Control of Pollution) Act, 1981[8].

The FCA 1980, was enacted to control the diversion of forest land for non-forestry purpose and to slow down deforestation. Under this legislation, the approval of the central government is required for diversion of forest land above 1 ha. for non-forestry purposes. The user agency has to pay for compensatory afforestation as well as an amount equal to the Net Present Value of the forests diverted. While this Act has helped in keeping a check on diversion of forests for non-forestry purposes, it has also posed serious challenges for setting up developmental infrastructure in states, especially the hill states which have limited non-forest land resources.

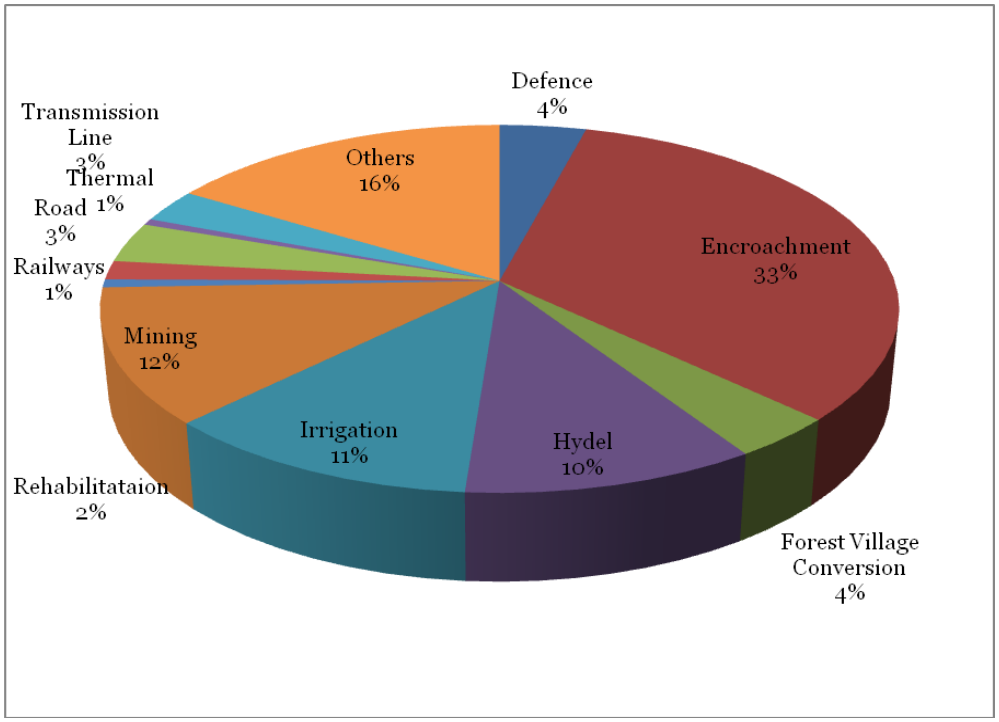
[8] For a comprehensive review of the present legislation see Pandey, 2012.

3.4 Approvals under FCA, 1980: Assessing the Performance

Since the FCA, 1980 came into being; a total forest area of 11.33 lakh ha. has been diverted for various activities. A sectoral break-down of this is presented in Graph 1. Graph 2 provides the status of approvals given during the said period. The following observations can be made on the basis of the information in these graphs:

- Since these projects were approved under FCA, 1980 appropriate mitigation measures were taken which was not the case prior to implementation of FCA, 1980.
- One third of the total forest land diverted is gone to encroachments whereas only 2 per cent is taken up by rehabilitation. Further, forest land diverted to encroachments is equal to the forest land diverted for mining, irrigation and hydel power projects put together. This implies that contrary to the perception that there is a conflict between forest conservation and infrastructure development; the real problem lies in either poor design and/or enforcement of policies.

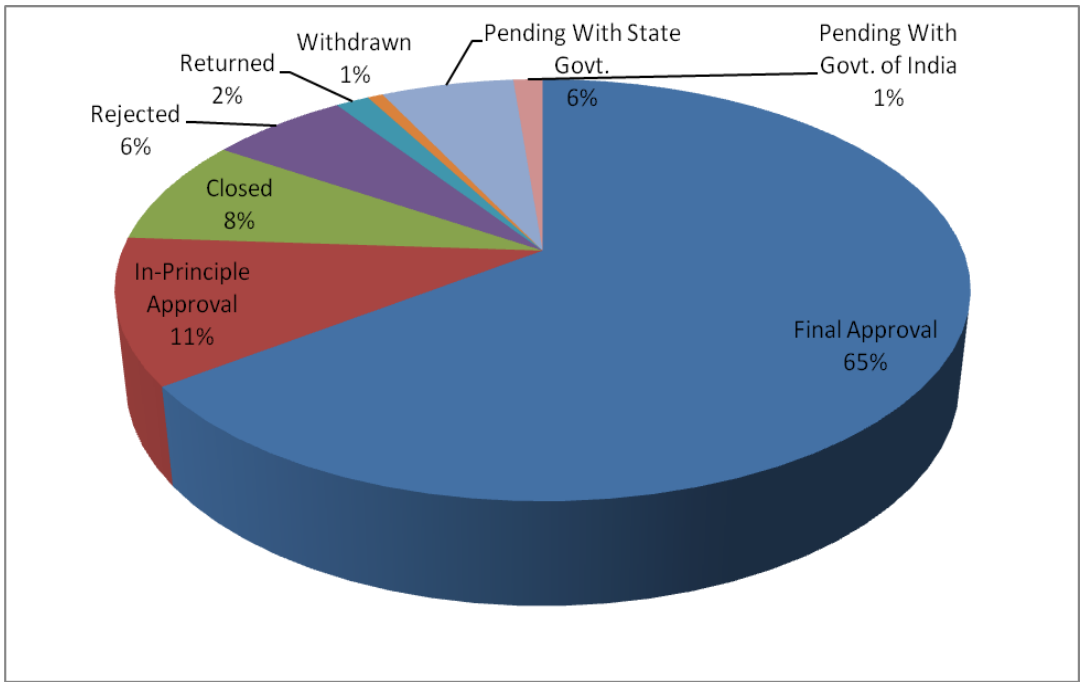
Graph 1: Approvals accorded for forest land diversion during 1980- 31 January 2012 (All India)



Source: MoEF, 2012

- Of the 29,534 proposals received for approval during the said period, in 65 per cent of the cases final approval has been granted and another 11 per cent have been given in-principle approval, implying an approval rate of 75 per cent (Graph 2).
- In the absence of any benchmark it is difficult to judge the success or otherwise of the approval rate. However, the number of cases rejected and closed constitutes 14 per cent of the total cases which seems reasonable given the national forest cover targets, and the complexity of the issues involved.

Graph 2: Status of forest clearance proposals during 1980- 31 January 2012 (All India)



Source: MoEF, 2012

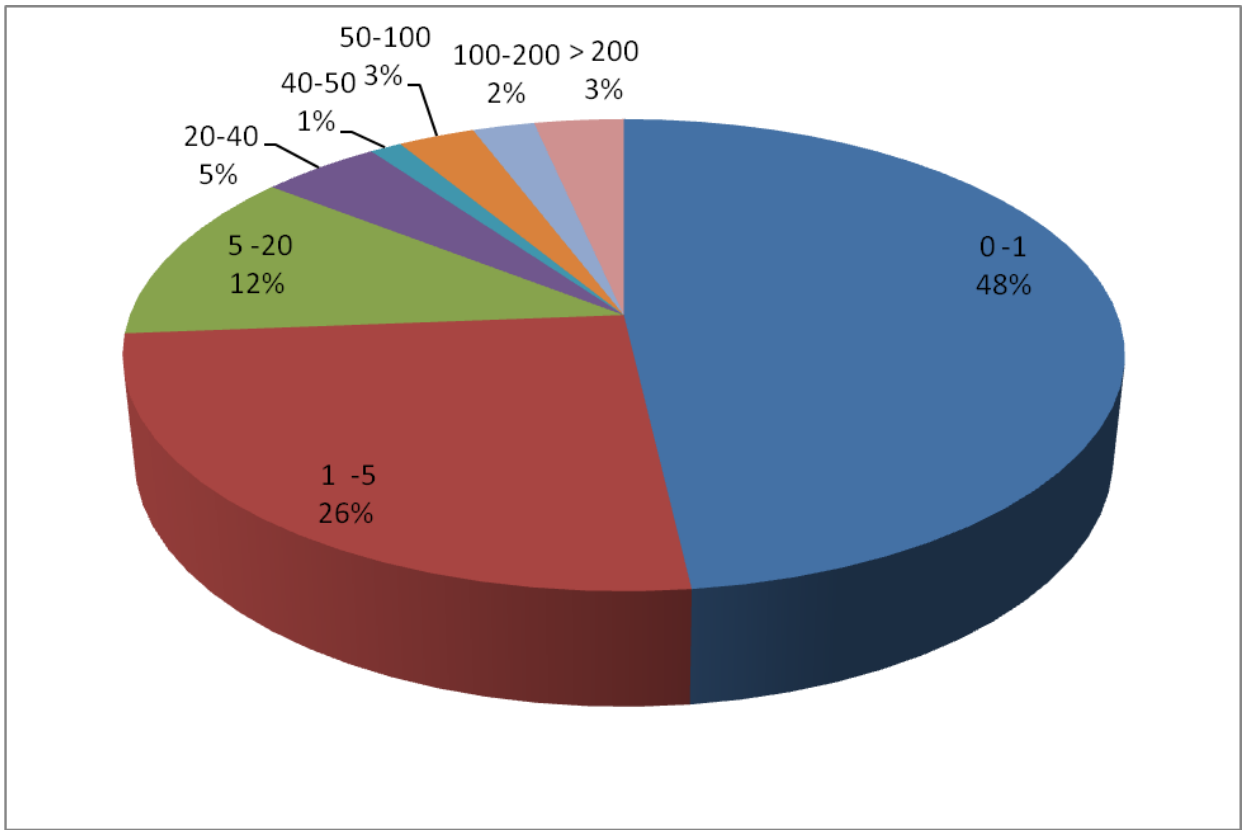
It may be seen in Graph 3 that 48 per cent of the total cases for approval of forest land were in upto 1 ha.category and over a quarter of cases were in 1-5 ha. category. Only in 5 per cent of the total cases were in over 100 ha. category. As mentioned earlier, to facilitate the implementation of certain categories developmental projects undertaken by government agencies in identified areas/categories the following general approvals have been granted by the MoEF in 0-1 ha and 1-5 ha classes:

- Public utility projects of 11 identified categories implemented by the government department – throughout country – 1 ha. in each case up to 31.1.2013

- Public utility projects of 13 identified categories implemented by the government departments in 60 districts in left wing extremism (LWE) affected districts selected for iap: 5.00 ha. in each case till 13.05.2016

- Public utility projects of 13 identified categories implemented by the government departments in remaining 23 LWE districts: 2.00 ha. in each case till31.12.2015.

Graph 3: Forest diversion proposals in different area classes (All India)

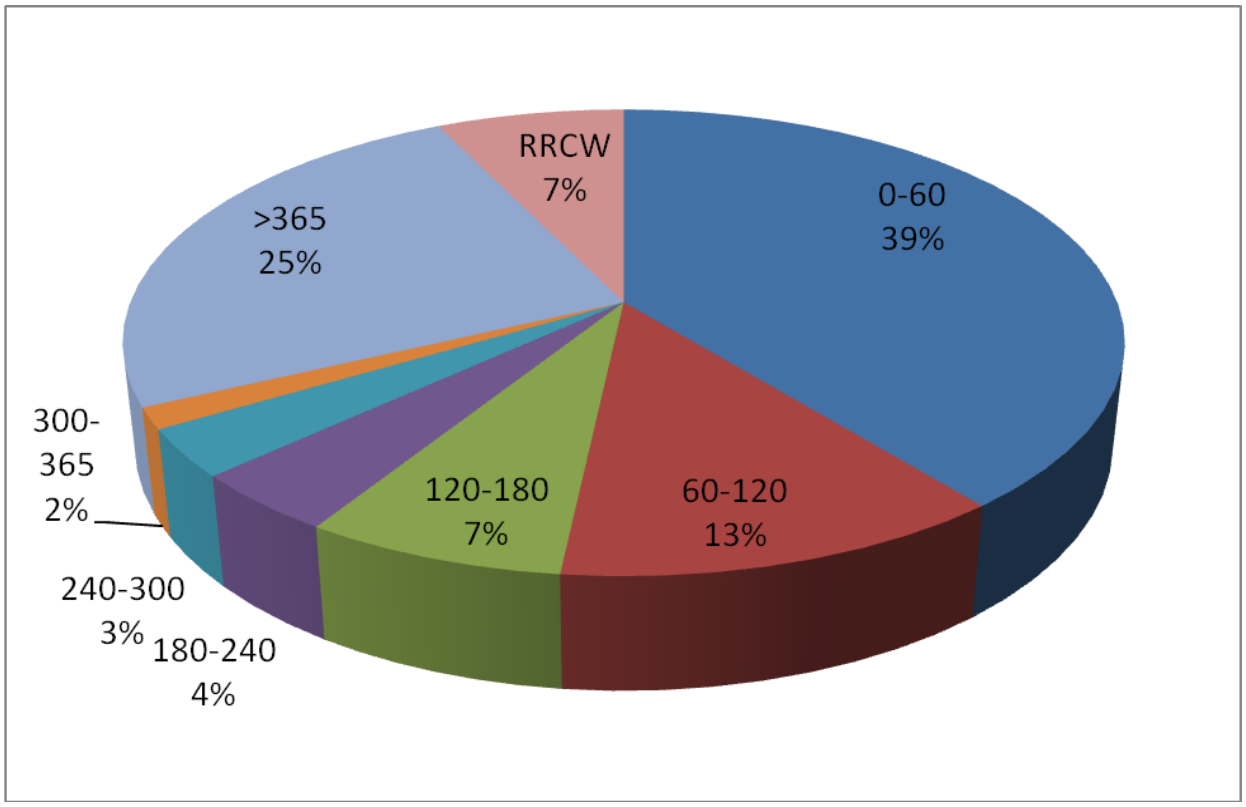


Source: MoEF, 2012

The Graph 4 shows the number of days taken in granting stage-I approvalunder the FCA, 1980 by the MoEFduring the period under reference. It may be seen that one fourth of the total cases took more than one year for stage-I approval, 7 per cent cases were dropped (retuned, rejected, closed, withdrawn) at this stage, while 68 per cent cases were given stage-I approval in under one year. Of the latter, 39 per cent cases received stage-I approval

within two months, stipulated time being 90 days except in case of lease renewal where it is 60 days.

Graph 4: Time taken (in days) by the MoEF to accord stage-I approval under FCA, 1980



RRCW- Returned, Rejected, Closed, Withdrawn); Source: MoEF, 2012

While the discussion so far in this sub-section provides an overview of the status of approvals under FCA, 1980; the data does not help understand the following:

- Which projects (type, size (in terms of forest area involved), location, type of institution responsible for execution of the project) took longer than the stipulated time. Is there a pattern? And
- What are the reasons for delay?

At the state government level:

Do reasons for delay constitute: poor /incomplete proposal; sloppy follow up; lack of trained personnel; lack of reliable data/information to support the case; absence of dedicated group of people for the purpose?

Previous record of poor compliance with the mitigative provisions of the FCA, 1980 could also be a factor leading to additional safeguards by the approving authority and thus more time. An overview of the compliance (by the state governments) in the cases cleared under FCA, 1980 shows that during the reference period, of the total 15,361 cases monitored, 42 per cent of the cases were found non-compliant. A state wise analyses shows that among the hill states the major defaulters are Arunachal Pradesh, Meghalaya, Manipur and Uttaranchal with non-compliance rate of 100%, 42%, 40%, and 34% respectively. However, in Arunachal Pradesh only one case was monitored and was found non-compliant. The extent of non-compliance and non-compliance in respect of which provisions is however not available except in the case of compensatory aforestation requirement.

All the hill states have defaulted on meeting the requirement of compensatory aforestation. Among the hill states, Tripura tops the compliance list with almost 43% compliance in compensatory aforestation followed by Meghalaya (27.12%), J&K (25.6%), and Arunachal Pradesh (23.15%). Manipur is the biggest defaulter followed by Uttaranchal and Assam.

At the MoEF level:

Do reasons for delay constitute: lack of trained personnel; lack of reliable data/information needed in decision making; absence of dedicated group of people for the pupose; lack of transparency?

Issues arising from the difference of opinion, between centre and states, on the desirability and design of the project due to lack of vision, faulty planning,

obsolete technology, multiplicity of schemes, overlapping jurisdictions could be a source of delay in decisions. For instance, one of the most common areas of contention (which came up in my discussions with the officials at the MoEF)is the desirability of better traffic management vis-a-vis broadening of some of the roads in mountains. Similarly, instead of a comprehensive plan for the development of an area where space utilisation can be optimised and projects can be executed in a time bound manner with minimum environmental damage [9], projects are undertaken by various departments resulting in duplications, less than optimal use of scarce space, environmental pollution and leakages. Therefore, for himalayan region better planning and convergence of schemes is very crucial.

3.5 Suggestions

To speed up the process of forest land and environmental approvals the following suggestions are made[10]:

a. Comprehensive planning for overall development of an area/city/state (medium to long-term perspective) encompassing infrastructure development schemes across different sectors to optimize space utilization.
b. Training for all relevant government departments/corporations/user agencies and forest officials for preparation of FCA, 1980 cases.
c. Dedicated specialized groups/missions at the state level and in MoEF for preparation and scrutiny of cases. Initial preparation and scrutiny may also be outsourced to experts/expert agencies.

[9]The Prime Minister at Nainital declared that the Centre will set up "Himalayan Development Authority" for overall development of the Himalayan region including all the states of North East.

[10] For a more detailed analysis and recommendations of earlier committees see Pandey (2012).

d. Posting of forest officers and subject experts in relevant government departments/corporations/user agencies.
e. Adoption of best global practices and e-governance systems.
f. Continuous updating of crucial data and information for decision making.
g. Introducing incentives for ensuring accountability.
h. Posting a compliance officer at state level and at the MoEF who will periodically prepare a compliance report which can be analyzed to identify the action points and recommend appropriate processes, checks and balances, technical and compliance training and e-governance needs to plug systemic and other flaws.

Pandey, 2012 also suggested a strategy for infrastructure development in hill states. This included, among others, (i) Setting up of an 'infrastructure planning mission' for formulating a long term plan for development of infrastructure in Hill State; (ii) Enhancement of norms for technology, quality, and cost of infrastructure development needs special consideration. Setting up of '*a technology mission'* for the development of infrastructure in hill states should be a priority; and (iii) Creating an '*infrastructure and technology fund'* for hill states which can be used for creating and upgrading strategic developmental infrastructure and for development/sourcing of hill sensitive technology (especially for development of market for niche mountain products, and diversification and value addition in agriculture) which are the two most critical factors in improving the productivity of resources and boosting the environmental and developmental performance of the hill states. The need for such fund should reduce overtime, so that eventually the compensation for provision of environmental services could be linked entirely to a comprehensive index of environmental externalities/performance.

4. Results and Analysis

Table 5 presents the index values and rankings state-wise for the two constituent components of the forest disability index. There are variations in the rankings of states across components; this indicates the importance of having a combined index that provides for the differences among states in terms of the range of parameters considered relevant for the study. Forest cover data is available on a regular basis from the MoEF and has been used in informed discussions and derivation of policy mechanisms for various forest ecosystem related quantitative and qualitative measures such as NPV, compensation for states in the finance commission's devolution, policy for wildlife and habitat protection, etc. However, it must be noted also that the area under forest cover is also an indicator of important ecosystem services many of which remain intangible, or cannot be evaluated to the full extent, such as biodiversity.

TABLE 5: Ranking according to individual components

RANK	Component_1		Component_2	
1	4.34	Mizoram	50.09	Arunachal Pradesh
2	3.85	Arunachal Pradesh	47.09	Mizoram
3	3.84	Nagaland	46.09	Jammu & Kashmir
4	3.69	Meghalaya	43.09	Sikkim
5	3.66	Manipur	42.61	Uttarakhand
6	3.64	Tripura	42.09	Manipur
7	2.27	Sikkim	41.43	Meghalaya
8	2.19	Uttarakhand	40.76	Nagaland
9	2.13	Kerala	38.76	Tripura
10	1.97	Chhattisgarh	12.54	Assam
11	1.69	Assam	10.81	Himachal Pradesh
12	1.50	Odisha	7.92	Maharashtra
13	1.38	Jharkhand	6.22	Kerala
14	1.26	Himachal Pradesh	4.54	Karnataka
15	1.21	Madhya Pradesh	1.58	West Bengal
16	0.90	Karnataka	0.00	Chhattisgarh
17	0.87	Tamil Nadu	0.00	Odisha
18	0.81	Andhra Pradesh	0.00	Jharkhand

19	0.79	Maharashtra	0.00	Madhya Pradesh
20	0.70	West Bengal	0.00	Tamil Nadu
21	0.49	Jammu & Kashmir	0.00	Andhra Pradesh
22	0.36	Gujarat	0.00	Gujarat
23	0.35	Bihar	0.00	Bihar
24	0.28	Uttar Pradesh	0.00	Uttar Pradesh
25	0.22	Rajasthan	0.00	Rajasthan
26	0.17	Haryana	0.00	Haryana
27	0.17	Punjab	0.00	Punjab

Component 2 provides insights on the infrastructure deficit when interacted with the proportion of hilly terrain. This component thereby directly relates to an important aspect of developmental disability as focused upon in the study. A close association is observed between the hill states and the infrastructure deficit. This gets heightened with the interaction of the two sub-components as the rankings across states reveals.

Table 6 provides the rankings of the states by the forest disability index, using the four alternative weighting options for the formula. While there are minor variations across scores for alternative formula, the relative rankings remain consistent across states, with a couple of

TABLE 6: Ranking of States according to Developmental Disability Index value

Rank	Fdi_1	State	Fdi_2	State	Fdi_3	State	Fdi_4	State
1	26.97	Arunachal Pradesh	22.35	Arunachal Pradesh	31.60	Arunachal Pradesh	36.22	Arunachal Pradesh
2	25.72	Mizoram	21.44	Mizoram	29.99	Mizoram	34.27	Mizoram
3	23.29	Jammu & Kashmir	19.04	Manipur	27.85	Jammu & Kashmir	32.41	Jammu & Kashmir
4	22.88	Manipur	18.78	Meghalaya	26.76	Sikkim	30.85	Sikkim
5	22.68	Sikkim	18.73	Jammu & Kashmir	26.72	Manipur	30.56	Manipur
6	22.56	Meghalaya	18.61	Nagaland	26.44	Uttarakhand	30.48	Uttarakhand
7	22.40	Uttarakhand	18.60	Sikkim	26.33	Meghalaya	30.10	Meghalaya
8	22.30	Nagaland	18.36	Uttarakhand	25.99	Nagaland	29.69	Nagaland
9	21.20	Tripura	17.69	Tripura	24.71	Tripura	28.22	Tripura

10	7.11	Assam	6.03	Assam	8.20	Assam	9.28	Assam
11	6.04	Himachal Pradesh	5.08	Himachal Pradesh	6.99	Himachal Pradesh	7.95	Himachal Pradesh
12	4.35	Maharashtra	3.77	Kerala	5.06	Maharashtra	5.78	Maharashtra
13	4.18	Kerala	3.64	Maharashtra	4.58	Kerala	4.99	Kerala
14	2.72	Karnataka	2.36	Karnataka	3.08	Karnataka	3.45	Karnataka
15	1.14	West Bengal	1.18	Chhattisgarh	1.23	West Bengal	1.32	West Bengal
16	0.99	Chhattisgarh	1.05	West Bengal	0.79	Chhattisgarh	0.59	Chhattisgarh
17	0.75	Odisha	0.90	Odisha	0.60	Odisha	0.45	Odisha
18	0.69	Jharkhand	0.83	Jharkhand	0.55	Jharkhand	0.41	Jharkhand
19	0.60	Madhya Pradesh	0.72	Madhya Pradesh	0.48	Madhya Pradesh	0.36	Madhya Pradesh
20	0.43	Tamil Nadu	0.52	Tamil Nadu	0.35	Tamil Nadu	0.26	Tamil Nadu
21	0.40	Andhra Pradesh	0.48	Andhra Pradesh	0.32	Andhra Pradesh	0.24	Andhra Pradesh
22	0.18	Gujarat	0.21	Gujarat	0.14	Gujarat	0.11	Gujarat
23	0.17	Bihar	0.21	Bihar	0.14	Bihar	0.10	Bihar
24	0.14	Uttar Pradesh	0.17	Uttar Pradesh	0.11	Uttar Pradesh	0.09	Uttar Pradesh
25	0.11	Rajasthan	0.13	Rajasthan	0.09	Rajasthan	0.07	Rajasthan
26	0.09	Haryana	0.10	Haryana	0.07	Haryana	0.05	Haryana
27	0.08	Punjab	0.10	Punjab	0.07	Punjab	0.05	Punjab

exceptions within the top 8 states in terms of the developmental disability index. This demonstrates its robustness across the weighting categories.

The results indicate that across the alternative rankings, states of Manipur, Arunachal, Meghalaya, Nagaland, and Mizoram dominate in terms of disability index as these are also states which have more than 60 per cent of the geographical area under forests, alongside substantial hilly terrain. These are also the less industrialized states. However, Jammu and Kashmir ranks high due to its substantial disadvantage in terms of the infrastructure deficit, alongside the higher transaction costs due to hilly terrain, although it has much lower percentage area under forest cover.

Among the states which have 30-60 per cent forest cover, and can be differentiated in terms of hilly and non-hilly terrain, Sikkim and Uttarakhand are also at relatively a greater disadvantage in terms of the infrastructure deficit component. Assam, in spite of having more than 30 per cent of its geographical area under forest cover ranks lower due a pattern of distribution

of hill areas across districts. In Assam some districts have very large hill areas whereas some have large plain areas[11]. Some hill states have hill areas distributed in such a way that most of their districts are classified as hill districts; this has improved proportion of hilly terrain data for these states. Although Himachal has relatively less forest cover than some other states such as Kerala, Chattisgarh or Jharkhand, its overall rank in terms of disability is higher due to disadvantage in terms of the infrastructure deficit when interacted with the proportion of hilly terrain.

5. Summary and Recommendations

All states in India have state-specific requirements to meet their developmental aspirations and targets of which poverty alleviation and the creation of infrastructure command high priority. Chronic poverty is often associated with being located in remote rural areas, such as hills and forested areas (Mehta and Shah 2002), which may not even be adequately reflected in state averages (Chaudhuri and Gupta 2009) as in the case of Chamba in H.P. or the hilly regions in Assam. There are in place mechanisms to address these specific needs such as through the tax devolution formulae used by the Finance Commissions, grants made by the Planning Commission and so on. Specific requirements for incentivizing forest conservation and to compensate states for economic disadvantages arising from the maintenance of forest cover have also been addressed by the Thirteenth Finance Commission. The present study seeks to address another dimension – that of specific disadvantages arising from increased costs arising from a combination of bio-physical features such as terrain and increased transaction costs due to legal and public good aspects of maintaining forest ecosystems. This differs from the earlier forest disability index of the Planning Commission (2004) which computed the replacement value of forests in terms of (agricultural) farming. It may be noted that if a complete valuation of ecosystem services applying

[11] A hill district is a district with more than 50% of its geographical area under 'hill talukas' based on criteria adopted by the planning Commission for hill area and Western Ghats development programs.

state-of-the art techniques to sufficiently disaggregated and reliable data is possible, then that would constitute the most comprehensive valuation replacing all these sub components of values. In the interim, a forest disability index is constructed, thereby generating a principle and basis for compensating hill states for a part of the values that their ecosystems provide based on the rationale of opportunity cost in economics. Note that this is a partial value, which captures only certain aspects, and is not the full opportunity cost.

1. The forest disability index developed here demonstrates that there is a case for devolving funds to states based on the higher transaction costs that they face due to bio-geographical reasons such as forested land in hilly terrain.
2. Since the notion of disability stems from the motivation of inclusiveness and sustainable development, it maybe also proposed that such devolution should be closely monitored and linked to outputs / outcomes that address the disability and help in overcoming these.
3. A contentious issue in this context is the choice of policy option for compensation. Various considerations including low technical and governance capacities of the state and local governments have led to reservations about general grants or even project based grants in India. There seems some merit in this argument until governance deficiencies at the state and local government level are addressed. However, it would be unfair to use this argument to undermine the need for compensation to hill states. The Committee may consider creating an *"infrastructure and technology fund"* for hill states which can be used for creating and upgrading strategic developmental infrastructure and for development/sourcing of hill sensitive technology (especially for development of market for niche mountain products, and diversification and value addition in agriculture) which are the two most critical factors in improving the productivity of resources and

boosting the environmental and developmental performance of the hill states. However, it is to be emphasized that the need for such a fund should reduce overtime, so that eventually the compensation for provision of environmental services could be linked entirely to a comprehensive index of environmental externalities/performance.

4. Finally, to streamline and speed up the process of forest land clearance and environmental approvals the following suggestion are made. These are expected to impart efficiency and transparency to the system.

- Comprehensive planning for overall development of an area/city/state (medium to long-term perspective) encompassing infrastructure development schemes across different sectors to optimize space utilization which is the most scare resource especially for those states which are under constant pressure of forest conservation.
- Training for all relevant government departments/corporations/user agencies and forest officials for preparation of FCA, 1980 cases.
- Dedicated specialized groups/missions at the state level and in MoEF for preparation and scrutiny of cases. Initial preparation and scrutiny may also be outsourced to experts/expert agencies.
- Posting of forest officers and subject experts in relevant government departments/corporations/user agencies.
- Adoption of best global practices and e-governance systems.
- Continuous updating of crucial data and information for decision making.
- Introducing incentives for ensuring accountability.
- Posting a compliance officer at state level and at the MoEF who will periodically prepare a compliance report which can be analyzed to identify the action points and recommend appropriate processes, checks and balances, technical and compliance training and e-governance needs to plug systemic and other flaws.

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Appendix

Table1: Volume per hectare in Different States/UTs(2009)

State	Forest Cover Area (ha)(2009)(FCA)	Total Growing Stock(in million cum) (2009)	Volume/ha (in Cum)(2009)
Andhra Pradesh	4638900.00	370.77	79.93
Arunachal Pradesh	6741000.00	567.205	84.14
Assam	2767300.00	214.86	77.64
Bihar	684500.00	82.38	120.35
Chhattisgarh	5567400.00	404.45	72.65
Delhi	17620.00	2.75	155.79
Goa	221900.00	11.61	52.33
Gujarat	1461900.00	166.25	113.72
Haryana	160800.00	20.16	125.38
Himachal Pradesh	1467900.00	342.46	233.30
Jammu & Kashmir	2253900.00	375.133	166.44
Jharkhand	2297700.00	167.62	72.95
Karnataka	3619400.00	416.89	115.18
Kerala	1730000.00	191.64	110.78
Madhya Pradesh	7770000.00	334.77	43.08
Maharashtra	5064600.00	440.70	87.02
Manipur	1709000.00	81.569	47.73
Meghalaya	1727500.00	66.375	38.42
Mizoram	1911700.00	77.434	40.51
Nagaland	1331800.00	53.636	40.27
Orissa	4890300.00	358.82	73.37
Punjab	176400.00	35.02	198.50

Rajasthan	1608700.00	115.95	72.07
Sikkim	335900.00	20.849	62.07
Tamil Nadu	2362500.00	214.73	90.89
Tripura	797700.00	29.255	36.67
Uttar Pradesh	1433800.00	205.08	143.03
Uttarakhand	2449600.00	481.066	196.39
West Bengal	1299500.00	138.21	106.35
UNION TERRITORIES			
Andaman & Nicobar Islands	672400.00	53.85	80.09
Chandigarh	1678.00	0.37	221.69
Dadra & Nagar Haveli	21100.00	4.83	228.77
Daman & Diu	615.00	0.12	191.87
Lakshadweep	2706.00	0.05	18.11
Puducherry	5006.00	0.41	82.50
All States	**69202725.00**	**6047.25**	**87.38**

Source: SFR 2011

Table 2: Change in the Forest Cover Area of states in India (2007-2009)

State	Total Forest Cover Area(km^2)(2007)	Total Forest Cover Area(km^2)(2009)	Change(2009-2007)(km^2)
Andhra Pradesh	46,670.00	46,389.00	-281.00
Arunachal Pradesh	67,484.00	67,410.00	-74.00
Assam	27,692.00	27,673.00	-19.00
Bihar	6,804.00	6,845.00	41.00
Chhattisgarh	55,678.00	55,674.00	-4.00
Delhi	176.58	176.20	-0.38
Goa	2,212.00	2,219.00	7.00
Gujarat	14,620.00	14,619.00	-1.00
Haryana	1,594.00	1,608.00	14.00
Himachal Pradesh	14,668.00	14,679.00	11.00
Jammu & Kashmir	22,537.00	22,539.00	2.00
Jharkhand	22,894.00	22,977.00	83.00
Karnataka	36,190.00	36,194.00	4.00
Kerala	17,324.00	17,300.00	-24.00
Madhya Pradesh	77,700.00	77,700.00	0.00
Maharashtra	50,650.00	50,646.00	-4.00
Manipur	17,280.00	17,090.00	-190.00
Meghalaya	17,321.00	17,275.00	-46.00

Mizoram	19,183.00	19,117.00	-66.00
Nagaland	13,464.00	13,318.00	-146.00
Orissa	48,855.00	48,903.00	48.00
Punjab	1,664.00	1,764.00	100.00
Rajasthan	16,036.00	16,087.00	51.00
Sikkim	3,359.00	3,359.00	0.00
Tamil Nadu	23,551.00	23,625.00	74.00
Tripura	7,985.00	7,977.00	-8.00
Uttar Pradesh	14,341.00	14,338.00	-3.00
Uttarakhand	24,495.00	24,496.00	1.00
West Bengal	12,994.00	12,995.00	1.00
UNION TERRITORIES			
Andaman & Nicobar Islands	6,662.00	6,724.00	62.00
Chandigarh	17.00	16.78	-0.22
Dadra & Nagar Haveli	211.00	211.00	0.00
Daman & Diu	5.65	6.15	0.50
Lakshadweep	26.48	27.06	0.58
Puducherry	49.97	50.06	0.09
All States	**692,393.68**	**692,027.25**	**-366.43**

Source: SFR 2011

Table 3: Forest Cover Area in Hill Districts of India (2009)

State	No. Of Hill Districts(2009)	Geographical Area(km²)[GA](2009)under Hilly Terrain	Total Forest Cover Area(km²)(in Hill Districts)(2009)(TFCA)	(TFCA)% of [GA]	Change (2007-2009)
Arunachal Pradesh	13	83,743.00	67,410.00	80.50	-74
Assam	3	19,153.00	12,985.00	67.80	-18
Himachal Pradesh	12	55,673.00	14,679.00	26.37	11
Jammu & Kashmir	14	222,236.00	22,539.00	10.14	2
Karnataka	6	48,046.00	23,200.00	48.29	0
Kerala	10	29,572.00	13,687.00	46.28	-13
Maharashtra	7	69,905.00	15,502.00	22.18	-6
Manipur	9	22,327.00	17,090.00	76.54	-190
Meghalaya	7	22,429.00	17,275.00	77.02	-46
Mizoram	8	21,081.00	19,117.00	90.68	-66

Nagaland	8	16,579.00	13,318.00	80.33	-146
Sikkim	4	7,096.00	3,359.00	47.34	0
Tamil Nadu	5	22,789.00	6,372.00	27.96	5
Tripura	4	10,486.00	7,977.00	76.07	-8
Uttarakhand	13	53,483.00	24,496.00	45.80	1
West Bengal	1	3,149.00	2,289.00	72.69	0
All States	**124**	**707,747.00**	**281,295.00**	**39.75**	-548

Source: SFR 2011

Table 4: Reasons of change in Forest Cover Area (2007-2009)

State	Reason
Andhra Pradesh	Management intervention like harvesting of short rotation crops followed by new regeneration/plantations, forest clearances in some encroached areas.
Andaman & Nicobar Islands	Recovery of coastal vegetation in Tsunami affected areas, shelterbelt plantations and increase in mangrove cover.
Arunachal Pradesh	Change in forest cover in the state is because of shifting cultivation and biotic pressure.
Assam	Decrease in Forest Cover is mainly attributed to illicit felling, encroachments in insurgency affected areas and shifting cultivation practices.
Bihar	Enhanced Plantation activity outside forest areas in recent times contributed towards increase in forest cover.
Chhattisgarh	Submergence of forest areas in catchments of the dams.
Jharkhand	Increase in forest cover is mainly on account of effective protection by the Village Forest Protection Committees and plantation activities undertaken in the state.
Manipur	Decrease in Forest Cover in the state is due to shortening of shifting cultivation cycle and biotic pressure.
Meghalaya	Decrease in Forest Cover in the state is due to shortening of shifting cultivation cycle and biotic pressure.
Mizoram	Decrease in Forest Cover in the state is due to shortening of shifting cultivation cycle and biotic pressure.
Nagaland	Decrease in Forest Cover in the state is due to shortening of shifting cultivation cycle and biotic pressure.
Orissa	Main reason for the increase in forest cover is due to effective protection by the JFM committees and regeneration of shifting cultivation areas.
Punjab	Growth of young plantations carried out under extremely aided Project and Agro-forestry activities in TOF areas.
Rajasthan	Regeneration in the forest areas and extensive plantation activities.
Tamil Nadu	Regeneration in the forest areas and extensive plantation activities in and outside forests.

Source: SFR 2011