



**Report of the Committee**

**To**

**Formulate Objective Parameters for**  
**Identification of Inviolable Forest Areas**

**Ministry of Environment and Forests,**  
**Government of India**

**July 2012**

## 1. Introduction

1.1. The Group of Ministers (GoM) constituted by the Cabinet Secretariat vide their O.M. No. 121/4/3/2010-Cab. dated 03.02.2011 to consider the environmental and developmental issues relating to coal mining and other development projects, in its fifth meeting held under the Chairmanship of the Hon'ble Finance Minister on 20<sup>th</sup> September 2011 *inter-alia* suggested that identified pristine forest areas where any mining activity would lead to irreversible damage to the forests should be barred from any kind of non-forest activity. The GoM further suggested that all such forests which can never be regenerated to the desired quality should be protected. The GoM therefore suggested that a committee comprising experts in the field can be constituted to identify such forests.

1.2. The Ministry of Environment and Forests (MoEF) after examination of the matter observed that for identification of such forest areas throughout India in an objective and unbiased manner, it will need to constitute two Committees. The first committee to formulate objective parameters for identification of such inviolate forest areas for any mining and related activities and after approval, the second committee to actually identify and prepare geo-referenced maps of the areas that meet the identified parameters in each State/ Union Territory.

1.3. The MoEF vide order dated 30.03.2012 therefore, constituted a committee under the Chairmanship of Secretary, Environment and Forests to formulate parameters for identification of pristine forest areas where any non-forestry activity would lead to irreversible damage, and such other forest areas which need to be conserved and protected to meet the larger objective of the long term conservation of forests and wildlife resources in the country. Apart from representatives of various institutes/organization such as National Bio-diversity Authority, Forest Survey of India, Wildlife Institute of India and National Tiger Conservation Authority, Principal Chief Conservators of Forest of Meghalaya, Tamilnadu, Madhya Pradesh, Rajasthan, Uttarakhand, Odisha and Rajasthan are also included as members of the committee. A copy of the MoEF's said order dated 30.03.2012 is enclosed as **Annexure-I**.

## 2. Broad Principles for Identification of Inviolate Areas

The inviolate areas are sites of significance for conservation of biodiversity (floral and faunal) and forest types that are unique and ecologically important. Besides these, the forested areas having high density coverage that are important for rendering invaluable ecological services, also need protection and conservation for sustainability of these

services through the generations. To identify and prioritize such sites/areas, global standard criteria and thresholds through effective, justifiable and transparent process using the best available scientific data/information to map such areas. Keeping this in mind, the Committee has identified following measurable parameters for identification of inviolate areas.

**A. Forest Type:**

Our country is endowed with a wide range of edaphic, climatic and physiographic conditions. This has resulted in a vast diversity of flora and fauna bringing the country within the mega diversity regions of the world. Of the 178 forest types identified in the country's forests as per 'Champion and Seth' classification (1968), many of them are unique (and therefore irreplaceable) to a particular site while some of these forest types, such as Tropical Wet Evergreen forests, are ecologically sensitive as they harbor a wide range of species diversity. Likewise, there are several forest types (e.g. Myristica swamp forest, reed breaks, desert dunes scrub etc.) which are either very small in extent and are found in one or few localities in the entire country and are hence irreplaceable. Based on the principles of their comparative ecological significance, extent and range, uniqueness etc. an attempt has been made to score these types on a scale of 1-100.

**B. Biological Richness:**

Biodiversity offers enormous economic and environmental values that are critical for human well-being. It is, however, imperiled by threats of habitat loss, degraded/impaired ecological processes, habitat fragmentation and climate change. Safeguarding significant/inviolate areas forms the backbone of biodiversity conservation. Sites of high irreplaceability and high vulnerability have the highest conservation urgency. Indian Institute of Remote Sensing have carried out biodiversity characterization for the country as a whole at landscape levels. Prioritization of the area based on the IIRS data on biodiversity, may be useful for scoring a site on the basis of this parameter.

**C. Wildlife Value:**

The country has a network of protected areas (PAN) in its forests. Although, global average for PAN coverage is 12%, India has only 4.9% of its geographical area under PAN comprising notified sanctuaries and national parks. These areas enjoy legal protection under Wild Life (Protection) Act, 1972 and specific provisions thereto, prohibit diversion of these areas for activities which are ecologically incompatible and may adversely affect their integrity. These PAs should therefore, be treated as inviolate. However, besides the

protected areas, there are corridors that connect these and special wildlife habitat such as wetlands, breeding sites of important bird species, congregation sites which also need to be conserved and preserved for the persistence of biodiversity. Based on these considerations, scoring criteria have been developed for assigning wildlife values to a site.

#### **D. Forest Cover:**

Forest cover density is an important parameter for assessing the health of a forest ecosystem. Biennial estimates of forest cover in country are made by Forest Survey of India and presented in India State of Forest Report (ISFR). As per ISFR 2011, very dense forests (having crown density more than 70 %) constitute only 2.54% of the geographical area, while moderately dense forest (having crown density from 40 % to 70 %) and open forest (having crown density from 10 % to 40 %) are 9.76% and 8.75% respectively. Scoring for forest cover can be done by averaging the gross forest cover and weighted forest cover, both expressed as fraction of the total area, multiplied by hundred.

#### **E. Landscape Integrity**

Integrity of landscape is an important factor to ensure integration of various elements of habitats, thereby fulfilling the requirement of connectivity, livelihoods and contiguity among them, besides lending aesthetic values. The world over, landscape approach is being adopted in land resources management and conservation. From biodiversity prospective also, it provides necessary gradients for species movement and their dispersion, thus ensuring their sustainability. Based on the land-use pattern and vegetation, some areas representing integrity of landscape, therefore, need to be protected for aforesaid reasons. An attempt has been made to give scores to such landscapes as visualized on satellite imageries/maps for the purpose of this exercise.

#### **F. Hydrological Value:**

Forests play important role in maintenance of hydrological cycle. Water is regarded as one of the important products of the forests. Maintenance of forest cover in catchment area of first order perennial streams is important for survival of these streams.

All the aforesaid parameters are measurable and information on these can be collected/compiled from data sources at Forest Survey of India (FSI), Wildlife Institute of

India (WII) and Indian Institute of Remote Sensing (IIRS)/National Remote Sensing Centre (NRSC) *etc.* The information being available in geo-spatial format, it is possible to carry out analysis in a GIS mode, and also facilitate storage and retrieval of information for developing a Decision Support System in a transparent and objective manner.

### **2.1. Methodology for identification of inviolate areas**

For identification of inviolate areas, the country will be divided into 1 km x 1 km grids. For each cell of a grid, scores, based on the aforesaid parameters will be given. These scores shall be averaged for each grid. Based on the threshold average score, each grid would be assigned the attribute of 'inviolate', as necessary.

### **2.2 Decision Rules for inviolate areas**

The basic unit for identification of inviolate areas would be a grid of 1 km x 1 km size on a map/imagery. Aggregate average score for each of the grid shall be worked out using an automated system and making use of forest cover/forest type map (digital data) of FSI, WL Map prepared by WII and biodiversity related data of IIRS. Following decision rules may be used for labelling each grid as inviolate.

#### **Decision Rule 1**

All the grids falling in Protected Areas (National Parks and Wildlife Sanctuaries), areas located within 1 km distance from boundary of protected areas, compact patches (of minimum 1 km sq size) of very dense forests, last remnants of forest types having total geographical area in entire country less than 50 sq. km, areas located in direct draining catchment of first-order perennial streams being utilised as water source/feeder stream for water supply schemes for towns and other habitations, areas located in direct draining catchment of the first-order perennial streams feeding hydro power/irrigation/ hydro power projects, and areas located within 250 meter distance from banks of the perennial streams/rivers and boundary of important wetlands (having area more than 10 ha.) and storage reservoirs of water supply/ irrigation/ hydro power projects / multi-purpose projects shall be automatically labelled inviolate.

## Decision Rule 2

Grids whose average score exceeds 70 (out of 100) shall also be labelled as inviolate.

## Decision Rule 3

Mining Blocks shall be considered inviolate if a majority of grids falling within a block have been labelled as inviolate.

## 3. Assigning Score for Each Parameter

### 3.1 Forest Cover

3.1.1 The FSI estimates forest cover of the country at an interval of every two years and publishes it in the form of State of Forest Reports. The latest forest cover (ISFR, 2011) layers prepared by the Forest Survey of India will be utilised to assign scores for forest cover.

3.1.2 Score for forest cover will be average of the gross forest cover and weighted forest cover, both expressed as fraction of the total area, multiplied by one hundred.

3.1.3 Gross forest cover will be the sum-total of the area of the open forest<sup>1</sup>, moderately dense forests<sup>2</sup> and the very dense forests<sup>3</sup>.

3.1.4 Similarly weighted forest cover is defined as below:

**Weighted forest cover:** Area of open forest x 0.25 + Area of moderately dense forest x 0.55 + Area of very dense forest x 0.85.

### 3.2 Forest Type

3.2.1 The FSI has prepared forest type map by mapping of 178 forest types (of natural origin) and plantations/ trees outside forests available in the country.

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<sup>1</sup> Forests having canopy density between 10 % to 40% and average canopy density 0.25

<sup>2</sup> Forests having canopy density between 40 % to 70% and average canopy density 0.55

<sup>3</sup> Forests having canopy density more than 70% and average canopy density 0.85

3.2.2 Based on the functional value and abundance/rarity, each forest type has been assigned a score on 0 to 100 scale. Details of the same are given in **annexure-II**.

3.2.3 To prevent disappearance of the last remnant of each forest type, all those forest types having total area less than 50 km<sup>2</sup> have been assigned score of 100.

### 3.3 Biological Richness

3.3.1 The Indian Institute of Remote Sensing (IIRS) has prepared biological richness map of the country. Biological richness of a landscape as per the said map is determined as a function of ecosystem uniqueness (EU), species diversity (H), biodiversity value (BV), terrain complexity and disturbance index (DI).

3.3.2 The Biological Richness (BR) for preparation of the said map has been calculated as below:

**Biological Richness**= $f$ {Ecosystem uniqueness, species richness or diversity, biodiversity value, terrain complexity and disturbance index}

$$BR = \sum_{i=1}^n (DI_i \times W_{ti1} + TCI_i \times W_{ti2} + SRI_i \times W_{ti3} + BVI_i \times W_{ti4} + EU_i \times W_{ti5})$$

where  $W_t$  = Weightages.

3.3.3 Disturbance index (DI) used in calculation of Biological richness has been computed by adopting a probabilistic weightage based linear combination of the defined parameters, as below:

Disturbance Index =  $f$  {fragmentation (F), porosity (P), interspersion (I), biotic interference (B), juxtaposition (J)}

3.3.4. The output Biological Richness spatial layer has been scaled to (0 - 100).

### 3.4 Wildlife Value

3.4.1 All protected areas notified under Wild Life (Protection) Act, 1972 would automatically be categorised as inviolate. However, the score for wildlife value of areas falling outside PAN would be based on its intrinsic value as wildlife habitat.

3.4.2 Rules for assigning score for wildlife value will be as below:

| <b>Description of Area</b>  | <b>Score</b> |
|---|--------------|
| Exclusive breeding sites/ habitats of rare/ endangered species even if they are not notified as Wildlife Sanctuary/ National Parks                      | 95           |
| Areas located outside the protected area network but located in critical migratory corridors linking important wildlife habitats                        | 90           |
| Area located within the eco-sensitive zones (beyond 1 km distance from boundary) around periphery of protected areas and buffer zone of tiger reserves. | 75           |
| Areas notified as Conservation Reserves   | 70           |
| Areas located outside the protected area network but having presence of more than 5 Schedule-I wildlife species   | 60           |
| Areas located outside the PA and having occasional presence of wildlife   | 25           |

### 3.5 Landscape Integrity

Depending on the level of fragmentation, size and distance from boundary of the un-fragmented landscapes in which these areas are located, a score of 0 to 100 scale will be assigned.

3.5.1 Rules to assign score for landscape integrity will be as below:

| <b>Description of Area</b>   | <b>Score</b> |
|--|--------------|
| Area located at or near the centre of an un-fragmented landscape having more than 1,000 sq. km area    | 100          |
| Area located at or near the centre of an un-fragmented landscape having area between 500 – 1000 sq. km | 90           |

|  |    |
|--|----|
| Area located at or near the centre of an un-fragmented landscape having area between 100 - 500 sq. km  | 80 |
| Area located at or near the centre of an un-fragmented landscape having area less than 100 sq. km  | 70 |
| Areas located in the totally fragmented landscapes having not a single un-fragmented patch of size more than 5.00 hectare within and 2 km distance from boundary of the cell | 0  |

### 3.6 Hydrological Value

3.6.1 The score for hydrological value of an area will be based on utility of area as catchment for a perennial/seasonal stream/river, economic importance of the river/streams fed by the catchment and distance from river/stream/wetland bank etc.

Detailed rules for assigning the score for hydrological value of an area are as below:

| Description of Area   | Score |
|---|-------|
| Area located in catchment area of water supply schemes, not being a part of the catchment area of any first order perennial stream  | 75    |
| Areas located within 100 meter distance from the banks of major seasonal streams/rivers   | 70    |
| Area located in catchment area of hydro power/ irrigation/multi-purpose projects not being a part of the catchment area of a first order perennial stream   | 60    |
| Area located in catchment area of perennial rivers having no hydro power/ irrigation/multi-purpose projects on them and also not being a part of the catchment area of a first order perennial stream | 55    |
| Area located in catchment area of important seasonal streams/rivers having no hydro power/ irrigation/multi-purpose projects on them  | 50    |
| Area not being catchment of any perennial or any major seasonal stream/river  | 40    |

The methodology adopted if approved may be placed in the public domain for comments before adoption.

#### **4. Strategy for Identification of Inviolate Areas**

4.1 Keeping in view that country-wide geo-spatial data for all the six parameters are already available, a committee will be constituted under Chairmanship of the Director General, FSI and consisting of representatives of the WII, National Biodiversity Authority, National Tiger Conservation Authority and concerned State Forest Departments and State Remote Sensing Application Centres to identify the areas which as per decision Rules indicated in para 2.2 may be defined as inviolate and submit a list along with geo-referenced map of such candidate inviolate areas to the Ministry of Environment & Forests.

4.2 On receipt of the list along with geo-referenced maps of the candidate inviolate areas, the MoEF will place a list of such inviolate areas on website of the Ministry to seek comments of public and other stakeholders within a stipulated period. The list and geo-referenced maps of candidate inviolate areas will also be sent to the concerned State/Union Territory Governments for their comments.

4.3 After considering the views of the concerned State/ UT Governments and other stakeholders, MoEF will finalize the list and maps of inviolate areas in each State/ UT and will notify them under the Environment (Protection) Act, 1986.

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**Annexure-I****Copy**

F. No. 11-168/2009-FC (pt.)  
Government of India  
Ministry of Environment and Forests  
(FC Division)

Paryavaran Bhawan,  
CGO Complex, Lodhi Road,  
New Delhi - 110 510.  
Dated: 30<sup>th</sup> March, 2012

**ORDER**

**Whereas**, a Group of Ministers (GoM) constituted by the Cabinet Secretariat vide their O.M. No. 121/4/3/2010-Cab. dated 03.02.2011 to consider the environmental and developmental issues relating to coal mining and other development projects, in its fifth meeting held under the Chairmanship of the Hon'ble Finance Minister on 20<sup>th</sup> September 2011 *inter-alia* suggested that identified pristine forest areas where any mining activity would lead to irreversible damage to the forests should be barred from any kind of non-forest activity;

**2. And whereas**, the GoM further suggested that all such forests which can never be regenerated to the desired quality should be protected;

**3. And whereas**, the GoM further suggested that a committee comprising experts in the field can be constituted to identify such forests;

**4. And whereas**, this Ministry after examination of the matter decided that for identification of pristine forest areas where any mining activity would lead to irreversible damage, and such other forest areas which needs to be conserved and protected to meet the larger objective of the long term conservation of forests and wildlife resources in the country, in an objective and unbiased manner, it may constitute two Committees. **First** to formulate objective parameters for identification of such areas, and **second** to actually identify and prepare geo-referenced maps of the areas that meet these parameters;

**5. Now therefore**, it is hereby decided that a committee, with the following composition, is constituted with immediate effect to formulate objective parameters for identification of inviolate forest areas:

- |   |                 |
|---|-----------------|
| 1. Secretary, Environment & Forests , Govt. of India  | <b>Chairman</b> |
| 2. Director General of Forests & Special Secretary to the Government of India                                 | <b>Member</b>   |
| 3. Addl. Director General of Forests (Wildlife), Ministry of Environment & Forests, Govt. of India            | <b>Member</b>   |
| 4. Addl. Director General of Forests (Forest Conservation), Ministry of Environment & Forests, Govt. of India | <b>Member</b>   |
| 5. Chairperson, National Bio-diversity Authority, Chennai   | <b>Member</b>   |

|     |  |                  |
|-----|--|------------------|
| 6.  | Director General, Forest Survey of India, Dehradun             | Member           |
| 7.  | Director, Wildlife Institute of India, Dehradun                | Member           |
| 8.  | Member Secretray, National Tiger Conservation Authority (NTCA) | Member           |
| 9.  | Principal Chief Conservator of Forests, Madhya Pradesh         | Member           |
| 10. | Principal Chief Conservator of Forests, Tamil Nadu             | Member           |
| 11. | Principal Chief Conservator of Forests, Uttarakhand            | Member           |
| 12. | Principal Chief Conservator of Forests, Orissa                 | Member           |
| 13. | Principal Chief Conservator of Forests, Meghalaya              | Member           |
| 14. | Principal Chief Conservator of Forests, Rajasthan              | Member           |
| 15. | Joint Secretray, Impact Assessment Division, MoEF              | Member           |
| 16. | Inspector General of Forests (Forest Conservation), MoEF       | Member-Secretray |

6. **And**, it is further decided that committee will submit its report within one month from date of its constitution.

Sd/

(H.C. Chaudhary)

Assistant Inspector General of Forests

1. Chairperson, National Bio-diversity Authority, Chennai.
2. Director General, Forest Survey of India, Dehradun.
3. Director, Wildlife Institute of India, Dehradun.
4. The Member Secretray, National Tiger Conservation Authority (NTCA).
5. Principal Chief Conservator of Forests, Madhya Pradesh.
6. Principal Chief Conservator of Forests, Tamilnadu.
7. Principal Chief Conservator of Forests, Uttarakhand.
8. Principal Chief Conservator of Forests, Orissa.
9. Principal Chief Conservator of Forests, Meghalaya.
10. Principal Chief Conservator of Forests, Rajasthan.
11. Sr. PPS to Secretray, Environment & Forests, MoEF.
12. Sr. PPS to DGF &SS, MoEF.
13. Sr. PPS to Addl. DGF (WL), MoEF.
14. Sr. PPS to Addl. DGF (FC), MoEF
15. PS to IGF (FC), MoEF.
16. PS to JS (RG), MoEF.

## Annexure-II

## Forest Types of the Country and Their Respective Scores

| Sl. No   | Forest Type  | Area (in Km <sup>2</sup> ) | Score |
|--|--|----------------------------|-------|
| <b>Group 1 Tropical Wet Evergreen Forests</b>  |  |                            |       |
| 1  | 1A/C1 Giant evergreen forest                                     | 39.43                      | 100   |
| 2  | 1A/C2 Andaman tropical evergreen forest                          | 2933.23                    | 95    |
| 3  | 1A/E1 (Andamans moist deciduous forest)                          | 160.04                     | 100   |
| 4  | 1A/C3 Southern hilltop tropical evergreen forest                 | 596.59                     | 95    |
| 5  | 1A/C4 West coast tropical evergreen forest                       | 10794.66                   | 90    |
| 6  | 1B/C1 Assam valley tropical wet evergreen forest (Dipterocarpus) | 1916.61                    | 95    |
| 7  | 1B/C2 a Kayea forest   | 1272.34                    | 95    |
| 8  | 1B/C2 b Mesua forest   | 21.40                      | 100   |
| 9  | 1B/C3 Cachar Tropical Evergreen Forest                           | 2578.59                    | 95    |
| 10   | 1/E1 Cane Brakes   | 69.73                      | 95    |
| 11   | 1/E2 Wet Bamboo Brakes   | 59.68                      | 95    |
| 12   | 1/2S1 Pioneer Euphorbiaceous Scrub                               | 485.01                     | 90    |
| <b>Group 2 Tropical Semi-Evergreen Forests</b> |  |                            |       |
| 13   | 2A/C1 Andaman Semi-Evergreen Forest                              | 1976.76                    | 85    |
| 14   | 2A/C2 West coast semi evergreen forest                           | 12382.86                   | 80    |
| 15   | 2A/C3 Tirunelveli semi evergreen forest                          | 119.68                     | 90    |
| 16   | 2A/2S1 West Coast Secondary Evergreen Dipterocarpus Forest       | 559.37                     | 85    |
| 17   | 2B/ C1a Assam alluvial plains semi-evergreen forest              | 6913.59                    | 80    |
| 18   | 2B/C1b Eastern Sub-Montane Semi-Evergreen Forest                 | 5544.13                    | 80    |
| 19   | 2B/1S1 Sub-Himalayan Light alluvial Semi-Evergreen Forest        | 21592.78                   | 80    |
| 20   | 2B/2S1 (Pioneer Euphorbiaceous scrub)                            | 334.64                     | 90    |
| 21   | 2B/2S2 Eastern Alluvial Secondary Semi-Evergreen Forest          | 7445.99                    | 80    |

|   |  |          |     |
|---|--|----------|-----|
| 22  | 2B/2S3 Sub Himalayan Secondary Wet Mixed Forest        | 357.50   | 85  |
| 23  | 2B/C2 Cachar Tropical Semi-Evergreen Forest            | 18918.77 | 80  |
| 24  | 2B/C3 Orissa Semi Evergreen Forest                     | 106.01   | 90  |
| 25  | 2/E1 Cane brakes                                       | 31.85    | 100 |
| 26  | 2/E2 (Wet bamboo brakes)                               | 12.80    | 100 |
| 27  | 2/E3 Moist bamboo brakes                               | 347.20   | 90  |
| 28  | 2/E4 Lateritic Semi Evergreen Forest                   | 239.27   | 90  |
| 29  | 2/2S1 Secondary moist bamboo brakes                    | 21785.73 | 80  |
| <b>Group 3 Tropical Moist Deciduous Forests</b> |  |          |     |
| 30  | 3A/C1 Andaman Moist Deciduous Forest                   | 585.43   | 75  |
| 31  | 3A/2S1 Andaman Secondary Moist Deciduous Forest        | 8.72     | 100 |
| 32  | 3B/C1 a Very moist teak forest                         | 105.19   | 70  |
| 33  | 3B/C1 b Moist teak forest                              | 10373.52 | 65  |
| 34  | 3B/C1 c Slightly moist teak Forest                     | 8420.91  | 60  |
| 35  | 3B/C2 Southern moist mixed deciduous forest            | 32074.77 | 60  |
| 36  | 3B/2S1 Southern Secondary Moist Mixed Deciduous Forest | 1417.08  | 60  |
| 37  | 3C/C1 a(i) East Himalayan Sal                          | 363.96   | 70  |
| 38  | 3C/C1 a(ii) Khasi Hill Sal                             | 1565.94  | 70  |
| 39  | 3C/C1 b(i) East Himalayan Upper Bhabar Sal             | 978.43   | 70  |
| 40  | 3C/C1 b(ii) East Himalayan Lower Bhabar Sal            | 427.94   | 70  |
| 41  | 3C/C1 c Eastern Tarai Sal Forest                       | 326.32   | 70  |
| 42  | 3C/C1 d Peninsular (coastal) Sal Forest                | 4.94     | 100 |
| 43  | 3C/C2 a Moist Siwalik sal forest                       | 3212.21  | 70  |
| 44  | 3C/C2 b(i) Bhabar-dun sal forest                       | 662.46   | 70  |
| 45  | 3C/C2 c Moist tarai sal forest                         | 542.20   | 70  |
| 46  | 3C/C2 d (i) Western Light Alluvial Plain Sal           | 1377.31  | 70  |
| 47  | 3C/C2d (iii) Eastern Heavy Alluvium plain Sal          | 997.77   | 70  |
| 48  | 3C/C2d (iv) App. Kamrup Sal                            | 877.96   | 70  |
| 49  | 3C/2e (i) Moist Peninsular High level Sal Forests      | 6660.01  | 70  |
| 50  | 3C/2e (ii) Moist Peninsular Low level Sal Forests      | 24500.50 | 70  |

|    |   |           |     |
|----|---|-----------|-----|
| 51 | 3C/2e (iii) Moist Peninsular Valley Sal Forests           | 1383.54   | 75  |
| 52 | 3C/DS1 Moist Sal Savannah                                 | 12.33     | 100 |
| 53 | 3C/C3 a West Gangatic moist mixed deciduous Forest        | 1103.97   | 60  |
| 54 | 3C/C3 b East Himalayan Moist Mixed Deciduous Forest       | 29806.03  | 60  |
| 55 | 3C/2S1 Northern Secondary Moist Mixed Deciduous Forest    | 5659.17   | 60  |
| 56 | 3C/2S2 (Secondary Euphorbiaceous Scrub )                  | 72.60     | 85  |
| 57 | 3/E1 Terminalia tomentosa forest                          | 14.80     | 100 |
| 58 | 3/1S1 Low Alluvial savannah woodland(Salmalia - Albizzia) | 4052.47   | 60  |
| 59 | 3/1S2 a Terminalia Lagerstroemia                          | 33.36     | 100 |
| 60 | 3/1S2 b Terminalia-Duabanga                               | 3562.72   | 60  |
| 61 | 3/2S1 (Dry bamboo brakes)                                 | 1.29      | 100 |
|    | <b>Group 4 Littoral &amp; Swamp Forests</b>               |           |     |
| 62 | 4A/L1 Littoral Forest                                     | 105.53    | 70  |
| 63 | 4B/TS1 Mangrove Scrub                                     | 750.86    | 60  |
| 64 | 4B/TS2 Mangrove Forest                                    | 2708.17   | 70  |
| 65 | 4B/TS3 Salt Water Mixed forest (Heritiera)                | 487.72    | 70  |
| 66 | 4B/TS4 Brackish Water Mixed forest (Heritiera)            | 313.62    | 70  |
| 67 | 4B/E1 Palm Swamp  | 151.61    | 70  |
| 68 | 4C/FS1 Myristica Swamp forest                             | 0.79      | 100 |
| 69 | 4C/FS2 Submontane Hill-valley Swamp Forest                | 10.01     | 100 |
| 70 | 4D/SS2 Barringtonia swamp Forest                          | 10.90     | 100 |
| 71 | 4D/SS3 Syzygium cumini swamp low forest                   | 215.10    | 70  |
| 72 | 4D/2S2 Eastern Wet Alluvial Grassland                     | 152.37    | 70  |
| 73 | 4E/RS1 Riparian fringing forest                           | 57.51     | 80  |
|    | <b>Group 5 Tropical Dry Deciduous Forests</b>             |           |     |
| 74 | 5A/C1 a Very Dry Teak Forest                              | 2570.88   | 40  |
| 75 | 5A/C1 b Dry Teak Forest                                   | 43275.08  | 40  |
| 76 | 5A/C2 Dry red sanders bearing forest                      | 801.25    | 70  |
| 77 | 5A/C3 Southern Dry Mixed Deciduous Forest                 | 102051.00 | 40  |

|     |   |          |     |
|-----|---|----------|-----|
| 78  | 5B/C1 a Dry Siwalik Sal Forest            | 913.24   | 60  |
| 79  | 5B/C1 b Dry Plains Sal Forest             | 125.58   | 60  |
| 80  | 5B/C1 c Dry Peninsular Sal Forest         | 33999.48 | 60  |
| 81  | 5B/C2 Northern Dry Mixed Deciduous Forest | 59370.21 | 40  |
| 82  | 5/DS1 Dry Deciduous Scrub                 | 32550.06 | 40  |
| 83  | 5/DS2 Dry savannah Forest                 | 842.32   | 40  |
| 84  | 5/DS3 (Euphorbia Scrub)                   | 28.43    | 100 |
| 85  | 5/DS4 (Dry grass land)                    | 860.10   | 30  |
| 86  | 5/E1 Anogeissus pendula Forest            | 5662.71  | 30  |
| 87  | 5/DS1 Anogeissus pendula Scrub            | 459.60   | 25  |
| 88  | 5/E2 Boswellia Forest                     | 1098.48  | 25  |
| 89  | 5/E3 Babul Forest                         | 138.01   | 20  |
| 90  | 5/E4 Hardwickia forest                    | 694.33   | 30  |
| 91  | 5/E5 Butea forest                         | 528.76   | 30  |
| 92  | 5/E6 Aegle forest                         | 1.54     | 100 |
| 93  | 5/E7 Laterite thorn forest                | 272.64   | 30  |
| 94  | 5/E8 a Phoenix Savannah Forest            | 45.96    | 100 |
| 95  | 5/E8 b Babul Savannah Forest              | 26.58    | 100 |
| 96  | 5/E8 c Salvadora - Tamarix scrub          | 188.17   | 35  |
| 97  | 5/E9 Dry bamboo brake                     | 5921.33  | 20  |
| 98  | 5/1S1 Dry Tropical Riverain Forest        | 212.44   | 30  |
| 99  | 5/1S2 Khair Sissoo Forest                 | 2504.48  | 30  |
| 100 | 5/2S1 Secondary dry deciduous forest      | 4431.59  | 25  |
|     | <b>Group 6 Tropical Thorn Forest</b>      |          |     |
| 101 | 6A/C1 Southern thorn forest               | 6902.41  | 20  |
| 102 | 6A/C2 Karnatak umbrella thorn forest      | 1353.59  | 20  |
| 103 | 6A/DS1 Southern thorn scrub               | 2802.56  | 10  |
| 104 | 6A/DS2 Southern Euphorbia scrub           | 28.27    | 100 |
| 105 | 6B/C1 Desert Thorn forest                 | 1561.57  | 10  |
| 106 | 6B/C2 Ravine Thorn Forest                 | 1011.63  | 15  |
| 107 | 6B/DS1 Zizyphus Scrub                     | 8.83     | 100 |
| 108 | 6B/DS2 Tropical Euphorbia Scrub           | 643.45   | 15  |
| 109 | 6/E1 (Euphorbia scrub)                    | 181.25   | 15  |

|     |   |          |     |
|-----|---|----------|-----|
| 110 | 6/E2 Acacia senegal forest                              | 870.62   | 15  |
| 111 | 6/E3 Rann Saline Thorn Forest                           | 714.28   | 15  |
| 112 | 6/E4 Salvadora Scrub                                    | 32.98    | 100 |
| 113 | 6/1S1 Desert dune scrub                                 | 12.40    | 100 |
|     | <b>Group 7 Tropical Dry Evergreen Forest</b>            |          |     |
| 114 | 7/C1 Tropical dry evergreen forest                      | 871.17   | 80  |
| 115 | 7/DS1 Tropical dry evergreen scrub                      | 56.84    | 80  |
|     | <b>Group 8 Subtropical Broadleaved Hill Forests</b>     |          |     |
| 116 | 8A/C1 Nilgiri sub tropical hill forest                  | 607.95   | 70  |
| 117 | 8A/DS1 South Indian sub-tropical hill savannah woodland | 29.84    | 75  |
| 118 | 8A/E1 Reed brakes (Ochalandra)                          | 8.17     | 100 |
| 119 | 8A/C2 Western Sub Tropical Hill Forest                  | 795.10   | 85  |
| 120 | 8B/C1 East Himalayan Sub-tropical Wet Hill              | 12172.18 | 70  |
| 121 | 8B/C2 Khasi Sub-Tropical Wet Hill Forest                | 5565.58  | 70  |
| 122 | 8B/2S1 (Assam subtropical pine forest)                  | 38.22    | 90  |
|     | <b>Group 9 Subtropical Pine Forests</b>                 |          |     |
| 123 | 9/C1 a Lower or Siwalik chir pine forest                | 5566.44  | 10  |
| 124 | 9/C1 b Upper or Himalayan chir pine forest              | 7880.46  | 10  |
| 125 | 9/DS1 Himalayan subtropical scrub                       | 623.88   | 20  |
| 126 | 9/DS2 Subtropical Euphorbia scrub                       | 42.04    | 90  |
| 127 | 9/C2 Assam Sub-Tropical Pine Forest                     | 4067.13  | 10  |
| 128 | 9/DS1 Assam subtropical pine savannah                   | 646.97   | 30  |
|     | <b>Group 10 Subtropical Dry Evergreen Forest</b>        |          |     |
| 129 | 10/C1 a Olea cuspidata scrub forest                     | 196.06   | 60  |
|     | <b>Group 11 Montane Wet Temperate Forests</b>           |          |     |
| 130 | 11A/C1 Southern montane wet temperate forest            | 128.01   | 80  |
| 131 | 11A/DS1 Southern montane wet scrub                      | 107.33   | 80  |
| 132 | 11A/DS2 Southern montane wet grassland                  | 96.75    | 70  |
| 133 | 11B/C1 a Lauraceous forest                              | 123.39   | 70  |
| 134 | 11B/C1 b Ban Oak forest                                 | 2745.98  | 65  |
| 135 | 11B/C1 c High Level Oak forest                          | 20.34    | 100 |

|     |   |         |     |
|-----|---|---------|-----|
| 136 | 11B/C2 Naga Hill Wet Temperate forest                                   | 1742.08 | 70  |
|     | <b>Group 12 Himalayan Moist Temperate Forests</b>                       |         |     |
| 137 | 12/C1 a Ban oak forest (Q.incana)                                       | 6402.68 | 65  |
| 138 | 12/C1 b Moru oak forest (Q.dilatata)                                    | 1020.27 | 65  |
| 139 | 12/C1/DS1 Oak scrub   | 568.47  | 60  |
| 140 | 12/C1 c Moist deodar forest   | 4856.05 | 70  |
| 141 | 12/C1 d Western mixed coniferous forest (spruce, blue pine, silver fir) | 5909.53 | 70  |
| 142 | 12/C1 e Moist temperate deciduous forest                                | 580.71  | 55  |
| 143 | 12/C1 f (Low-level blue pine forest (P.wallichiana))                    | 2043.14 | 55  |
| 144 | 12/C2/DS1 Oak scrub   | 5.07    | 60  |
| 145 | 12/C1/DS2 Himalayan temperate secondary scrub                           | 530.58  | 60  |
| 146 | 12/C2 a Kharsu oak forest (Q.semicarpifolia)                            | 271.38  | 65  |
| 147 | 12/C2 b West Himalayan upper oak/fir forest                             | 1146.02 | 65  |
| 148 | 12/C2 c (Moist temperate deciduous forest)                              | 317.71  | 65  |
| 149 | 12/C3 a East Himalayan Mixed Coniferous Forest                          | 5572.87 | 60  |
| 150 | 12/DS1 Montane bamboo Brakes  | 16.68   | 100 |
| 151 | 12/E1 Cypress forest  | 6.36    | 100 |
| 152 | 12/1S1 Alder Forest   | 18.11   | 100 |
| 153 | 12/1S2 Riverain blue pine forest  | 109.18  | 65  |
| 154 | 12/2S1 Low level blue pine forest                                       | 87.39   | 65  |
|     | <b>Group 13 Himalayan Dry Temperate Forests</b>                         |         |     |
| 155 | 13(i)/C1 Dry broadleaved and coniferous forest (Q.ilex-P.gerardiana)    | 809.59  | 60  |
| 156 | 13/C2 a Neoza pine forest (P.gerardiana)                                | 120.68  | 55  |
| 157 | 13(i)/C2 b Dry deodar forest  | 1387.85 | 60  |
| 158 | 13/DS1 Pohu Scrub   | 76.32   | 55  |
| 159 | 13/DS2 Dry Temprate scrub   | 133.58  | 50  |
| 160 | 13(i)/C3 (West Himalayan dry temperate deciduous forest)                | 269.44  | 50  |
| 161 | 13(i)/C4 West himalayan high level dry blue pine forest (P.wallichiana) | 1444.77 | 50  |