

**No. 25/35/2013-ESZ-RE**  
**Government of India**  
**Ministry of Environment and Forests**

Paryavaran Bhavan  
CGO Complex, Lodi Road  
New Delhi - 110 003

Dated: 24<sup>th</sup> October 2013

**OFFICE MEMORANDUM**

**Sub: Eco-sensitive Zones around Protected Areas in Goa - reg.**

1. The Government of Goa submitted proposals regarding declaration of Eco-sensitive Zones around the following Protected Areas in Goa to the Ministry of Environment and Forests:

- (i) Cotigao Wildlife Sanctuary, South Goa
- (ii) Netravali Wildlife Sanctuary, South Goa
- (iii) Bhagwan Mahaveer Wildlife Sanctuary and National Park, North Goa
- (iv) Madei Wildlife Sanctuary, North Goa
- (v) Bondla Wildlife Sanctuary, North Goa and
- (vi) Dr. Salim Ali Wildlife Sanctuary, North Goa

2. The Ministry of Environment and Forests constituted a Committee vide its OM No. 25/27/2013-ESZ-RE dated 9.9.2013 under the Chairmanship of Dr. Rajesh Gopal, ADG (PT), MoEF for visiting the abovementioned six Protected Areas in Goa towards surveying their natural boundaries in relation to the establishment of Eco-sensitive Zones.

The Terms of Reference of the said Committee are as below:

(i) The Committee will undertake a site specific site survey of all six protected areas in Goa, with reference to studying the topography and report on the existing natural boundaries around-that is outside each protected area. Such boundaries could include inter alia rivers, hills etc.

(ii) The Committee will draw up a definition of what could constitute a credible natural boundary, always keeping in mind that the object is to protect the flora, fauna and biodiversity in the Protected Area from biotic pressure.

(iii) The Committee will submit its views on whether any of the natural boundaries of the Protected Area in Goa could be an effective boundary of a robust Eco Sensitive Zone around the Protected Area.

3. The Committee submitted its report to the Ministry on 18<sup>th</sup> October 2013. A copy of the same is annexed.

4. The Ministry of Environment and Forests accepts the report of the Committee "in principle" subject to the following;

a) The Committee has taken great care to delineate the ESZs for the PAs with scientific rigour and with utmost commitment to the objective of protection of flora and fauna in the PAs

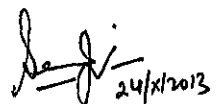
b) MoEF accepts that although Goa is a small state nearly 42% of the area of the State is protected in terms of being forest land or CRZ area. Nevertheless, even while keeping in mind the legitimate development needs of the people of Goa, as also the fact that the economy of Goa has been badly affected due to the closure of mining over the last one year, and the consequent downstream effects, the primary purpose of MoEF while keeping the above in mind is to ensure the protection of the environmental integrity of the region.

c) In view of the above, despite a specific recommendation from the Government of Goa to take natural boundaries or the recommendation of the CEC as the buffer zone cannot be accepted. The eco sensitive zones defined in a site specific manner by the MoEF Committee is hereby accepted.

d) the State Government of Goa has also in its Cabinet decision requested that since mining accounts for more than 20.4% of the SDP and over 30% of the state's population depends for its livelihood on mining and allied activities, and also 25% of the state revenue comes from mining it is not possible to abruptly close mining. Further adequate time should be allowed to the state to phase out activities which are not permitted, including mining in the buffer zone in a phased manner subject to erecting of wild life and eco friendly barriers. The MoEF Committee has dealt with this issue in its report and the recommendations of the state in this regard are accepted by MoEF. Accordingly, as recommended by the Committee, the draft ESZ notifications will be notified on the MoEF website. In four out of six PAs, the ESZs and restrictions pertaining to banned activities will come into force as soon as the final notification is issued according to law and due procedure. Further, as recommended by the Goa Government and the MoEF Committee, in respect of two out of six PAs namely Nethravali Wildlife Sanctuary and Bhagwan Mahaveer Wildlife Sanctuary and National Park, since the ESZ proposed for them is already very fragmented and disturbed due to mining the State Government may be allowed to permit phasing out of mining activities over a period of time which will enable proper rehabilitation, reclamation and restoration of the eco sensitive zone. The State should ensure that a proper and rigorous mining closure plan as per IBM norms is implemented and rehabilitation and ecological restoration completed in the quickest possible time. It is made clear, that in respect of these two PAs, Nethravali Wildlife Sanctuary and Bhagwan Mahaveer Wildlife Sanctuary and National Park, no further mining activity will be permitted beyond the time of the phase out period recommended by the State Government of Goa.

However, this would be subject to relevant court orders on the subject.

5. A Draft notification defining Eco-sensitive Zone around each of the six Protected Areas would be issued for Stakeholder consultations.
6. This issues with the approval of the Competent Authority.



**(Dr. Satish C. Garkoti)**  
**Director**

Copy to:-

1. PS to MoS (I/C) E&F
2. PPS to Secretary (E&F)
3. PPS to AS (HP)
4. PS to JS (AT)/ Adv (GVS)

**Report of the Committee on six Protected Areas in Goa in relation to establishment of eco-sensitive zones**

1. The Ministry of Environment and Forests constituted a Committee vide its O.M. No. 25/27/2013-ESZ-RE dated 9.9.2013 for visiting the following six protected areas in Goa towards surveying their natural boundaries in relation the establishment of eco-sensitive zones:

- (i) Cotigao Wildlife Sanctuary, South Goa
- (ii) Netravali Wildlife Sanctuary, South Goa
- (iii) Bhagwan Mahaveer Wildlife Sanctuary and National Park, North Goa
- (iv) Madei Wildlife Sanctuary, North Goa
- (v) Bondla Wildlife Sanctuary, North Goa and
- (vi) Dr. Salim Ali Wildlife Sanctuary, North Goa

2. The composition of the said Committee is as below:

- (i) Dr. Rajesh Gopal, Additional Director General of Forests and Member Secretary of National Tiger Conservation Authority – Chairman.
- (ii) Mr. Jagdish Kishwan, Ex-Additional Director General of Forests (Wildlife), Ministry of Environment and Forests – Member.
- (iii) Mr. A.K. Bansal, Ex-Additional Director General of Forests (Forest Conservation), Ministry of Environment and Forests – Member.

3. The Terms of Reference of the said Committee are as below:

- (i) The Committee will undertake a site specific survey of all six protected areas in Goa, with reference to studying the topography and report on the existing natural boundaries around- that is outside each protected area. Such boundaries could include inter alia rivers, hills etc.
- (ii) The Committee will draw up a definition of what could constitute a credible natural boundary, always keeping in mind that the object is to protect the flora, fauna and biodiversity in the protected area from biotic pressure.
- (iii) The Committee will submit its view on whether any of the natural boundaries of the protected area in Goa could be an effective boundary of a robust Eco-Sensitive Zone around the protected area.

4. Very recently, the National Tiger Conservation Authority, with the approval of the competent authority, had constituted a Committee (hereinafter referred as NTCA Committee) vide letter No. 1-20/2013-NTCA dated 30.8.2013 for ascertaining the spatial presence of tiger, co-predators and prey and extant of their habitat in Goa. The Committee comprised of the following expert Members:



- (i) Shri Ravikiran Govekar, AIG (NTCA), Regional Office, Nagpur
- (ii) Shri C.M. Shivakumar, AIG (NTCA), Regional Office, Bengaluru
- (iii) Dr. Bilal Habib, Scientist, Wildlife Institute of India
- (iv) Dr. G. Talukdar, Scientist (GIS), Wildlife Institute of India

4 (A). The Terms of Reference of the above Committee were as below:

- (i) Ground truthing using GPS locations with transect surveys for ascertaining the spatial presence of tiger, co-predators, prey and extant of their habitat in Goa.
- (ii) Ascertaining the presence and extant of other endangered floral/faunal species in the area peripheral to areas within the State vis-à-vis the land use in vogue.

5. Since, tiger is a terminal consumer in the ecological food pyramid and its conservation entails the conservation of all the trophic levels in an ecosystem, the instant Committee in its first meeting held on 16.9.2013 took note of the study undertaken by the NTCA Committee. The instant Committee discussed the findings of the report on the spatial presence of tiger in Goa and had discussion with Members of the NTCA Committee on 25.9.2013.

The NTCA Committee had also consulted the data / information emerging from a national collaborative project of the Department of Space/Department of Biotechnology on landscape level biodiversity characterization, using multi-season IRS LISS-III data. This analysis provides spatial information on vegetation types etc., and the details of the methodology and biological richness modelling have also been published. In general, the spatial information relating to vegetation type and landscape parameters have been combined for generating modelled layers on biological richness. Hence, the instant Committee considered the same for general guidance, since forest fragmentation and biological richness are important in the context of eco-sensitive zones. The NTCA Committee, based on field observations, interalia, had found that at a distance of 3-4 km from protected area boundary, the occurrence of wild animal signs decreased drastically, and, therefore, a 3.5 km distance was taken as a 'threshold' distance for prioritizing potential tiger areas outside protected areas of Goa, while considering it as the 'optimal value', which also lies close to the 'Mean Maximum Distance Moved' (MMDM) and tiger home range radius estimated by scientific studies in the country.

6. Subsequently, the instant Committee made a field visit to Goa from 25.9.2013 to 27.9.2013, alongwith DIG-NTCA, AIG-NTCA Nagpur and AIG-NTCA Bengaluru. The Committee undertook field visit to the following protected areas in Goa vis-à-vis the TOR, accompanied by State field officials:



- (1) Dr. Salim Ali Wildlife Sanctuary
- (2) Madei Wildlife Sanctuary
- (3) Bondla Wildlife Sanctuary
- (4) Bhagwan Mahaveer Wildlife Sanctuary and National Park
- (5) Netravali Wildlife Sanctuary
- (6) Cotigao Wildlife Sanctuary

7. **General findings of the Committee:**

(i) **Dr. Salim Ali Wildlife Sanctuary:** This is a small protected area of approximately 1.78 sq.km., notified on acquired agricultural land (1998), presently supporting mangroves. It is bounded on three sides (North, West and South) by rivers (Mandovi and Mapusa), with a village (Chorao) located towards its Eastern side. The State Forest Department had earlier made bunds at places to prevent salt water from entering the agricultural fields which now serve as a walking path in the protected area. The area between the protected area boundary and the adjoining village, also supporting mangroves, which forms part of the area proposed as eco-sensitive zone by the State, is with the State's Fisheries Department. The river is used for transportation. Further, due to sedimentation coming from upstream, there may be 'accretion' of land on river banks. The protected area is rich in bird life, crocodiles, leopards etc.

(ii) **Madei Wildlife Sanctuary:** This was notified in 1999 with an area of 208.48 sq.km. The Sanctuary has tiger presence. Recently (18.4.2013), a tiger has been camera trapped by the Forest Department and also by an independent scientist. A sambar kill (made by tiger) has also been reported in the area on 24.9.2013. There are evidences of a tigress with two cubs as well. It is learnt that tiger presence has been reported in the said protected area since 2001 and a case of tiger poaching was also registered in 2009.

(iii) **Bhagwan Mahaveer Wildlife Sanctuary and National Park:** This protected area is located on the Eastern part of the State, with an area of 240 sq.km. Initially, it was notified as a Sanctuary (Molem Wildlife Sanctuary) in 1967. Subsequently an area of 107 sq.km. of the said Sanctuary was notified as the Molem National Park in 1978. Later, the name was changed to Bhagwan Mahaveer Wildlife Sanctuary and National Park (Wildlife Sanctuary 133 sq.km., National Park 107 sq.km.).

There are several mining leases along the peripheral area of the Sanctuary, starting almost from its boundary and extending beyond in the mainland of the State.

(iv) **Netravali Wildlife Sanctuary:** This Sanctuary was notified in 1999 with a total area of 211.05 sq.km.

There are several mining leases along the peripheral area of the Sanctuary (Northern / Southern portions), starting almost from its boundary. The mining leases are closely honeycombed between the boundaries of the Sanctuary in the Northern portion apparently encompassing areas within the boundaries as well.

(v) **Bondla Wildlife Sanctuary:** This was notified in 1969 on ridge top with an area of 7.98 sq.km.

(vi) **Cotigao Wildlife Sanctuary:** This was notified in 1968 with a total area of 85.65 sq.km.

Madei, Bhagwan Mahaveer and Netravali Wildlife Sanctuaries are located mostly in the North Western Ghat forests. The Cotigao Wildlife Sanctuary is largely low lying and contiguous to the Netravali Wildlife Sanctuary. The Bondla Wildlife Sanctuary (confined only to the hilltop) is connected with the Bhagwan Mahaveer National Park (a map showing protected areas of the State is given at **Annexures-I, II and III**).

In several parts of the State, there are 'private forests' belonging to individuals / families. One such private forest ('Mokash' forest) was seen near the Madei Wildlife Sanctuary.

The boundaries of these protected areas are reportedly coterminous with the boundaries of forests notified under the Indian Forest Act, 1927. Moreover, it was learnt that there are forest areas contiguous to some of the protected areas, traditionally under the control of the wildlife staff (which may not be part of protected area notifications). In general, the boundaries of the protected areas end either on ridge tops or at the bottom of valleys. This feature is useful to minimize impacts from outer areas into the protected areas.

In Goa, the forests and tree cover are luxuriant owing to high interspersion of natural features (elevation, edaphic factors, drainage). Bulk of the forest exists in undulating areas on the Western Ghats along the western boundary of the State. However, forest biodiversity exists outside such forest areas as well. Further, the major Western Ghat forests extends from the North to the Southern direction within the State, with most of the rivers / rivulets flowing from the higher elevations across the contour/boundaries of protected areas.

8. The mining activities are providing local employment especially in transportation through trucks.

9. Findings of the Committee vis-à-vis the TOR:

(i) **The Committee will undertake a site specific survey of all six protected areas in Goa, with reference to studying the topography and report on**

**the existing natural boundaries around- that is outside each protected area. Such boundaries could include inter alia rivers, hills etc.**

The Committee visited the six protected areas as per the TOR and the GPS locations of sites visited are at **Annexure-IV**. The observations are as below:

**a) Dr. Salim Ali Wildlife Sanctuary**

Dr. Salim Ali Wildlife Sanctuary does not have any hill area and is a land mass surrounded on three sides (North, West and South) by rivers, with a village (Chorao) located towards its Eastern side. In the case of this protected area, the rivers serve as natural boundary on three sides, but for the Eastern side towards the village Chorao.

**(b) Madei Wildlife Sanctuary**

The Madei Wildlife Sanctuary has a predominantly hilly terrain, contiguous with Maharashtra and the adjoining State of Karnataka, separated by ridges. The boundary of the protected area encompasses the ridge top extending upto the valley bottom. The habitat also forms the catchment of several rivers including the 'Mahadei', which flows out from almost the central portion of the protected area towards the mainland of the State, while being coterminous with the boundary of the protected area for some distance. These constitute the prominent natural features of the protected area. Further, a large reservoir is situated near the North Western boundary of the protected area (Anjunem dam).

**(c) Bhagwan Mahaveer Wildlife Sanctuary / National Park**

The terrain is predominantly hilly and the area contained within the notified boundary ranges from ridge top to valley bottom. Several rivers originate within the protected area including the river 'Dudhsagar', which makes its boundary for some distance in the South Western portion. These constitute the prominent natural features of the protected area.

**(d) Netravali Wildlife Sanctuary**

The terrain of the protected area is mostly hilly, serving as catchment area for many rivulets and rivers. A large reservoir (Selaulim) is situated on the Western boundary of the protected area.

**(e) Bondla Wildlife Sanctuary**

The protected area is confined only to a hill top. However, the ridge has habitat contiguity with the Madei and Bhagwan Mahaveer Wildlife Sanctuaries.





- i. Obtaining altitudinal profiling of the protected areas in Goa along the Western Ghats, beginning from the ridge top and extending beyond 1, 2 and 3 km. from the boundaries till the forest edge, based on GIS analysis, besides mapping of macro/micro watersheds.
- ii. Considering the 'threshold' distance of 3.5 km. estimated by the NTCA Committee in the context of occurrence of predator / prey signs vis-à-vis the protected area boundary.
- iii. Considering the overall location of the protected areas on the Northern-Western Ghats within Goa vis-à-vis the contiguous landscape / tiger habitat in Maharashtra and Karnataka.


The altitudinal profiling of the four major protected areas on the Northern-Western Ghats (Madei / Bhagwan Mahaveer / Netravali / Cotigao) revealed that the protected area boundaries are either on ridge tops or at valley bottoms. In general, the boundaries of such protected areas largely align with the watersheds. Several micro watersheds exist along the boundaries of the protected areas extending as a network on the mainland of the State. Since such micro watersheds have a bearing on the spatial presence / distribution of flora / fauna and the habitat use by major species of wild animals, it is important to prescribe a 'peripheral / buffer belt' along the boundaries of protected areas which can serve as a robust Ecosensitive Zone to protect portions of such areas. This prescription can be a combination of natural feature and empirical knowledge relating to habitat use by wild animals like tigers / ungulates. Further, it was also felt necessary to secure the habitat portions having contiguity, keeping in mind their corridor value for gene flow, besides the need for protecting the biodiversity value of low land forests on the South Western portion of the State.

In view of the above, the following views are offered:

- (i) A peripheral strip of land, with an average radial distance of not less than 1 km. from the boundaries of the four protected areas under reference (Madei, Bhagwan Mahaveer, Netravali, Bondla), is required as a robust Ecosensitive Zone to protect the flora / fauna of such protected areas from biotic / external pressure. This strip, to a large extent, may ensure the ecological integrity of portions of micro watersheds along the periphery, besides providing extended habitat for wild flora / fauna. This radial distance is suggested as an optimal value based on the 3.5 km. threshold distance (as suggested by the NTCA Committee) taken approximately from the central portions of protected areas with maximum tiger habitat potential, which have an average width of about 6 km., providing scope of protecting major portions of micro watersheds existing along the boundaries of protected areas. In view of the observed very low tiger presence and the protected areas on the ridge serving mainly as a corridor / extended habitat, and the contiguity of the protected areas, it would

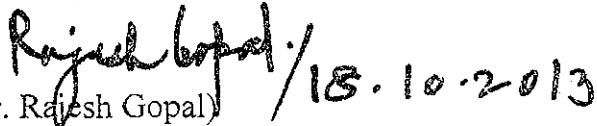
be reasonable to assess the threshold distance approximately from the central portion of the protected areas, instead of their boundaries. The suggested boundary may be demarcated on the ground using either the village or forest boundary (including the village if it has 50% or more forest coverage).

- (ii) The boundary of the Ecosensitive Zone along the South Western portion of Cotigao Wildlife Sanctuary may extend upto a radial distance of 3 kms., to protect existing floral and faunal species.
- (iii) The ridge habitat linking Bondla to Madei / Bhagwan Mahaveer Wildlife Sanctuaries may be protected for its corridor value.
- (iv) The mining leases in the peripheral areas of Bhagwan Mahaveer and Netravali Wildlife Sanctuaries need to be phased out in a time bound manner, based on a "closure plan", with due approval of the Hon'ble Apex Court, so as to obtain the suggested minimum radial buffer of 1 km. (from the boundary of the Sanctuaries) for a robust Ecosensitive Zone. This phasing out is important, since sudden loss of local employment may foster animosity of local people against protected areas. It is important to ensure ecological restoration of the areas degraded due to mining by adopting site specific best practices based on an Action Plan, with a monitoring mechanism. In the context of diamond mining by the National Mineral Development Corporation in and around some portions of the Panna Tiger Reserve (Madhya Pradesh), a monitoring mechanism has been created as directed by the Hon'ble Apex Court in I.A. Nos. 1485 and 1507 of WP (Civil) No. 202/1995 (T.N. Godavarman Thirumulpad vs. UOI & Ors.).



(Jagdish Kishwan)  
Ex-ADGF (WL) & 18.10.2013  
Member, Goa Committee

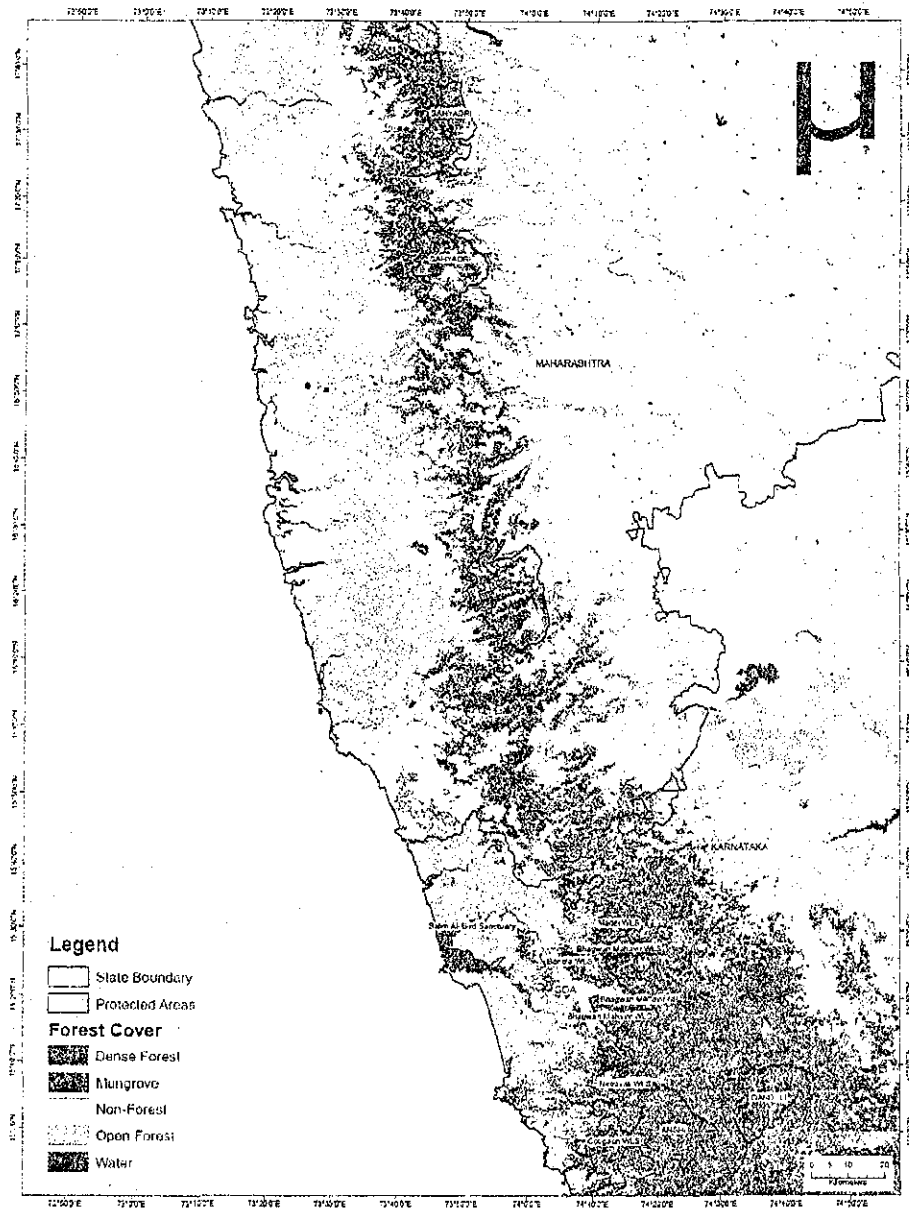
(A.K. Bansal)  
Ex-ADGF (FC) &  
Member, Goa Committee



(Dr. Rajesh Gopal)  
ADG (PT) & Member Secretary (NTCA)  
Chairman, Goa Committee

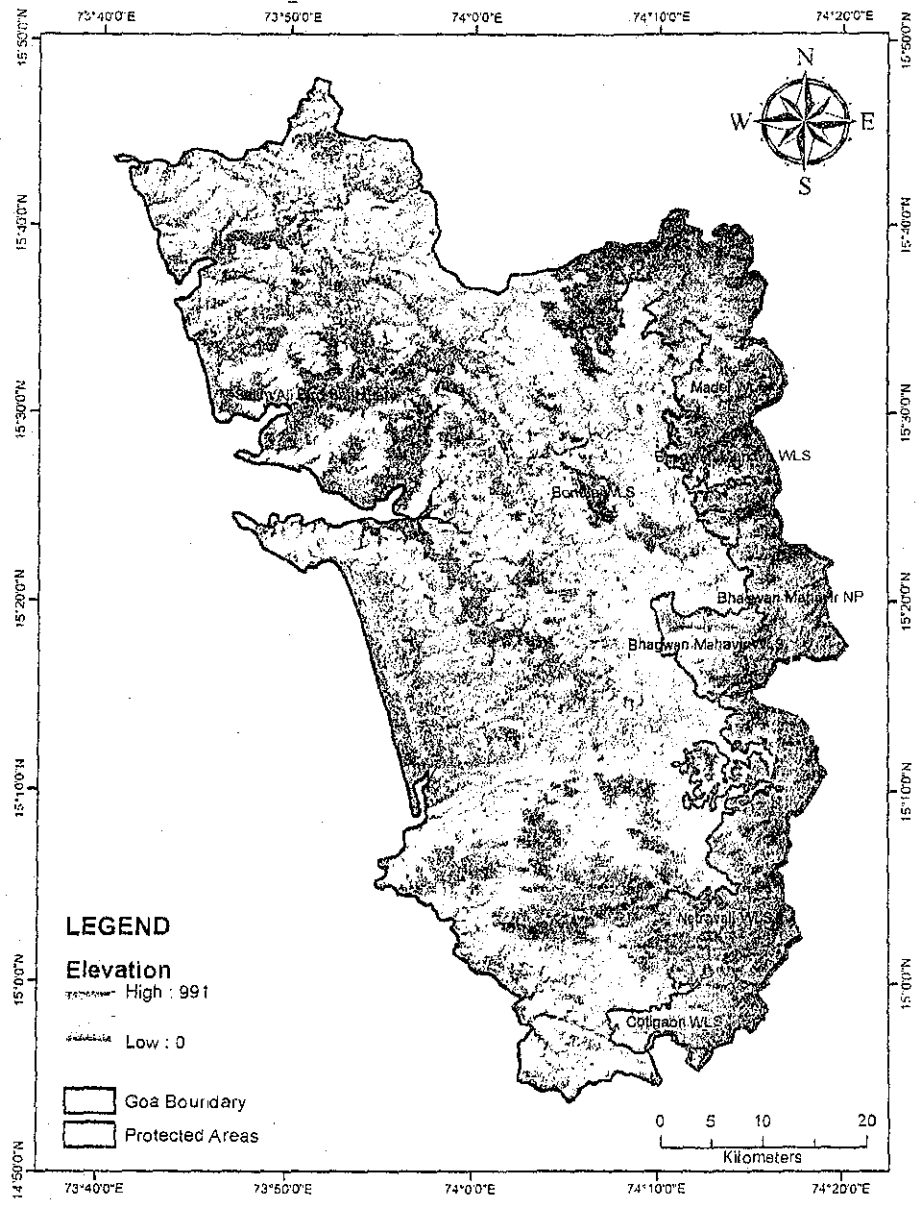
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Map of Protected Areas in Western Ghats with Forest Cover

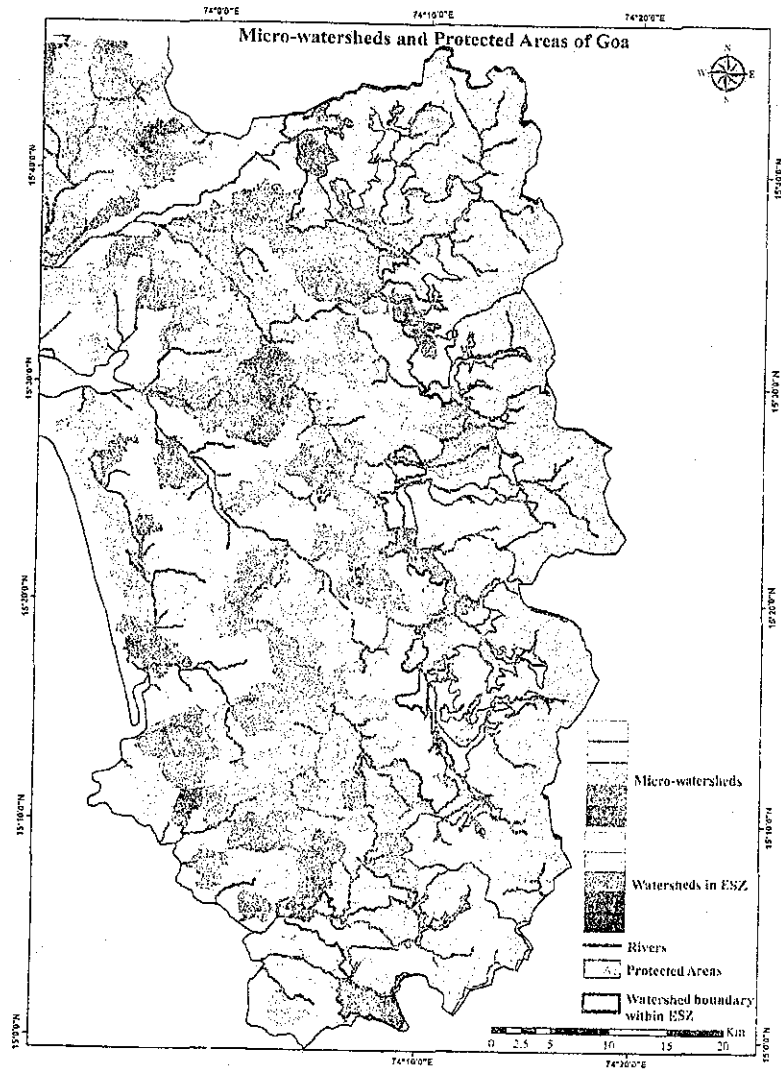


Source: Forest Cover Map 2008 (FSI)

**Annexure-II**



**Annexure-III**



Annexure-IV

Visit to PAs of Goa: 26/09/2013 by the Team constituted by MoEF

Sr. No.	Locality	Latitude	Longitude
1	Salim Ali Bird Sanctuary Gate	15 30 47.7	73 52 14.5
2	Madei-Check Post-Gulule	15 36 56.6	74 05 26.4
3	Madei-Ghonsuli Point- cairn	15 37 15.9	74 07 05.2
4	Madei- Ponsurla view point	15 38 18.5	74 07 00.4
5	Madei- Gawane mine	15 28 00.8	74 10 23.5
6	Bondla sanctuary	15 26 11.4	74 06 03.84
7	Mollem- Dudhasagar river/Collem (Mollem sanctuary named as Bhagwan Mahaveer sanctuary)	15 20 43.4	74 14 10.8
9	Mollem- Roadside	15 19 25.7	74 11 02.2
10	Mollem- Waiyadave- River '0' meter boundary near Dudhsagar river	15 20 31.2	74 10 21.8
11	Netravali- Siddha Point	15 12 46.4	74 12 19.1
12	Netravali- Ambyaghat checkpost	15 03 44.2	074 09 59.8
13	Cotigao- Astagal	14 58 41.0	74 08 27.5