

Matheran Eco sensitive area: Time to catch a positive spirit !



**Submitted To
Winrock International (INDIA)**

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I. Title

Matheran Eco sensitive area: Time to catch a positive spirit !

II. Subtitle

Not Applicable.

III. Abstract

Ecologically Sensitive Areas (ESA) or Ecologically Fragile Areas (EFA) of 1986 is a category of conservation areas that is more flexible and open than present day Protected Areas (PAs-Wild Life Sanctuaries and National Parks); which face pressures beyond their resilience power and thus are vulnerable to ecological degradation. It does not prohibit livelihoods except from hazardous industries. It does not include local people prior informed consent (PIC), a mistake PAs repeat but Biodiversity Act (2002) has avoided and should be incorporated into ESA. This lacuna explains some of its failures and conflicts. Taking up '**Matheran**' ESA as a case, this study (a) attempts to address the **pros & cons** and potential of Eco-Sensitive Areas (b) looks for the possible reasons of conflict / failure and (c) suggests ways to overcome them. However, this case study does not conclude whether to use ESA or not but rather throws light on "if and how" it can be used, by whom. This may help in effective manifestation of existing ESA's and those that are proposed.

IV. Keywords

Matheran, Ecologically Sensitive Areas (ESA), Western Ghats, Social linkages

Need of the hour:

What we observed during our field visits to *Matheran* and perceived through the interviews, is that legal provisions for protection (here ESA) remain subject to understanding and interpretation of law and are far removed from possibilities of use by concerned citizens due to their complicated jargon and presentation. Demystification in simple, lucid language and effective communication (say popular media) is thus required so as to maximize the benefits of such declaration.

V. Background and Objectives

Ecological problems of 20th century are biodiversity loss and pollution. To protect biodiversity loss, provision of PAs is made under the Wild Life (Protection) Act, 1972. However, displacing people has resulted in public protests. There is no law to protect biodiversity or reduce pollution in urban areas. Therefore, Environment (Protection) Act, 1986 annex ESA as PAs for urban areas. Area identified as eco-sensitive* could be given a special protection status through notification under the Section 3 (2) v of Environment (Protection) Act, 1986 (EPA) and Section 5 (1) of the Environment (Protection) Rules, 1986 (EPR). It is an innovative conservation strategy, as it does not call for evacuating its inhabitants unlike PAs, but their livelihoods are conserved. Once the area is declared as ESA, local people can continue leaving there but hazardous industries has to close. It not only offers the scope to tailor the rules of implementation according to the conditions and requirements of the particular area, but also allows differential protection directives for different zones within an ESA. For example, core zone and buffer zone can have different developmental regulations. However, in some ESAs, especially where the protection is imposed from outside, it suffers from major drawbacks. These include slow/no implementation, opposition by local people, or administrative bodies. Present study tries to look at various dimensions of these shortcomings and thus delineate ways to overcome them for the effective use of ESA protection in general.

Why Matheran?

Easy accessibility from Pune and Mumbai, acquaintance with the biodiversity issues are some of the reasons why we selected Matheran as the study area. Besides, it is declared as an ESA in 2002 by Ministry of Environment and Forests (MoEF), Government of India. Box 1 gives in detail various parameters applicable to Matheran and surrounding zone due to which it is given an ESA status.

It is facing some conflicts because of

- 1) The ban on new constructions
- 2) No change in existing land use pattern is allowed
- 3) Unemployment etc.

This has incurred strong opposition by shopkeepers and hoteliers as these restrictions hamper their business interests. And also from the Matheran Municipal Corporation (MMC) to some extent, as their development plans cannot gain support from the legal framework of ESA. Corporation wishes to attract large number of tourists in Matheran by creating massive developments and collect huge revenues in return.

Thus, our main objectives of the study were;

- a) To study the social linkages and the implications of declaration of ESA,
- b) To find out what kind of further studies or documentation is required etc. and
- c) To look at how one can effectively manage and successfully implement ESA provisions

Box 1. * General Criteria for ESA declaration

MoEF put together various criteria based on which areas can be declared as ESAs. These criteria are species based (Endemism, Rarity etc.), Ecosystem based (Sacred Groves etc.) and Geomorphological feature based (Origins of rivers etc).

Criteria used to declare Matheran as ESA

Primary Criteria

- Biodiversity
- Slopes greater than 20°
- Endemism
- Rarity
- Area of Intrinsically low resilience
- Breeding sites
- Origins of river

Auxillary criteria

- Upward catchment area
- High rainfall area
- Not so steep slopes

(Source: discussion with Mr. Sameer Mehta, Bombay Environmental Action Group)

VI. Methodology

Interviewing various stakeholders and **targeted interactions** with Forest Department and MMC officials was our main methodological tool. For effective discussion we first got ourselves acquainted with the various rules and regulations that govern Matheran and surrounding areas. Draft as well as final notification by MoEF, declaring Matheran as an ESA was consulted so as to get insight into the legal framework. **Semi-structured interviews** were conducted with 45 persons.

This involves various individuals across economic strata such as those involved in tourism activities, real estate owners, hoteliers, horse owners and handcart owners. Besides this, discussions with various representatives of NGO's were done. Mr. Samir Mehta of BEAG (Bombay Environmental Action Group) who was instrumental in the declaration process was consulted for his views on why he felt that Matheran could qualify for ESA. Though we relied more on the extempore information by the informants, we developed a questionnaire to ensure the discussions are on track. The questionnaire includes set of questions like (i) whether their routine life is changed after the declaration (ii) how they view the need for ESA and its benefits or problems and (iii) what are the current problems they are facing due to ESA etc. Details of the field visits and purpose are given in Table 1. Secondary data was collected through extensive literature survey that comprised of scientific papers, legal documents and popular articles. A separate list of these referred articles is given in bibliography.

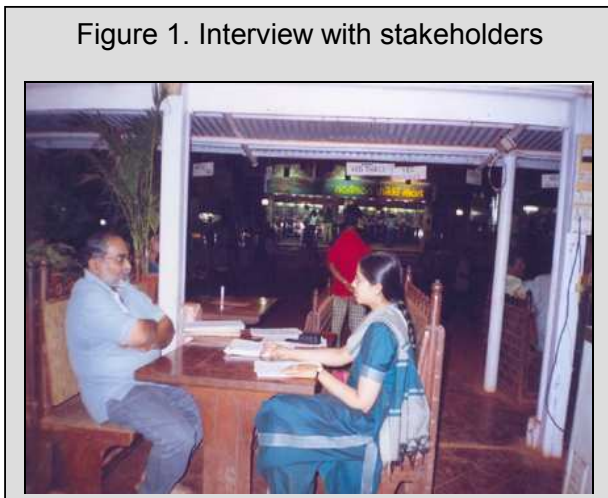


Table 1. Field visit details

Date and Place	Name of the Person interviewed	Institutions/Affiliation	Purpose of visit
24.10. 2005 Satara	Mr. Sunil Limaye DFO, Satara Ex-DFO Raigad	Forest Department	(a) To understand Forest Dept. point of view about ESA, Matheran and Mahabaleshwar in specific.
7. 12. 2006 Alibaug	Mr. Kambale DFO, Raigad	Forest Department	(a) To understand Dept. point of view Matheran ESA (b) To collect information regarding development plan and protection plan
8/9. 12. 2005 Matheran	Mr. Ajay Sawant Vice-President.	Matheran Municipal Corporation	(a) To understand current status after declaration of ESA and their approach towards Matheran ESA. (b) To study the development plan.
	Hoteliers from Matheran	Matheran citizen	
	Mr. Murtaza Taher Matheranwala	Friends of environment and sons of soil (FESS - Local NGO)	
23/24.01.2006 Matheran	Mr. Tawade Local people, Horse owners, shopkeepers, etc.	Matheran Bachav Samiti (Local NGO)	(a) To interview people so as to understand the present situation
		Matheran citizens	
15.02.2006 Pune	Ms. Manju Menon	Kalpviksha, Pune	(a) To know the perceptions of independent observers to help analyze the situation better
	Mr. Utkarsh Ghate	Pune	
	Mr. Raghunandan Velankar	Gene Campaign, Delhi	
	Mr. Kapil Sahasrabuddhe	Centre for Environment and Education, Pune	

* During the various field visits to Matheran, we have prepared our own sketch map of the area, as no official map and/ or Toposheet was made available to us, as Matheran lies near the coast and is a restricted area.

* Besides these field visits, reference articles were collected by visiting libraries of private agencies such as RANWA, Kalpavriksha, MACS, News paper offices etc.

VII. Description

Geographical position



The Western Ghats of India are one of the hottest Biodiversity hotspots of the world (Myers *et al.*, 2000) that are endowed with rich diversity of plants and animals. Matheran, the smallest hill station in the Northern Western Ghats of Maharashtra is about 7.2sq.km in area. The word Matheran means 'forest' (*ran*) on the 'head' (*mathe*) (Figure 2). It is experiencing the impacts of large scale and

unplanned tourism and related development. It is located between Mumbai-Pune urban belt and situated at a distance of about 64 km South-East of Mumbai (Karjat Taluka, District Raigad) and 81 km from Alibaug, the district headquarter. Another metropolis, Pune lies at a distance of about 125 km in South-East direction. Matheran ESA encompasses 214.73 sq. Km of land in and around it and 200 meters buffer zone covering about 89 villages. More than 60 % of the area of Matheran comes under 'reserved forest' category. The details of various zones and their areal expansion are given in Table 2.

Table 2. The distribution of Matheran Eco-Sensitive-Area

Zones	Area in sq.
Forest zone	205.58
Green zone 1	1.91
Green zone 2	1.88
Quarry zone	0.02
Urbanization zone	5.34
Total Area	214.73

Geographically Matheran plateau lies between 18° 55'N Latitude and 73° 51'E Longitude and it is to the west of main range of Western Ghats. Bio-geographically, the region is important on account of being an outlier of the main Western Ghats mountain chain and in effect sheltering a pocket of evergreen forest isolated in geological past. Surrounded by hill and dale topography Matheran presents a dynamic landscape. The deep ravines around it are covered by dense forests and the top of hill is a large plateau. Its general height above m.s.l. is 759m and the highest point on it is at 803.45m. The laterite, which forms the upper strata of the plateau, appears as a purplish red rock variegated with different colours. Fragmented laterite cap is found in addition to the thick laterite clay deposits. The major threat today Matheran is facing are the landslides due to heavy rainfall and the weathered rock pattern itself.

It is very rich on accounts of biodiversity as it supports evergreen forest of Memecylon-Syzigium-Actinodaphne type (Puri *et al.*, 1983). Various tree species commonly seen on the plateau are *Olea dioica*, *Mangifera indica*, *Eugenia jambolana*, *Ficus glomerata*, *Heterophragma roxburghii*, *Bridelia retusa* and *Memecylon umbellatum*. Predominant tree species on the slopes are *Terminalia tomentosa*, *Lagerstroemia parviflora*, *Adina cordifolia*, *Garuga pinnata*, *Dillenia pentagyna*, *Pongamia glabra*, *Schleichera trijuga* and *Bombax malabarica*. It is also a home to **endangered endemic** mammal species such as *Ratufa indica elphinstonii* (**Giant squirrel**), which is **Scheduled-I species**.

Though rich in biodiversity, there are scanty records of floral and faunal wealth of the area (Birdwood, 1886, Maharashtra State Gazetteer, 1987). Being an ESA, certain steps are thus immediately required to be taken towards proper documentation of these elements as this will help in exploring '**eco-tourism potential**' of the area.

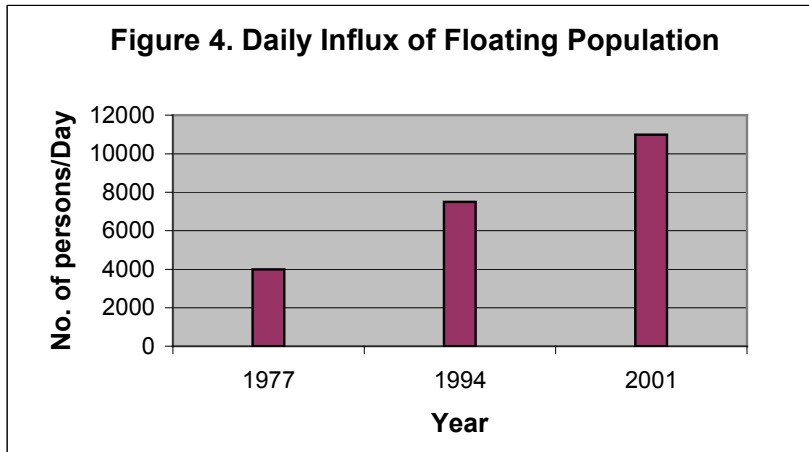
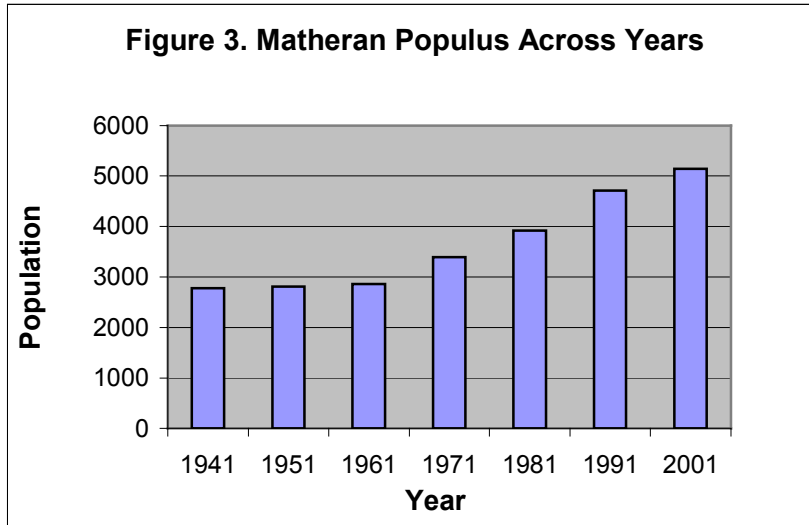
What makes Matheran different than all the other hill stations is, it does not have multiple points of entry, which controls illegal access, unlike other hill stations. The only vehicle road is up to the Dasturi naka, the outer limit of corporation. Vehicles are not allowed in Matheran Municipal limits.

Demography and other details

The population of Matheran can be categorized as Permanent population and Floating population. The permanent population was more or less stagnant till 1961 having annual growth rate between 0.12% - 0.17%. However, the growth rate increased since 1971 and currently reached up to 2.01%. Figure 3 depicts rise in population across years as per the census data. The floating population is increasing every year and it is observed that **average daily influx** of floating population has increased from 4000 in 1977 to 11,000 in 2001 i.e. 2.8 times increase over a span of 40 yrs (Figure 4). This floating population is mainly comprised of tourists.

The occupational structure of Matheran can be classified into 3 categories i.e. primary, secondary and tertiary. As per the 1991 census there were 2095 workers, which accounted for 44.50% of the total population. Among them 1.72% were engaged in the Primary sector i.e. livestock and forestry but agriculture was absent. 9.71% were engaged in the secondary sector i.e. construction and industry and 89.67% were in tertiary sector i.e. trade, commerce, transport and communication. Most of these activities are mainly tourism oriented.

Matheran has witnessed the increase in tourism, leading to a boom in construction of new hotels and resorts and allied activities on the hill. The annual number of tourists in Matheran rose from 1.67 lakhs in 1991 to 2.51 lakhs in 1999 with an average increase of 13,000-20,000 tourists per month. A serious implication of this spurt in the tourist number is excessive stress on infrastructure facilities besides unchecked growth of hotels and resorts industry. This has exerted pressure on the ecologically fragile areas as it demands increase use of fuelwood, felling of trees (mainly private lands to accommodate additional construction), and greater pressure on water and sanitation system. Till date there is no proper documentation of the carrying capacity of the area, which are required for sustainable planning and this may prove critical in days to come.



Present malady:

Visits to the study area revealed that declaration of Matheran as ESA has resulted in social conflicts because of (a) ban on any commercial activities (b) opposition by local hotel lobby due to the fear of losing precious real estate and (c) growing unemployment. A case study of lower economy class servants shows that about 100 people, who lend handcart services for transport, are immigrants having no permanent settlements. Due to the fixed land use pattern, a regulation under ESA, they cannot have it either. On the other hand, because of the poor implementation, illegal constructions are seen. Low-income group citizens suffer the most as their families expand faster, but the need for larger houses is not fulfilled. These low-income group people are vital for smooth functioning of tourism industry as they work in hotels, as tourist guides, home servants etc. These are the ones who generally face stringent action if rules are broken, whereas hotel owners escape from penalties. This results in social conflicts.

Before going into the details of why this situation has happened? It is essential to know the declaration process of an ESA (refer Box 2).

Box 2. Declaration of ESA usually takes the following route

- (i) MoEF stating the expanse of the area to be declared as ESA issues a draft notification. This notification also states the activities to be banned or restricted henceforth.
- (ii) It invites objections and / or suggestions in respect of the said draft notification.
- (iii) MoEF then, within a period of one year from issuing the draft notification, is supposed to issue final notification for the same, taking into consideration the objections and suggestions.

The final notification usually gives period of two years to the concerned State Government to prepare a Zonal Master Plan for the said ESA (in this case 2004 is the deadline for preparation of Zonal Master Plan). A Monitoring Committee is constituted to monitor and ensure compliance with the provisions of this notification. The specifications of the Committee along with the issues to be dealt with in the Zonal Master Plan are given in the notification. The plan is to be submitted to MoEF within stipulated period, upon approval of which it is acted upon.

The biggest irony of the Matheran is, though four years are passed after the final notification, the zonal master plan has not yet been prepared. Following appear to be the reasons for failure:

- (1) Conflicting ideas of development among the policy makers and stakeholders,
- (2) Non-involvement of local communities during the notification process and also in planning and management and
- (3) Imposition of restrictions for constrained use of natural resources when all the key actors do not understand its exact importance.

Key Actors, their roles and impacts:

Following Key actors and stakeholders were identified. There were consulted to understand (i) what kind of decision-making process is there? (ii) Is public taken into confidence prior to declaration? (ii) what are their ideas regarding ESA etc. Table 3 gives details of interviews conducted with various stakeholders. Key actors and various stakeholders were grouped into Governmental and Non Governmental bodies for better understanding.

Government bodies:

1. State Government: It has the most important job of making a Zonal Master Plan (ZMP) so that the implementation of the ESA regulations could be started with. It was expected to be prepared within 2 years from the date of declaration of ESA notification in Feb 2002, but is not prepared as on date. This ZMP should be prepared by following a procedure similar to that prescribed in Maharashtra Regional Town Planning Act (1966). ZMP should include development plan, Tourism Master Plan, Sub-Zonal Master Plan that includes development regulations for Gaothan and Gaothan Expansion Areas.

2. Monitoring Committee: According to the Notification, this committee is the most vital governing body that is empowered to discharge all the functions specifically enumerated in the notification and to do the entire things incidental thereto. It is the duty of the Committee to file all the complaints in case of non-compliance of the directions. This Committee comprises of representatives from state departments of Forest and Environment, Pollution Control Board, Urban Development and subject experts on ESA issue and representatives of NGOs. But the committee itself does not even have regular meetings and so not in a functioning state. This affects daily routine of the residents, as many crucial decisions are kept pending for long. Delay in approval is one of the reasons for social unrest.

3. Forest Department: Since 60-70% of the ESA including 65% of Matheran Plateau is reserved forest, Forest Department is responsible for its protection under Indian Forest Act (1927) and Forest (Conservation) Act (1980).

4. Matheran Municipal Corporation (MMC) is an active administrative body managing Matheran. It has its own rules and orders under the authority of Government for the guidance of visitors and others. These rules states that no vehicle should be permitted in MMC limits, trees should not pruned or cut without the permission of Divisional forest officer, Honorable Collector's permission is necessary for any new constructions etc. These rules are followed by MMC since 1959. The development plan for Matheran is prepared in 1996, but due to some legal inadequacies has not yet been sanctioned. Previous Development plan is in function currently.

5. Collector of Raigad District and Superintendent of Matheran: These two has administrative powers through the Matheran Rules as well as ESA.

Non-Governmental bodies:

1. NGOs: BEAG and FESS are instrumental in ESA declaration process. These are the groups taking initiatives and working in developmental issues of Matheran.

2. Hotel association and Horse-owners' association: Probably this is the most influential lobby and can act as pressure group in Matheran.

3. Real estate owners: Many of the private properties are designated with 'heritage site' status under Matheran Rules. Being well-wooded campuses, these are also the areas of high biodiversity.

Table 3. Opinions of various stakeholders

Name of the person	Institutions	Stakeholders opinion
1. Mr. Kamble	DFO, Raigad	1. As 65% of the area is under reserve forest, role of forest department is very well identified.
2. Mr. Ajay Sawant	MMC	1. Tourism, being a major economic activity, development of Matheran is necessary. We wont leave any stone unturned for that. 2. Matheran rules are sufficient to protect the Matheran. No need of ESA protection. 3. Funds are not sufficient for the development of Matheran.
3. Mr. Murtaza	Friends of environment and sons of soil (FESS-Local NGO)	1. Demand of ESA protection has not arisen within the community. 2. Working of Monitoring committee is not satisfactory (hardly any meetings have taken place since declaration, thus delaying decisions on many important matters). 3. Because of poor implementation, ESA act as speed breaker to the development of Matheran. 4. Illegal construction is going on within the ESA boundaries.
4. Mr. Tawade	Matheran Bachav Samiti (Local NGO)	1. Rules of Matheran ESA are stringent which create hindrance in the developmental activities as well as routine life.

VIII. Policy Recommendations

Following comparison of policies under ESA and other regulations (Table 4) shows that ESA does provide additional protective regulations and thus it is not an unnecessary regulation as perceived by some people in local administrative bodies and a few local people finding Matheran rules sufficient to protect Matheran.

Table 4. Comparative account of protection strategies envisaged under various legislative mechanisms

Provisions made under ESA	Other than ESA
1. No reduction in tribal area, forest zone, green zone and agricultural zone	A) <u>Indian Forest Act</u> , 1927 and <u>Forest (conservation) Act</u> , 1980 - Provisions 1 and 6 (made under ESA) are offered by these acts.
2. Absolute height of buildings shall not exceed 9m and the number of storey shall not exceed ground plus one	B) <u>Matheran rules</u> – Provisions 3, 6,7 and 10 (made under ESA) are also under these rules. The only difference is that the district Collector is in-charge for them, not the monitoring committee of ESA.
3. All developmental activities shall require prior approval of the monitoring committee	C) The only provision which is not in ESA is that blasting is not allowed within MMC limits
4. Permission only to non-hazardous industries	
5. Ban on quarrying and mining	
6. No tree felling	
7. Tourism expansion only after tourism master plan and that too within the range of carrying capacity	
8. Identification of natural and man-made heritage sites	
9. Ban on plastic use	
10. No vehicular traffic in MMC limits	
11. Mandatory conservation of natural springs,	
12. Solid waste management and	
13. Protection of hill slopes	

In this way, there are some additional protections provided by ESA, but they are not getting implemented because of the poor understanding. Every regulation, in general, adds to a lot of paperwork and legalities with no decisions either in favour or against are taken on time.

Following are some '**Gaps**' that are identified in these provisions, which are responsible for poor implementation of ESA.

1. **Legal framework:** The concept of an ESA is not mentioned in any of the Statutes and remains subject to interpretation.
2. The authority that will look after the smooth functioning of the monitoring committee is not specified.
3. Though implementation agencies are identified, their exact role is not clear.
4. The list of non-polluting/non-hazardous industries and developmental activities is not specified.
5. Funds are not provided when an area gains an ESA status. As a result, designing protection strategies becomes difficult.
6. Local people were not taken into confidence before the declaration and still people's are unaware about how one can benefit from ESA declaration. In general, ESA is perceived as anti-developmental regulation, thus hampering the very purpose of declaration.

Recommendations:

1. If an area is sufficiently protected under some legislation-in this case Matheran Rules that include few protective regulations- then ESA should give additive benefits to an extent such that costs to people (increased paperwork, introduction of time-lags due to obtaining permissions etc.) become worth bearing.
2. **A functional local level monitoring committee** comprising of experts and representatives of local bodies, residents, NGO's etc. should be set up for addressing local level issues. This committee will function under the guidelines of monitoring committee, which will now assume **steering committee** role. This will probably increase the frequency of meetings and will help in avoiding delay in decision-making process thereby reducing social complications.

3. Alternative professions should be made available for the people who tend to lose their jobs due to protection. For example the people working in brick-kilns, etc.

4. Training programmes for the administrative body should be conducted to manage the ESA in a way, which will neither compromise ecological health of the area, nor the revenues they need. In fact some ways could reap both the benefits, for example, **eco-tourism in Matheran could turn the 'ESA' tag into a boon or by attracting tourists round the year rather than heavy tourism for few days.**

5. When ESA declaration process initiates, at the same time need of such protection status should be discussed with the local people, administrative body, concerned NGOs etc. This will be helpful in smooth functioning of ESA.

6. Awareness creation among people to understand the need for protection ensuring their active participation during and after the declaration process.

Key learnings:

1. It is observed that implementation of an ESA is very poor. As a result, it gets a major setback. Therefore, effective awareness creation on all the levels should form an essential component of any protection plan, especially when the need for protection has not arisen within the local community.

2. Positive outlook, understanding of the opportunity and search for creative ways to manifest the goal is extremely necessary for making a good use of the provisions for protection.

What Next?

Biodiversity Act of (2002) has PIC component. Such provisions should be adopted and amend ESA by developing a process of Participatory Resource Management (PRM) i.e. Joint Forest Management or Joint Protected Area Management. Following activities (Table 5) will help in identifying the ‘**conservation potential**’ of the area. This will lead us to review how ESA could be useful and whom to sensitize to use these provisions.

Table 5. Proposed Activities for better utilization of ESA

Activity	Rationale and brief description of the activity	Actors responsible for the activity
Listing out green and non-green land uses	The notification bans change of land use from green to non-green. A list of types of activities that can qualify as green and non-green land use will be very useful in this case.	Forest Department with the help of legal experts
Preparation of green map	Important tool for eco-development/eco-tourism (a) Mapping of diversity-rich and rare species spots (b) map threats or its degree especially with respect to these hot spots	Academicians, NGO's
Carrying capacity assessment	To see the tourism it can support without overstressing natural resources. Can be done through students projects such as water budget of a hotel, fuel wood requirement etc.	Students

X. Conclusions

The declaration of an area as ESA should not be viewed as being against the protection or development. In fact it has a space for developmental planning. It is thus essential for the policy makers (1) to ensure that the stakeholders understand the nitty-gritty's of ESA so that a common objective of sustaining resources and development is set and achieved, (2) to train them to achieve this through awareness generation, capacity building programmes while creating a positive will to act so and (3) to involve locals in the planning-management. This could be achieved through various training programmes to maximize the support of people thereby lessening their opposition. The role of concerned citizens and NGOs as a catalyst in overall understanding of the process is very essential. The success of such provisions will largely depend on how effectively it is managed and planned as well as the manner in which the powers and implementation responsibilities are shared among the stakeholders.

XI. Acknowledgements

First of all we would like to thank **Winrock International (India)** for their financial support. We are thankful to the Forest Department officials, especially **Mr. Kamble, DFO** and **Mr. Sunil Limaye**, Ex DFO, Raigad for their cooperation and help. Thanks are also due to **Ms. Manju Menon** of Kalpavriksha, **Mr. Raghunandan Velankar** of Gene Campaign and **Mr. Utkarsh Ghate** for their perceptive comments. We are also grateful to **Mr. Ajay Sawant**, Vice-President of MMC, representatives of FESS and MBS and **Ms. Radhika Kanade** and **Mr. Kapil Sahasrabuddhe** for sharing their views.

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3. Space for conservation, by Kanchi Kohil and Manju Menon

XIII. Key people and institutions

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6. Mr. Murtaza Taher Matheranwala, Friends of Environment and Sons of Soil (FESS). Member of Monitoring Committee.
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7. Mr. Tawade, Matheran Bachav Samiti (MBS)

8. Mrs. Lords, MBS, Matheran

XIV. Publications and websites

1. Draft and Final Notification of MoEF regarding declaration of Matheran as ESA.

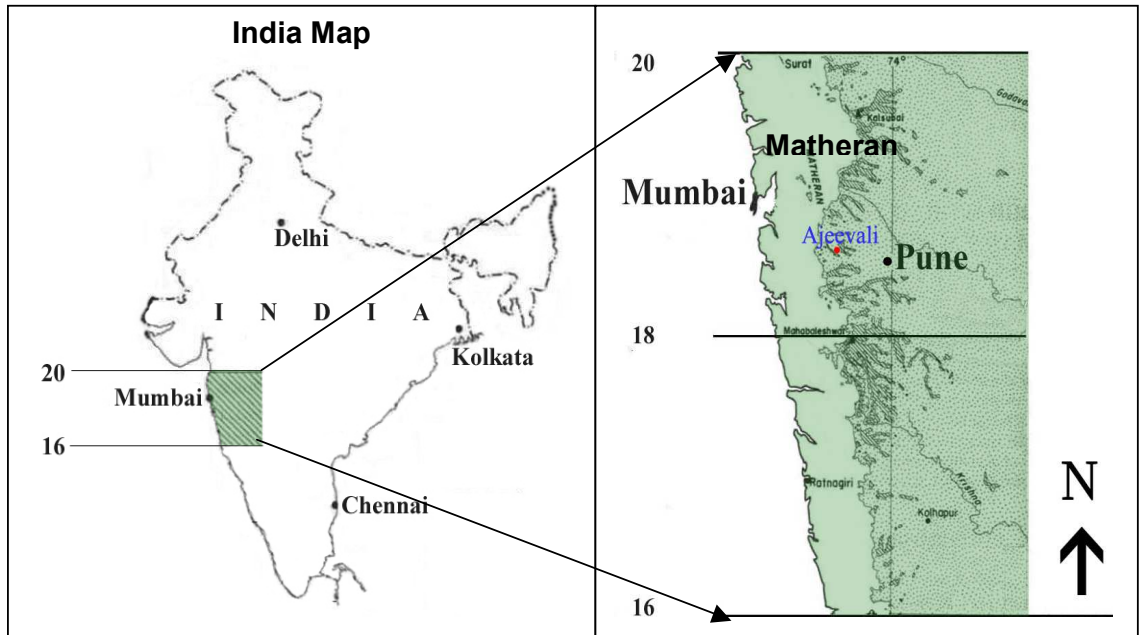
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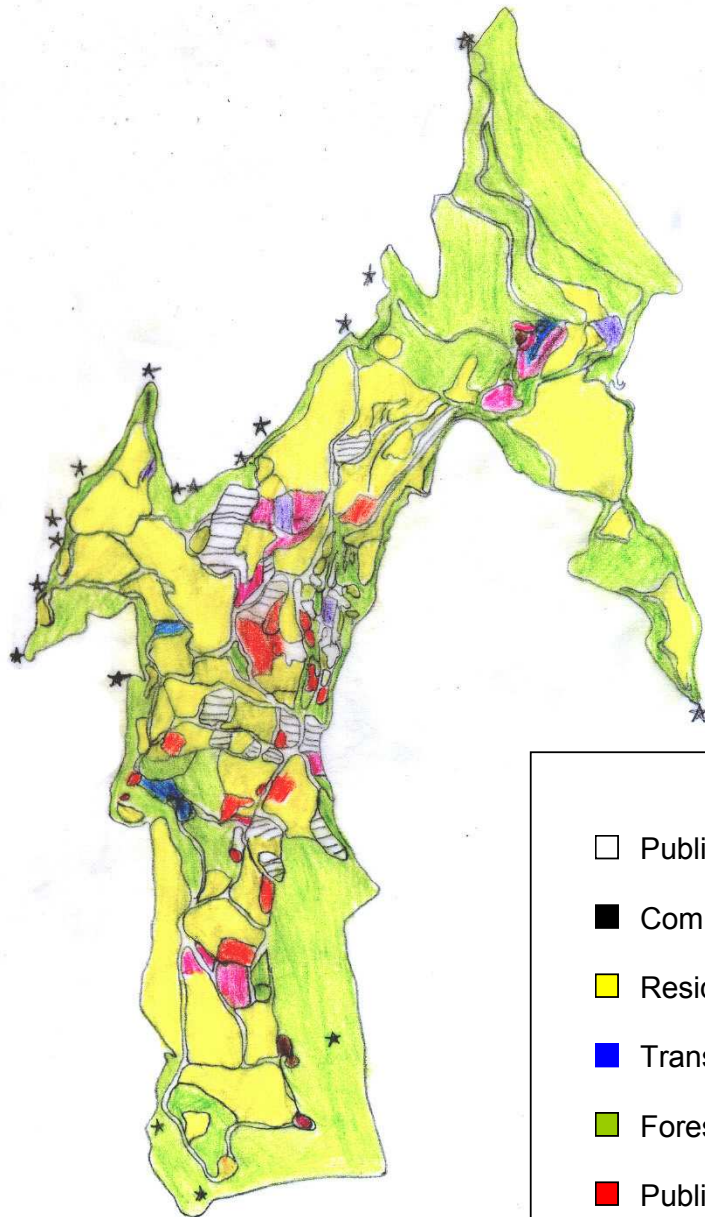
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XV. Map depicting Geographical position of Matheran



Land Use Map Prepared during the Present Study



Legend

- Public utilities
- Commercial
- Residential
- Transport
- Forest land
- Public-semi public
- Water bodies
- Recreational space
- Cremation and Burial ground
- * Tourist spots

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XVII. Brief description of association:

Senior author guided Master's students for the summer training programme (in 2002) regarding **studies on Matheran ESA**, where he has developed an insight into various issues. During the '*Ecosystem Assessment and Management Inputs for Northern Western Ghats*' project (supported by UNDP-CEE-SGP Programme), the author has visited Matheran to study the biodiversity of the area.