CHAPTER VII

Integrated Analysis and Strategies for Conservation and Management of Forest Resources of Alagar Hills

7.1. Introduction

A number of approaches like adhoc approach, system approach, regional approach, human ecology approach, etc., have been used for environmental management. However, it has been recognised than an integrated approach is the best approach towards environmental management to suit the local areas (Jawahar Raj, 2001). A spatial model has been developed based on the integrated approach to derive habitat suitability class zones for thriving native, endangered and threatened species of plants. This exercise has been done for conservation and management of forest resources of Alagar hills.

7.2. Methodology

The spatial model developed for the present study is a kind of the process driven model. The process driven models, otherwise known as conceptual models, use mathematics to describe the factors controlling the processes and these are mostly deductive in nature. A deductive model draws a specific conclusion (the generated new proportion) from a set of general propositions (the premises). In other words, deductive reasoning proceeds from general truths or reasons to a conclusion. The assumption is that the conclusion necessarily follows the premises; that is, if the premises are accepted, then it would be self–contradictory to reject the conclusion (Skidmore, 2002).

The spatial model, in the present study, is attempted by integrating a number of factors, the premises, which include indices such as NDVI, MSI and FCI (Forest Continuity Index), physical factors such as slope, aspect and the landscape elements (the forest categories). The following expression has been applied to derive habitat suitability classes of landcover for thriving native, endangered and threatened species of plants.

Habitat Suitability = ((Slope + Aspect + NDVI + MSI + FCI + Forest cover type) / 18) *100

Where, the value '18' stands for the maximum weightage value a single suitability class could attain (6 factors X maximum weightage to each of the factor (3) = 18). The value 100 is multiplied in order to derive the result in percentage. The Table 7.1 shows the weightage values assigned to different classes of different factors.

Table. 7.1 Factors and their weightages for habitat suitability analysis

S. No	Slope (Degrees)	Aspect	NDVI	MSI	FCI	Forest Cover Type	Weightage Value
1	< 16	Flat, NE, E, SE	> 0.17	< 0	> 4.5	Dense Forest	3
2	16 – 12	S,N	0.10– 0.17	0 - 2	3.5 – 4.5	Open Forest, Scrub	2
3	> 32	W, SW, NW	< 0.03 – 0.10	> 2	< 3.5	Non Forested Land	1

The weightage values are assigned to different habitat suitability classes based on logical reasons and observations. All the factors are first divided into three classes and a maximum weightage of 3 has been assigned to the most favourable factor class and a value of 1 has been assigned to the least favourable factor class. The value 2 represents a moderately favourable class of factors.

The probability of stable undisturbed vegetation cover decreases with the steepness of the slope. So steep slope is assigned a weightage of 1 and a shallow slope which is expected to provide favourable growth conditions is assigned a higher weightage of 3. The observations made and the deductions derived

through environmental visualisation of Alagar hill environs suggest, a favourable growth conditions prevail in the Eastward slopes and a less favourable growth conditions in the Westward slopes. Thus the Aspect categories of Flat, East, Northeast and Southeast are assigned a weightage of 3 while the westward slopes are assigned a weightage of 1. The higher values of NDVI indicate vegetation vigour while the low values of MSI indicate a low moisture stress. Thus NDVI and MSI have an indirect proportion and the weightages are assigned accordingly. Forest Continuity Index (FCI) is an important factor that indicates the disturbance regime in the forest cover. Thus higher values of FCI indicates a less disturbance and more continuity, hence, it is assigned with a higher weightage value. A weightage of 3 is assigned to dense forest cover, for it is the most preferred land cover and a weightage of 1 is assigned to non-forested area where harbouring threatened species of flora is impossible.

The model has been attempted with the 'raster' format maps of the factors. These factors are reclassified according to the weightages assigned. Then the reclassified factors are put into the expression to derive the habitat suitability classes, in the raster calculator of Arc GIS 'Spatial Analyst'.

7.3. Habitat Suitability Zones

The result thus derived using various factors (Fig.7.1) show different classes of landcover belongs to different percentages of habitat suitability. Higher suitability values indicate most favourable habitat suitability zone. The most suitable classes in the range of 90 – 100 % of suitability is found to be distributed in a majority of eastern slopes of the 'right Catapult Ranges' where the Bison Valley is located and in the higher altitudes of the 'left undulating ridges'. The area falls under the Bison Valley is the most preferred location, for it is inaccessible to human beings and protected naturally. Some interior locations of Silambar Valley are also under this class; however, the possibility of human interferences is more in this part of the hill. The higher reaches of the

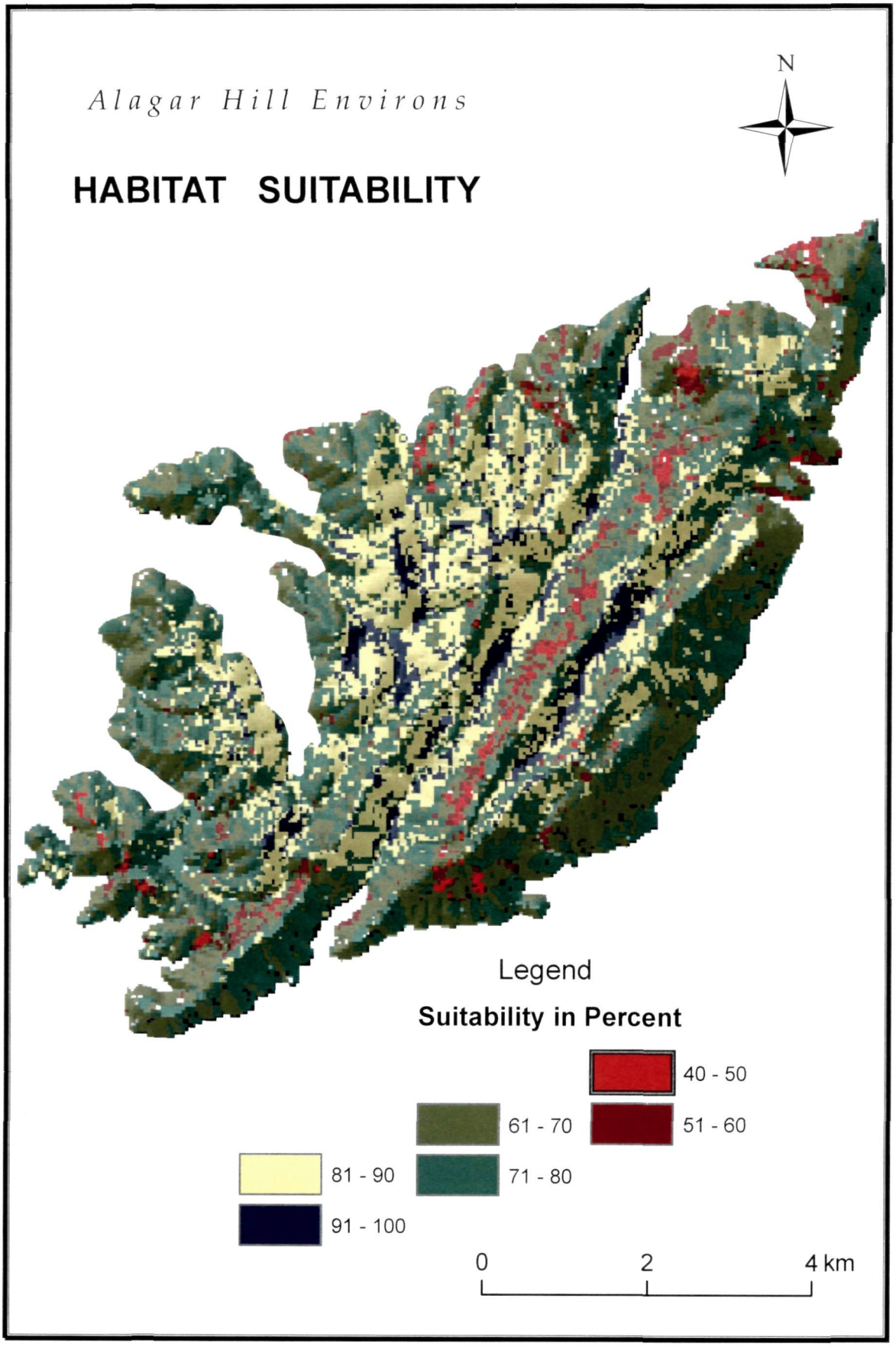
Alagar Hill Environs
N
HABITAT SUITABILITY
Legend
Suitability in Percent
40 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
0
2
4 km

Fig. 7.1

left undulating ridges are the next most preferred location for thriving of threatened or endangered species of flora.

In general, the low habitat suitability zones are found along the periphery of the hill zone and at the west facing slope of the left arm of the 'Catapult Ranges'. There is an expected coincidence of poor growth conditions in the places of higher rate of down slope movement. These areas are found near the beak of the northern edges of Alagar hills. Most of the areas of the Catapult Ranges fall under the medium suitable range. It is observed that prolonged negligence of this less accessible region affects the biodiversity rich Bison Valley.

The peripheral zone falling under the low suitability class has the possibility of regeneration, especially, the southern peripheral region where the growth of *prosophis sp.*, is abundant. In these places, aforestation measures may be attempted to restore the health of the forest environment. On the western periphery a number of plantations owned by public exist. Now-a-days these patches are filled by planting the *Eucalyptus* and *Casuarina*, which requires less attention and more profitable. Eucalyptus generally never harbour bird population and with its allelopathic effects would not allow other plants to grow in its vicinity.

7.4. Strategies for Conservation and Management of Forest Resources

7.4.1. Management Objectives

The management objectives of Alagar hill forest need not follow the general rules and practices proposed for the forest management. Rather, it should address problems unique to the locality and should incorporate answers to the problems addressed by the locals. The main objective should be to improve and upgrade the management of the entire spectrum of the management of biological diversity (flora and fauna) of the region. The new management strategies should encourage the resources utilisation and activities that do not

adversely affect the conservation and research functions. This will result in sustained yield and increased productivity from the area without adversely affecting the ecosystem.

7.4.2. Management Plan

The Alagar hills reserved forest boundary should be divided into a number of habitat suitability zones. The areas with a habitat suitability of 80% - 100% fall under the core zone. Accordingly, the peaks of the Bison Valley, Periya Aruvi Valley and left undulating ridges come under this zone. In the core zone human interferences should be totally banned with the aim of preserving the biological community in a natural state.

The areas with a habitat suitability of 60% to 80% are considered as *restoration zone.* The eastern slopes Silambar Valley and open forest areas of left undulating ridges and Bison Valley are grouped under this category. Here the human interferences should be as least as possible. The aim of the *restoration zone* is to function like a buffer to protect the core zone from the external interferences.

The areas with a habitat suitability of 40% to 60% may function like a *manipulation forestry zone,* where harvest of natural resources is permitted to a minimal level. The areas of religious importance in Alagar hills viz., Alagar temple, Pazhamudhir Cholai, Nupura Gangai and Southern Peripheral area, the Silambar Valley up to Nupura Gangai are confined to the *zone of ecotourism.* In this zone activities may be allowed.

7.4.3. Forest Department

The State and Central Government Forest Departments, have to look after the forests and wild life management, collectively, collaborating among themselves. The activities like smuggling, poaching, encroachment, fires, excessive grazing, etc., should be controlled only by the co-ordinated efforts by

the forest protection bodies. Restoration of degraded forest and wildlife habitats should also be done. The soil conservation measures have to be taken in eroded areas. The Core Zone has to be kept free from human interference; the manipulation zone requires a suitable management plan for achieving sustainable harvest of forest resources with a minimum loss of biological diversity. The working plan now existing in various divisions should be examined and modified to suit the local needs of Alagar hills.

7.4.4. Tourism Department

The Central and State Government Tourism Development agencies should promote nature based eco-tourism and develop tourist complexes outside the forest areas. The NGO's and Tourism Departments can prepare and market mementos unique to Alagar hills such as the herbal products, herbal tea, herbal hair oil, etc. There should be creative application of thought to encourage ecotourism and educational tourism in this area, which should induce genuine nature loving habit among younger generation and also propagate educative experience to others.

Tourism is a major revenue generating functions in Alagar hills. However, the facilities for tourists are very poor. Except the Government owned Travelers Bungalow there is no other hotels for the tourists for boarding and lodging.

Upto a kilometre distance in the thickets above Nupura Gangai, on the right Catapult Ranges, should be protected well and fenced. Here the horse riding could be arranged to give a feeling of the thick forest environ, as a strategy to boost eco-tourism. Rope car way may also be introduced, like in other eco-tourist places to view the natural environment of the Alagar hills. Along the road ways, stone benches may be erected for bird watchers.

7.4.5. Administrative Management

The conservation and management of forest resources of Alagar hills require a coordinated effort of a number of agencies. In this regard an Administrative Advisory Council, represented by various Government Departments, scientists, Professors from University Departments and colleges and eminent persons may be formed. Since Alagar hills are very close to Madurai city, administrators from Madurai Corporation should be included in the Advisory Committee. The following are some of the administrative concerns suggested for the better management of Alagar hill environs.

The proximity of Alagar hills to Madurai city makes it a favourable tourist destination to Madurai. But Alagar hills environ is within the jurisdiction of Dindigul District and the forest too is managed by the Forest Department of Dindigul District. This is an ironical state of management. So it is suggested for better management, the Alagar hill environs has to be transferred to the Forest Department of Madurai District.

In order to effectively protect the existing forest cover, it is suggested that the Reserved Forest boundary of Alagar hills should be revised to exclude Silambar Valley. The Silambar Valley could be promoted as an eco-tourism and religious tourist spot and may be handed over to the Tourism Department. This will enhance the protection of the rest of the undisturbed forest cover in the core and restoration zones.

The western border of Silambar Valley should be fenced and monitored strictly. Activities like grazing and tourism should be banned in this area.

It is a practice that heaps of wood cut in the nearby areas are burnt atop Alagar hills as part of a ritual during the month of 'Karthigai' (November - December). This practice generally consumes tones of wood every year. Apart from that, the fire wood collection is immense as almost all the hotels nearby

and the households which don't have gas connections are directly depending on Alagar hills for their fuel wood. Further, fire wood collectors not only collect the broken branches of trees but some times cut down the trees to supply fuel wood to nearby hotels and use it for household purposes. The Government may make special arrangements to supply LPG gas connections at subsidiary rate to the nearby villages of the hill environment to control the illegal firewood collection.

Various Departments in the Universities and Colleges of Madurai, Dindigul and Tiruchirappalli could be mooted out to conduct intensive research works on Alagar hills for protection of natural resources conservation and management.

7.4.6. Monitoring

Long-term monitoring of a variety of environmental parameters are essential for an adequate understanding of ecological processes. Satellite images have to be obtained regularly to monitor a wide range of vegetational, hydrological, geological and land use. Further as proposed in this thesis various landscape ecological metrics, such as dominance and diversity indices and forest continuity index should be included in the monitoring list so as to ensure the ecological resilience.

The advisory committee could well be engaged in monitoring the natural resources. Especially the nearby University departments and Colleges could be involved in the task of periodic monitoring, surveying, accounting the flora and fauna and other resources of Alagar hill environs.