

Localities of great significance to conservation of India's biological diversity

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Abstract. We provide estimates of the extent to which each of the 43 vegetation types of India still persist as forest formations and at various stages of degradation, as also the extent to which these are represented in the present day network of wild life sanctuaries and national parks. Based on this analysis, we suggest a series of localities which should be accorded the highest priority in our attempts to conserve the whole spectrum of India's biological diversity.

Keywords. Biological diversity; conservation; nature reserves; vegetation types; India

1. Introduction

Ours is an era of profound changes on the surface of earth, changes driven by an unprecedented level of human demands on the resources of our planet. Amongst the most critical of these is the rapid depletion of biological diversity, a vital resource that has been built up over billions of years of evolutionary history. Most plausible scenarios today suggest that we are likely to lose as much as half of an estimated total of 10 million species of living organisms by the end of this century. Since such a loss will be irreversible it is obviously a matter of prime human concern to avert it as far as possible (Ehrlich and Ehrlich 1981).

There is indeed widespread awareness of this challenge confronting us, in India, as in the rest of the world and a great deal is being done to protect our heritage of biological diversity (DOE 1983; IUCN 1980). It is obvious, however, that human populations and human demands on the resources of the earth will continue to mount, at least for the next several decades, and that we cannot hope to save all that remains of wilderness on the face of the earth. We must therefore accept the need to sacrifice some of the natural habitats, while ensuring that others are protected and continue to serve their vital function as repositories of biological diversity. In order to do this effectively, we must understand how biological diversity is distributed, and how it may be conserved to the best of our ability in an ever shrinking network of nature reserves. This implies that we must set priorities for different localities in terms of their significance for conservation, and focus our efforts accordingly. The purpose of this paper is to contribute to such an attempt for the Indian subcontinent, an effort that we believe to be an important component of the scientific inputs that must go into our conservation efforts. We deem it a privilege that this contribution is part of a festschrift for Dr Salim Ali, a man who has done more than anybody else to build up the scientific basis of the nature conservation movement in our country.

2. Distribution of biological diversity

The Indian subcontinent is estimated to harbour a total 2,00,000 species of plants and animals, and a whole variety of micro-organisms about which we know little (Chatterjee 1939; Zoological Survey of India 1980; Jain 1984; Gadgil and Meher-Homji 1986). These are not uniformly distributed over the country, but rather occur where their own special requirements are fulfilled in terms of physical environment, as well as the complex of populations of other species of living organisms.

Generally, a set of species, dependent on each other and on a specific configuration of physical conditions for their existence tend to be distributed together. Thus, the banks of fast flowing Himalayan rivers or the intertidal zone on rocky shores of the east coast of India, or the exposed hills at high elevations of the western ghats, each harbour their own assemblages of living organisms. Such ecosystems are natural units that go to constitute the total biosphere. Some of these ecosystems may be very restricted in occurrence, as for instance the spray zones at the base of major waterfalls, while others such as the flat arid plains of Rajasthan desert may be very widely distributed. In order to make sense of this complex pattern, we classify similar ecosystems into broad biome types such as tropical rain forests or hill streams. Biomes such as tropical rain forests are zonal, i.e. coincide with broad climatic zones while others like the hill stream are azonal. For reasons of convenience, broad ecological classifications emphasize zonally distributed biomes. Further, such biomes are identified with the major plant species, rather than with the more mobile and less obvious animals and micro-organisms. Ecological diversity of a region is therefore best summarised in the form of zonally defined biomes identified with their dominant vegetation type.

Particular assemblages of living organisms differ not only because they may be subject to different environmental regimes, but also because of their different evolutionary histories. Thus the African grasslands and forests have a variety of antelope species, while species of deer play a similar ecological role in many Asian grasslands and forests. The alpine grasslands in Himalaya support a different species of mountain goat, *Hemitragus jemlahicus* from grasslands of the western ghats which harbour *H. hylocrius*. Biologists classify the world in different biogeographic realms and provinces to account for this variation in composition of their biota due to historical factors. Each such biogeographic realm and its provinces tend to possess their own characteristic, though not necessarily completely unique set of plant and animal species.

An effort at conserving the total spectrum of biological diversity must therefore take into account the distribution of plant and animal species in terms of biomes as well as biogeographic provinces. As mentioned above, the biomes are best characterized in terms of the vegetation, and the classic work on India's vegetation is that of Champion (1936), revised by Champion and Seth (1968). Unfortunately, this classification of forest types is not based on mapping the vegetation of the entire country, but on the study of a few selected stands. A major deficiency of the classification is a confusion between physical and anthropogenic influences, so that degradation stages of the same original climax vegetation are accorded the same status as distinct climatic climaxes. Further this classification employs an improper demarcation into northern and southern types, although in peninsular India latitude does not differentiate vegetation the way it does in Europe due to the sheltering effect

of the Himalayan ranges. The classification also makes poor use of terms such as subtropical, dry evergreen and semi-evergreen (Puri *et al* 1983). Also, Champion's classification deals mainly with tree vegetation. An ideal treatment should be more complete than Champion's and should deal with the entire gamut of vegetation including aquatic flora, strand communities and degraded stages of the forest in a more complete way. It is therefore best to look for an alternative to Champion's forest types based on detailed mapping of the country's vegetation.

Such an alternative is available in form of the vegetation maps of peninsular India by Gaussen (1959) and the French Institute School, and of Himalaya by Schweinfurth (1957). Gaussen's classification of vegetation introduces the important notion of series of vegetation. A series includes the various physiognomic stages encountered in an ecological region ranging from the forest to scattered shrubs created through anthropogenic influences. The final stage of the series, expected to be reached if the successional processes were permitted to proceed without human interference, is termed as *plesioclimax*, the potential vegetation of a locality. Gaussen and the French School identify each vegetation type after 3 or more species characteristic of its *plesioclimax* stage. These species are selected because of their dominance, abundance, fidelity or economic value. Because of the consideration of characteristic species, this classification also takes into account the differences brought about through divergence in evolutionary history. These vegetation types thus combine ecological and biogeographical considerations and are ideally suited to serve as basic units for directing conservation effort on a national scale. Schweinfurth has adopted a similar approach for the Himalaya, although his treatment is based on much less extensive work. We therefore suggest that an effort at conservation of the total spectrum of India's biological diversity would be best based on an attempt to secure representation of each of the 43 vegetation types that may be distinguished on the basis of the combined work of the French Institute School (Gaussen *et al* 1961a, b, 1963a, b, 1965a, b, 1968a, b, 1971, 1972, 1973, 1978; Schweinfurth 1957). This is what we have attempted to do, with the additional help of maps based on satellite imagery by the National Remote Sensing Agency (1983), Kawosa *et al* (1983), and Bellan (1985), as well as the Forest Atlas of India (Das Gupta 1976). We have assigned to each vegetation type protected and undisturbed areas of vegetation based on the work of Forest Survey of India (1982). The information so generated has been scrutinized by a committee of the Indian Man and Biosphere Programme (1982) as well as a large number of knowledgeable naturalists, scientists and managers. All of this has gone into the analysis presented below (see also Gadgil and Meher-Homji 1986).

3. Status survey

We summarise below the information on the 43 vegetation types. This includes the potential area, as estimated by Gaussen *et al* and Schweinfurth (*op cit*), the minimal and maximal estimates of areas that remain under a forest formation as well as at other stages of degradation from estimates of NRSA (1983), Bellan (1985) and Kawosa *et al* (1983) and areas protected as wild life sanctuaries and national parks from the maps of Forest Survey of India (1982). Finally, we indicate wherever possible localities of great significance for the purpose of conservation of the biological diversity associated with a particular vegetation type. The choice of these

localities is based on wide ranging discussions we have had with many knowledgeable people, as well as through a committee of the Indian national MAB programme. It is not at all our claim that the priorities that we set down here are final; however we do believe that they provide excellent working material to focus our attention on localities that are highly significant. We also hope that this list would generate further debate and, hopefully, action on this vital issue.

(i) Thorny types

(1) and (2)

(a) Vegetation type	...	<i>Calligonum</i> Series + <i>Prosopis</i> — <i>Salvadora</i> — <i>Capparis</i> — <i>Ziziphus</i> series
(b) Champion's equivalent	...	The discontinuous thicket and scattered shrubs of <i>Prosopis</i> — <i>Salvadora</i> — <i>Capparis</i> — <i>Ziziphus</i> series find their equivalent in the northern desert thorn forest
(c) Potential area (km ²)	...	308750-00
(d) Area under forest (km ²)	...	92 63-1543 75
(e) Area under degraded vegetation (km ²)	...	16672 50-76878 75
(f) Total area under nature reserves (km ²)	...	3084 55
(g) Key areas for conservation	...	

Jaisalmer Desert National Park Jaisalmer district Rajasthan State 3000-00 km²

(3)

(a) Vegetation type	...	<i>Acacia</i> — <i>Capparis</i> series
(b) Champion's equivalent	...	Northern thorn scrub and northern <i>Euphorbia</i> semi desert scrub
Discontinuous thicket and scattered scrub formations of the <i>Acacia</i> — <i>Capparis</i> series	...	
Savanna formation	...	Southern Cutch thorn forest
(c) Potential area (km ²)	...	172500-00
(d) Area under forest (km ²)	...	690-00
(e) Area under degraded vegetation (km ²)	...	4485-00-47437 50
(f) Total area under nature reserves (km ²)	...	75 30
(g) Key areas for conservation	...	

Velavadar National Park Bhavnagar district Gujarat State 17 80 km²

(ii) Deciduous types

(4) (a) Vegetation type	...	<i>Acacia senegal</i> — <i>Anogeissus pendula</i> series
(b) Champion's equivalent	...	
Dry deciduous open forest and scrub-woodland	...	Edaphic climax type of dry tropical forest: <i>Anogeissus pendula</i> forest
Thorny thicket	...	Edaphic climax type of dry tropical forests: <i>Anogeissus pendula</i> scrub
Discontinuous thicket, scattered shrubs, tree-savanna and shrub-savanna	...	Northern tropical forests— <i>Euphorbia</i> scrub and <i>Ziziphus</i> scrub
(c) Potential area (km ²)	...	346000-00
(d) Area under forest (km ²)	...	1730-00-3460-00
(e) Area under degraded vegetation (km ²)	...	3460-00-104838-00
(f) Total area under nature reserves (km ²)	...	8 20
(g) Key areas for conservation	...	None identified
(5) (a) Vegetation type	...	<i>Acacia catechu</i> — <i>Anogeissus pendula</i> series

- (b) Champion's equivalent
 Dry deciduous open forest and scrub-woodland } Edaphic climax type of dry tropical forest: *Anogeissus pendula* forest
 Thorny Thicket } Edaphic climax type of dry tropical forests: *Anogeissus pendula* scrub
 Discontinuous thicket, scattered shrubs, tree-savanna and shrub-savanna } Northern tropical forests *Euphorbia* scrub and *Ziziphus* scrub
- (c) Potential area (km²) 158050-00
 (d) Area under forest (km²) 3161 00-12644-00
 (e) Area under degraded vegetation (km²) 1580 50-16595 25
 (f) Total area under nature reserves (km²) 2317 46
 (g) Key areas for conservation
- | | | |
|-------------------------------|---|------------------------|
| Sariska wildlife sanctuary | Alwar district Rajasthan State | 496 37 km ² |
| Chambal wildlife sanctuary | Kota district Rajasthan State | — |
| National Chambal sanctuary | Etawah Agra district UP State | 635 00 km ² |
| Sawai Madhopur | Sawai Madhopur district Rajasthan State | 392 00 km ² |
| Keola Deo Ghana National Park | Bharatpur district Rajasthan State | 29 00 km ² |
- (6) (a) Vegetation type *Anogeissus pendula*—*Anogeissus latifolia* series
 (b) Champion's equivalent
 Shrub-savanna } Dry savanna forest
 Discontinuous thorny thicket } Dry deciduous scrub
 Low scattered shrubs } *Euphorbia* semi-desert scrub; *Euphorbia* scrub-degradation stage
- (c) Potential area (km²) 50000-00
 (d) Area under forest (km²) 900 00-2500 00
 (e) Area under degraded vegetation (km²) 200 00-1500 00
 (f) Total area under nature reserves (km²) 925 16
 (g) Key areas for conservation
- | | | |
|------------------------|-----------------------------|------------------------|
| Shivpuri National Park | Shivpuri district M P State | 156 00 km ² |
|------------------------|-----------------------------|------------------------|
- (7) (a) Vegetation type *Acacia*—*Anogeissus latifolia* series
 (b) Champion's equivalent
 Shrub-savanna } Dry savanna forest
 Low scattered shrub } *Euphorbia* semi-desert scrub
- (c) Potential area (km²) 97800 00
 (d) Area under forest (km²) 2934 00
 (e) Area under degraded vegetation (km²) 293 40-2347 20
 (f) Total area under nature reserves (km²) Nil
 (g) Key areas for conservation None identified
- (8) (a) Vegetation type *Anogeissus latifolia*—*Hardwickia binata* series
 (b) Champion's equivalent
 Open forest } South Indian dry deciduous forest: *Hardwickia* type
 savanna-woodland }
 Tree-savanna } Dry tropical seral type dry savanna forest
 Shrub-savanna }
 Scrub-woodland } Southern Kutch thorn forest
 thorny thicket }
 Scattered shrubs } Southern *Euphorbia* semi desert scrub
- (c) Potential area (km²) 121250 00
 (d) Area under forest (km²) 10912 50-14550 00
 (e) Area under degraded vegetation (km²) 1212 50-7032 50

	(f) Total area under nature reserves (km ²)	3901.73
	(g) Key areas for conservation	
	Nagarjunsagar wildlife sanctuary	Hyderabad district A P State 3568.00 km ²
	Tungabhadra wildlife sanctuary	Bellary district Karnataka State 112.11 km ²
(9)	(a) Vegetation type	<i>Anogeissus latifolia</i> — <i>Terminalia</i> series
	(b) Champion's equivalent	
	Dry deciduous forest	Northern dry mixed deciduous forest
	Open forest	-do-
	Savanna-woodland	-do-
	Discontinuous thicket and scattered shrubs	<i>Euphorbia</i> scrub
	Tree-savanna	Dry savanna forest
	shrub-savanna	
	(c) Potential area (km ²)	119750.00
	(d) Area under forest (km ²)	598.75-10777.50
	(e) Area under degraded vegetation (km ²)	718.50-11975.00
	(f) Total area under nature reserves (km ²)	954.65
	(g) Key areas for conservation	None identified
(10)	(a) Vegetation type	<i>Terminalia</i> — <i>Anogeissus latifolia</i> — <i>Cleistanthus</i> series
	(b) Champion's equivalent	
	Deciduous forest	(Northern tropical) dry mixed deciduous forest
	Scrub-woodland } Discontinuous thicket }	(Northern) <i>Acacia</i> scrub forest
	Scattered shrub	(Southern) <i>Euphorbia</i> semi-desert scrub
	(c) Potential area (km ²)	103750.00
	(d) Area under forest (km ²)	8300.00-17845.00
	(e) Area under degraded vegetation (km ²)	2905.00-20750.00
	(f) Total area under nature reserves (km ²)	1079.71
	(g) Key areas for conservation	
	Nagzira wildlife sanctuary	Bhandara district Maharashtra State 136.10 km ²
	Navegaon National Park	Bhandara district Maharashtra State 133.20 km ²
(11)	(a) Vegetation type	<i>Terminalia</i> — <i>Anogeissus latifolia</i> <i>Tectona</i> series
	(b) Champion's equivalent	
	Deciduous forest, open forest and scrub } woodland }	Southern tropical dry or very dry deciduous teak
	Savanna woodland and tree savanna } }	Dry teak forest, secondary dry deciduous or savanna forest
	Closed thicket and discontinuous } thicket }	Dry deciduous scrub
	Tree pseudo-steppe	Northern thorn forest northern <i>Acacia</i> forest
	Low scattered shrub	Southern <i>Euphorbia</i> semi-desert scrub and <i>Euphorbia</i> scrub
	(c) Potential area (km ²)	360900.00
	(d) Area under forest (km ²)	18045.00-28872.00
	(e) Area under degraded vegetation (km ²)	10827.00-50526.00
	(f) Total area under nature reserves (km ²)	8047.22
	(g) Key areas for conservation	
	Gir wildlife sanctuary and National Park	Junagarh district Gujarat State 1412.10 km ²

Mudumalai wildlife sanctuary	Nilgiri district Tamilnadu State	321.10 km ²
Ganjan wildlife sanctuary	Panna district MP State	285.30 km ²
Panna National Park	Panna district MP State	782.00 km ²
Madeshwara Malai	Mysore district Karnataka State	20.00 km ²
Bandipur Tiger reserve	Mysore district Karnataka State	460.00 km ²
Nagarhole National Park	Mysore district Karnataka State	101.50 km ²
Nilgiri eastern slope	Coimbatore district Tamilnadu	37.20 km ²
Talamalai	-do-	20.40 km ²
(12)	(a) Vegetation type	<i>Tectona—Terminalia</i> series
	(b) Champion's equivalent	
	Intermediate types of deciduous forest	Southern Indian moist deciduous forest
	Open forests	Dry teak forest
		Dry deciduous scrub forest
	Tree and shrub-savanna	Dry savanna forest
	Thickets	Dry deciduous scrub forest
	(c) Potential area (km ²)	172500.00
	(d) Area under forest (km ²)	25875.00-60720.00
	(e) Area under degraded vegetation (km ²)	10350.00-51750.00
	(f) Total area under nature reserves (km ²)	14629.53
	(g) Key areas for conservation	
	Kutru wildlife sanctuary	Bastar district MP State 2273.50 km ²
	Indravati National Park	-do- 1258.00 km ²
	Tadoba National Park	Chandrapur district Maharashtra State 116.50 km ²
(13)	(a) Vegetation type	<i>Tectona—Terminalia—Adina— Anogeissus</i> series
	(b) Champion's equivalent	
	Intermediate type of deciduous forests	South Indian moist deciduous forest
	Open forests	Dry teak forests
	Tree and shrub savanna	Dry savanna forest
	Thickets	Dry deciduous scrub forest
	(c) Potential area (km ²)	16250.00
	(d) Area under forest (km ²)	3412.50-4533.75
	(e) Area under degraded vegetation (km ²)	747.50-1933.75
	(f) Total area under nature reserves (km ²)	602.70
	(g) Key areas for conservation	
	Purna wildlife sanctuary	Dang district Gujarat State 290.00 km ²
(14)	(a) Vegetation type	<i>Tectona—Dillenia—Lagerstroemia lanceolata—Terminalia paniculata</i> series
	(b) Champion's equivalent	
	Moist deciduous forest	South Indian tropical moist deciduous forest
	Open forest with bamboos	Secondary moist bamboo brakes
	Lateritic facies	Western laterite semi evergreen forest
	(c) Potential area (km ²)	49750.00
	(d) Area under forest (km ²)	2587.00-8955.00
	(e) Area under degraded vegetation (km ²)	895.50-8308.25
	(f) Total area under nature reserves (km ²)	7252.80
	(g) Key areas for conservation	
	Anashi Ghat (Part of Dandeli wildlife sanctuary)	North Kanara district Karnataka State 160.00 km ²

			<i>Shorea—Buchanania—Cleistanthus</i> series
(15)	(a) Vegetation type		
	(b) Champion's equivalent		
	Deciduous forest open forest and scrub-woodland	}	The transition between dry deciduous sal and moist Peninsular sal
	Thicket		Dry deciduous scrub
	Discontinuous thicket and scattered shrub	}	Too degraded to find equivalence in Champion's forest types
	(c) Potential area (km ²)		83750-00
	(d) Area under forest (km ²)		2596 25-13818 75
	(e) Area under degraded vegetation (km ²)		83 75-20937 50
	(f) Total area under nature reserve (km ²)		410 05
	(g) Key areas for conservation		None identified
			<i>Shorea—Cleistanthus—Croton</i> series
(16)	(a) Vegetation type		Dry deciduous sal and dry deciduous scrub
	(b) Champion's equivalent		
	(c) Potential area (km ²)		107500-00
	(d) Area under forest (km ²)		2795 00-7525 00
	(e) Area under degraded vegetation (km ²)		53 75-7525 00
	(f) Total area under nature reserves (km ²)		393-01
	(g) Key areas for conservation		
	Dalma wildlife sanctuary	Singhbhum district Bihar State	193 20 km ²
			<i>Shorea—Terminalia—Adina</i> series
(17)	(a) Vegetation type		
	(b) Champion's equivalent		
	Open forest and scrub-woodland	}	Moist peninsular sal type
	Thickets		Dry deciduous scrub
	Tree savanna		Moist sal savanna type
	Discontinuous thicket		Northern <i>Acacia</i> scrub
	(c) Potential area (km ²)		196100-00
	(d) Area under forest (km ²)		6667 40-72557 00
	(e) Area under degraded vegetation (km ²)		392 20-72557 00
	(f) Total area under nature reserves (km ²)		12944 09
	(g) Key areas for conservation		
	Manas wildlife sanctuary	Barpeta district Assam State	390 00 km ²
	Palamau tiger reserve	Daltanganj district Bihar State	979 20 km ²
	Champaran	Champaran district Bihar State	—
	Kanha National Park	Mandla district MP State	980 00 km ²
	Corbett National Park	Nainital district UP State	525 00 km ²
	Dudhwa National Park	Lakhimpur district UP State	490 00 km ²
	Neora valley	Darjeeling district West Bengal	88 00 km ²
			<i>Shorea—Dillenia—Pterospermum</i> series
(18)	(a) Vegetation type		
	(b) Champion's equivalent		
	Deciduous forest, Open forest and scrub woodland	}	Moist tropical primary seral type: coastal sal
	Thickets		Dry deciduous scrub forest
	(c) Potential area (km ²)		18750 00
	(d) Area under forest (km ²)		412 50-1125 00
	(e) Area under degraded vegetation (km ²)		393 75-562 50
	(f) Total area under nature reserves		Nil
	(g) Key areas for conservation		None identified
			<i>Shorea—Syzygium operculatum—Toona symplocos</i> series
(19)	(a) Vegetation type		

(b) Champion's equivalent			
Deciduous forest, Open forest and Scrub-woodland	}	Moist peninsular sal forest of the northern tropical moist deciduous forest	
(c) Potential area (km ²)		49500-00	
(d) Area under forest (km ²)		1980-00-24255-00	
(e) Area under degraded vegetation (km ²)		1237-50-20790-00	
(f) Total area under nature reserves (km ²)		657-05	
(g) Key areas for conservation			
Simlipal wildlife sanctuary and National Park		Mayurbhanj district Orissa State	303-00 km ²
(iii) Semi-evergreen types			
(20) (a) Vegetation type		<i>Toona—Garuga</i> series	
(b) Champion's equivalent		(Orissa) Tropical semi-evergreen forest	
Semi-deciduous forest		Northern tropical semi-evergreen savanna	
(c) Potential area (km ²)		10000-00	
(d) Area under forest (km ²)		1700-00-3600-00	
(e) Area under degraded vegetation (km ²)		50-00-1700-00	
(f) Total area under nature reserves (km ²)		Nil	
(g) Key areas for conservation		None identified	
(21) (a) Vegetation type		<i>Bridelia—Ficus glomerata—Syzygium</i> series	
(b) Champion's equivalent		Bombay sub-tropical evergreen forest	
Semi-deciduous forests		Dry savanna forest	
Tree and shrub-savanna		Sub-tropical thorn forest (Northern <i>Euphorbia</i> scrub)	
Discontinuous thorny thicket			
(c) Potential area (km ²)		2750-00	
(d) Area under forest (km ²)		1069-75-1127-50	
(e) Area under degraded vegetation (km ²)		247-50-990-00	
(f) Total area under nature reserves (km ²)		112-60	
(g) Key areas for conservation			
Mount Abu wildlife sanctuary		Sirohi district Rajasthan State	112-6 km ²
(iv) Evergreen types			
(22-23) (a) Vegetation type		Shola (Montane) forest and <i>Gordonia—Schefflera—Meliosma</i> series	
(b) Champion's equivalent		South wet montane forest (climax)	
Shola:		Southern montane wet grassland	
Shrub-savanna:			
(c) Potential area (km ²)		5000-00	
(d) Area under forest (km ²)		150-00-650-00	
(e) Area under degraded vegetation (km ²)		150-00-950-00	
(f) Total area under nature reserves (km ²)		70-00	
(g) Key areas for conservation			
Eravikulam National Park		Idukki district Kerala State	60-00 km ²
Anamalai and Tunacadau wildlife sanctuary		Coimbatore district Tamilnadu	10-00 km ²
Ebanadu		Nilgiri district Tamilnadu	2-20 km ²
Kaubatti		-do-	2-90 km ²

(24)	(a) Vegetation type	<i>Memecylon—Actinodaphne—Syzygium</i> series
	(b) Champion's equivalent	Forest corresponds to the Bombay subtropical evergreen forest
	(c) Potential area (km ²)	5000.00
	(d) Area under forest (km ²)	230.00–1200.00
	(e) Area under degraded vegetation (km ²)	100.00–900.00
	(f) Total area under nature reserves (km ²)	Nil
	(g) Key areas for conservation	
	Kankumbi	Belgaum district Karnataka State —
	Koyna valley	Satara district Maharashtra State —
(25)	(a) Vegetation type	<i>Persea—Holigarna—Diospyros</i> series
	(b) Champion's equivalent	
	Moist evergreen forest	Western tropical evergreen forest
	Semi-evergreen forest	West coast tropical semi-evergreen forest
	Closed deciduous forest	Secondary moist deciduous forest
	(c) Potential area (km ²)	12500.00
	(d) Area under forest (km ²)	2275.00–6900.00
	(e) Area under degraded vegetation (km ²)	100.00–1050.00
	(f) Total area under nature reserves (km ²)	Nil
	(g) Key areas for conservation	None identified
(26)	(a) Vegetation type:	<i>Dipterocarpus—Mesua—Palaquium</i> series
	(b) Champion's equivalent:	
	Moist evergreen forest	Western tropical evergreen forest (climax)
	Semi-evergreen	West coast tropical semi-evergreen forest (climax and seral)
	Clump savanna	(Nilgiris) sub-tropical hill savanna
	Moist deciduous forest Open forest }	Southern tropical secondary moist deciduous forest
	(c) Potential area (km ²)	19500.00
	(d) Area under forest (km ²)	1852.50–8385.00
	(e) Area under degraded vegetation (km ²)	448.50–9321.00
	(f) Total area under nature reserves (km ²)	2066.40
	(g) Key areas for conservation	
	Govardhangiri—Attigod—Jog forests	Shimoga district Karnataka State 180.00 km ²
	Pushpagiri	Coorg district Karnataka State 37.50 km ²
	Narasimha Parvat—Naravi— } Tungabhadra	South Kanara district 90.00 km ²
	Kudrcmukh (Bhagvati valley)	-do- 250.00 km ²
(27)	(a) Vegetation type	<i>Cullenia—Mesua—Palaquium</i> series
	(b) Champion's equivalent-	
	Moist evergreen forest	Western tropical evergreen forest (climax)
	Semi-evergreen forest	West coast tropical semi-evergreen forest (climax and seral)
	Riparian or low level sholas	Nilgiris subtropical evergreen forest (climax)
	Evergreen or semi-evergreen	Nilgiris subtropical hill savanna (seral)
	(c) Potential area (km ²)	20000.00
	(d) Area under forest (km ²)	780.00–4380.00
	(e) Area under degraded vegetation (km ²)	80.00–1000.00
	(f) Total area under nature reserves (km ²)	2337.59
	(g) Key areas for conservation	

Agastyamalai Kalakadu wildlife sanctuary	Kanyakumari district Tamilnadu	223.30 km ²
Ervikulam National Park	Idukki district Kerala State	10.00 km ²
Thekkady tiger reserve	Idukki district Kerala State	779.00 km ²
Silent Valley National Park	Palghat district Kerala State	89.50 km ²

(v) Dry evergreen types

- (28) (a) Vegetation type *Acacia—Albizia amara*
 (b) Champion's equivalent
 Scrub-woodland Tropical dry evergreen forest
 Closed thicket and continuous thicket Southern thorn forest (climax)
Acacia planifrons Carnatic umbrella thorn forest (climax)
 Scattered shrubs Southern *Euphorbia* semi-desert scrub (climax)
 (c) Potential area (km²) 153500.00
 (d) Area under forest (km²) 1381.50-7675.00
 (e) Area under degraded vegetation (km²) 1535.00-3070.00
 (f) Total area under nature reserves (km²) Nil
 (g) Key areas for conservation None identified
- (29) (a) Vegetation type *Manilkara—Chloroxylon* series
 (b) Champion's equivalent This series corresponds to dry evergreen forest type
 Discontinuous thicket Southern thorn forest
 (c) Potential area (km²) 27500.00
 (d) Area under forest (km²) 55.00-275.00
 (e) Area under degraded vegetation (km²) 82.50-1375.00
 (f) Total area under nature reserves (km²) 520.30
 (g) Key areas for conservation

Point Calimere wildlife sanctuary	Thanjavur district Tamilnadu	17.20 km ²
Pulicat bird sanctuary (Wetland)	Nellore district AP State	500.00 km ²

- (30) (a) Vegetation type *Albizia amara Chloroxylon—Anogeissus latifolia* series
 (b) Champion's equivalent
 Savanna woodland South Indian dry mixed deciduous forest
 Shrub-savanna Dry savanna forest
 Discontinuous thorny thicket Dry deciduous scrub
 Scattered shrubs Southern *Euphorbia* semi-desert scrub
 (c) Potential area (km²) 27250.00
 (d) Area under forest (km²) 109.00-272.50
 (e) Area under degraded vegetation (km²) 81.75-1417.00
 (f) Total area under nature reserve (km²) 43.80
 (g) Key areas for conservation None identified

(vi) Himalayas

- (31) (a) Vegetation type Tropical wet evergreen forest
 (b) Champion's equivalent Tropical wet evergreen forest
 (c) Potential area (km²) 58600.00
 (d) Area under forest (km²) 4043.40-16056.40
 (e) Area under degraded vegetation (km²) 1172.00
 (f) Total area under nature reserves (km²) 1950.50
 (g) Key areas for conservation

Danseri-Kaki-Disama RF	Nagaland
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(32)	(a) Vegetation type	..	Tropical moist deciduous forest
	(b) Champion's equivalent	..	—
	(c) Potential area (km ²)	..	54720.00
	(d) Area under forest (km ²)	..	Given together for tropical wet evergreen (31) and moist deciduous forest along with the former
	(e) Area under degraded vegetation (km ²)	..	—
	(f) Total area under nature reserves (km ²)	..	1078.53
	(g) Key areas for conservation	..	
	Intangki wildlife sanctuary	Kohima district Nagaland	202.00 km ²
	Kaziranga National Park	Jorhat district Assam	430.00 km ²
	Keibul Lambio (Wetland) National Park	Central district Manipur	40.00 km ²
	Balphakram National Park	Meghalaya	200.20 km ²
(33)	(a) Vegetation type	..	Subtropical broad leaved hill forest
	(b) Champion's equivalent	..	—
	(c) Potential area (km ²)	..	3000.00
	(d) Area under forest (km ²)	..	Given for Himalayan sub-tropical forests as a whole i.e. vegetation types (33), (34) and (35) 207.00–822.00
	(e) Area under degraded vegetation (km ²)	..	60.00
	(f) Total area under nature reserves (km ²)	..	Nil
	(g) Key areas for conservation	..	None identified
(34)	(a) Vegetation type	..	Subtropical evergreen sclerophyllous forest
	(b) Champion's equivalent	..	—
	(c) Potential area (km ²)	..	13400.00
	(d) Area under forest (km ²)	..	Given under the previous vegetation type for Himalayan subtropical forests i.e. vegetation types (33), (34) and (35) taken together
	(e) Area under degraded vegetation (km ²)	..	—
	(f) Total area under nature reserves (km ²)	..	110.30
	(g) Key areas for conservation	..	None identified
(35)	(a) Vegetation type	..	Subtropical <i>Pinus roxburghii</i> forests
	(b) Champion's equivalent	..	Subtropical pine forest formation
	(c) Potential area (km ²)	..	49000.00
	(d) Area under forest (km ²)	..	Given for subtropical Himalayan forests as a whole i.e. vegetation types (33), (34), (35) taken together under (33)
	(e) Area under degraded vegetation (km ²)	..	—
	(f) Total area under nature reserves (km ²)	..	1092.09
	(g) Key areas for conservation (km ²)	..	None identified
(36)	(a) Vegetation type	..	Temperate mixed oak and coniferous forest
	(b) Champion's equivalent	..	Himalayan moist temperate forest
	(c) Potential area (km ²)	..	23600.00
	(d) Area under forest (km ²)	..	For Himalayan temperate forest as a whole—for vegetation types (36), (37) and (38) 448.40–14301.60
	(e) Area under degraded vegetation (km ²)	..	165.20
	(f) Total area under nature reserves (km ²)	..	1555.82
	(g) Key areas for conservation	..	
	Kistwar high altitude National Park	Doda district Jammu and Kashmir	200.00 km ²

(37)	(a)	Vegetation type	Temperate coniferous forest	
	(b)	Champion's equivalent	Himalayan moist temperate forest	
	(c)	Potential area (km ²)	9120-00	
	(d)	Area under forest (km ²)	See for Himalayan temperate forest as a whole—vegetation types (36), (37), (38) under (36)	
	(e)	Area under degraded vegetation (km ²)	—	
	(f)	Total area under nature reserves (km ²)	656-96	
	(g)	Key areas for conservation (km ²)		
		Dachigam National Park	Srinagar district Jammu and Kashmir	141-00 km ²
		Gulmarg Man and Biosphere Reserve	-do-	180-00 km ²
		Overu—Aru Man and Biosphere Reserve	-do-	212-50 km ²
(38)	(a)	Vegetation type	Wet temperate forest	
	(b)	Champion's equivalent	—	
	(c)	Potential area (km ²)	28280-00	
	(d)	Area under forest (km ²)	Given for Himalayan temperate forests as a whole under vegetation type (36)	
	(e)	Area under degraded vegetation (km ²)	—	
	(f)	Total area under nature reserves (km ²)	410-49	
	(g)	Key areas for conservation (km ²)		
		Namdapha wildlife sanctuary	Tirap district Arunachal Pradesh	232-66 km ²
(39)	(a)	Vegetation type	Subalpine altimontane forest	
	(b)	Champion's equivalent	Partly alpine fir birch wood and partly alpine birch—rhododendron forest	
	(c)	Potential area (km ²)	50760-00	
	(d)	Area under forest (km ²)	101-52-7817-04	
	(e)	Area under degraded vegetation (km ²)	—	
	(f)	Total area under nature reserves (km ²)	1101-48	
	(g)	Key areas for conservation (km ²)		
		Sainj—Tirthan valley	Himachal Pradesh	140-00 km ²
		Kedarnath wildlife sanctuary	Chamoli district	478-50 km ²
		Nandadevi National Park	UP State	630-33 km ²
		Henus high altitude National Park	Leh district Jammu and Kashmir	150-00 km ²
(40)	(a)	Vegetation type	Alpine scrub and meadows	
	(b)	Champion's equivalent	—	
	(c)	Potential area (km ²)	5120-00	
	(d)	Area under forest (km ²)	—	
	(e)	Area under degraded vegetation (km ²)	—	
	(f)	Total area under nature reserves (km ²)	408-83	
	(g)	Key areas for conservation (km ²)		
		Phoolon Ki Ghati	Chamoli district UP State	89-50 km ²
(41)	(a)	Vegetation type	Alpine steppe	
	(b)	Champion's equivalent	Dry alpine scrub	
	(c)	Potential area (km ²)	56000-00	
	(d)	Area under forest (km ²)	—	
	(e)	Area under degraded vegetation (km ²)	—	
	(f)	Total area under nature reserves (km ²)	1195-09	
	(g)	Key areas for conservation		
		Shang Gaui reserve wildlife sanctuary	Leh district Jammu and Kashmir	80-00 km ²
		Henus high altitude National Park	Leh district Jammu and Kashmir	150-00 km ²

Overa—Aran Man and Biosphere reserve	Srinagar district Jammu and Kashmir	212 50 km ²
Kistwar high altitude National Park	Doda district Jammu and Kashmir	200 00 km ²
Singalila National Park	Darjeeling district West Bengal	78 60 km ²

(vii) Mangroves

(42)	(a) Vegetation type	Mangrove	
	(b) Champion's equivalent	—	
	(c) Potential area (km ²)	6810 00	
	(d) Area under forest (km ²)	640 14–681 00	
	(e) Area under degraded vegetation (km ²)	—	
	(f) Total area under nature reserves (km ²)*	8158 39	
	(g) Key areas for conservation		
	Sunderban Tiger reserve	24 Paraganas district West Bengal	2585 00 km ²
	Point Calimere wildlife sanctuary	Tanjavur district Tamilnadu	17 29 km ²
	Wild ass sanctuary	Surendranagar district Gujarat State	4958 70 km ²
	Killai	Cuddalore district Tamilnadu	1 00 km ²
	Pichavaram	—do—	4 00 km ²
	Andaman–Nicobar islands	Andaman–Nicobar islands	—

*Some of the nature reserves include coastal areas other than that with mangrove vegetation

(viii) Andaman and Nicobar

(43)	(a) Vegetation type	Tropical wet evergreen forest	
	(b) Champion's equivalent	Evergreen forest	
	(c) Potential area (km ²)	6840 00	
	(d) Area under forest (km ²)	5472 00–6156 00	
	(e) Area under degraded vegetation (km ²)	410 40	
	(f) Total area under nature reserves (km ²)	811 18	
	(g) Key areas for conservation		
	Saddle peak National Park	North Andaman district (main island) Andaman–Nicobar	32 53 km ²
	Jarawa area National Park	South and middle Andaman (East) Andaman–Nicobar	720 87 km ²
	North Button National Park	North Button island (Middle Andaman) Andaman–Nicobar	0 40 km ²
	South Button National Park	—do—	3 00 km ²
	Mount Harriet National Park	South Andaman Andaman and Nicobar	46 60 km ²
	Interview Island	—	—
	Tarmugli group of coral reef islands	—	—

Acknowledgements

We are grateful to Prof P Legris for the facilities provided for this investigation and to Dr F Blasco and Dr M F Bellan for making available their unpublished vegetation maps. We also acknowledge the help of Messrs Kessvavane, Kichenassamy, Tirouvingadassamy and Jayabalan in the map analysis. A number of colleagues have helped with comments and information.

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