

Chapter 6

Environmental objective and outcome indicators

Environmental Objectives for the Vietnam Forestry Development Strategy: Forest protection, natural protection and biodiversity conservation are aimed to effectively contribute to watershed, coastal and urban protection, natural disaster mitigation, erosion control, protection of water sources and environmental protection, and to create income sources from environmental services (environmental fees, CO₂ market, ecotourism, etc.) for the national economy.

Environmental Objectives for the Forest Sector 5-year Plan: Sustainable protection and utilization of natural resources and environment, specifically as follows:

- Identify and effectively conserve biodiversity and protection areas; and*
- Improve participatory sustainable natural resources management system.*

Environmental Objectives for Program 661: Establish 5 million hectares of new forest together with protection of existing forests in order to increase the forest cover to 43% of the national territory, protect the environment, decrease the severity of natural disasters, increase water availability, preserve genetic resources, and protect biodiversity.

Indicator 2.3.1 *No of forest fauna and flora species that are rare or endangered (threatened with extinction)*

Species that are “endangered” or “threatened with extinction” refer to the species that are at high risk of becoming extinct in the near future. “Rare” fauna and flora species consist of high-valued species that are being overexploited.

Biodiversity means not only the variation of species and genetic resources of each type but also the variation of species communities, habitats and ecosystems. Variation of genes, species, and ecosystems contributes to the creation of products and services that are necessary to the prosperity of humankind.

Biodiversity indicators often refer to the quantity of important ecosystems, rare fauna species and proportion of the national territory that is protected as nature reserves. It is, in fact, easy to calculate these indicators and each country has its own way to identify the ecosystems and its most important fauna and flora species.

The indicator of the number of rare and endangered fauna and flora species is an indirect indicator reflecting the overall status and effectiveness of biodiversity conservation efforts. The most important thing is that the number of species needs to be updated regularly (at least on annual basis) and covers all ecological zones throughout the country. With respect to the current situation, on annual basis, provincial FPDs can update data for this indicator with support from the Natural Reserve Division of the FPD.

According to the Decision No. 54/2006/QĐ-BNN dated 5 July 2006 of the Minister of Agriculture and Rural Development on the release of the List of Wild Animals and Plants as defined in the Appendixes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This Vietnamese list currently contains 15 flora and 62 faunal species.

Table 20: List of rare and endangered wild plants in Vietnam		
No.	Vietnamese names	Scientific names
	PINE FAMILY	PINOPHYTA
1	Hoàng đàn	<i>Cupressus torulosa</i>
2	Bách Đài Loan	<i>Taiwania cryptomerioides</i>
3	Bách vàng	<i>Xanthocyparis vietnamensis</i>
4	Vân Sam Phan xi păng	<i>Abies delavayi fansipanensis</i>
5	Thông Pà cò	<i>Pinus kwangtungensis</i>
6	Thông đỏ nam	<i>Taxus wallichiana (T. baccata wallichiana)</i>
7	Thông nước (Thuỷ tùng)	<i>Glyptostrobus pensilis</i>
	NGÀNH MỘC LAN	MAGNOLIOPHYTA
	Lớp mộc lan	Magnoliopsida
8	Hoàng liên gai (Hoàng mù)	<i>Berberis julianae</i>

9	Hoàng mộc (Nghê hoa)	<i>Berberis wallichiana</i>
10	Mun sọc (Thị bong)	<i>Diospyros salletii</i>
11	Sưa (Huê mộc vàng)	<i>Dalbergia tonkinensis</i>
12	Hoàng liên Trung Quốc	<i>Coptis chinensis</i>
13	Hoàng liên chân gà	<i>Coptis quinquesecta</i>
	Lớp hành	Liliopsida
14	Các loài Lan kim tuyến	<i>Anoectochilus</i> spp.
15	Các loài Lan hài	<i>Paphiopedilum</i> spp

Source: FPD, 2006

Table 21: List of rare and endangered wild animals in Vietnam

No.	Vietnamese names	Scientific names
	MAMMAL	MAMMALIA
	Bộ cánh da	Dermoptera
1	Chồn bay (Cây bay)	<i>Cynocephalus variegatus</i>
	Bộ khỉ hầu	Primates
2	Cu li lớn	<i>Nycticebus bengalensis</i> (<i>N. coucang</i>)
3	Cu li nhỏ	<i>Nycticebus pygmaeus</i>
4	Voọc chà vá chân xám	<i>Pygathrix cinerea</i>
5	Voọc chà vá chân đỏ	<i>Pygathrix nemaeus</i>
6	Voọc chà vá chân đen	<i>Pygathrix nigripes</i>
7	Voọc mũi hếch	<i>Rhinopithecus avunculus</i>
8	Voọc xám	<i>Trachypithecus barbei</i> (<i>T. phayrei</i>)
9	Voọc mõng trắng	<i>Trachypithecus delacouri</i>
10	Voọc đen má trắng	<i>Trachypithecus francoisi</i>
11	Voọc đen Hà Tĩnh	<i>Trachypithecus hatinhensis</i>
12	Voọc Cát Bà (Voọc đen đầu vàng)	<i>Trachypithecus poliocephalus</i>
13	Voọc bạc Đông Dương	<i>Trachypithecus villosus</i> (<i>T. cristatus</i>)
14	Vượn đen tuyền tây bắc	<i>Nomascus (Hylobates) concolor</i>
15	Vượn đen má hung	<i>Nomascus (Hylobates) gabriellae</i>
16	Vượn đen má trắng	<i>Nomascus (Hylobates) leucogenys</i>
17	Vượn đen tuyền đông bắc	<i>Nomascus (Hylobates) nasutus</i>
	Bộ thú ăn thịt	Carnivora
18	Sói đỏ (Chó sói lửa)	<i>Cuon alpinus</i>
19	Gấu chó	<i>Ursus (Helarctos) malayanus</i>
20	Gấu ngựa	<i>Ursus (Selenarctos) thibetanus</i>
21	Rái cá thường	<i>Lutra lutra</i>
22	Rái cá lông mũi	<i>Lutra sumatrana</i>
23	Rái cá lông mượt	<i>Lutrogale (Lutra) perspicillata</i>
24	Rái cá vuốt bé	<i>Amblonyx (Aonyx) cinereus</i> (<i>A. cinerea</i>)
25	Chồn mực (Cây đen)	<i>Arctictis binturong</i>
26	Beo lửa (Beo vàng)	<i>Catopuma (Felis) temminckii</i>
27	Mèo ri	<i>Felis chaus</i>
28	Mèo gấm	<i>Pardofelis (Felis) marmorata</i>
29	Mèo rừng	<i>Prionailurus (Felis) bengalensis</i>

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30	Mèo cá	<i>Prionailurus (Felis) viverrina</i>
31	Báo gấm	<i>Neofelis nebulosa</i>
32	Báo hoa mai	<i>Panthera pardus</i>
33	Hổ	<i>Panthera tigris</i>
	Bộ có vòi	Proboscidea
34	Voi	<i>Elephas maximus</i>
	Bộ móng guốc ngón lẻ	Perissodactyla
35	Tê giác một sừng	<i>Rhinoceros sondaicus</i>
	Bộ móng guốc ngón chẵn	Artiodactyla
36	Hươu vàng	<i>Axis (Cervus) porcinus</i>
37	Nai cà tong	<i>Cervus eldii</i>
38	Mang lớn	<i>Megamuntiacus vuquangensis</i>
39	Mang Trường Sơn	<i>Muntiacus truongsonensis</i>
40	Hươu xạ	<i>Moschus berezovskii</i>
41	Bò tót	<i>Bos gaurus</i>
42	Bò rừng	<i>Bos javanicus</i>
43	Bò xám	<i>Bos sauveli</i>
44	Trâu rừng	<i>Bubalus arnee</i>
45	Sơn dương	<i>Naemorhedus (Capricornis) sumatraensis</i>
46	Sao la	<i>Pseudoryx nghetinhensis</i>
	Bộ thỏ rừng	Lagomorpha
47	Thỏ vằn	<i>Nesolagus timinsi</i>
	LỚP CHIM	AVES
	Bộ bồ nông	Pelecaniformes
48	Già đầy nhỏ	<i>Leptoptilos javanicus</i>
49	Quắm cánh xanh	<i>Pseudibis davisoni</i>
50	Cò thìa	<i>Platalea minor</i>
	Bộ sếu	Gruiformes
51	Sếu đầu đỏ (Sếu cổ trụi)	<i>Grus antigone</i>
	Bộ gà	Galiformes
52	Gà tiền mặt vàng	<i>Polyplectron bicalcaratum</i>
53	Gà tiền mặt đỏ	<i>Polyplectron germaini</i>
54	Trĩ sao	<i>Rheinardia ocellata</i>
55	Công	<i>Pavo muticus</i>
56	Gà lôi hồng tía	<i>Lophura diardi</i>
57	Gà lôi mào trắng	<i>Lophura edwardsi</i>
58	Gà lôi Hà Tĩnh	<i>Lophura hatinhensis</i>
59	Gà lôi mào đen	<i>Lophura imperialis</i>
60	Gà lôi trắng	<i>Lophura nycthemera</i>
	REPTILE	REPTILIA
	Bộ có vẩy	Squamata
61	Hổ mang chúa	<i>Ophiophagus hannah</i>
	Bộ rùa	Testudinata
62	Rùa hộp ba vạch	<i>Cuora trifasciata</i>

Source: FPD, 2006

Indicator 2.3.2 *Rate of forest cover classified by elevation and slope*

The identification of the forest area according to elevation and slope supports the classification of protection forest, plantation of protection forest, zoning for forest protection and monitoring and evaluation indirectly of the protection capability of forests. The inventory and planning of the protection forest are based on the criteria of the rainfall, slope, comparative height, soil type and scope of area. However, the indicator of the natural forest and plantation forest area covering soils on a slope of more than 25° (with high risk of potential erosion) and elevation is an indicator used to assess quickly the quality of the protection forest.

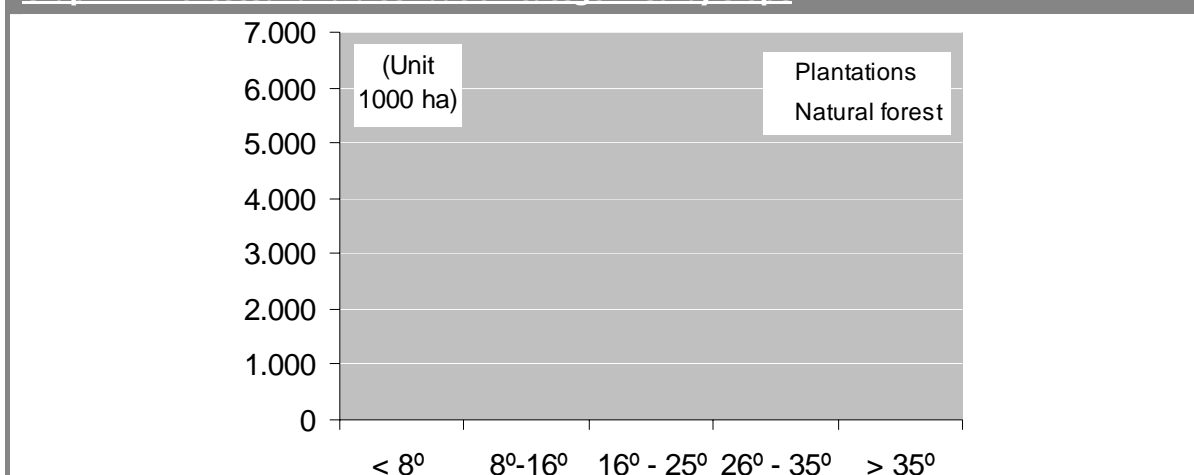
Table 22: Forest area distributed according to elevation and slope

Unit: 1000 ha

Height belts	Forest types	Categorized as to the gradient (degree)						Forest cover at gradient > 25°
		Total	< 8°	8°-16°	16° - 25°	26° - 35°	> 35°	
Total	Forested land	12,182.4	2,858.7	1,117.4	5,838.5	1,457.9	909.9	7.18
	Natural forest	10,166.6	2,597.8	972.3	4,387.1	1,365.8	843.6	6.70
	Plantations	2,015.8	260.9	145.1	1,451.4	92.1	66.2	0.48
≤ 300m	Forested land	4,026.8	443.2	291.2	2,940.5	119.0	232.9	1.07
	Natural forest	2,586.2	316.5	204.5	1,748.0	93.7	223.5	0.96
	Plantations	1,440.6	126.6	86.7	1,192.6	25.3	9.4	0.11
301-700m	Forested land	4,286.4	1,180.6	459.3	1,817.0	567.4	262.1	2.52
	Natural forest	3,862.4	1,084.1	414.0	1,613.1	524.5	226.7	2.28
	Plantations	424.0	96.4	45.3	204.0	42.9	35.4	0.24
701-1000m	Forested land	2,032.4	610.3	188.0	679.6	362.4	192.2	1.68
	Natural forest	1,939.3	589.6	180.4	641.2	349.2	178.9	1.60
	Plantations	93.1	20.7	7.6	38.4	13.2	13.2	0.08
1001-1700m	Forested land	1,602.8	557.4	166.0	379.4	347.4	152.6	1.52
	Natural forest	1,547.5	541.6	160.7	363.2	337.1	144.7	1.46
	Plantations	55.3	15.8	5.2	16.2	10.3	7.9	0.06
> 1700m	Forested land	233.9	67.3	12.9	21.9	61.7	70.2	0.40
	Natural forest	231.2	65.9	12.7	21.6	61.2	69.9	0.40
	Plantations	2.8	1.4	0.2	0.3	0.6	0.3	0.00

Source: Monitoring of forest resources of FIPI in Circle III 2001-2005 (Collective data of the 6 key forestry regions having land hills and mountains)

Graph 11: Forested land distribution categorized by slope



Source: Monitoring of forest resources of FIPI in Circle III 2001-2005 (Collective data of the 6 key forestry regions having land hills and mountains)

The un-used land area that is classified according to elevation includes grass and brushwood species covered land area; brushwood leaves-covered land area; and areas recovering, e.g., from shifting cultivation, through natural regeneration. The distribution of the bare lands and denuded hills according to elevation is one of the important criteria to select proper sivilcultural interventions for the plantation and natural regeneration.

Table 23: Bare lands and denuded hills distributed according to elevation of the 6 key forestry regions

Regions	Total	Unit: ha				
		< 300 m	300-700 m	701-1000 m	1001 -1700 m	> 1700 m
Total	5,733,536	2,057,642	2,011,986	904,094	693,502	66,313
Northwest	1,302,093	75,121	365,997	413,729	419,581	27,664
Northeast	1,470,300	478,367	651,075	161,945	144,855	34,059
North Central	1,100,925	783,442	255,536	43,765	16,950	1,232
South Central	901,716	470,259	320,463	82,961	27,214	819
Central Highlands	776,446	85,425	401,985	201,594	84,903	2,538
Southeast	182,056	165,027	16,930	99	0	0

Source: Monitoring of forest resources of FIPI in Vircle III 2001-2005 (Collective data of the 6 key forestry regions having land hills and mountains)

Table 7.2.2 shows that the bare lands and denuded hills area at the elevation of 700 m and below accounts for 70% of the total. Less unused land area is located at an elevation of 701 m or higher, except for the the Northwest region (as the Northwest has the higher average elevation than other regions).

Table 24: Bare lands and denuded hills distributed according to the slope of the 6 key forestry regions

Unit: ha

Regions	Total	< 8°	8°-16°	16° - 25°	26° - 35°	> 35°
Nationwide	5,733,536	1,464,613	564,263	2,846,937	680,849	176,874
Northwest	1,302,093	465,304	117,044	305,976	324,601	89,169
Northeast	1,470,300	448,795	154,265	613,379	195,484	58,377
North Central	1,100,925	174,732	90,959	753,227	65,705	16,301
South Central	901,716	268,321	125,496	422,684	74,950	10,265
Central Highlands	776,446	104,385	73,927	576,321	19,080	2,733
Southeast	182,056	3,076	2,572	175,350	1,030	28

Source: Monitoring of forest resources of FIPI in Circle III 2001-2005 (Collective data of the 6 key forestry regions having land hills and mountains)

The slopes at < 8° accounts for 26% of the total, which is mainly located in the Northwest, Northeast and South central regions. This type of land is still exists in quantity, but it is rarely used for forestry purposes since it is not concentrated. Moreover, it is often used for agricultural activities by local households residing near and inside the forest area. The sloping land at 8 to 15° accounts for small proportion (10%) of the total, primarily located in the Northeast, Northwest and South central regions. The slopes of 16° to 25° accounts for 50%, mainly located in the Northeast and North Central regions, and the Central Highlands, has potential for forestry development. The slopes at (or above 25°) accounts for 15%, mainly located in the Northwest and Northeast: with this degree of slope, it is difficult to undertake afforestation. Taking into consideration the total un-used forest area throughout the country, the Northwest and Northeast regions have greatest amounts (from 23 to 26%).

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