

TRENDS OF WILDLIFE CONSERVATION IN CHANGING FOREST RESOURCE SITUATIONS IN THE ASIA-PACIFIC REGION

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INTRODUCTION

As a result of rapid social and economic growth in the Asia-Pacific Region, many developing countries are increasingly confronted with serious environmental crises, resulting from the degradation and depletion of the basic natural resources required for human life, such as agricultural land and water, forestland and marine resources. Among these natural resources, the depletion of once rich natural forests is increasingly recognised as a threat to maintaining the sustainability of productive soils, a clean and regulated water supply, fishery stocks and biological diversity. In most cases, however, due to the indirect and invisible functions of forests in the long-term, their roles have been neglected under the pressure to fulfil short-term, immediate needs for food production.

Wildlife conservation is one of the needs for sustaining healthy human life, providing rural communities with food and income and urban citizens with recreational opportunities. Also, there are some fundamental philosophical questions behind this subject. "Wildlife deserves an equal right to live as human beings" is one. "Skewed economic development may result in the corruption of human morals and hence human communities" is another.

This paper reviews trends in human community development and wildlife conservation, with regard to depletion and restoration of forest resources.

LAND

The total land area, excluding inland water bodies, covered by FAO's members in the Asia-Pacific Region (30 countries) in 1994, was 3,005 million ha, accounting for 23.0% of the world's land area (13,048 million ha). This also accounted for 33.7% of the world's arable and permanently cropped land; 30.1% of the world's permanent pastureland and 18.8% of the world's forests and woodland. The proportions of 1) arable and permanently cropped land; 2) permanent pasture; and 3) forests and woodland to the total land area of the Region, were 17%, 34% and 26% respectively (FAO, 1999).

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The total land area of the 27 developing countries of the Region in 1994 was 2,173 million ha, amounting to 16.7% of the world's land area.

POPULATION

As shown in Table 1, the total population of the Region during the years 1977, 1987 and 1997 increased from 2,353 million, to 2,820 million and then to 3,137 million, or 55.7%, 56.1% and 53.9% of the world's total population respectively. The total agricultural population of the Region during the same period increased from 1,540 million to 1,692 million, and then 1,862 million or 71.9%, 72.6% and 72.9% of the world's agricultural population respectively. Therefore, the net increase of the population in the Region during 1977-97 was 784 million as a whole, and 322 million in the agriculture sector. The percentages of the agricultural population of the Region are much higher than those of the rest of the world.

The Region is, therefore, heavily populated with 53.9% of the global population living on 23.0% of the world's total land area. This is particularly true in the agricultural sector of developing countries. For example, the ratio of arable and permanently cropped land to agricultural population in the Region declined from 0.34 ha/capita in 1961 to 0.26 ha/capita in 1990, and dropped further to 0.25 ha/capita in 1997. This is a direct indication of land scarcity. It contrasts sharply with land/capita ratios in the rest of the world, which were 1.61 ha/capita in 1961, 1.52 ha/capita in 1990, and 1.44 ha/capita in 1997. Farmers in the Region cultivate smaller land areas to support larger populations per unit farmland than elsewhere.

Table 1. Population changes in the Asia-Pacific Region during 1977-1997 (millions)

	Total Population (T)			Agricultural population (A)			Percentage of A to T		
	1977	1987	1997	1977	1987	1997	1977	1987	1997
Developing countries (27)	2,222	2,678	2,989	1,524	1,682	1,855	68.6%	62.8%	62.0%
Developed countries (3)	131	142	148	16.2	10.1	7.2	12.4%	7.1%	4.9%
Asia-Pacific Total (30)	2,353	2,820	3,137	1,540	1,692	1,862	65.4%	60.0%	59.3%
Rest of World	1,873	2,207	2,686	602	637	692	32.1%	28.9%	25.8%
World Total	4,227	5,026	5,823	2,141	2,329	2,554	50.7%	46.3%	43.9%

Sources: Selected Indicators of Food and Agriculture Development in Asia-Pacific Region, 1978-88. RAPA Publication: 1989/7
 Selected Indicators of Food and Agriculture Development in Asia-Pacific Region, 1988-98. RAP Publication: 1999/34

TRENDS IN FOREST LAND AND RESOURCES

Deforestation

Deforestation continues in developing countries in the tropics of the Region. According to estimates made by two FAO global projects, “FAO/UNEP Tropical Forest Resources Assessment” (FAO, 1982), and “Forest Resources Assessment 1990 (FRA 1990)” (FAO, 1993), the annual rate of deforestation in these countries of the Region increased from 2.0 million ha during 1976-80 to 3.9 million ha during 1981-90. Whether this trend accelerated, was constant or declined the 1990s is of great concern to everyone.

In 1997, FAO released the estimated deforestation figures of the world with the reference year 1995 (FAO, 1997). Since these figures were mostly derived from calculations based on the deforestation rates estimated in the FRA 1990 assessment, these figures did not necessarily reflect the real situation. In order to update global information on forest resources, FAO has been carrying out the “Forest Resources Assessment 2000 Programme (FRA 2000)” since 1997, including estimating the deforestation rate during the 1990s in the Region. The results of FRA 2000 will be published in late 2000. From preliminary observations, the deforestation rate of the Region seems to be slower than that of 10 years ago.

Shrinking natural forests and malfunctioning forest ecosystems in the tropics have resulted in many problems. They range from an increased occurrence of natural disasters to changing climatic patterns. Every year and every season, the media reports tragic stories of victims of floods, drought, landslides, etc. Irrigation departments and electricity authorities warn that irrigation channels and dams are deteriorating due to accelerated siltation. Forest industries are hastening the depletion of wood resources. Scientists warn of the danger of losing wildlife habitats and the extinction of plant and animal species that will cause irreversible damage to biodiversity and so forth. In many cases, they quote mistreatment of forests. In-depth analyses of the consequences of deforestation are rare, especially those that dig deeper to reveal our ill-fated way of life and how we interact with nature.

Degradation

In addition to deforestation there is gradual, often hidden, degradation of forests. If deforestation is analogous to the tip of an iceberg, degradation is the massive body in the deep sea. It is not obvious like deforestation. Since most degradation processes are not so easily detectable and there are no effective monitoring and assessment systems, its reality and consequences are not well understood by the general public. Many experts strongly believe that degradation is much more serious and widespread than deforestation in terms of areas covered. It is like a chronic disease that deteriorates one's health in the long run. A certain level of degradation can be cured by the regenerating capacity of nature. Beyond this limit, however, a natural ecosystem is pressed into a secondary condition, which sometimes results in absolute deforestation — leaving unproductive wastelands. We can see a few hundred million hectares of wastelands that were once rich and productive in ancient times, in countries such as China and India in

the Asia-Pacific Region. Most degradation was caused by man's abuse of natural resources (ANON., 1999b).

The dilemma has been deepened between our agricultural production systems (the spine of human life support systems) and the depletion of natural resources. Forests have always acted as a buffer to absorb increased human pressures, providing additional land to human communities for food production, and regenerating themselves when the pressure was eased. This tacit understanding between man and nature appears to have been broken by our greed and stupidity.

Experiences in developed countries offer some possible solutions, such as: 1) increased yield of agricultural products per unit area; 2) intensive management of natural resources; 3) rehabilitation of degraded lands; 4) population control; 5) improved land use planning and management; 6) increased job opportunities outside the agriculture sector and 7) enhanced education and training. Every effort has been made and there have been some successes like the *Green Revolution* in high potential agricultural land, mostly located on alluvial soils, to increase crop yield. In marginal lands, on slopes or in dry areas in the tropics with prevailing poverty, however, nobody knows how much of this advice will be applicable. In the tropics, most nutrients are deposited in biomass, not in the soils and nutrients in the soils are easily washed away. Intensified population pressure has reduced almost to zero the area of forestland suitable for conversion to agriculture. Landless people have no 'new world' to migrate to, as millions of people did in the 19th century.

RESTORATION OF DEGRADED FORESTS

New Recognition

In developing countries, it is now widely recognised that forests play an important role in long-term national security, as shown by the effects of the declining trend of forest resources. People have realised that there can be no agricultural development without water, the supply of which is guaranteed by forests. This directly affects rural farmers who have been living in and with natural ecosystems.

Urban citizens, living a stressful modern life, instinctively desire the mental relief provided by nature, as represented by forests, even though they rarely get opportunities to visit them. Forests are attaining a more symbolic meaning to these people. Thus, the "Conserve nature (this mostly means 'forests')" slogan voiced by environmental NGO's or journalists has been winning the sympathy of citizens. Both rural and urban people have started to feel that there is little sense in environmental protection, biodiversity conservation and public welfare without protecting forests.

Such a changing atmosphere in the last 10-15 years has driven government authorities in two policy directions: 1) protection of remaining natural forests, and 2) rehabilitation of degraded forest land by promotion of reforestation programmes. Now, almost every country has launched nation-wide programmes for nature conservation (in most cases this means "forest conservation") and reforestation, which are often referred to as "regreening programmes".

Table 2. Protected Areas in Thailand, 1979-1998 (ha)

Year	National Parks		Forest Parks		Wildlife Sanctuaries		Non-hunting Areas		Wildlife Parks		Botanical Gardens		Arboreta		Whole Country	
	No	Area	No	Area	No	Area	No	Area	No	Area	No	Area	No	Area	No	Area
1979	16	932,915	32	35,429	21	1,866,538	15	227,987	2	2,455	3	616	21	1,207	110	3,067,147
1981	40	2,152,196	47	72,868	24	1,992,268	22	234,408	2	2,455	4	658	28	2,195	167	4,457,048
1983	47	2,449,342	55	126,360	25	1,991,968	28	236,835	2	2,455	5	1,272	29	2,483	191	4,810,715
1985	50	2,605,380	57	150,112	27	2,036,248	37	299,847	2	2,455	5	1,000	42	3,127	220	5,098,169
1987	54	2,815,625	56	76,191	29	2,173,660	42	314,847	2	2,455	5	1,000	42	3,127	230	5,386,905
1989	60	3,181,618	50	50,221	31	2,468,397	47	414,550	2	2,455	5	1,000	42	3,127	237	6,121,368
1990	63	3,386,718	36	31,999	33	2,531,397	48	417,090	2	2,455	5	1,392	40	3,187	227	6,374,238
1991	74	3,869,550	44	61,024	34	2,606,145	48	417,090	2	2,455	5	1,400	42	2,870	249	6,960,534
1992	77	3,928,350	44	61,024	35	2,786,724	49	418,791	2	2,455	5	1,538	44	3,188	256	7,202,070
1993	77	3,928,350	47	82,377	36	2,828,520	43	295,889	0	0	13	2,051	42	2,619	258	7,139,806
1994	79	4,021,615	42	52,746	37	2,888,639	43	295,889	0	0	13	2,051	44	2,719	258	7,263,659
1995	81	4,173,825	42	62,673	38	2,938,839	42	295,889	0	0	15	5,649	47	2,836	265	7,479,711
1996	82	4,233,226	57	76,173	42	3,098,696	44	321,739	0	0	15	5,649	47	2,836	287	7,738,319
1997	82	4,233,226	66	86,061	44	3,201,189	43	297,239	0	0	15	5,649	49	3,081	299	7,826,445
1998	87	4,418,212	65	86,771	46	3,267,184	44	310,183	0	0	15	5,649	53	3,432	310	8,091,431

Source: Forestry Statistics of Thailand, 1985, 1992 and 1998, Royal Forest Department (RFD).

In many countries, upgrading of conventional forest reserves into permanent protection forests has been intensified. They are categorised as special protected areas, such as national parks, wildlife sanctuaries, forest parks, etc., and their total areas are constantly increasing. Table 2 clearly indicates this movement in Thailand. The number of national parks and wildlife sanctuaries has increased from 16 and 21 in 1979, to 87 and 46 in 1998 respectively, with a significant increase in total protected areas.

TRENDS IN THE REGION

One option to restore degraded natural ecosystems (most of them are found in forests) is through protected areas. Table 3 shows the current regional situation of protected areas classified according to the IUCN's six categories of protected area.

The definition of a protected area used here follows that adopted by IUCN, i.e.: "An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means." IUCN (1994) noted that although all protected areas meet the general purposes contained in this definition, in practice the precise purposes for which protected areas are managed differ greatly.

The following are the main purposes of management:

- Scientific research (Category Ia);
- Wilderness protection (Category Ib);
- Preservation of species and genetic diversity (Category II and IV);
- Maintenance of environmental services (Category II and V);
- Protection of specific natural and cultural features (Category III);
- Tourism and recreation (Category II and V);
- Education (All Categories but particularly II);
- Sustainable use of resources from natural ecosystems (Category VI); and
- Maintenance of cultural and traditional attributes (Category III, V and VI).

The IUCN's six protected area categories and definitions are given in the Annex. This list, based on the UN List of Protected Areas 1997, indicates that 280 million ha of land, inland waters and coastal zones (including sea surface) were covered by various types of protected areas in the Region (it is assumed that those figures were at the end of 1996). They account for approximately 9.3% of the total land area of the Region, although this figure is not absolutely accurate due to the inclusion of inland water bodies and seas. The total number of protected areas is 3,796, with an average size of 73,896 ha. It is remarkable to know that Australia alone has 1,148 protected areas (30.2% of the whole), covering 103 million ha (36.8% of the whole). Among developing countries, the shares of China (608 with 68 million ha), Indonesia (709 with 34 million ha) and India (379 with 14 million ha) are quite large. It is, of course, proportional to their large landmass, but both China and India are countries that have been suffering from environmental and socio-economic problems over a few hundred million hectares of wastelands, resulting from the long historical process of degradation of forests and woodlands. Protected area systems are very important to conserve remaining natural forests, wildlife habitat, biodiversity, historical sites and scenic beauty in these countries, as well as to restore degraded forest lands.

In terms of coverage rate, New Zealand is ranked in the first position with 23.63% of the total land area, followed by Bhutan (21.23%), Brunei (19.97%), Indonesia (18.99%), and Cambodia (18.51%). Australia's figure, 13.52%, reflects extensive protective coverage as already mentioned above. Sri Lanka (13.29%), New Zealand and Australia were the first three countries in the Region to establish protected areas in the latter part of the 19th century. Indonesia took the lead in establishing protected areas after its first one in 1910 up to 1949. China, after declaring its first protected area in 1956, rushed to establish more protected areas during the 1980s (456 were established during this period).

The countries that have very few protected areas include Myanmar (2 protected areas with 0.26% of coverage), Vanuatu (1 with 0.28%), Solomon Islands (1 with 0.30%), and Bangladesh (9 with 0.75%). Six out of 10 countries in this group belong to the island nations in the South Pacific Ocean.

The FOREST DEPARTMENT OF MYANMAR (1999a) reported that they established a Protected Areas Network in the early 1980's through an FAO-assisted conservation project. Since then, a total of 28 protected areas, including wildlife sanctuaries and

national parks, have been established in representative bio-units of the country. Individual reserves vary in size from 125 to 2,100 km²; today the total area under protection is 13,684 km² or about 2.02% of the total land area. In the short-term, Myanmar hopes to bring at least 5% of its total land area under protection, with a long-term objective of increasing this to 10%. However, management of currently gazetted protected areas is minimal due to serious financial and human resource constraints.

This statement contrasts with the UN List of Protected Areas 1997 because it has listed only two protected areas for Myanmar against 28 reported by the Forest Department. This indicates three possible scenarios: 1) Myanmar established 26 protected areas during 1997 and 1999; 2) Myanmar had not reported all of their protected areas to the UN; or 3) the UN recognised that most protected areas in Myanmar do not fulfil the required standard, due to poor management. The reality is not known, but most likely, the Forest Department was so ashamed of the poor management of the protected areas that they hesitated to report these to the UN.

A similar discrepancy in the number of protected areas in Thailand can be seen. The UN List says that Thailand had 140 protected areas, including 75 national parks and 37 wildlife sanctuaries (assumed in 1996). They contrast with the figures in 1996 shown in Table 2 — 82 national parks and 42 wildlife sanctuaries. Another case is seen in India. The UN List shows that the numbers of national parks and wildlife sanctuaries are 65 and 314 respectively, while the same categories reported in the National Forestry Action Programme report (ANON., 1999b) shows 80 and 441 respectively. In this case, of course, the reference years are different. There is a possibility of an increase in numbers during 1996 and 1998 (or 1999). These cases suggest that it is safer to refer to the information in the UN List as indicative figures to see the general trend of protected areas in the Region.

The UNESCO's World Heritage programme covers some national parks and wildlife sanctuaries, such as the Manas Wildlife Sanctuary in India, the Royal Chitwan National Park in Nepal and the Thungyai – Huai Kha Khaeng Wildlife Sanctuaries in Thailand. Those covered can get special funds to enhance their nature conservation programmes. As a result, wildlife conservation activities can be much more extensive and effective.

The Ramsar Convention also helps to conserve wildlife in various kinds of wetlands, by rivers, coastal lines, inland lakes and swamps, including natural vegetation.

BENEFITS IN THE PROTECTED AREA SYSTEMS

There is no doubt that protected area systems have greatly contributed to conservation of nature, scenic beauty, historical monuments, and cultural heritage. Many endangered species and biodiversity in original ecosystems could not have been conserved without protected area systems.

Modern tourism depends on attractive sites in these protected areas. All earnings from tourism cannot be attributable to protected areas, but a large portion comes from natural and cultural attractions visited in protected areas. The tourism industry also provides various job and income opportunities to all levels of people, particularly those who are living in local communities.

Table 3. Protected Areas in Asia and the Pacific Region by the IUCN's Protected Area Category I to VI

Country	I				II				III			
	No.	Ave. size (ha)	Total Area (ha)	%	No.	Ave. size (ha)	Total Area (ha)	%	No.	Ave. size (ha)	Total Area (ha)	%
Australia	471	57,214	26,947,636	25.9	432	54,704	23,631,96	22.8	64	5,256	336,372	0.3
Bangladesh	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Bhutan	1	64,400	64,400	6.5	4	173,075	692,300	69.4	0	-	0	0.0
Brunei Darussalam	9	7,364	66,274	57.6	1	48,859	48,859	42.4	0	-	0	0.0
Cambodia	0	-	0	0.0	7	105,179	736,250	22.5	0	-	0	0.0
China	37	1,314,277	48,628,247	71.3	20	40,784	815,673	1.2	9	13,302	119,715	0.2
Fiji	5	3,784	18,922	100.0	0	-	0	0.0	0	-	0	0.0
India	2	98,022	196,043	1.4	63	51,599	3,250,755	22.8	0	-	0	0.0
Indonesia	70	36,785	2,574,950	7.5	35	362,533	12,688.65	36.9	1	5,000	5,000	0.0
Iran	0	-	0	0.0	7	153,614	1,075,300	13.0	2	3,075	6,150	0.1
Japan	8	3,056	24,446	1.0	15	86,399	1,295,988	50.8	0	-	0	0.0
Kiribati	0	-	0	0.0	0	-	0	0.0	3	8,877	26,630	100.0
Korea, DPR	0	-	0	0.0	9	16,683	150,143	47.7	4	2,625	10,500	3.3
Korea, Rep.	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Lao PDR	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Malaysia	26	3,403	88,487	5.9	17	47,964	815,388	54.2	0	-	0	0.0
Mongolia	11	929,256	10,221,814	63.4	6	809,944	4,859,665	30.1	17	58,699	997,881	6.2
Myanmar	0	-	0	0.0	1	160,580	160,580	92.7	0	-	0	0.0
Nepal	0	-	0	0.0	8	127,175	1,017,400	80.1	0	-	0	0.0
New Zealand	52	30,289	1,575,052	24.9	13	220,228	2,862,966	45.2	77	3,879	298,669	4.7
Pakistan	0	-	0	0.0	6	147,033	882,195	23.6	0	-	0	0.0
Palau	0	-	0	0.0	0	-	0	0.0	1	1,200	1,200	30.0
Papua New Guinea	0	-	0	0.0	3	2,441	7,323	0.7	0	-	0	0.0
Philippines	2	7,492	14,983	1.0	5	89,637	448,185	30.8	0	-	0	0.0
Samoa, W.	0	-	0	0.0	1	2,857	2,857	24.9	0	-	0	0.0
Singapore	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Solomon Islands	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Sri Lanka	15	4,910	73,644	8.6	22	20,725	455,946	53.1	0	-	0	0.0
Thailand	0	-	0	0.0	74	53,343	3,947,398	55.8	28	13,739	384,687	5.4
Tonga	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Tuvalu	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Vanuatu	0	-	0	0.0	0	-	0	0.0	0	-	0	0.0
Vietnam	0	-	0	0.0	9	22,500	202,496	20.4	0	-	0	0.0

Total	709	127,637	90,494,89	32.3	75	79,219	60,048,28	21.4	206	10,616	2,186,804	0.8
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Source: The UN List of Protected Areas 1997 (downloaded from the website of the World Conservation Monitoring Centre, WCMC).

Remarks: 1) No protected areas are listed in the above UN List for the following countries: Cook Islands, Maldives, Marshall Islands, Nauru, Niue, and Tokerau.

2) Average sizes and shares in percentage in each category are calculated by the author.

IV				V				VI							
No.	Ave. size (ha)	Total Area (ha)	%	No.	Ave. size (ha)	Total Area (ha)	%	No.	Ave. size (ha)	Total Area (ha)	%	No.	Ave. size (ha)	Total Area (ha)	
77	10,632	818,657	0.8	15	307,417	4,611,259	4.4	89	533,947	47,521,272	45.8	114	90,477	103,867,157	
6	13,889	83,332	85.0	3	4,903	14,708	15.0	0	-	0	0.0	9	10,893	98,040	
4	60,275	241,100	24.2	0	-	0	0.0	0	-	0	0.0	9	110,867	997,800	
0	-	0	0.0	0	-	0	0.0	0	-	0	0.0	10	11,513	115,133	
8	173,125	1,385,000	42.4	5	148,400	742,000	22.7	3	134,650	403,950	12.4	23	142,052	3,267,200	
149	37,725	5,621,095	8.2	63	73,978	4,660,642	6.8	330	25,371	8,372,485	12.3	608	112,200	68,217,857	
0	-	0	0.0	0	-	0	0.0	0	-	0	0.0	5	3,784	18,922	
313	34,574	10,821,691	75.7	1	18,600	18,600	0.1	0	-	0	0.0	379	37,697	14,287,089	
42	85,563	3,593,648	10.4	30	12,188	365,651	1.1	531	28,587	15,179,821	44.1	709	48,530	34,407,729	
22	138,610	3,049,421	36.7	37	112,667	4,168,695	50.2	0	-	0	0.0	68	122,052	8,299,566	
29	16,469	477,610	18.7	13	57,865	752,239	29.5	0	-	0	0.0	65	39,235	2,550,283	
0	-	0	0.0	0	-	0	0.0	0	-	0	0.0	3	8,877	26,630	
6	25,673	154,039	49.0	0	-	0	0.0	0	-	0	0.0	19	16,562	314,682	
6	5,848	35,089	5.14	20	32,365	647,304	94.9	0	-	0	0.0	26	26,246	682,393	
17	162,135	2,756,300	100.0	0	-	0	0.0	0	-	0	0.0	17	162,135	2,756,300	
9	64,416	579,745	38.5	1	1,011	1,011	0.1	1	20,682	20,682	1.4	54	27,876	1,505,313	
1	49,940	49,940	0.3	0	-	0	0.0	0	-	0	0.0	35	460,837	16,129,300	
0	-	0	0.0	1	12,691	12,691	7.3	0	-	0	0.0	2	86,636	173,271	
4	23,525	94,100	7.4	0	-	0	0.0	2	79,500	159,000	12.5	14	90,750	1,270,500	
66	3,361	221,850	3.5	17	80,584	1,369,930	21.6	1	5,400	5,400	0.1	226	28,026	6,333,867	
45	60,371	2,716,693	72.7	4	30,513	122,051	3.3	2	9,069	18,137	0.5	57	65,598	3,739,076	
0	-	0	0.0	0	-	0	0.0	1	2,800	2,800	70.0	2	2,000	4,000	
0	-	0	0.0	0	-	0	0.0	17	60,517	1,028,786	99.3	20	51,805	1,036,109	
1	89,359	89,359	6.1	10	90,111	901,109	62.0	0	-	0	0.0	18	80,758	1,453,636	
2	3,608	7,215	62.9	0	-	0	0.0	1	1,400	1,400	12.2	4	2,868	11,472	
1	2,796	2,796	100.0	0	-	0	0.0	0	-	0	0.0	1	2,796	2,796	
0	-	0	0.0	0	-	0	0.0	1	8,270	8,270	100.0	1	8,270	8,270	
32	10,285	329,106	38.3	0	-	0	0.0	0	-	0	0.0	69	12,445	858,696	
37	73,717	2,727,545	38.6	1	13,100	13,100	0.2	0	-	0	0.0	140	50,520	7,072,730	
0	-	0	0.0	0	-	0	0.0	1	2,835	2,835	100.0	1	2,835	2,835	
0	-	0	0.0	0	-	0	0.0	1	3,300	3,300	100.0	1	3,300	3,300	
0	-	0	0.0	0	-	0	0.0	1	3,470	3,470	100.0	1	3,470	3,470	

43	18,417	791,948	79.6	0	-	0	0.0	0	-	0	0.0	52	19,124	994,444
920	39,834	36,647,279	13.1	221	83,262	18,400,990	6.6	982	74,065	72,731,608	25.9	379	73,896	280,509,866

The total contribution of tourism to social and economic development is well demonstrated in some countries like Thailand, India and Nepal².

It is impossible to assess the educational values and mental satisfaction that protected areas offer to visitors, but it should be an invaluable contribution for healthy human communities.

The chances to restore and rehabilitate damaged sites are greater within protected area systems because of stricter legal status and protection programmes.

CONSTRAINTS IN PROTECTED AREA SYSTEMS

It should be noted, however, that the current protected area systems practised in each country have some constraints, which prevail in developing countries in particular.

The case of Myanmar mentioned above represents the commonly observed constraints in economically weak and heavily populated countries. These include serious shortages of 1) financial support and 2) well-trained and experienced human resources in the management of protected areas. In other words, it implies a gap between the reality of the protected area management in these countries and the expected international standards.

The UN List of Protected Areas displays a wide range of terminology used by countries in their protected area classifications and management. For example, 'National Park' is the most commonly used terminology in the Category II, but there are many others, such as 'Conservation Area', 'Nature Reserve', 'Nature Park', 'State Reserve', 'Historical Reserve', 'Park', 'National Conservation Park', 'National Reserve', etc. Australia uses both 'National Park' and other terms for the Category II. On the other hand, China does not use the 'National Park' terminology, but 'Nature Reserve' in use has the same meaning. This confusing situation makes a comparison between countries difficult, unless their management concepts and objectives are known.

It is also a well-known fact that so-called protected areas are not always well protected. Unless local communities and individuals observe the law, illegal logging, hunting or encroachment cannot be stopped. Unclear boundaries, poor enforcement of laws, lack of incentives to local communities and lack of strong partnerships among all concerned can create major problems. Complex land ownership and lack of legal provisions often make the effective management of protected areas impossible.

Lack of land to establish protected areas extensive enough to conserve viable populations of large vertebrates, such as tiger, elephant and rhinoceros, is another constraint. This is especially true in smaller countries. Even in India, a large country, with 3.3 million ha of 'tiger reserves' within the protected areas system, "many sanctuaries are too small to maintain viable wildlife populations particularly of larger

² Bhatt (1996) reported that the Sagarmatha (Everest) National Park and the Annapurna Conservation Area in Nepal have faced serious environmental problems caused by too many visitors. Over consumption of fuel-wood and local food products, pollution of drinking water and accumulation of garbage left by trekkers are major problems.

mammals” (ANON., 1999b). Lack of scientific knowledge on how large protected areas must be to conserve viable populations, without genetic degradation, has made it more difficult to negotiate and convince land-related departments or ministries of the need for large protected areas.

One effective strategy to establish large protected areas is to do so jointly with neighbouring countries, across international borders. There are very few examples, however, like the “Royal Manas National Park” (97,500 ha) in Bhutan, which was designated in 1988 adjoining the “Manas Wildlife Sactuary” (39,100 ha) in India.

It is wise that the IUCN Categories have been defined according to management criteria instead of using nominal terms such as ‘National Park’ or ‘Wildlife Sanctuaries’. As already mentioned, such nominal terms differ from one country to another and this situation will probably continue. Although the IUCN Categories provide principles of protected area management, the real control and management of protected areas are in the hands of national or local governments and people. They are the driving forces for setting the management objectives of protected areas and achieving them.

OTHER OPTIONS

It is recognised that conservation of wildlife by protected area systems alone is not enough. Setting a buffer zone around a protected area reduces pressure on wildlife and also helps reduce conflicts between wildlife and people, arising from crop damage or deaths or injuries caused by wild animals. These buffer zones should not necessarily be a part of the protected areas. If buffer zones become degraded, they should be restored.

Individual protected areas tend to exist in isolation like islands in the ocean. This situation prevents genetic exchange amongst wildlife species, especially amongst the large mammals, and consequently degrades their genetic viability. Many experts strongly recommend connecting protected areas by corridors with remaining natural forests or even with man-made plantations. Appropriate use of riparian forests, roadside tree belts, mountain ridges or even narrow hedgerows in farmlands can help the migration of wildlife. If those forests or vegetation belts are degraded, they should be restored, either by natural regeneration or artificial tree planting with certain conservation measures such as prohibiting hunting. Artificial transmigration should sometimes be considered.

Local people often regard woodlots inside or around temples, shrines, graveyards and historical sites as sacred areas. They also offer a good refuge for wildlife. Restoration and maintenance of these woodlots are, therefore, important, even if their sizes are relatively small.

Although not well known, some countries in the Region have a long history of establishing protected areas. Many of them were established under strong religious influences and some of them are still in practice. IUCN (1991), for example, quoted the statements of Singh (1985): “protection of wildlife has a long tradition in the Indian subcontinent. The concept of protected areas dates back at least to the 4th century BC in India, with the establishment of *Abhayaranyas*, or forest reserves, advocated in the *Arthasashtra*, the well-known manual of state-craft.” Similarly, in Sri Lanka, IUCN (1991) quoted the statements of (DIKSHIT, 1986): “... one of the world’s first wildlife sanctuaries was created in the 3rd century BC by King Davenampiya Tissa at the same

time that Buddhism was being introduced to the island.” In Japan, *Kasugataisya*, a shrine in Nara, has been sheltering deer in forests behind the shrine, for at least a few hundred years. Also, the shrine has prohibited hunting on their premises. This has resulted in the co-existence of wild deer and citizens in the middle of Nara City (although the deer sometimes suffer from traffic accidents). In Bhutan, it is strictly prohibited to kill wildlife, including fish, within a 500-m radius of any monastery. Such traditions should be encouraged.

SOME BASIC PREREQUISITES FOR EFFECTIVE WILDLIFE CONSERVATION

When we consider restoration of degraded forests for wildlife conservation, either inside or outside protected areas, there are some prerequisites. First of all, the co-operation of local communities is essential. By encouraging participation, there is a chance to raise awareness of wildlife conservation. Also, we can understand their requirements and wishes better. Through this process, the programme staff and local people can develop incentives.

Secondly, people’s participation becomes reliable by various institutional and legal support mechanisms. The level of official commitment confirms the rights and duties of people living in or around protected areas. Technical assistance, land ownership or entitlement, financial supports, credit schemes, etc. from forestry departments, research institutes and other public or private sectors cannot act well without such commitment.

Thirdly, a good understanding as to why we need the conservation of nature or biodiversity is essential in the whole society of a nation. In this regard, efforts to enhance environmental education for children in schools and for the general public through the media are essential. Both tangible benefits, like economic returns from tourism and intangible or long-term benefits, such as flood prevention, water supply, and also philosophical aspects to broaden human morals are required.

CONCLUSIONS

In human history, we can find many examples of nations or communities losing vitality and territory and being replaced by other tribes. Historians attribute this decline to incapable kings or leaders, or strong invaders. However, an interesting observation by one historian was that as human communities expanded their society, culture flourished in one place for one period. This was often followed by decline, leaving behind a vast wasteland. This observation implies that the real cause of decline might be due to forest destruction and land degradation: no more water either from the sky or mountains; no more soil fertility and consequently no more food production. Faced with this grave constraint, the self-sustainable and self-defence capacities of nations were weakened. Such nations became vulnerable to invading forces or, the people dispersed to more promising land. This mechanism is probably one of the fundamental forces driving human history.

It seems to me that, in most tropical countries, such a process has been taking place over the last few decades. The agricultural policies of these countries have tended to put

an emphasis and priority on the expansion of arable land, whilst neglecting the overall functions of forest ecosystems - the mechanisms of which were not known until recent years. When forest resources were abundant and policy makers could concentrate on how to feed increasing populations, conversion of forests into agricultural lands was justifiable. By human nature, it is unbearable to see people suffer from starvation. There was also a wide social consensus to support this decision. However, the whole situation seems to have changed. Forest resources have been continuously lost and their ecological functions to regulate water, soils and climate have also been reduced to a critical point, beyond which short-term recovery is impossible (KASHIO, 1995).

It is time to shift the development paradigm towards conservation and better management of natural resources to co-exist with all species on Earth. We are often trapped in a phantom dream of materialistic fulfilment or short-sighted comfort, striving for freedom from endless desires. By restoring degraded nature, we will find that saving wildlife is not only for other species but also for us, to open our eyes to a balanced way of life — based on self-control of our greed and co-existence with other species. That is our duty to ensure our own survival.

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