

# Social and Biological Implications for Endangered Species Management: the Philippine Eagle *Pithecophaga jefferyi*

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## PART I: SOCIAL IMPLICATIONS

Management of endangered species is primarily a socio-economic, political, religious and cultural problem (1) but very few species-preservation efforts have considered this in recovery plans. The problems of these human social dimensions are most apparent in developing countries where serious overpopulation, inequitable distribution of national income and reliance on dwindling natural resources are the norm. For endangered species management programmes to work in these countries, wildlife managers must embrace a holistic understanding of humanity's interrelationship with the environment and how it affects the target species. To address only the scientific, biological and technological aspects is a waste of precious time when the local human population is rapidly depleting the natural resources needed for the survival of species, including *Homo sapiens*.

The Philippines is facing a daunting array of environmental problems because of incredible social complexities and severely depleted natural resources (2). The future existence of the Philippine Eagle (*Pithecophaga jefferyi*) in the wild is tied to the forest resources, but the forests to support Eagles may be gone by the year 2000 because of present exploitative trends and exploding human population.

At one time the Philippine landmass of 30 million ha (3) was almost totally carpeted with forest. Estimates of the present forest cover vary from an official figure of 11.1 million ha, of which 2.7 million ha are old-growth, to a private consultant's figure of 6 million ha, of which 1 million ha are old-growth (5). The legal exploitation rate for logging runs from 1.7% to 2.4% (4) and can be doubled when illegal activities are included, namely illegal logging, slash-and-burn farming, firewood gathering, charcoal making and gathering of minor forest products (7). The old-growth forests will be logged over by the early 1990s (3) and the entire forest wiped out as early as 2007. Ironically, the official forest destruction figure for 1985 from all causes is 14,632 ha with loss to logging listed at 1,918 ha only (7).

There are 56 million people in the Philippines; with an annual growth rate of 2.4%, the population will reach 79 million by the year 2000 and, although there is relative success, there remains difficulty in implementing a realistic plan for population control. At present 38 million people live in rural areas (3) and 1 million dependents, or 280,000 families, are officially listed as forest occupants who continue to chip away at the forest's edge and occasionally shoot Eagles. The Bureau of Forest Development (BFD) claims that these forest dwellers destroyed only 941 ha of forest for

farmland in 1985 or .003 ha per family (8). This seems a bit unrealistic in the light of actual field surveys conducted by personnel of the Philippine Eagle Conservation Programme (PECP). Illegal kaingin-making (slash and burn farming) and other forest-destructive practices, e.g. illegal logging, were rampant and unregulated in all forest areas visited. Firewood is used by 70% of the population and may account for half the wood cut (6). This and charcoal-making are not listed in any official statistics for forest destruction. The magnitude of these problems has the authorities in a quandary. Virtually no forest area is unaffected by illegal activities and the laws governing them are unofficially perceived as unenforceable.

More than 75 ethnic groups (9) inhabit the Philippines' 7,100 islands (10).

The islands and the ethnic groups are isolating mechanisms which inhibit communication, social interaction and development of a unified cultural identity (11). Coupled with population pressures, this creates a formula for social unrest. The country is racked by an 18-year communist insurgency (12) and a 15-year attempt by Muslim extremists to make Mindanao Island autonomous (13), plus other bids for local autonomy from armed cultural minorities (14). Moreover the fluid political situation, where the majority of Filipinos think politics, is exacting rapid changes in the national government from the ashes of a dictator-thief to a fledgling Phoenix-type democracy strained by repeated coups, rapid changes in cabinet posts and a discontented military, all of which provide the instability necessary for opportunists further to exploit the country's resources.

In order to service the Philippine national debt of US\$30 billion (15), the country justifies the short-term need to tap dwindling natural resources while attempting to retool an agrarian economy to meet long-term demands. Needed land reforms are strikingly complex. Most of the 9 million ha of the productive croplands which are privately owned (3) are tilled by 75% of the 28 million people who reside in these areas. There are 12.7 million ha listed as marginal cropland (6) converted from forested land. Contrary to local belief, these perceived fertile lands are nearly sterile (16) and became so after a few years of soil-destructive farming practices. The 10 million people who eke out an existence on the lands (3) must continually move into new areas to support their large families. Much of the new lands they clear is jungle. There is just too little land for so many people. The multiple pressures of economics (logging to service the debt) and land for the landless (clear forests) and the other tree removal processes on the remaining 6 million ha of timber-land clearly indicate that the forested habitat of the Eagle will disappear unless there is a major shift in the Filipino's attitude towards the environment and his role in it.

A short-term change in attitude is unlikely to occur despite the most intensive and persuasive educational effort. Change usually comes about when something is actually experienced (11), as was voiced by a forestry official and is supported as a common thought among Filipinos: "We will change only when faced with imminent disaster. When our forests are gone and we feel the effects, we will change". Faced with this terrible apathy, in part supported by the above data, what likelihood is there to save the Philippine Eagle and its habitat? It is suggested that species and habitat preservation efforts must develop realistic strategies based on a clear understanding of the socio-economic, political, spiritual and cultural factors of a developing or even a developed country.

## PART II: BIOLOGICAL IMPLICATIONS

### Species description and breeding biology

The Philippine Eagle (*Pithecophaga jefferyi*) is a giant forest raptor and the primary predator of the Philippines, to which it is endemic. The Eagle sports a narrow, highly-arched bill behind which sit the piercing grey-blue eyes deep-set beneath distinct eye ridges. A facial mask is formed of blue-grey skin pock-marked by black pin feathers. The crown displays a magical crest of long lanceolated feathers. The back, wings and tail are coloured deep brown, cast with a reddish hue and margined with white. The chest of white flows down to the thighs, the thigh feathers finely streaked brown. The legs and feet are scaled in yellow, the powerful talons curved scimitars of ebony. The wings span nearly 2m and the total wing area is known to be the broadest among birds of prey. The Eagle's body can tip the scale at 6.5 kg while its height registers about 1m.

The Philippine Eagle inhabits forested regions in Luzon, Samar, Leyte and Mindanao (Mindanao is the acknowledged stronghold of the species, Leyte being marginal).

It preys on a wide variety of forest species (sometimes monkeys are the favoured diet); no factual documentation of it preying on domestic livestock has been recorded. Dominant forest trees on steep mountain slopes are the preferred nesting sites, the nest itself usually on an epiphytic fern.

The Eagle produces one egg per cycle, rearing one offspring every two years, but can lay again within a year should the previous year's attempt fail. Incubation lasts for 60 days, most of the duties being attended to by the female while the male provides the food. The eaglet fledges in about 150 days and becomes independent in about 18 months, the parents presumably "pushing" the juvenile out of their 60-100km<sup>2</sup> territory.

### Significance of the species

The Philippine Eagle represents the top bioindicator to the health and well-being of the Philippine forest ecosystem. Its radical slip towards extinction provides a potent message to the Filipino people that something is seriously wrong with their environment. The Eagle possesses mystical, superstitious and empathic qualities that can be harnessed to advance its importance to Filipinos, especially to mountain-based cultural minorities where the Eagles reside. Thus it serves as a significant rallying point for conservation awareness and can lead to the creation of a conservation ethic which Kellert (1) suggests is the major prerequisite of any successful species preservation effort.

People benefit from the Eagle because it provides a focal point for recreation and tourism. Thousands have flocked to the Philippine Eagle Research and Nature Center in Davao City, Mindanao, to see the bird and commune with nature. Many trek into the remote wilderness to view the Eagle in the wild; this benefits local indigents who sell goods and act as guides. Indeed, the Philippine Eagle has become a local and international celebrity.

The Eagle is aesthetically stunning because of its size and unique features. The species is biologically significant because it is a unique genotype and endemic to the Philippines. By weeding out the aberrant and weak animals it preys upon, it helps to maintain a healthy ecosystem.

The Philippine Eagle is God's unparalleled creation and people have a responsibility to save it. In Genesis 6:20, God told Noah, "Of fowls after their kind, and of cattle after their kind, of every creeping thing of the earth after his kind, two of every sort shall come unto thee. *To keep them alive*". This spiritual perspective may be the most significant reason for Filipinos to rally for the Eagle's survival, because Filipinos are historically and culturally deeply religious. It is an avenue worth pursuing.

### Historical perspective

The Philippine Islands emerged from the sea floor during the Eocene Epoch due to the movement of oceanic plates and the resultant anticlinal folding and volcanic activity (2). Luzon is the largest and probably the oldest island in the archipelago (3) and was once connected by land-bridges only once to Samar, Leyte and Mindanao during the late Middle Pleistocene about 160,000 years BP (4), after which a water channel has existed between Luzon and Samar up to the present. Current evidence suggests that the Eagle does not cross over broad expanses of water and open land (5) (see Appendix I). It is likely that the Eagle speciated in Luzon and dispersed through its current range along the late Middle Pleistocene land-bridges. The suggestion that it colonized from an ancestor originating on the Sunda Shelf, a group of islands once connected to the Asian mainland, Palawan included (2), is most unlikely; there are no large forest eagles in these areas and the Sunda Shelf is not connected to Mindanao, the only possible colonising link the Eagle may have had.

The last time the major landmasses of the Philippines were connected, except for Luzon, was during the late Pleistocene, ca. 16,000 to 18,000 BP (6). Interaction then took place among the Eagle populations on Samar, Leyte and Mindanao. As is clearly shown, the Eagle population naturally fragmented twice into distinct demes. Human-induced fragmentation of these demes began around 15,000 years BP when men entered the islands and started to clear forests for agriculture (7). This initial push into the Eagles' habitat would naturally have contributed little or no damage but as human population and technology expanded to include logging, other resource exploitation and infrastructure development, contiguous forests were severed into fragments which caused division of the demes and further genetic isolation (*see Flow Diagram*).

To-day the forest fragmentation problem is severe. From the smallest fragments Eagle populations have disappeared because of secondary decimating factors such as hunting and trapping. In the thirty-seven fragments that still contain Eagle populations, the estimated density ranges from 71 to 2 individuals (see Table I and Map I).

Geneticists suggest that random mating populations, because of the high potential for inbreeding, should not be less than fifty. Perhaps only two forest fragments contain Eagle populations in excess of fifty.

Birds existing at low population densities are prone to extinction (8) and are normally linked to replacement by a new species (9). Humanity is rapidly replacing the Eagle in impoverished forest fragments.

### **Significant trends**

The Eagle was probably detected much earlier than when first collected by John Whitehead on Samar Island in 1896 (10). The first nest was discovered and studied only in 1963 (11). Obviously, the Eagle was rare from the start.

Most of the Philippine Islands were once carpeted by approximately 30 million ha of rainforest. Given that a Philippine Eagle pair commands a 100km<sup>2</sup> territory, the total population could not have exceeded 6,000 individuals. This estimate does not subtract forested islands that probably never contained populations, i.e. Palawan and some of the Visayas, and forested areas unsuitable for Eagles.

This natural scarcity protected the Eagle from human depredation. Currently, however, it has become vulnerable to hunting and trapping because the forested expanse of the past, which hid it from view, no longer exists. Lately, Philippine Eagles have increasingly been coming into the hands of humans with devastating results - most die, some are released, while others are retained in captivity.

## **PART III: MANAGEMENT STRATEGY**

Management strategies for the Philippine Eagle are made up of practical actions evolved over the years and suited to the social spectrum of the country.

These include people management, captive population management, and wild population and habitat management.

As stressed in Part I, the people management problem is truly complex but is something that must be dealt with or the wild Eagle and its habitat will certainly disappear. The most obvious approach to this problem is communication through educational extension work. Education, as is well known, must be geared to the audiences' intellectual capabilities, career or job status, age structure and social standing. Methods are developed that are easily understood without being too simplistic or too overbearing (see Appendix II).

Captive breeding of endangered species is proving a useful management tool with many species, the Peregrine Falcon (1), Mauritius Kestrel (2), California Condor (3) and Cranes (4) being among the most well known. These modern day arks of survival are probably pioneering a phase of faunal and floral management that will become the norm rather than the exception because the wild as it is known will soon cease to exist.

The Eagles which the Philippine Eagle Conservation Program (PECP) has been attempting to manipulate in a controlled environment for captive breeding are by and large psychological misfits. Most were brought into captivity through violent means, ill-treated and improperly fed prior to being placed with the PECP. Dr. James Grier (pers. comm.), the first to breed Golden Eagles in captivity, commented that PECP birds were like inmates in a mental institution being brought together and told to breed before spectators. Despite the profound difficulties first encountered with these eagle misfits, they have been successfully developed as imprints in surrogate relationships with humans for artificial insemination work, and brought together as pairs that naturally mate within the confines of their chamber.

Obviously the PECP will never be able to build up a viable gene pool from a handful of misfits. In 1980 the PECP suggested to authorities a scheme to remove Eagle eggs and young from selected, critically threatened nest sites to build up a viable captive population for breeding.

Unfortunately, our efforts to pursue this objective were hampered by individual professional "opinions" and political "feelings", which Soule (5) claims are stumbling-blocks to the establishment of breeding and management consortia which would significantly increase the effective population size of many captive and endangered species.

Recently, the PECP reintroduced the egg-and-chick-removal management strategy and suggested that the government select and identify forest fragments which they believe can or cannot be protected. From the doomed fragments, the Eagle populations can be removed and distributed to selected captive breeders to manage better the proposed captive gene bank. Surplus Eagles bred from these gene pools and eggs or young can be seeded back to the wild, using procedures that have worked with other raptor species, e.g. *foster parenting* (6) and *hacking* (7).

Management of the Eagle in the wild will depend on the government's ability to maintain habitat systems large enough to sustain and support viable populations. Since this appears unlikely, the next best alternative is to manage the remnant population in marginal habitat. The PECP can exchange surplus Eagles or swap eggs from one forest fragment to another and vice versa to encourage genetic flow (8). Genetic "bottle-necking" poses a serious problem for a majority of the fragmented Eagle populations and must be avoided at all costs (9).

Food substitution may be tried where Eagles are food-stressed in severely impoverished areas but this could also lead to predation on domestic animals of the rural poor. But, if it is attempted in coordination with another scheme to encourage rural participation in protecting the Eagle and its habitat, then any predation on domestic stock might be tolerated by the mountain farmers.

The most promising management scheme is the "Adopt-a-Nest" programme. Since the PECP launched this programme in 1985, natives and logging-concession workers have reported a total of eight occupied nests (see Appendix III). This is unprecedented. Prior to this, the PECP had spent hundreds of hours perched on the edges of logging roads and mountain ridge-tops searching for Eagle nests and found only three. Others were shown to us by curious mountain natives who wanted to know what was so special about the Eagle, but no incentive was offered to them. Instead, the law protecting the Eagles was stressed and, after PECP studies were completed, the fate of the finds was left in the hands of an unenforceable law and land-hungry farmers. Without our presence to mitigate the situation and without any tangible incentive offered the mountain farmers to protect the Eagles, these people quickly forgot the law and cut down the forests for cropland. The nesting trees and Eagles disappeared!

Clearly, the adopt-a-nest plan is working. It is human nature to want to be recognised and paid for any effort. For 3,000 pesos (US\$ 150.00) the mountain people fortunate to be near the nest of an Eagle become de facto conservation officers during the breeding cycle. Because the PECP must verify each phase of the cycle, e.g. egg in nest, egg hatched and eaglet fledged before the staggered reward is completed, the natives warmly receive us and we become a harmonious team working together to save the Eagle. But should this programme stop for any reason, we will surely lose the natives' trust and the birds' future will be in doubt.

## PROGNOSIS

Given the present social trends and rates of forest destruction, the long-term prognosis for the Philippine Eagle is bleak indeed. Some of the birds can survive in degraded forest habitat or secondary growth, but none can survive naturally without forest. Population levels are so low in forest fragments currently sustaining Eagles that even if the Philippine Government were able to protect such fragments it is doubtful whether these relict populations could survive in the long term without human intervention.

The Philippine Eagle is at a crossroads. Indications are that it is in a precipitous decline. This majestic flyer is the bearer of a sobering thought for the Filipino people and one that must be heeded immediately. Loss of the forest and the Eagle will mean the loss of a diverse support system needed for human survival. It is a prophetic message, one that can no longer be ignored.

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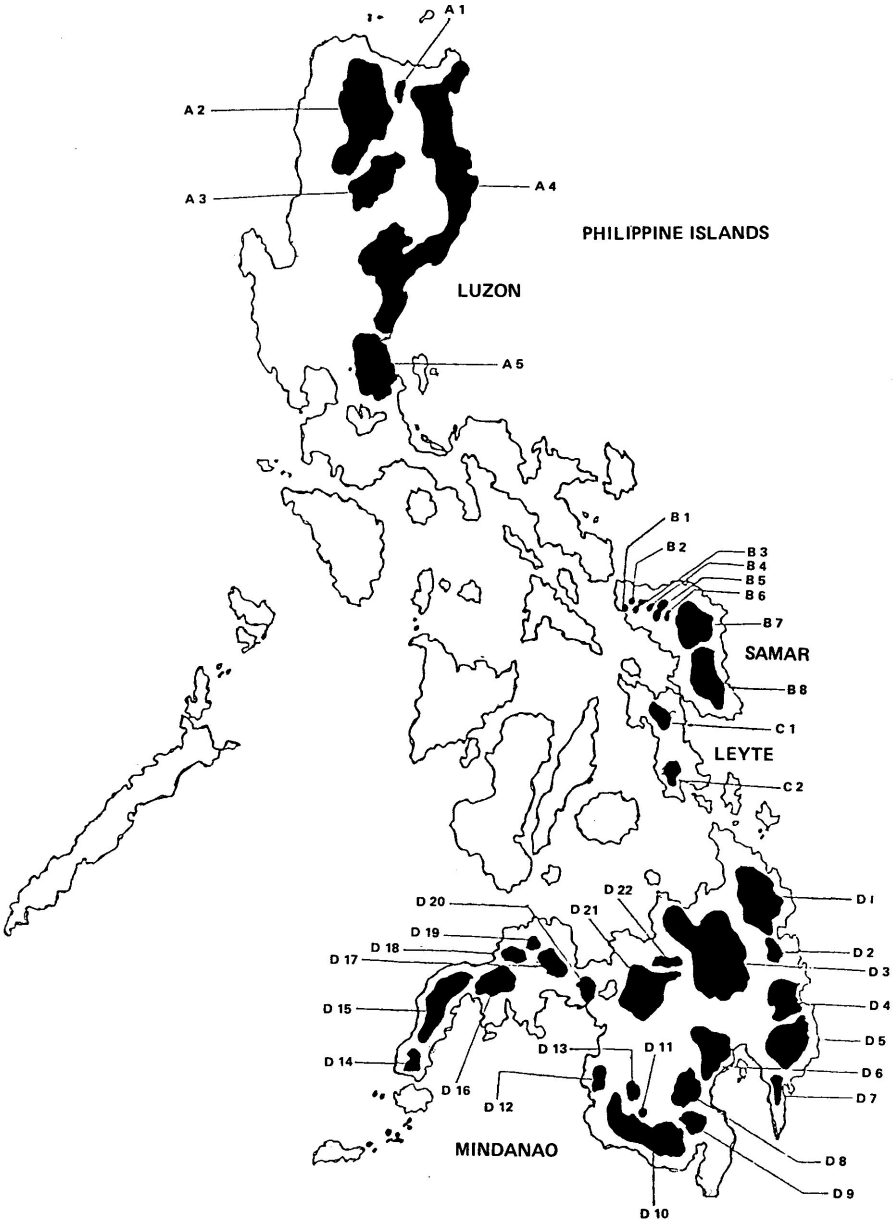


Table 1: Population estimates for Luzon, Samar, Leyte and Mindanao.

1. Formulae: % land area/territory size = population estimate
  - a. Estimated area used by the Eagles: 100%, 60%, 50%, 40%
  - b. Estimate territory size: 100km<sup>2</sup>, 60km<sup>2</sup>
2. Genetic bottleneck can occur at less than 50 individuals.
3. Paucity of Philippine Eagle sightings and scarcity of retrievals and nests located in Luzon, Samar and Leyte may indicate a much smaller population than calculated.
4. Indices to relative abundance can be as useful as actual numbers.

AREA NO. AREA SIZE/KM <sup>2</sup>		POPULATION ESTIMATED: 100km. TERRITORY SIZE/PAIR % of land used by the Eagles			
		100%	60%	50%	40%
Luzon A1	100	1.00	.60	.50	.40
Luzon A2	2960	29.60	17.76	14.80	11.84
Luzon A3	480	4.80	2.88	2.40	1.92
Luzon A4	3560	35.60	21.38	17.80	14.24
Luzon A5	1200	12.00	7.20	6.00	4.80
T O T A L	8300	83.00	49.82	41.50	33.20
Samar B1	80	.80	.48	.40	.32
Samar B2	70	.70	.42	.35	.28
Samar B3	100	1.00	.60	.50	.40
Samar B4	40	.40	.12	.20	.16
Samar B5	100	1.00	.60	.50	.40
Samar B6	60	.60	.36	.30	.24
Samar B7	700	7.00	4.20	3.50	2.80
Samar B8	800	8.00	4.80	4.00	3.40
T O T A L	1950	19.50	11.58	9.75	8.00
Leyte C1	180	1.80	1.08	.90	.72
Leyte C2	220	2.20	2.32	1.10	1.60
T O T A L	400	4.00	2.40	2.00	1.60
Mindanao D1	1200	12.00	7.20	6.00	4.80
Mindanao D2	120	1.20	.72	.60	.48
Mindanao D3	1600	16.00	9.60	8.00	6.40
Mindanao D4	600	6.00	3.60	3.00	2.40
Mindanao D5	1500	15.00	9.00	7.50	6.00
Mindanao D6	580	5.80	3.48	2.90	2.32
Mindanao D7	180	1.80	1.08	.90	.72
Mindanao D8	260	2.60	1.60	1.30	1.04
Mindanao D9	340	3.40	2.04	1.70	1.36
Mindanao D10	1000	10.00	6.00	5.00	4.00
Mindanao D11	40	.40	.24	.20	.16
Mindanao D13	160	1.60	.96	.80	.64
Mindanao D14	300	3.00	1.80	1.50	1.20
Mindanao D15	700	7.00	4.20	3.50	2.80
Mindanao D16	620	6.20	3.72	3.10	2.48
Mindanao D17	300	3.00	1.80	1.50	1.20
Mindanao D18	200	2.00	1.20	1.00	.80
Mindanao D19	80	.80	.48	.40	.32
Mindanao D20	280	2.80	1.68	1.40	1.12
Mindanao D21	1200	12.00	7.20	6.00	4.80
Mindanao D22	140	1.40	.84	.70	.56
T O T A L	11520	115.20	69.16	57.60	46.08
TOTAL FOR 4 ISLANDS	22170	221.70	132.96	110.85	88.88

Map 1 Population estimates (Philippine Eagle pair) in existing forest fragments. Refer to Table 1.



# APPENDIX I

## ASSUMPTIONS: PHILIPPINE EAGLE POPULATION THEORY

1. Philippine Eagles do not immigrate into or emigrate out of a forest fragment. Broad expanses of water and open land (ca. 20km) pose impassable barriers over which Eagles will not fly. This theory is supported by:
  - 1.1 Five Eagles retrieved alive from large bodies of water near the shore and one from a large inland lake.
  - 1.2 Eagles would be extremely easy to detect if they frequented open farmland but reported sightings in these areas are negligible.
  - 1.3 Eagles are normally captured (hunting, trapping) in forested areas.
  - Eagles have never been sighted over open water.
  - 1.4 Eagles are not found in other Philippine islands or Borneo that were always separated from the Eagle island group by deep water.
2. Forest fragments occupied by Eagles are at carrying capacity and tolerance density (density of demes).
3. Established breeding pairs will maintain and defend a territory throughout most (if not all) of their natural life cycle.
 

Q: Will a male or female Eagle upon losing his or her mate re-establish a pair bond with another of the opposite sex?

Q: Will the widowed male or female continue to defend the territory established while still paired?

Q: Will surplus Eagles attempt to dominate and claim a territory occupied by a single widowed bird?

Q: What happens to the ousted individual?
4. Population parameters remain constant for all four islands based on land area available and territory size.
5. In a forest fragment (of the 37 still available) the area used by Eagles will be smaller than the total area because of forest type, elevation, weather, food availability, terrain and clearings not identified.
  - 5.1 Nesting zones will not exceed 1450 m.a.s.l. or be within the dwarf mossy forest.
  - 5.2 Luzon, Samar and Leyte are within the typhoon belt.
  - 5.3 Luzon contains no flying lemurs (*Cynocephalus volanes*), a major diet item on Mindanao.
6. Surplus Eagles inside a fragment will establish residence only if vacancies become available.
7. Eagles nest and rear one offspring every two years, if successful. They may breed the following year if a nesting attempt fails.
 

\* Nesting success

Disturbed areas: 30-50% to fledging

Undisturbed areas: 60-80% to fledging
8. Life characteristics
  - 8.1 Sex-age structure
    - 8.1.1. Sex ratio 50/50.
    - 8.1.2. Adults can live 30-60 years.
  - 8.2 Sexual maturity reached between 6 and 8 years.
  - 8.3 Specific natality
    - 8.3.1. Disturbed areas: fledging to sexual maturity 30-60%.
    - 8.3.2. Undisturbed areas: fledging to sexual maturity 50-70%.
  - 8.4 Mortality (all factors) 7.5%-10% per year for total population. Varies per individual fragment and dependent on particular decimating factors.

Greater in disturbed areas.
9. Decimating factors
  - 9.1 Natural
    - 9.1.1. Direct
      - 9.1.1.1. starvation

- 9.1.1.2. intraspecific aggression
- 9.1.1.3. disease or parasites
- 9.1.1.4. weather
- 9.1.1.5. fire
- 9.1.1.6. accidents
  - . prey becoming predator (snakes)
  - . choking
  - . wing sprain
- 9.1.2. Indirect
  - 9.1.2.1. stress
  - 9.1.2.2. habitat change
  - 9.1.2.3. food availability
- 9.2 Man-induced
  - 9.2.1. Direct
    - 9.2.1.1. hunting
    - 9.2.1.2. trapping
    - 9.2.1.3. poisoning
  - 9.2.2. Indirect
    - 9.2.2.1. habitat removal
    - 9.2.2.2. stress

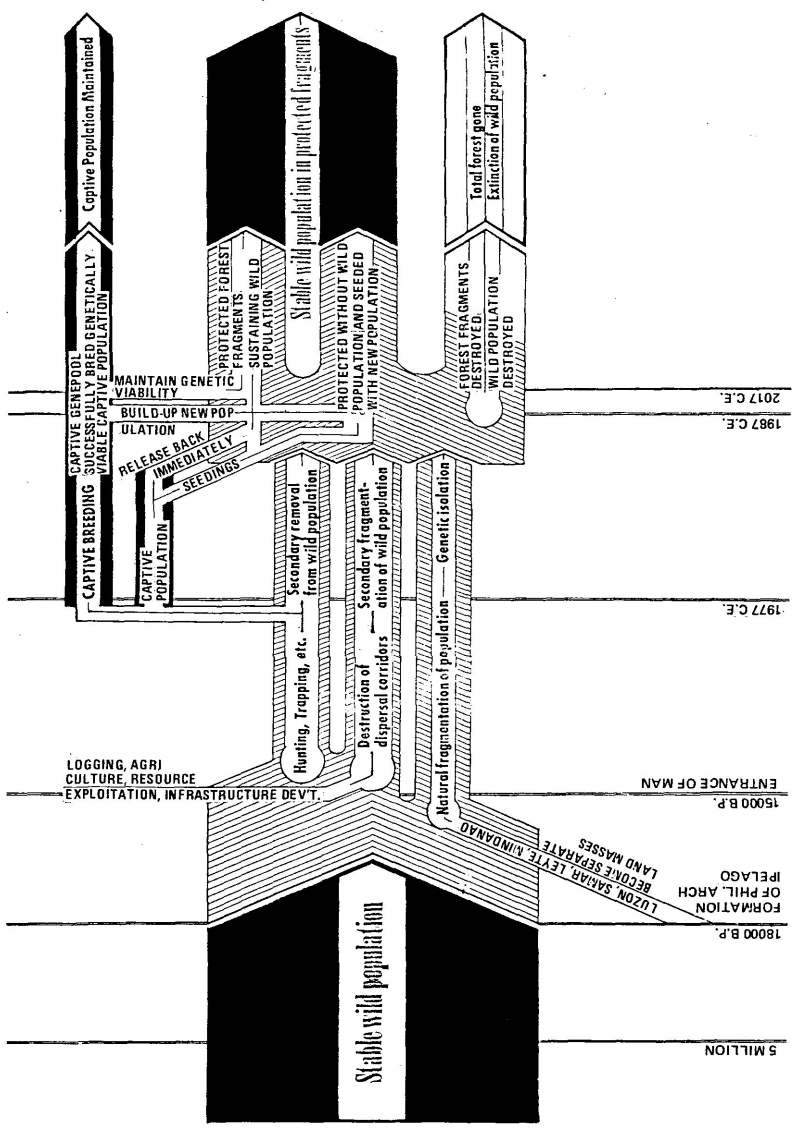
## APPENDIX II

### EDUCATIONAL EXTENSION WORK

The Philippine Eagle Conservation Program (PECP) employs a wide array of educational aids and approaches which have evolved over time, based on success and failures. Those that have been most effective are:

1. **Film showings:** The film "To Live and Be Free", the story of the Philippine Eagle, produced by Films and Research for an Endangered Environment Ltd. (FREE Ltd.), is shown to schools, social organisations, rural outposts (while conducting field studies) and on television. It has generated an awareness of what the Philippine Eagle is and appeals to the public for support in its conservation. The film's shortcomings are apparent in that it does not provide a clear understanding of the problems and does not give any answers.
2. **Poster:** The Bureau of Forest Development and the PECP have periodically distributed posters, their central message being "Save the Philippine Eagle". Unfortunately, they have been printed in limited numbers and the effect they have is difficult to assess. Again, the message is simple without providing the problems and solutions.
3. **Pamphlets, brochures and leaflets:** Many variations have been produced, ranging from colour and black-and-white presentations to simple script messages. These are distributed at film showings, lectures, public displays and while conducting field studies. They depict the Eagle and its plight, present the Philippine Government agencies and conservation organisations responsible for attempts to save the Eagle, show some of the problems and give some solutions. They appear to be effective where many have been distributed.
4. **Newsprint, radio and television:** The media are the most effective means in getting the Philippine Eagle Conservation message to the public. The Eagle has become well known nationally and internationally through continuous updates to the media provided by the Philippine Government and the PECP. All issues are covered and available for public scrutiny.
5. **Lectures:** These are given in concert with visual aids, i.e. projected images and graphics, and allow a detailed presentation of the problems and potential solutions. The PECP has been effective in stimulating student groups, academics, religious affiliations and social organisations to join the effort; it has also convinced policy-makers to support the programme.
6. **Public displays:** This is the newest addition to the PECP's repertoire of educational efforts. It has proved a very effective way to generate interest in conservation. The exhibition includes:

Diagram 1 Hypothetical flow diagram for Philippine Eagle



(1) photo displays and cartoon posters explaining the Eagle and the conservation effort; (2) a full-scale poster of the Eagle; (3) a simulated nesting site complete with aerial plants, an egg and a stuffed Eagle; (4) another stuffed Eagle skin study laid out as in a morgue with an interpreter explaining why the Eagle(s) died; and (5) a map showing where the Eagles are found. This has proved very effective and allowed all sectors of society to learn just about all we know in our efforts to conserve the Eagle and its habitat.

7. **Philippine Eagle Research and Nature Centre (PERNC):** This facility displays the real thing in a natural setting. Tourists (foreign and local), student groups, ethnic minorities, politicians and newsmakers commune with the Eagle and leave the Centre with an understanding and awareness unavailable through any other educational setting. Seeing is believing, and it works.
8. **Adopt an Eagle:** Although this scheme has not been implemented, it will eventually allow the public to keep a captive Eagle alive for one year. The Eagle's cost of maintenance and upkeep will be shouldered by any individual willing to do so.
9. **Promotional materials:** T-shirts, towels, car stickers, dolls, postcards and any other commercial item with the image of the Philippine Eagle have and will be developed for public consumption. These items act as constant reminders to the purchasers of what the conservation effort is all about. They promote conservation and provide visual stimulation. Promotions get the public involved in what the PECP is doing.

These programmes work and can be expanded to include:

1. Producing additional films.
2. Producing more meaningful posters in greater numbers.
3. Producing more pamphlets, brochures and hand-outs that cater to various sectors of society.
4. Increasing involvement with the media.
5. Training effective lecturers.
6. Expanding public displays to airports, civic centres, theatres, other areas with large social gatherings, and during town festivals.
7. Developing additional research facilities and extension offices on other islands containing Philippine Eagle populations.
8. Expanding the Adopt-a-Nest programme to areas known to contain fragmented populations of the Eagle. Beginning the Adopt-a-Captive-Eagle programme.
9. Developing additional promotions and expanding their distribution.

# Appendix III

## PHILIPPINE EAGLE: FATE OF 25 NESTING ATTEMPTS

<u>YEAR</u>	<u>SUCCESSFUL</u>		<u>FAILED</u>		<u>PROBABLE</u>	<u>U N K N O W N</u>				<u>FAILED</u>	
	D	U	D	U	D	SUCCESS				D	U
1963	1*										
1976					1*					1*	
1977			1*								
1978	1*		3*		1**						
1979					1*						
1981			1*								
1982			1*		1*						
1983			2*								
1984	1*		1*								
1985		2*									
1986		2*	3*								
1987		1*									
SUBTOTAL	3 + 5		12 + 0		4 + 0					1 + 0	
T O T A L	8		12		4					1	
PERCENTAGE	32%		48%		16%					4%	

Successful and probable success  
48%

Failed  
52%

\* Reported to be successful by informant.

\*\* Young still alive in nest when close observation was terminated.

D Nest sites were disturbed by researchers, logging operations or premeditated interference by man.

U Relatively undisturbed by man except for spot checks and verifications of egg production, hatching and fledging.