STATUS OF THE LEOPARD (Panthera pardus) IN JAVA, INDONESIA

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INTRODUCTION

The leopard, Panthera pardus, is the top carnivore in Java and shares its habitat with two other felids, the leopard cat, Felis bengalensis, and the fishing cat, Felis viverrinus. The tiger, Panthera tigris sondaica, is extinct.

Before the large scale conversion of forest to agricultural areas as a result of rapid growth of the human population, the leopard was distributed throughout the island, and ranged from sea level to the peaks of some of the highest volcanoes (Hoogerwerf, 1970). Furthermore, it enjoyed a wide distribution and good numbers prior to the modification of its habitat by man. Java, although occupying only 7% of the total land area of Indonesia, supports a human population of over 100 million people and is one of the most densely populated islands in the world. Java has already lost its tiger despite the availability of habitat and good legislation. The leopard, however, being an exceptionally adaptable predator, has managed to survive despite this very high human population. How much longer the leopard can hold on in Java will depend on measures taken today for its long term conservation.

HABITAT

In Java, leopards can thrive in a variety of habitats that range from patches of dense tropical rainforest found in the southwestern part of the island and on mountain tops to dry deciduous forests and scrub in the East. It was once found in almost all State Forests, including timber forests. Unlike tigers, leopards are more tolerant of sun, and can inhabit much drier habitats, including treeless savannah-type ecosystems. It is this ability to adapt to changes in temperature fluctuations that enables the leopard in Java to inhabit high mountains and extend its range to upper elevations where minimum temperatures approach freezing (Hoogerwerf, 1970). Moreover, it seems to thrive particularly well in seral stages of plant successional patterns thereby making it less susceptible than many other mammals to man's disruptive activities (Myers, 1976). In general, interdispersion of subclimax habitats creates an optimum environment for a diverse herbivore-carnivore community (Sunquist & Mishra, 1985).

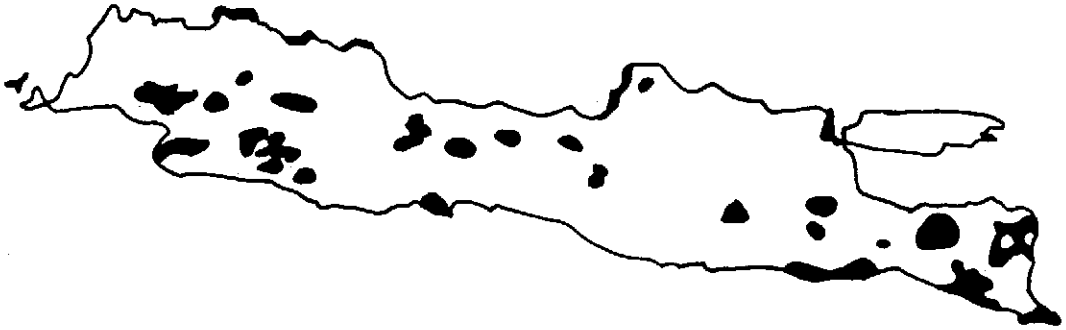
DISTRIBUTION

Java, one of the most densely population islands in the world, has lost more than 90% of its natural vegetation. Primary forests only remain in the mountainous regions at elevations above 1400 m. By 1980, the extent of the closed broad-leaved forest cover was estimated to be only about 11,800 km2 or 8% of the land area (Collins et al, 1981). The altitude range of the mountains in Java are such that most are rich habitat for leopards when left in their undisturbed state. These conditions are shown in Fig. 1. The list of known localities given in Table 1 represents the minimum distribution of the species, its presence known only because these areas have been subject to study for other purposes. This data suggests that leopards can be expected to occur in other remote areas, especially along forested slopes of volcanic mountains, once these were systematically investigated. Given the number of areas where the leopard may be present but has not yet been studied, it could be maintained that at least in the short term, the situation regarding the survival prospects for the leopard in Java does not appear that alarming. However, it would certainly be more prudent to follow a fail-safe policy, and probably also more in accord with the overall situation, to plan on the converse basis, i.e. that there are only three populations of leopards known to exist which do not appear subject to any immediate threat: those in Ujung Kulon National Park/Gunung Honje Reserve (40,000 ha), Meru Betiri National Park (50,000 ha), and Atlas Purwo Game Reserve (62,000 ha). The Pulau Kangean, although small (3,000 ha), is of special interest on account of its "rare population of leopards" (MacKinnon et al, 1982).

FOOD HABITS

Leopards in Java prey on a variety of animals that range in size from bats and mice to barking deer (Hoogerwerf, 1970). However, its preferred prey appears to be the medium sized barking deer, Muntiacus muntjak, which is abundant in almost all protected areas of Java. In addition to barking deer, the leopard is fairly catholic in its food habits, preying on species such as the long-tailed macaque, Macaca fascicularis, silvered leaf-monkey, Presbytis cristata, wild boar, Sus scrofa, lesser mouse deer, Tragulus javanicus, and at times even an occasional Javan gibbon, Hylobates moloch. In areas near human settlements and agriculture, leopards may also prey on domestic dogs, goats and even chickens. Only the banteng, Bos javanicus, appears to be immune from leopard predation because of its formidable size and strong maternal care directed toward the young.

Java, forest cover 1990



Remaining forest and reserves of Java

Distribution of known populations of the leopard *Panthera pardus melas* in Java.
1. Ujung Kulon/Gn. Honje; 2. Ranca Danau; 3. Cibodas; 4. Gn. Simpang;
5. Gn. Halimun; 6. Pasir Salam; 7. Meru-Betiri; 8. Yang Plateau;
9. Baluran; 10. Alas Purwo; 11. Maelang; and 12. Pulau Kangean.

Table 1. Reserves in Java inhabited by leopards, (Panthera pardus).

Name	Status	Area (ha)	Alt. (m)
1. Ujung Kulon/Gn Honje	NP	40,000	0-623
2. Ranca Danau	NR	2,500	0-90
3. Gibodas	NP	14,000	500-3019
4. Gunung Simpang	NR	15,000	600-1600
5. Gunung Halimun	NR	40,000	500-1929
6. Pasir Salam	HR	13,340	100-600
7. Meru Betiri	NP	50,000	0-1223
8. Yang Plateau	GR	14,145	1600-3088
9. Baluran	NP	25,000	0-1250
10. Alas Purwo	GR	62,000	0-360
11. Maelang	HR	70,000	100-2800
12. Pulau Kangean	GR	3,000	100-365

NP = National Park, NR = Nature Reserve, GR = Game Reserve, HR = Hunting Reserve

NUMBER AND DENSITY OF LEOPARD

There has never been an island-wide census of the leopard in Java. In Wilpattu National Park, Sri Lanka, Eisenberg and Lockhart (1972) estimated leopard density to be 1 per 30 km2, a density which is similar to one which Schaller (1972) proposed for leopards in the Serengeti National Park in Tanzania. However, in prime leopard habitat in Ruhuna National Park, Sri Lanka, leopard density could be as high as 1 per 5.6 km2 (Santiapillai, et al, 1982). In Java, an initial approximation suggests an average density of 1 per 10 km2 in moderately suitable habitats, and 1 per 5 km2 in favorable ones. Based on these estimates, we feel there could be anywhere from 350 to 790 leopards within the conservation areas of Java. While it is impossible to verify this estimate, it is clear that today that leopard populations in Java can be measured in the "hundreds" whereas in the last century they could have been estimated in the "thousands".

CONSERVATION AIMS AND PROSPECTS

Recommendations for the long-term conservation of the leopard in Java need not depend on precise qualification of its populations. What is needed is to know if the animals exist in significant numbers throughout their range. Therefore, it is necessary to establish whether the populations are increasing, declining, or remaining stable. With the disappearance of the tiger, the leopard appears to have increased its numbers in a few reserves: Ujung Kulong and Meru Betiri. Elsewhere, many reserves are either too small or surrounded by dense human population. In those instances, prospects for the leopard's long-term survival appear grim. Small reserves such as Ranca Danau and Paulau Kangean in Java cannot support viable populations indefinitely, and leopard populations in these reserves are very vulnerable to local catastrophes. Random changes in the populations such as marked fluctuations in the sex ratio, have proportionately more impact on smaller populations of carnivores (Bertram, 1986). One way of avoiding some of the problems associated with managing small populations of leopards would be through the establishment of forest corridors to link smaller reserves with larger ones. This, however, is unlikely on an island like Java because of its high human population and intense agricultural tradition. There is simply no more land available to link isolated reserves!

The leopard, like other large predators and a few large herbivores, is a species where the basis for its conservation in the wild must be in terms of keeping the human settlements and wildlife refuges well separated. Some loss of domestic livestock is inevitable if it grazes inside a large predator's home range. Conservation in Java also must take into account the leopard's extreme vulnerability to poisoning. Its greatest threat comes from an increase in its use; the leopard's propensity for scavenging makes it more susceptible than many carnivores to taking treated lumps of meat (Myers, 1976). After fragmentation of its habitat, Hoogerwerf (1970) attributed the extinction of the Javan tiger primarily to this cause.

The very high commercial value of its pelt also poses a threat to the Javan leopard. Leopard skins are easily smuggled from Java to the island of Madura where they can be transported by boat to more lucrative markets in other countries.

The long-term survival prospects for the leopard in Java will depend on how well the human population in this densely populated island can control its numbers. Protected areas alone offer poor bets for the long-term survival of the leopard in the face of burgeoning human populations. Conservation areas are not immune to the threats that originate from outside its boundaries.

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