

In this issue of TIGERPAPER the spotlight is on cats of all sizes. This includes "big cats" like tigers, lions, leopards, and also the smaller jungle cats. We have received so many articles on the subject that they seemed to warrant an issue of their own.

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

by Charles Santiapillai and Widodo Sukohadi Ramono

Introduction

The leopard (*Panthera pardus*) is the top carnivore in Java, sharing its habitat with two other felids, the leopard cat (*Felis bengalensis*) and the Fishing cat (*Felis viverrina*). The Javan tiger (*Panthera tigris sondaica*) is extinct.

Before the large scale conversion of forest and the expansion of agricultural areas as a result of rapid growth of the human population, the leopard was distributed throughout the island, from sea level to the peaks of some of the highest volcanoes (Hoogerwerf, 1970). 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 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 in Java despite a very high human population. But how much longer the leopard can hold on will depend on the measures we take today for its long term conservation in Java.

Habitat

Leopard can thrive in a variety of habitats in Java that range from patches of dense tropical rainforest found in the south-western part of the island, to the mountains, and to dry deciduous forests and scrub in the east. It was once known from almost all the State Forests, including the timber forests in Java. Unlike the tiger, the leopard is more tolerant of the sun and so 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

great altitudes where the night time temperatures are around freezing point (Hoogerwerf, 1970). But it seems to particularly thrive in the seral stages of successional vegetation patterns, which makes it less susceptible than many other mammals to man's disruptive activities (Myers, 1976). In general, the maintenance of an interdispersion of subclimax habitats creates an optimum environment for a diverse herbivore-carnivore community. (Sunquist & Mishra, 1985).

Distribution

Java, being one of the most densely populated islands in the world, has lost more than 90% of its natural vegetation. Primary forests remain only 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.*, 1991). The altitude range of the mountains in Java is such that most of their areas is rich habitat for the leopard in their undisturbed state. The list of known localities given in Table 1 represents the minimum distribution of the species. Its presence in a number of the localities listed is known only because the areas concerned have been the subject of study for other purposes, suggesting that the leopard might occur in other remote areas, especially along the forested slopes of volcanic mountains, if these were systematically investigated. Given the considerable extent of areas where the leopard may in fact be present but has not yet been searched for, it could be maintained that in the short term at least, the situation regarding the survival prospects for the leopard in Java do not appear to be that alarming. However, it would certainly be more prudent in terms of following a fail-safe policy, and probably also more in accord with the overall facts of the situation, to plan on the converse basis, that there are only three populations of the leopard known to exist which appear not to be subject to an immediate threat i.e. those in Ujung Kulon National park/Gunung Honje reserve

(40,000 ha), Meru Betiri National Park (50,000 ha) and the Alas 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

The leopard preys on a variety of animals in Java that range in size from bats and mice to barking deer (Hoogerwerf, 1970). However, its preferred prey appears to be the medium size barking deer (*Muntiacus*

munjak), which is in abundance in almost all the protected areas in Java. The leopard is fairly catholic in its food habits, preying, in addition to the barking deer, on monkeys such as the long-tailed macaque (*Macaca fascicularis*) and 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, the leopard is also known to prey on dogs, goats and even chickens. Only the banteng (*Bos javanicus*) appears to be immune from leopard predation on account of its formidable size and strong maternal care of its young.

Table 1. Reserves in Java inhabited by leopard (*Panthera pardus*)

Name	Status	Area (ha)	Alt. (m)
Ujung Kulon/Gn Honje	NP	40,000	0-623
2. Ranca Danau	NR	2,500	0-90
3. Cibodas	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 & Density of Leopard

There has never been an island-wide census of the number of leopards in Java. In Wilpattu National Park, Sri Lanka, Eisenberg & Lockhart (1972) estimated the leopard density to be 1 per 30 km², which is similar to that of Schaller (1972) for the leopard in the Serengeti National Park in Africa. However, in prime leopard habitat in the Ruhuna National Park in Sri Lanka, leopard density could be as high as 1 per 5.6 km² (Santiapillai *et al.*, 1982). As far as Java is concerned, as a first approximation, on the basis of average density

estimates of 1 per 10 km² in moderately suitable habitats and 1 per 5 km² in favourable ones, we estimate that there could be anything from 350 to 700 leopards within the conservation areas in Java. While it is impossible to be certain that this estimate is correct, it is clear that the number of leopards in Java can now be measured in "hundreds" whereas in the last century, it would have been estimated in "thousands".

Conservation Aims & Prospects

Recommendations for the long-term conserva-

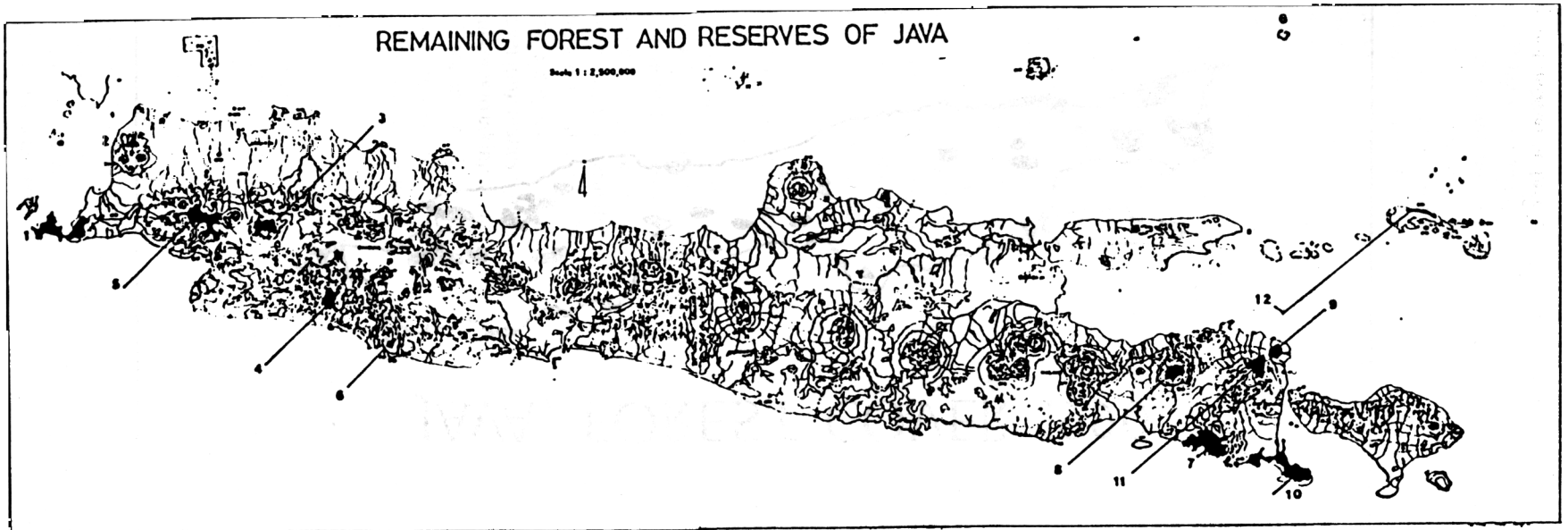


Fig. 1 Distribution of known populations of the leopard (*Panthera pardus melas*) in Java. (1. Ujung Kulon/Gn. Honje; 2. Ranca Danau; 3. Cibodas; 4. Gn. Simpang; 5. Gn. Halimun; 6. Pasir Salam; 7. Meru-Betiri; 8. Yang Plateau; 9. Baluran; 10. Alas Purwo; 11. Maelang; & 12. Pulau Kangean.

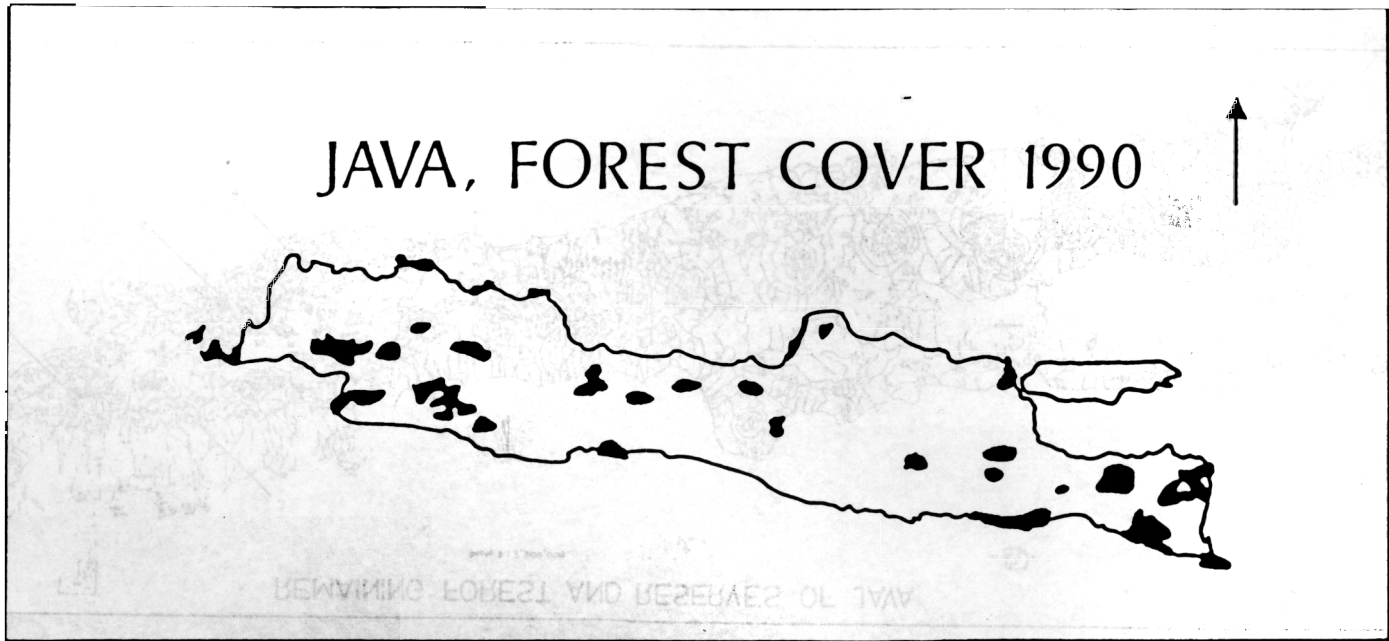


Fig. The extent of forest cover in Java in 1990 (after Santiapillai & MacKinnon 1991)

tion of the leopard in Java need not depend on precise quantification 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 in numbers, declining or remaining stable. In a few reserves (such as Ujung Kulon and Meru Betiri), with the demise of the Javan tiger, the leopard appears to have increased in number. But elsewhere, many reserves are either small or surrounded by dense human populations. Here, the prospects for long-term survival of the leopard appears grim. Small reserves such as Ranca Danau and Pulau Kangean in Java cannot support viable populations indefinitely. The 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 leopard would be through the establishment of forest corridors to link smaller reserves with the larger ones. But this is unlikely to be the case in an island such as Java with its high human population and intense agricultural tradition. There is no more forest 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 aiming to keep the human settlements and wildlife refuges well separated. Some loss of domestic livestock is inevitable if this stock grazes inside a big predator's range. Conservation must take into account the high vulnerability of the leopard to poisoning. The greatest threat to the leopard in Java comes from the increasing use of poison. The leopard's propensity for scavenging makes it more susceptible than many other carnivores to taking treated lumps of meat (Myers, 1976). Hoogerwerf (1970) attributed the extinction of the tiger in Java following fragmentation of its habitat, primarily to this cause.

The very high commercial value of its pelt also poses a threat to the leopard in Java. Leopard skins can be easily smuggled out of Java to the island of Madura, from where they could be transported by boats 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 will control its number. Protected areas alone offer poor bets for the long-term survival of the leopard in the face of a burgeoning human population. The conservation areas are not immune to the threats that originate outside its boundaries.

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