

# Why do elephants raid crops in Sumatra

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The Sumatran elephant (*Elephas maximus sumatranus*) has an image problem. Almost all the reports that are published in the media refer to its proclivity to raiding crops and thereby causing economic ruin to the farmers trying to eke out a precarious existence near areas inhabited by elephants. Elephant damage to oil palm and rubber plantations in South-east Asia can run into millions of dollars in economic loss to the country (Blair & Noor, 1981). Much of the crop depredations can be reduced if development planners and policy makers pause to understand why elephants raid crops.

The number of wild elephants in Sumatra is estimated to be between 2,500 and 4,500 animals (Blouch & Haryanto, 1984; Blouch & Simbolon, 1985). Prior to about 1900, when agricultural settlements in Sumatra first led to a substantial degree of deforestation, most of the island was covered with primary forest. Presumably, up to that time, the elephant was more or less continuously distributed throughout the entire island. Less than a century later, the elephant finds itself with its back against the wall. The conversion of primary forest into agricultural holdings, some of which have proved ephemeral and been abandoned, is a particularly serious cause of conservation problem in Sumatra, and the large mammals such as the elephant, rhinoceros and tiger are among the species most seriously affected by it. It is estimated that between 65 and 85% of the forests in the lowlands of Sumatra have already been lost (Whitten *et al.*, 1984). The mountain areas to date have been less seriously affected, but the disruption of continuous cover is already substantial in some cases (Santiapillai & Widodo, 1989), and perhaps 15% of their total area may tentatively be estimated as already removed.

The altitude range of the mountains in Sumatra is such that most of their area would have been rich habitat in the past in their undisturbed state. Although the elephants thrive in seral stages of vegetation, yet in the past when much of the land was under rainforest cover, the animals would have maintained large numbers by seasonally shifting their feeding grounds between the lowlands and the mountains. Many of the past elephant migratory paths extended from the hills to the lowlands and *vice versa* (Groeneveldt, 1938). All this had to change by the turn of the century, when increasing human population and increasing agricultural land use not only reduced substantially the land area once available to the elephants, but more importantly, blocked out certain channels of response such as emigration and dispersion. In extreme cases, the elephant herds have become "pocketed" into isolated, forest patches surrounded by a hostile landscape dominated by man (Olivier 1980). The situation has reversed from one in which man lived in small settlements in areas dominated by the elephants, to one in which the elephants find themselves surrounded by a man dominated environment. This has proved a sure recipe for escalation of elephant-human conflicts in Sumatra since then.

The elephants, like other wildlife have lost so much of their former habitat, that they are often forced to invade the communities that have displaced them (Caufield, 1984). Herein lies the crux of the elephant crop-raiding problem in Sumatra.

To understand why elephants resort to raiding crops, it is important to know something about their ecology. The elephant is a social animal. There are two social units comprising

the elephant populations (Laws, 1970): The first is the family unit or herd consisting of the oldest female (the so called matriarch), her daughters and their offspring. The members of the herd are related to one another and move about as a cohesive unit. In Sumatra, such units typically range in size between 4 and 8 animals. The second social unit is the bull group which is a loose temporary aggregation of often unrelated males (Eisenberg, 1981). Both males and females reach sexual maturity between the ages of 10 and 15 years. Once the male reaches sexual maturity it leaves the matriarchal herd and leads a solitary life. This is a way to prevent inbreeding in the herd. It will seek oestrous females in other herds and attempt to mate. Thus the adult, solitary bull is often more than a rogue elephant; it is a roving gene-pool. A number of adult bulls can meet and form the loose aggregations referred to as the bull groups. In Sumatra, much of the crop raiding is carried out either by solitary bulls or bull groups.

The male elephants also take more risks than do the matriarchal family units (Sukumar & Gadgil, 1988). In Way Kambas National Park, along the unprotected southern border which abuts on cultivated land, more males were responsible for crop raiding than family units. Male elephants also appear to respond to risks during the raids by forming larger groups. Why should this be so?

The elephants are unspecialised feeders: that means they are fairly catholic in their diets, feeding on a wide variety of plant species and not restricted to a few items. More than 90 species of plants are known to be eaten by elephants in Asia (McKay, 1973; Olivier, 1978; Santapillai & Suprahman, 1986). A probable reason for the lack of selectivity is the need to consume between 6-8% of their body weight a day (Sukumar 1985; Vancuylenberg, 1974). This works out in the case of an adult male weighing 4,000 kg between 240 kg and 320 kg of wet weight per day (or 180-240 kg/day in the case of an adult female weighing 3,000 kg).

Given this background, it is easy to understand why elephants, with their large size and intemperate appetite raid cultivated areas and devour crops when their habitat is encroached by man. When extremely palatable and nutritious crops such as sugarcane, oil palm and paddy are cultivated by the side of elephant reserves, elephant raids are inevitable. Sugar cane and oil palm plantations function like elephant supermarkets, attracting the animals from far and wide (Ratnam, 1984). The proximity of such palatable items as sugarcane, oil palm, paddy etc. make available to elephants nutrient-rich food. It also eliminates searching time and thereby enables the elephants to optimise foraging efficiency. Increased nutrition would also lead to increased body size among the bulls and can ensure success in male-male competitions (Sukumar & Gadgil, 1988). Given the fact that the provision of parental care to the young is the prerogative of the females (mother, aunts and grandmother) and not of the adult males, it is easy to understand why the female herds do not take unnecessary risks by raiding crops frequently. Whenever female herds raid crops, they rarely stray out much farther from the forest boundary.

There are no easy solutions to stop elephants from raiding crops once agriculture becomes the principal land use in the vicinity of elephant reserves. The Directorate-General of Forest Protection and Nature Conservation (PHPA) of the Ministry of Forestry has attempted a number of measures in the past that range from translocation of entire herds of elephants from problem areas to the safety of game reserves, to the capture and domestication of chronic crop raiders for eventual use in Forestry, Agriculture and Tourism. The Elephant Training Centre near the Way Kambas National Park in Lampung province of Sumatra has been successful in training wild-caught elephants. Trained elephants have enormous economic potential and can be used in timber extraction in the Production Forest such as Teak, Eucalyptus and Pine. They also, unlike the heavy machinery, cause the least damage to

the environment. Domestic elephants form the backbone of timber extraction in Burma (Gale, 1974). There is no reason why they should not succeed in Sumatra as well.

However it would be naive to believe that capturing chronic crop raiders and training them in itself would solve the elephant-human conflicts in Sumatra. It is at best only a temporary measure and should not become institutionalized practice accepted as routine. Mitigating elephant-human conflicts would require more effective methods such as the use of electrified fences in combination with trenches in areas where elephants pose a serious threat to the plantations or crops (Piesse, 1992). But even these are unlikely to completely eliminate the conflicts as long as elephants are confined to a patch work of parks and reserves surrounded by hostile landscape dominated by man. Setting up of parks and reserves as viable self-sustaining ecosystems alone may prove poor bets for the long term if we fail to address the factors that have led to the conflicts.

On the one hand, people are tempted to have more and more consumer goods, and on the other, they are asked to preserve natural resources: these two are incompatible (Mishra, 1985). The problem concerning the elephant in Sumatra provides yet one more compelling argument for ending the indiscriminate felling and deforestation which have been sweeping across the island. While the need to retain large tracts of undisturbed forest is axiomatic, it is not essential *ipso facto* to stop commercial exploitation of timber in forest to be managed as habitat for the elephant. It is simply necessary to control it strictly.

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