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Elephant Conservation and Mitigation of Human-Elephant Conflict in Government of Malaysia-UNDP Multiple-Use Forest Landscapes Project Area in Sabah

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Abstract. The Bornean subspecies of Asian elephant is mainly restricted to Sabah, Malaysia. Declining revenues from logging in Sabah due to high levels of past extraction, is now leading to conversion of forests to land-uses generating greater short term revenue, such as oil palm plantations. However, such forest conversion results in habitat loss, fragmentation and increased human-elephant-conflict. Currently, 261,264 ha of central Sabah forests are being brought under a 'multiple use forest landscape management model'. The initiative envisions various developmental activities including oil palm plantations, while attempting to conserve elephants and other biodiversity by protecting critical landscape segments and improving plantation sustainability.

Introduction

One of the challenges to conserving Asian elephants and other wildlife is to incorporate conservation strategies into development and land-use planning, especially around existing wildlife habitats (Johnsingh & Williams 1999). The latest Sabah Elephant Action Plan (2012-2016), states that habitat loss, habitat fragmentation, low genetic diversity, illegal killing, snare trapping and poor public awareness are the main threats to Bornean elephant populations in Sabah. Although currently some 1,635,098 ha representing approximately 22% of the total landmass of Sabah have been set aside for totally protected status, forest conversion to other types of land use continues (Sabah Forestry Department Annual Report, 2012). Competition between people and elephants for space and resources, results in increased costs on both sides: (1) economic losses from crop raiding and infrastructural damage by elephants, (2) protective actions and retaliation measures by people that cause injury or death of animals (Sitati *et al*. 2003).

The Bornean elephant

The Bornean elephant (*Elephas maximus borneensis*) is one of the four recognized Asian elephant subspecies. They are genetically different to all other Asian elephants (Fernando *et al*. 2003). They have some differences in morphology and behaviour. Bornean elephants have the smallest distribution range of the four subspecies and are possibly fewer than Sumatran elephants which were designated as 'critically endangered' in 2013 (IUCN Red List of Threatened Species). As most of the Bornean elephants are in Sabah, their management in the state will determine the future of the subspecies.

Elephants are found only in forested areas in the south, centre and east of Sabah. The legal status of the Bornean elephant in Sabah was recently upgraded to Schedule I "Totally Protected

Species" which is the highest level of protection under the Sabah Wildlife Conservation Enactment 1997. Consequently, any person caught killing or hunting an elephant will receive a mandatory six month to five year jail sentence (Elephant Action Plan, 2012-2016).

Human-elephant conflict (HEC)

Loss of elephants, crop raiding patterns and economic losses due to HEC in Sabah are not well documented, making it difficult to understand the trends and intensity of the conflicts. HEC reached a climax in Sabah in 2013, when 14 elephants were found dead over a period of 4-5 weeks in the Forest Management Unit (FMU) 23, a Yayasan Sabah concession area in the Gunung Rara Forest Reserve. The Sabah Wildlife Department determined that these elephants died of poisoning, but to date the type of poison has not been determined, and no suspect has been apprehended.

Approximately 10,000 km^2 or one third of all commercial forest reserves within the Central Forest of Sabah, which are under the jurisdiction of the Sabah Forestry Department are managed by Yayasan Sabah, a para-state organization (Reynolds *et al*. 2011). Most of these lowland forests are now in a highly degraded condition and are home to the largest elephant population, estimated to consist of 1132 individuals (95% CI= 748-1713, Alfred *et al*. 2010). Some forest reserves have recently been converted to oil palm plantations and electric-fences erected on their boundaries, creating bottlenecks and hampering the movement of elephants. An example is the conversion of parts of Kalabakan and Gunung Rara Forest Reserves, impacting habitat connectivity for elephants between Sapulut Forest Reserve and the rest of Central Sabah Range (Elephant Action Plan, 2012-2016).

Government of Malaysia-UNDP project area

By 2014, timber production from the State's natural forests was projected to decline by over 95% from its peak in the 1970s (Reynolds *et al*. 2011). To ensure and maintain revenue for the socio-economic development in Sabah, a Government of Malaysia-UNDP project was initiated in March 2012. The objective of the project was to institutionalize a multiple-use forest landscape planning and management model, bringing the management of critical protected areas and connecting landscapes under a common management umbrella, implementation of which is sustainably funded by revenue generated within the area (GoM-UNDP project document, 2012). The proposed 261,264 ha project area (Fig. 1) titled "Malaysia: Biodiversity Conservation in Multiple Use Landscapes in Sabah" provides an opportunity to include "best management practices" in a multiple-use forest landscape while enabling ongoing sustainable uses.

The proposed project area encompasses FMU 23, 24 and 26 in Gunung Rara and Kalabakan Forest Reserves (Fig. 1). Upland mixed dipterocarp-kerangas forests occupy 44% or 115,760 ha of the total area and are located between 300 and 750 m-asl in the southern and central parts of the landscape. The next dominant forest type is upland dipterocarp forests, representing 41% or 106,511 ha, which are mostly found in the northern and eastern regions. The remainder consists of lowland dipterocarp (13% or 32,884 ha) and upland kerangas forests (0.1% or 316 ha). The project implementation agency is the Sabah Forestry Department (SFD).

The SFD raised concerns of HEC in the project area especially in relation to a 25,000 ha area of forest that will be converted to oil palm in the near future by the company TSH Group. The adjoining estate, Seri Jaya oil palm plantation

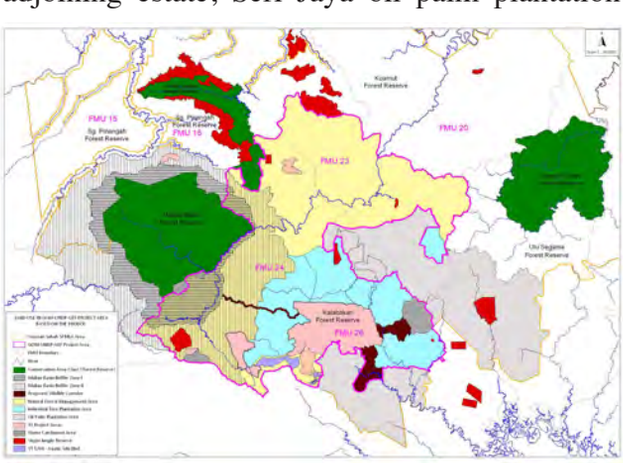

Figure 1. UNDP-GEF project area in Sabah (outlined in purple).

Figure 2. Fixing the satellite GPS collar on Dara.

(ca. 26,000 ha) is also managed by TSH. The area already planted with oil palm has been protected by electric fencing since 2007. TSH reports that there were only a few instances where elephants have come into the plantation through the fence and that there have not been any significant damage to the plantation by elephants (Tuan Haji Roslee pers. comm.). Currently the company has 270 km of fencing around their plantation.

Elephant movements

To date, five adult female elephants have been collared with GPS satellite tracking devices in the area (Fig. 2). Two females were collared in 2005 by WWF-Malaysia (Alfred *et al*. 2012) and another three females, were collared in 2013 by the Sabah Wildlife Department (SWD), Danau Girang Field Centre (DGFC) and WWF-Malaysia. One of the females was part of the herd where 14 individuals were found dead in Gunung Rara Forest Reserve. The main objective of the collaring program is to better understand movement and ranging behaviour of elephants within the changing landscape in the Gunung Rara and Kalabakan regions, thereby helping in management planning for these areas and to find long-term solutions to HEC by better landuse planning.

Most of the lands that were and will be converted to oil palm plantations in Central Sabah were identified as highly suitable for elephants, by a study done between 2005 and 2008. The habitat suitability maps developed by this study were based on elephant dung detected along roads and trails which was then scored on four aspects deemed important for elephants (forest type, elevation, slope, distance to rivers) and given a relative weight based on their importance according to expert opinion, the sum of which was taken to represent habitat suitability (Alfred *et al*. 2012) (Fig. 3).

Since 2005, elephants were observed to stop using the area of Benta Wawasan and Seri Jaya oil palm plantations, presumably due to the erection of electric fences along the plantation boundaries (Tuan Haji Roslee, pers. comm.). Benta Wawasan and Seri Jaya plantations cover an area of 106,000 ha (Reynolds *et al*. 2011). The latest area proposed for conversion to oil palm will further reduce the natural habitat for elephants. The conversion may increase HEC in the area, as the satellite collared herds are observed to currently use the area. A 14,000 ha area of highly degraded forest south of the oil palm plantations, called Innoprise-IKEA Rainforest Project (INIKEA) is currently being

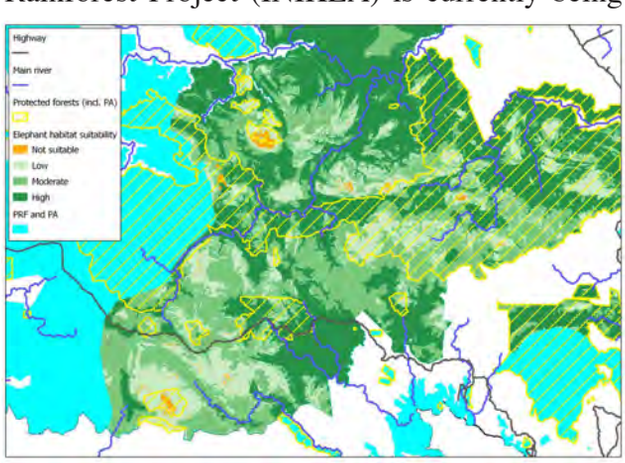

Figure 3. Habitat suitability map for elephants in Central Sabah.

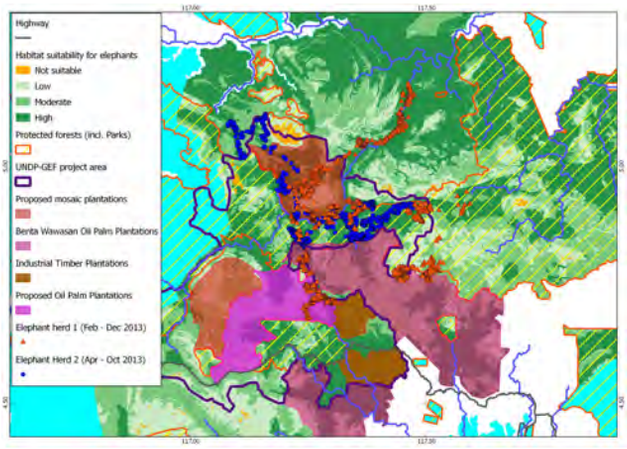

Figure 4. Elephant movements in Central Sabah based on the two most recent satellite tracked herds, overlaid on the habitat suitability map.

restored to conserve biodiversity. In late 2013, INIKEA was upgraded to a Class I protection forest (it had been heavily logged and extensively burned during the major El Nino drought which caused fires that swept through forests of Sabah in 1982/1983). Although this area is available for the elephants, it is very hilly, and the collared elephant herds do not use it, probably due to the terrain. When the GPS locations of the collared elephants were overlaid on the habitat suitability map (Fig. 4), it showed that these herds largely restricted their movement to areas identified as of high or moderate suitability for elephants. Rivers, small tributaries and roads may play an important role in determining the ranging patterns and habitat used by these herds, as most GPS locations are associated with these aspects. While there is inadequate data to identify the particular environmental parameters that are instrumental in this restriction, it is possible that the main factor is food availability. The distribution of food plants is likely to be strongly correlated with elevation, slope and disturbance both natural and anthropogenic.

Mitigation of HEC in the project area

The data currently available on Bornean elephants, while suggesting certain patterns in ranging and habitat use, are insufficient to guide specific management and development. Effective elephant management and HEC mitigation can only be done through obtaining an adequate quantity of location specific data using appropriate methodology (Blake *et al*. 2001). While a major effort needs to be launched to obtain the necessary data, provisional management decisions need to be taken based on available data (Fig. 5).

In the meeting with the Director of Sabah Forestry Department on the 30th of June 2013 in Sandakan which were attended by the authors, SFD officers and representatives of the oil palm companies; the SFD stated that they are committed to developing the landscape in a sustainable manner based on current information of elephant movement. SFD has determined that oil palm plantation in the development area would be subject to the following:

1. No oil palm to be planted in land above 600 m elevation or slope greater than 25 degrees.
2. All water courses including rivers and streams greater than 3 m width to have a minimum riparian forest buffer of 30 m width.
3. Exclusion of the corridor used by Dara's group across the project area.

In addition, a Technical Working Group (TWG) comprised of local and international experts with vast experience in various fields was formed to address and provide credible current information on biodiversity within the project area.

Conclusion

In order to save biodiversity and elephants, Sabah needs to embrace a holistic approach at the

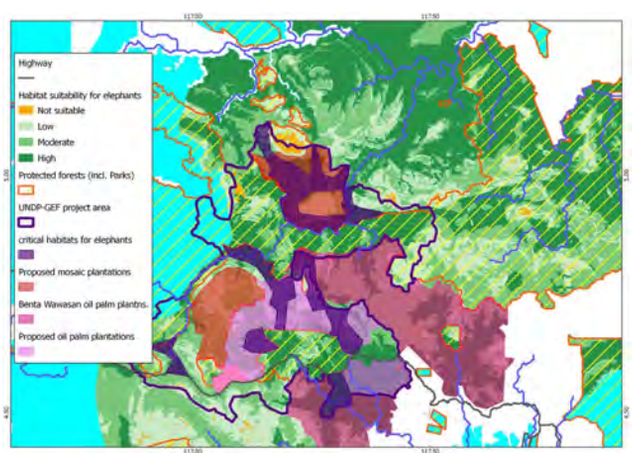

Figure 5. Proposed corridors and linkages including habitat along rivers and tributaries, focusing on habitat suitability for elephants in the project landscape.

landscape level. Developing and implementing a master plan for elephant management in the project area based on appropriate data can conserve the Bornean elephant, prevent economic losses to oil palm from elephant depredation, prevent HEC becoming a major socio-economic and political issue, and allow development of sustainable elephant viewing based tourism. To achieve these goals, site specific information on the ranging patterns, habitat use, behaviour and ecology of elephants are key. Successful development and implementation of such a master plan is only possible if all stakeholders openly and transparently share information.

A major shortfall of the GoM-UNDP project is that it is developing a new land-use plan without considering the need to sustain long-ranging species like the elephant. This situation may result in increased conflicts and possibly increase elephant mortality and financial losses. The fact that wildlife experts (NGOs, academic institutions and state agencies) have been invited to join the TWG since October 2013 is a step in the right direction in order to minimize adverse effects of development on elephant survival. However, it should also be realized that elephants are an integral part of the landscape of Sabah and some amount of HEC and economic losses would have to be tolerated where development is done in areas with elephants.

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