FIRST INTERIM REPORT FOR 21ST CENTURY TIGER

Grant number:

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INTRODUCTION

The conservation value of Sumatran rainforest has been widely recognised, both because of its biodiversity value and the extent of the remaining habitat patches. They also play an important role in providing resources for local communities and ecological services, such as watershed production. However, these forests are threatened by the unsustainable and illegal logging that is taking place throughout Sumatra. One region that typifies deforestation patterns in Sumatra is the area that includes Kerinci Seblat National Park (KSNP) in the west of the island.

KSNP has been designated the highest priority for tiger conservation yet the response of the tiger and their prey species to habitat loss from deforestation is not known. This report documents the research supported by 21st Century Tiger that includes an investigation of historical and recent deforestation patterns in and around KSNP and the research that is now underway to determine the affect this threat is having on tiger and their prey species.

RESEARCH PROGRESS

Mapping and Predicting Tiger Habitat Loss in KSNP

A historical and recent deforestation analysis was conducted for KSNP and surrounding areas that includes the nine districts covering the national park. Landsat Thematic Mapper (TM) satellite images were used to map forest cover in the study area in 1995

and 2000. The first forest classification map at a fine scale resolution was created for KSNP and surrounding areas using Landsat TM images from 2000 (Figure 1). In 2000 there was 20 121 km^2 of rainforest in the study area, with hill forest making up 45 % and submontane making 31 % of this total. Between 1995 and 2000 there was an annual deforestation rate of 1.26 % yr^{-1} but this figure only included the conversion of forest to degraded forest or agricultural land (Figure 2). It was difficult to identify where degraded forest was converted to very degraded forest and so these areas were not included in the deforestation analysis.

Figure 1 - Forest classification in KSNP and surrounding areas

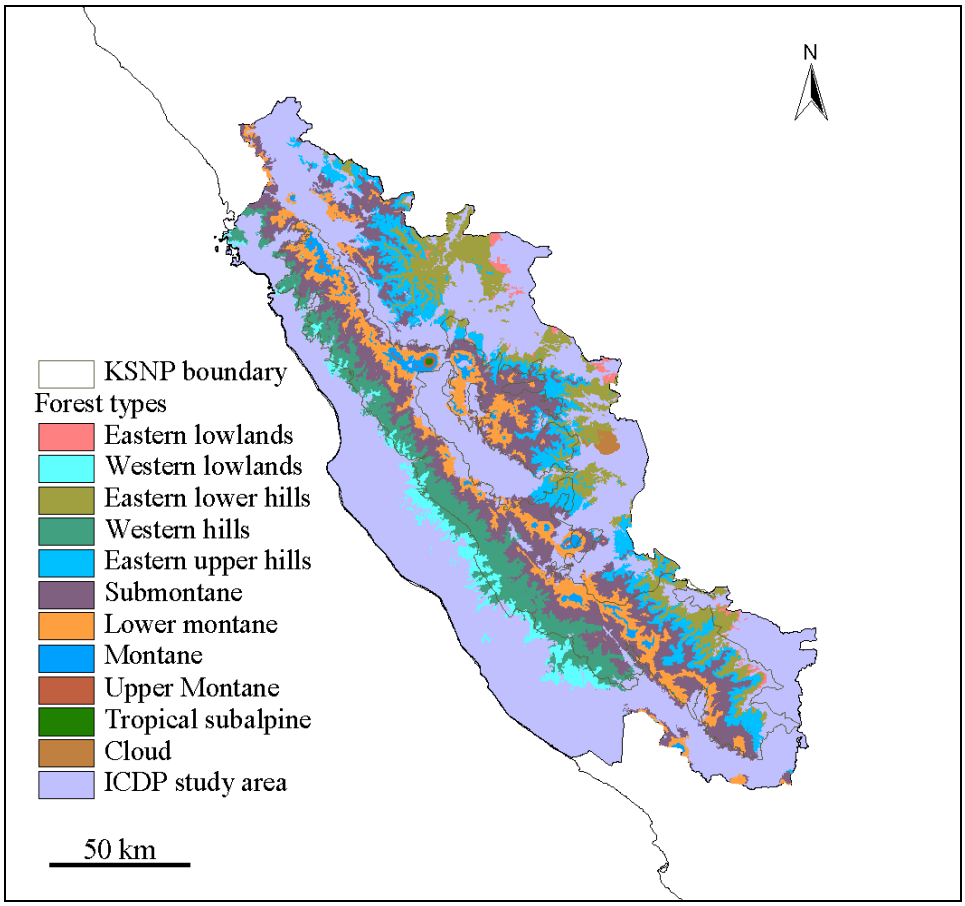
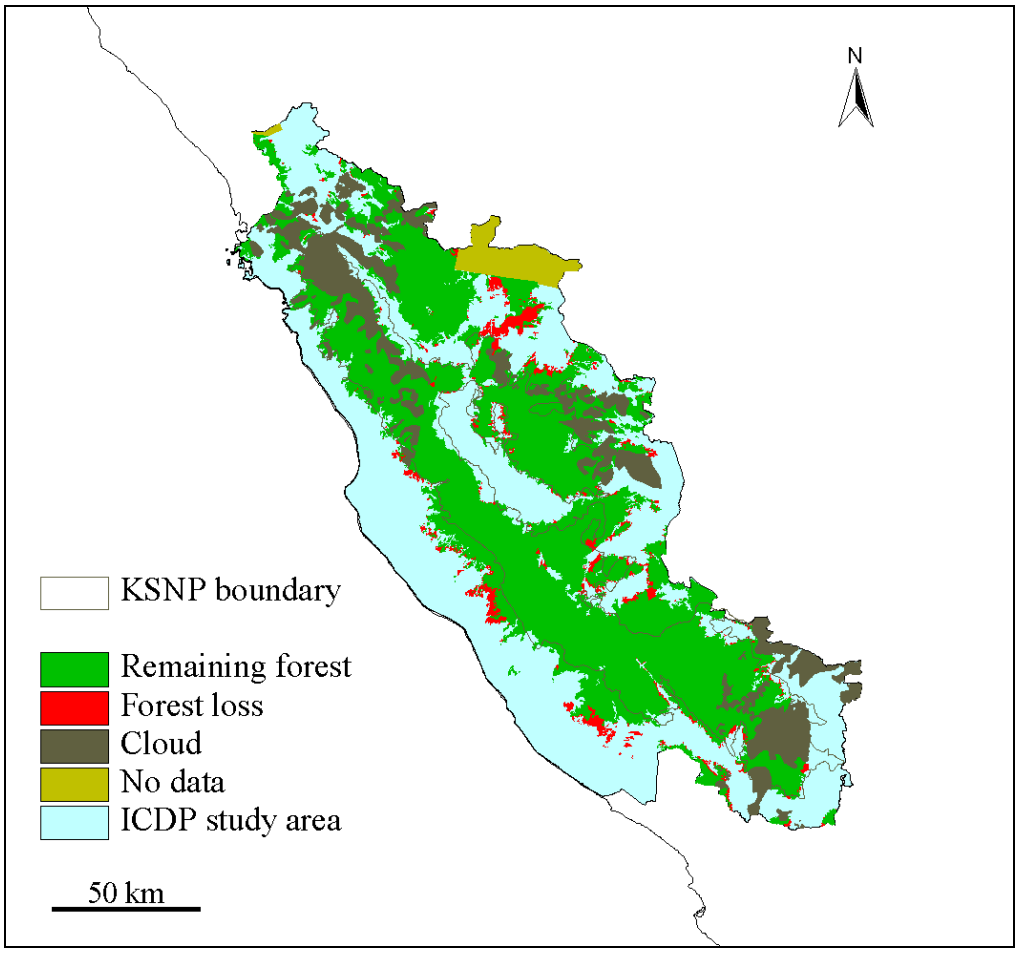


Figure 2 - Forest cover changes between 1995 and 2000



Logistic regression modelling was used to find the factors that determined the distribution of forest in the study area. The final model included three significant factors, which were elevation, distance to roads and the agricultural potential of the underlying soil. Forest was more likely to have been cleared from low-lying areas that were close to roads and had good agricultural potential. The model explained 62 % of the observed variation (forest loss), with most of this (43 %) being explained by elevation.

Logistic regression modelling was used to find the factors that determined deforestation between 1995 and 2000. The final model included four factors, which were forest protection status, distance from settlements, distance from roads and distance from logging roads. Forest was more likely to have been cleared if outside the park, close to

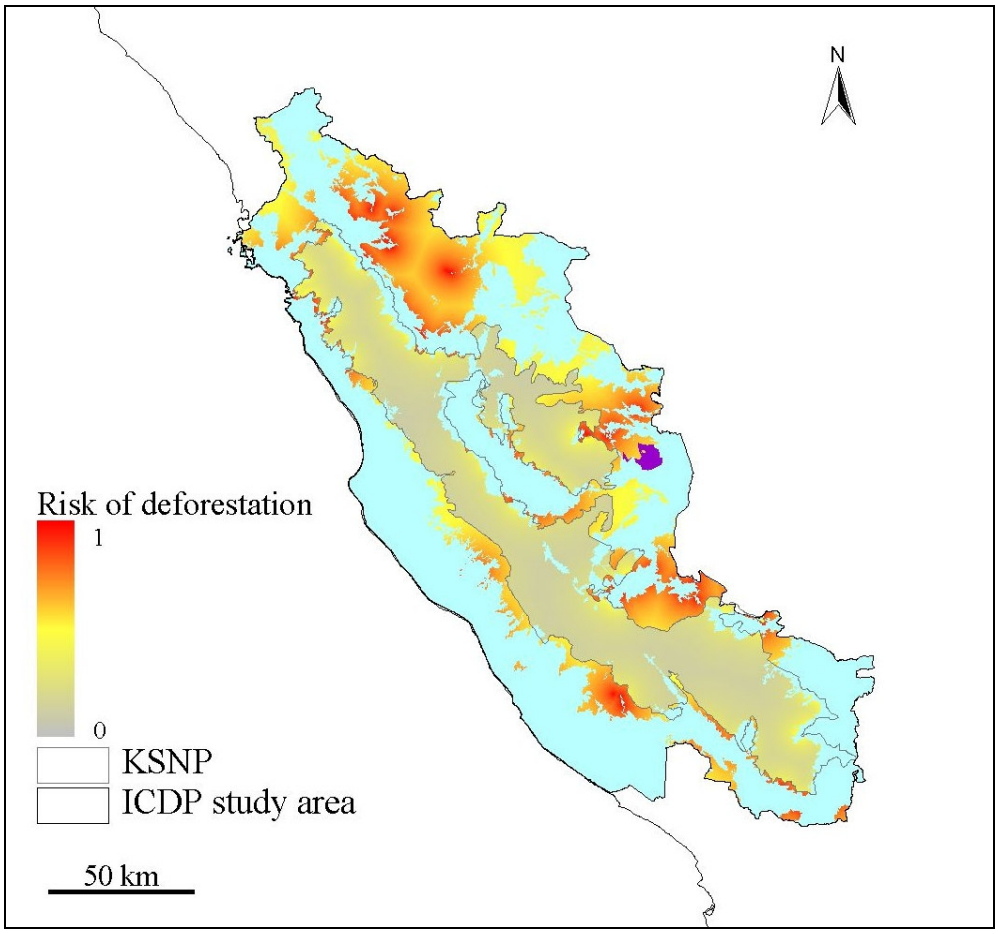
settlements, close to roads and close to logging roads. The model explained 42.5 % of the observed variation (forest loss). Three factors explained the majority of the variation, forest proximity to logging roads (14.8 %), it's protection status (14 %) and it's proximity to roads (10 %).

The fact that predicted deforestation risk was lower in KSNP is encouraging but there are two reasons why this should not be over-emphasised. Firstly, KSNP contained forest that was difficult to access and so would be unlikely to be cleared even without protected area (PA) status. Secondly, during the study period there were still large patches of forest without PA status and these could probably be more easily logged.

The recent deforestation model illustrated how the historical pattern of deforestation developed. Deforestation tended to occur close to settlements but most of these settlements were found close to roads and at lower elevations. This suggests that the long-term trend illustrated by the historical model is not inevitable and that efforts to reduce logging around these settlements could dramatically reduce deforestation rates.

The comparatively low explanatory power of the recent deforestation model was expected given the relatively short time period over which deforestation was measured and the probable influence of a range of unmeasured socio-economic factors. However, it was felt that the model still provided valuable insights into the factors that determined forest loss and so it was used to produce a new coverage showing future risk of deforestation (Figure 3). This coverage identified the large patches of forest found in the south and east of the study area as being most at risk of deforestation.

Figure 3 - Predicted risk of deforestation



The risk of deforestation coverage was also used to predict patterns of forest fragmentation and habitat loss. The model predicted that hill forest would be the most susceptible forest habitat type, partly because most of the accessible lowland forest had already been cleared. The predicted decline in submontane and montane forest was initially less dramatic, although all forest types showed a dramatic decline in the later stages of deforestation. The predicted decline in mean forest patch area was more complicated, as the forest patches first became smaller, then fragmented and finally were completely cleared.

From this research a complete geographic information system (GIS) dataset is now available for KSNP and surrounding areas. These datasets are freely available and will be distributed to the relevant government departments, non-governmental organizations and

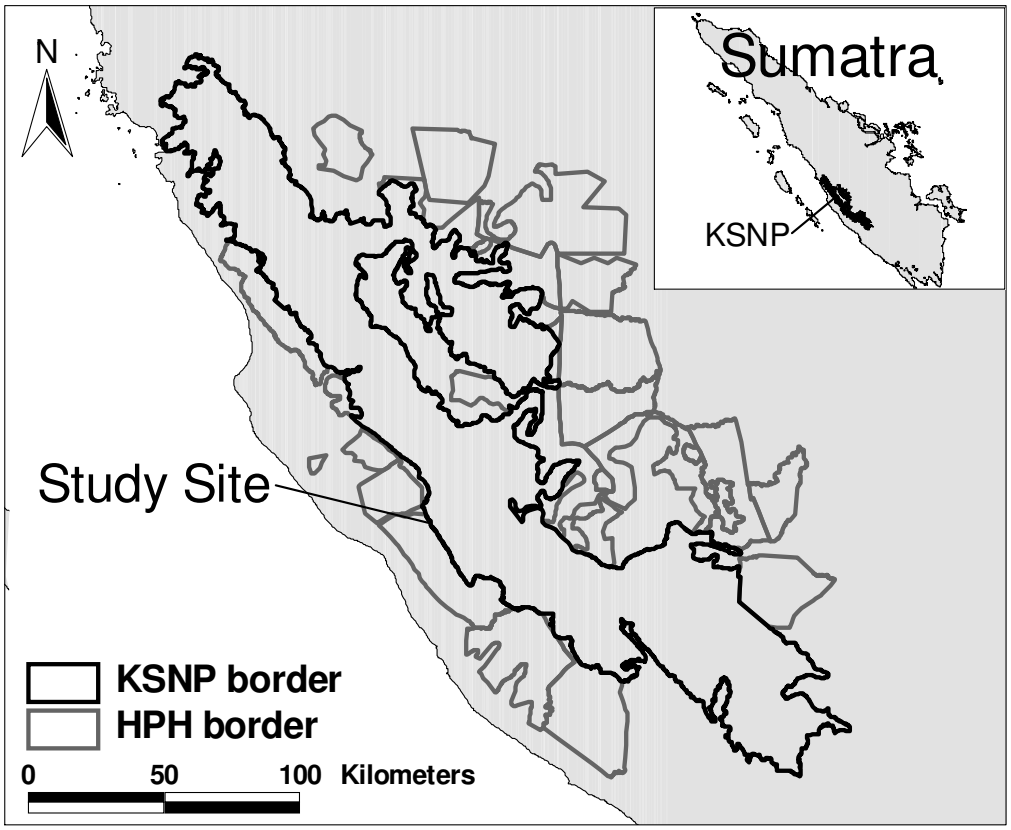
research students working within KSNP. These datasets although complete are subject to change with the acquisition of more recent or more detailed information. These datasets are archived at the Integrated Conservation and Development Programme Component D office, Sungai Penuh, Kerinci. Spatial data is available for,

- Elevation
- Slope
- Logging roads
- Forest cover 1995
- Forest cover 2000
- Forest vegetation classification
- Forest change from 1995 to 2000
- Forest vulnerability to change

Tiger Field Research

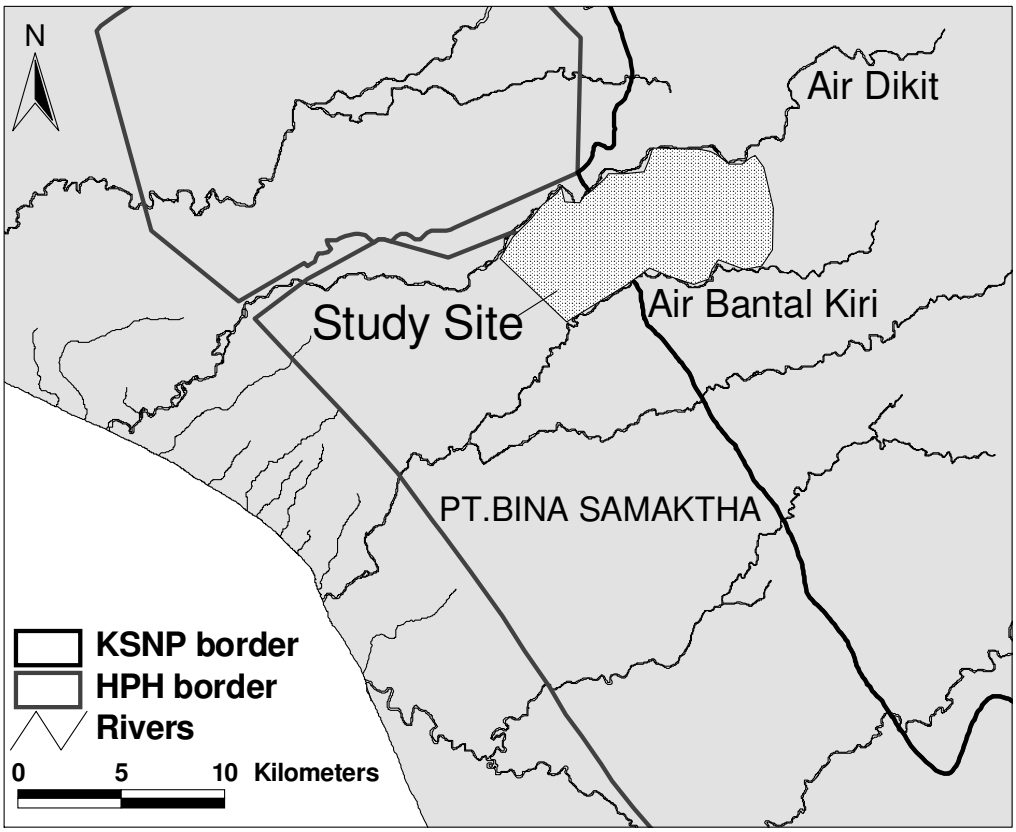
A permanent research study site has now been found in Bengkulu province, southwest Sumatra. Desa Bukit Makmur SP4 (UTM 47s 768753/9710338), North Bengkulu is a transmigration village of pioneer farmers located within the former logging concession (HPH) of Bina Samaktha (Figure 4). The farmland situated between the rivers Air Dikit and Air Bantal Kiri abuts the KSNP border (Figure 5).

Figure 4 – Location of Desa Bukit Makmur SP4, Bengkulu



Located at the forest edge there is on-going conflict between farmers growing crops and wildlife from KSNP forest entering these farms to eat the crops. The main culprits are reported as wild boar (*Sus scrofa*) and pig-tailed macaque (*Macaca nemistrina*). These animals cause considerable damage and are quite capable of destroying 4-5 banana trees in a few hours. Current research will be to determine which animals most frequently enter the farmland and those that actually cause the most damage. Eighty farmers have agreed to participate in this study and they have each received a 14-month calendar on which to record such information (Appendix 1). Every month calendars are checked for any problems arising and consistency in data collection. In return all photo trapping pictures will be distributed to the farmers and family photographs have been taken for each farm household and once framed presented to each family.

Figure 5 – Location of Desa Bukit Makmur SP4 study site

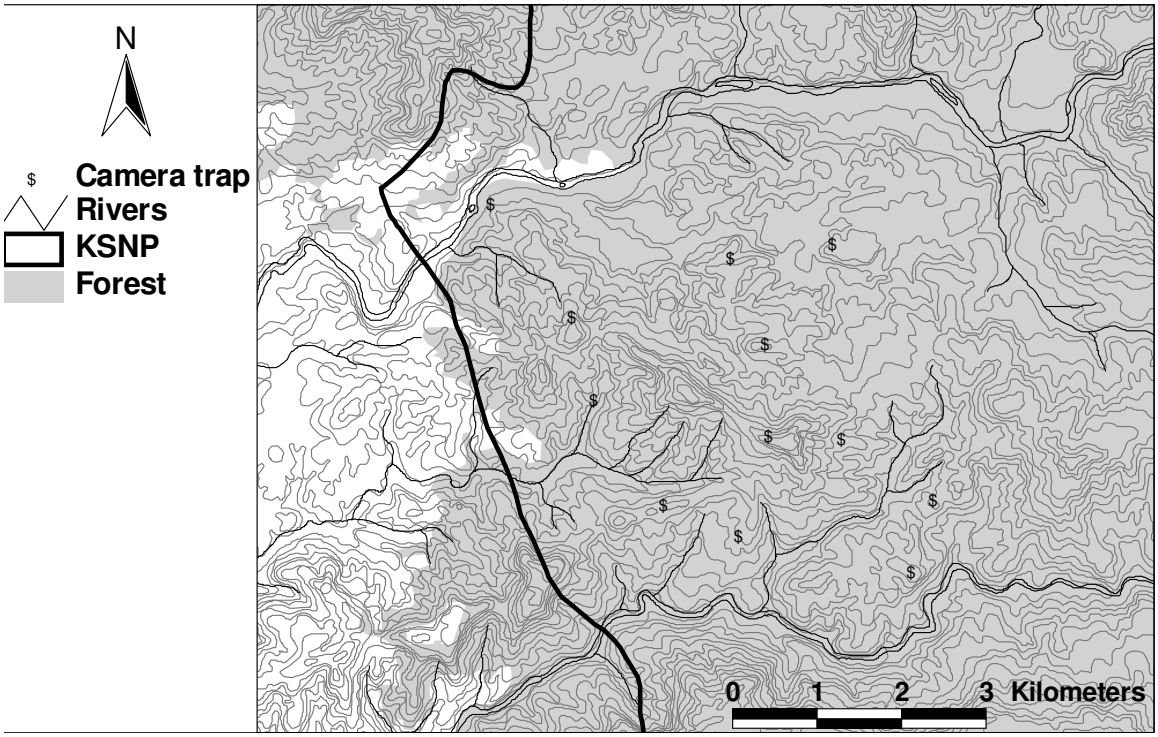


Concurrent to research in the farmland, forest transects have been cut at different distances (0, 1, 2, 3, 4, 5, 6 km) from the farmland edge into the forest. Transects are walked on a daily basis between 05.30-0900 and 17.30-20.00 hrs. Direct signs of tiger and prey species are recorded. This research has only been running for 2 months and data are presently limited, but tiger presence has been recorded along with the complete requisite of tiger prey species, including wild boar, bearded pig (*Sus barbartus*), sambar deer (*Cervus unicolor*), muntjac (*Muntjac muntiacus*).

Photo trapping has only been conducted for a total of just over 4000 hours using 12 camera traps (Figure 6). From this useful learning exercise the following animals have been recorded: tiger, wild boar, bearded pig, tapir (*Tapirus indicus*), porcupine (*Hystrix brachyura*), sunbear (*Helarctos malayanus*) and several other smaller mammals. Camera trapping will be conducted over a 12-month period in total.

Camera traps were operational during the start of a mast fruiting durian season. Two bearded pig sounders, of eight and nine individuals, and a lone male were encountered in the forest and nine photographs were recorded that ranged from 1 to 7 individuals (average size = 3). Tiger pugmarks were readily encountered during this period and always in close proximity to bearded pig footprints.

Figure 6 – camera trap locations in relation to the KSNP topography



Indonesian Research Counterpart

An Indonesian national, Yoan Dinata, from the National University of Indonesia, Jakarta, who joined this research finished his final year undergraduate field research October 2001 after spending 5 months in KSNP. This research investigated the ecological and conservation requirements of tiger and their prey species (sambar, muntjac, mouse deer, wild boar) in and around KSNP. These data were analysed in Sumatra and the research showed that from eight locations visited that

- Prey species did not show any preference between lowland, hill and submontane/montane forest habitat
- Tiger showed the strongest preference for submontane/montane forest habitat then hill forest and then lowland forest
- Areas that were at lower elevation, further from villages and with less illegal logging were significantly more likely to have higher prey species encounter rates
- Areas that were close to rivers, that had less prey poaching and had less illegal logging were significantly more likely to have higher tiger encounter rates

The finding that prey species did not differ between habitats highlights the difficulties of gathering data on tiger prey species in tropical forest environments, as only secondary signs were used (e.g. footprints and faeces). The finding that tiger signs were more likely to be encountered at higher elevation forest habitat indicated that other factors, not only topographic, were most probably important in determining tiger presence in these habitats. It was found that these habitats at higher elevations had lower levels of prey poaching and less illegal logging and this correlated with higher tiger abundance. Illegal logging was found to most adversely effect prey species abundance, but also distance from villages where illegal logging usually centres. Prey species were found to show a preference to habitat at lower elevation, which would appear to contradict the previous finding of 'no habitat preference' but the during the second analysis habitat type was analysed in conjunction with additional factors.

KSNP-Tiger Protection and Conservation Units GIS Training

Basic GIS training using ArcView GIS software has been provided for the database officers within the KSNP-Tiger Protection and Conservation Units (TPCU). All spatial datasets and GIS software have been transferred to the TPCU main computer. Construction of a tiger database for KSNP is now underway and data from all field researchers and a World Bank/GEF project within KSNP is being collated. The initial enthusiasm shown by the database officer has translated into a firm grasp of the GIS

basics that proved conducive to working a more advanced level. Subsequent maps produced for the TPCU confirm the database officer's clear understanding of GIS methodology. Further teaching will involve the database officer completing aptitude exercises and developing skills in other areas of a GIS, to begin in 2002.

FUTURE RESEARCH

The mapping and modelling exercise in this report provided valuable insights into deforestation in and around KSNP. The first comprehensive forest map for the focal area was produced during this period but it is necessary to obtain better quality satellite images, with minimal cloud, and update this map. The maps should then be geo-referenced and ground-truthed using field data to further improve their accuracy. A more detailed village dataset is currently being searched for by ICDP component D. Once this has been obtained the deforestation study will be repeated and the factors that are important in explaining the process will be used to produce an updated forest vulnerability model.

Fieldwork will restart January 2002 until November 2002. This will involve monitoring tiger and prey species populations using camera trapping and line transect methodologies. An Indonesian national from the National University of Indonesia, Jakarta, will join with this research in March 2002 to conduct fieldwork as part of a final year undergraduate field research. This research is intended to focus on the response of tiger prey species, with particular reference to the little studied Asian tapir. The study will employ a capture-recapture methodology to derive population abundance estimates and monitor the response of this prey species to habitat loss.

Contact has been made with the Directors of Biology at the University of Bengkulu (provincial university) and the University of Andallas, (West Sumatra provincial university) for capacity building purposes and collaboration of research projects including suitable counterparts to join my research. Similar contact has been made with the National University of Indonesia, Jakarta, through the Biological Science Club.

Plans are being made for a previous research counterpart, Yoan Dinata, will rejoin with this research during July 2002 and then independently continue the camera trapping campaign once I return to England in November 2002 to complete my Ph.D. thesis. Dinata proved competent at all levels of field research and his sound scientific knowledge and gusto for tiger research will prove useful in training prospective Indonesian national students who will join the project. The focus of this research would be the on-going collection of data on tiger and their prey species to augment that collected in 2001 and 2002. Camera trapping will then move to adjacent forest to obtain information on tiger home range and movement patterns, data that are lacking for KSNP. The research will then take a new focus to monitor tiger prey species, especially bearded pig, movement and abundance during a durian season and the response of tiger movement and abundance. These data will be compared with those collected previously in this study and also with data to be collected once the durian season has finished.

Contact is to be made with oil palm plantation directors from Agro Muko, based in Muko Muko, North Bengkulu, close to the current research location. This will open a discourse for possibly future research of tiger and their prey species ecology in this habitat.

CONTACT DETAILS

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