Smart Patrol as Monitoring System In Resort Way Nipah Bukit Barisan Selatan National Park

IOP Conf. Series: Journal of Physics: Conf. Series **1338** (2019) 012023 doi:10.1088/1742-6596/1338/1/012023

Smart Patrol as Monitoring System In Resort Way Nipah Bukit Barisan Selatan National Park

A A Efendi[1,a], E Fitria[1,b], S P Haryanto[3,e], Y Charles[2,d] and E L Rustiati[1,c]

[1]Biology Department, Faculty of Math. and Science, Lampung University. Prof. Dr. Soemantri Brodjonegoro Street no 1 Gedong Meneng, Bandar Lampung 35145, Lampung Province, Indonesia
[2]WWF-Indonesia Southerm Sumatran Program. Jenderal Urip Sumoharjo Street Gg. Ismail Blok B No. 165 Sukarame, Bandar Lampung 35135, Lampung Province, Indonesia
[3]Forestry Department, Fakulty of Agriculture, Lampung University. Prof. Dr. Soemantri Brodjonegoro Street no 1 Gedong Meneng, Bandar Lampung 35145, Lampung Province, Indonesia

[a]ahmad.afanefendi2017@yahoo.com; [b]elenfitria712@gmail.com;
[c]elly.lestari@fmipa.unila.ac.id; [d]ycharles@wwf.id, [e]sugengharyanto@fp.unila.ac.id

ABSTRACT. SMART is new aplication developed to measure, evaluate, an improve effectivity of monitoring and activity of conservation based of location. The research be held on march-april 2018, in Resort Way Nipah Bukit Barisan Selatan National Park (BBSNP), under program and collaboration with WWF-Indonesia Southern Sumatran Program. This research to understand effort security conservation area with SMART Patrol in Resort Way Nipah Bukit Barisan Selatan National Park. In this research use data patrol period July 2015-July 2017 as discussion material. Data devided into some groups (data series) consists of 4 groups is group 1 (period patrol September-December 2015), group 2 (period patrol March-June 2016), group 3 (period patrol September-December 2016) and group 4 (period patrol March-June 2017). High threat findings in period patrol March-June 2016 and 2017, while low threat findings in period patrol September-Desember 2015 and 2016. Wild animal findings increased in 3 first period and decreased in fourth period. Resort Way Nipah had over land function as plantation of coffee *(Coffea sp)*, cocoa *(Theobroma cacao)*, peper *(Piper nigrum)* and banana *(Musa paradisiaca)*. Has been identified 25 species wild animal findings in Resort Way Nipah based on direct findings and indirect findings. Based on 25 species wild animal has identified, divided based on conservation status is Least Concern (9 species) Near Threatnes (4 species) Vulnerable (4 species) Endangered (5 species) and Critically Endangered (3 species).

1. Introduction

Bukit Barisan Selatan National Park is home to three of the rarest and charismatic animals, are rhinos, elephants and Sumatran tigers. Bukit Barisan Selatan National Park spans 355,511 hectares and is included in the administrative regions of Lampung and Bengkulu Provinces. There are 3 things that threaten the survival of Bukit Barisan Selatan National Park, are land clearing, hunting and illegal logging. Base of the three threats, illegal land clearing and forest conversion to agriculture are the most serious threats [1].

The principle that is important in forest protection activities is the early prevention of the development of the causes of damage, this is considered to be far more effective than handling after damage or returning the forest as before. Forest protection not only faces how to deal with damage when it occurs, but rather is directed to recognize and evaluate all potential sources of damage. This is done so that great damage can be avoided, so that damage to forests can be minimized from potential causes encountered [9].

Spatial Monitoring and Reporting Tool (SMART) is a new application developed to measure, evaluate, and improve the effectiveness of monitoring and conservation activities based location. The SMART system was created to assist conservation area managers and other natural reserve areas in planning, implementing, and evaluating conservation interventions in the field. Through forest safeguards with procedures that are suitable and compatible with forest management planning systems, potential sources of damage are identified as much as possible. and evaluated before major damage occurred [10].

The purpose of this study is to understand the efforts to safeguard conservation areas with SMART Patrol at the Way Nipah Resort, Bukit Barisan Selatan National Park.

2. Materials and Methods

This research was conducted in March-April 2018, at the Way Nipah Resort Bukit Barisan Selatan National Park and use data patrol period July 2015-July 2017 as discussion material. The tools used in processing the security data for SMART-based conservation areas are GPS, cameras, and patrol data books. The materials used in this practical work are observation data, documentation data, and spatial data.

The steps taken are as follows:

1. Preparation stage: Conduct a preliminary survey, introduction and selection of research areas conducted under the guidance of WWF-Indonesia Southern Sumatra Program. Make a permit to enter the conservation area and make a presentation addressed to the Bukit Barisan Selatan National Park Central Office.
2. Data collection stage: Prepare the tools needed, are GPS (Garmin GPSMap 78S), camera (Canon PowerShot SX280 HS), and patrol book. Field observations, namely forest patrol activities carried out in March 2018. Record data obtained to in a patrol book.
3. Data processing stage: Prepare input patrol data in the form of observation data, documentation and spatial data at Resort Way Nipah for the period July 2015 - July 2017. Preparing the SMART application, Ms. Exel and ArcGis. Enter data (entry data) results of SMART patrol, the data entered in the form of documentation data (photos, videos, and sound recordings), spatial data (traces and coordinates) and observation data (position, wildlife, features, threats , trade and ownership of TSL, plants, phenology, human and animal conflicts, tourism and environmental services and community interaction. Doing export (query) on data that has been inputted into Ms. Exel. Processing data on findings of threats and findings of wildlife on Ms. Exel, while other finding data were used as supporting data. Grouping the data into groups (data series), consisting of 4 groups: Group 1 patrol period September-December 2015, group 2 patrol period March-June 2016, group 3 patrol period September-December 2016 and group 4 patrol period March-June 2017. Then analyze the data obtained using the SMART Application.

3. Results and Discussion

3.1. Threat findings

Threat findings Based on patrol activities at the Way Nipah Resort for the period of 2015-2017 were 479 found threat findings. Based on 4 patrol periods, patrols for the September-December 2015 period were 126 findings, in March-June 2016 were 186 findings, September-December 2016 were 18 findings, and March-June 2017 were 149 findings. Illegal land use were 292 findings or 61% of total threat findings (n = 479) (figure 1).

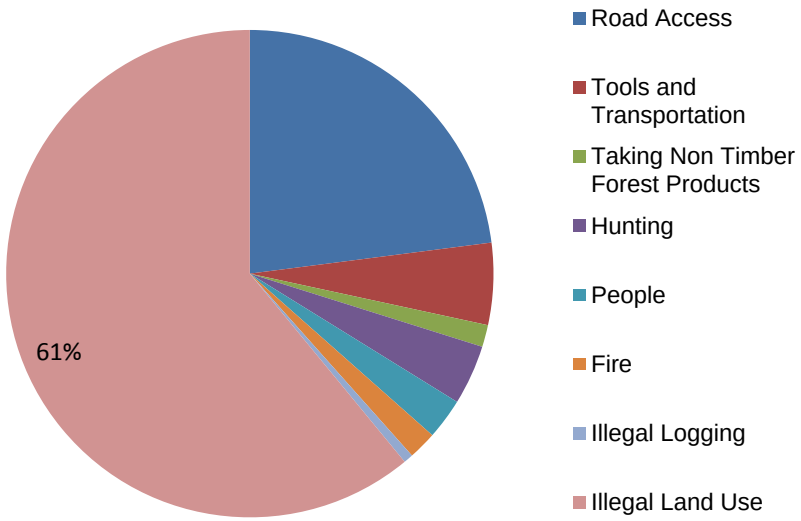

Figure 1. Finding threats at the Way Nipah Resort

Threat findings during patrols included road access, tools and transportation, taking non-timber forest products, hunting, peoples, fires, illegal logging, and illegal land use. Findings of road access were found 110 findings, consisting of findings on paths (figure 2) and road vehicles (figure 3). Tools and transportation were found 26 findings, consisting of findings of huts (places where the actors around the gardens rest in the area) (figure 4), machetes (tools for gardening), garden shoes (footwear for gardening), and motorbikes (means of transportation for gardening) (figure 5). Fires were found 9 findings, consisting of natural fires (arising from fires caused by long dry seasons) and intentional by the community (land deliberately burned to be used as plantation land). The peoples were found 13 findings, people who met with the patrol team usually ran away, but the peoples who were caught by the patrol team will be warned or asked to make a statement. Illegal logging were found 3 findings, while the wood taken was meranti type (*Shorea sp*). Hunting were found 19 findings, consisting of findings of bird snares, porcupines (*Histryx branciuran*), and deer. Taking non-timber forest products were found 7 findings, consisting of jengkol findings and coffee found in the hut. The illegal land use of forest areas were found in 292 findings, consisting of findings from coffee plantations (*Coffea sp*), cocoa (*Theobroma cacao*), pepper (*Piper nigrum*) and bananas (*Musa paradisiaca*).

Figure 2. Finding pathways

Figure 3. Findings of vehicle paths

Figure 4. Findings of huts

Figure 5. Findings of motors

Based on the threat findings obtained during the patrol, the highest threat findings were 292 found is illegal use of forest areas from a total of 479 findings. From these findings, forest areas experienced land conversion as plantation land, including cocoa gardens *(Theobroma cacao)* (figure 6), coffee *(Coffea sp)* (figure 7), bananas *(Musa paradisiaca)* and pepper *(Piper nigrum)* (figure 8) .

Figure 6. Findings of cocoa gardens

Figure 7. Findings of coffee and banana gardens

Figure 8. Findings of pepper gardens

From the plantations cultivated by the surrounding community, the most common gardens are coffee and cocoa gardens. This is because coffee and cocoa are suitable to be planted at Way Nipah Resort and become a major commodity in Indonesia. According to the Ministry of Agriculture (2016),

Indonesia is the largest coffee producer in the world after Brazil and Vietnam. Indonesia is also known to have coffee with a special taste through various coffee and civet coffee variants. With the unique taste and aroma of coffee from Indonesia, Indonesia has a great opportunity to increase its coffee trade in the world [8].

The high findings of illegal use of forest areas illustrates the still high level of land conversion that occurs in Bukit Barisan Selatan National Park, especially in the Way Nipah Resort. This can lead to a decline in wildlife habitat and can adversely affect the presence of wildlife and the ecosystems inside. According to Wiratno (2010), management of conservation areas is considered not effective and optimal can be seen from a variety of management indicators, including the integrity of the area, the level of regional disturbances, hunting of endangered animals and flora, overlapping interests with other sectors, availability of facilities and infrastructure, resources human and regional arrangement [1].

Security measures that can be carried out by the patrol team if they meet with the community or hunters within the area include, the patrol team will give a warning to the people caught by the team or by making a statement to not re-enter the conservation area. If the patrol team finds a hut, work equipment or snare, then the patrol team will do it by destroying it. If the patrol team discovers plantation land within the area, which is a sign member.

3.2. Wild Animal Findings

Based on patrol activities for the 2015-2017 period, 346 findings of wildlife have been found. Wildlife findings are information about the distribution of key animals and are associated with potential threats to these key animals. Based on the findings of these wildlife, 25 species of wildlife were found at Way Nipah Resort (table 1).

These animals are identified based on direct or indirect findings. Wildlife that can be found directly by the patrol team can threaten the safety of the patrol team and wildlife. This is because wild animals can attack humans and can even have an adverse effect on the hunting of wildlife by humans. The number of animals that can be found directly are 6 species, indirectly as many as 13 species, and directly or indirectly as many as 6 species. Indirect identification of wildlife is based on signs of its existence.

Signs of animal existence include dirt, traces, scratches, puddles and nests. According to the Ministry of Environment and Forestry (2018) [7], signs of wildlife in the forest area include footprints, animal sounds, food marks, scratches, body friction, friction of horns, nests, dirt, mud, dead animals, bones, and skull. According to Francis [2], most large mammals are easily detected by using traces. Dirt is easy to find and its presence is recorded, it can help in animal identification [6]. Some examples of signs of animal presence were found by patrol teams including droppings of *Elephas maximus sumatranus* (figure 9), footprints of *Tapirus indicus* (figure 10), and scratches of *Helarctos malayanus* (figure 11).

Figure 9. Droppings of *Elephas maximus sumatranus*

Figure 10. Footprints of *Tapirus indicus*

Table 1. Wildlife that has been identified

No	Local Name	Scientific Name	Types of Findings		Conservation Status (IUCN)
			Directly	Indirect	
1	Elang bondol	*Haliastur Indus*	✓		*Least Concern*
2	Gagak	*Corvus Linnaeus*	✓		*Least Concern*
3	Enggang klihingan	*Anorrhinus galeritus*		✓	*Least Concern*
4	Julang emas	*Aceros undulates*	✓	✓	*Least Concern*
5	Rangkong gading	*Rhinoplax vigil*		✓	*Critically Endangered*
6	Kuau raja	*Argusianus argus*	✓	✓	*Near Threatened*
7	Enggang cula	*Buceros rhinoceros*	✓	✓	*Near Threatened*
8	Ayam hutan merah	*Gallus gallus*	✓		*Least Concern*
9	Jelarang	*Ratufa bicolor*	✓		*Critically Endangered*
10	Owa ungko	*Hylobates agilis*	✓		*Endangered*
11	Lutung simpai	*Presbytis melalophos*	✓	✓	*Endangered*
12	Siamang	*Symphalagus syndactylus*	✓	✓	*Endangered*
13	Beruk	*Macaca nemestrina*	✓		*Vulnerable*
14	Pelanduk napu	*Tragulus napu*		✓	*Least Concern*
15	Rusa sambar	*Cervus unicolor*		✓	*Vulnerable*
16	Kijang muncak	*Muntiacus muntjak*	✓	✓	*Least Concern*
17	Babi hutan	*Sus scrofa*		✓	*Least Concern*
18	Tapir asia	*Tapirus indicus*		✓	*Endangered*
19	Kucing kuwuk	*Prionailurus bengalensis*		✓	*Least Concern*
20	Kucing emas	*Pardofelis temminckii*		✓	*Near Threatened*
21	Kucing tandang	*Prionailurus planiceps*		✓	*Endangered*
22	Macan dahan	*Neofelis diardi*		✓	*Vulnerable*
23	Harimau sumatera	*Panthera tigris sumatrensis*		✓	*Critically Endangered*
24	Beruang madu	*Helarctos malayanus*		✓	*Vulnerable*
25	Gajah sumatera	*Elephas maximus sumatranus*		✓	*Critically Endangered*

Figure 11. Scratches of *Helarctos malayanus*

3.3. Conservation Status of Wild Animal Findings

According to the IUCN (2018) there are 9 groups of species based on their conservation status are, not evaluated (Not evaluated), lack of data (Data deficient), low risk (Least Concern), almost threatened (Near Threatened), vulnerable (Vulnerable), threatened (Endangered), critical (Critically endangered), extinct in the wild (Extint in the wild), and extinct (Extint) [4].

Of the 25 wildlife species that have been identified, 9 species (36%) are at low risk (these animals have been evaluated but are not included in any category), 3 species (16%) are almost threatened (these animals are close to endangered status), 4 species (16%) vulnerable (these animals are at risk of extinction in the wild in the future), 5 species (20%) are threatened (these animals are at high risk of extinction in the wild in the future), and 4 species (12%) critical (these animals are at risk of facing extinction in the near future) (figure 12).

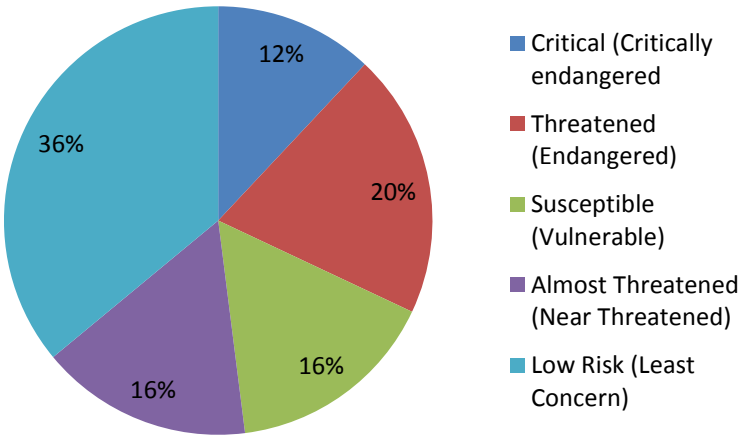

Figure 12. Status conservation of wildlife findings at Way Nipah Resort

Based on 25 species of wildlife that have been identified, grouped based on their conservation status, namely, low risk (Least Concern) 9 species, including pelapuk napu (*Tragulus napu*), elang bondol (*Haliastur indus*), gagak (*Corvus corax*), enggang kilihingan (*Anorrhinus galeritus*), kucing kuwuk (*Prionailurus bengalensis*), ayam hutan merah (*Gallus gallus*), kijang muncak (*Muntiacus muntjak*), babi hutan (*Sus scrofa*), and julang emas (*Aceros undulatus*). Nearly threatened (Near Threatened) 3 species, including kucing emas (*Pardofelis temminckii)*, kuau raja (*Argusianus argus*), and enggang cula (*Buceros rhinoceros*). Vulnerable 4 species, including beruk (*Macaca nemestrina*), macan dahan (*Neofelis diardi*), beruang madu (*Helarctos malayanus*), and rusa sambar (*Cervus unicolor*). Endangered 5 species, including owa ungko (*Hylobates agilis*), kucing tandang (*Prionailurus planiceps*), lutung simpai (*Presbytis melalophos*), tapir asia (*Tapirus indicus*), and siamang (*Symphalagus syndactylus*). Critically endangered 4 species, including jelarang (*Ratufa bicolor*), rangkong gading (*Rhinoplax vigil*), harimau sumatera (*Panthera tigris sumatrensis*) and gajah sumatera (*Elephas maximus sumatranus*).

3.4. Threats and Wildlife Findings in Way Nipah Resort

Based on the patrols that have been carried out, the number of threats and wildlife found were fluctuated periodically (figure 13). The number of threat findings can affect the number of wildlife findings in each period. Wildlife in nature is highly susceptible to human activities and disturbances, high human activity in the area can adversely affect the habitat and presence of wildlife in it.

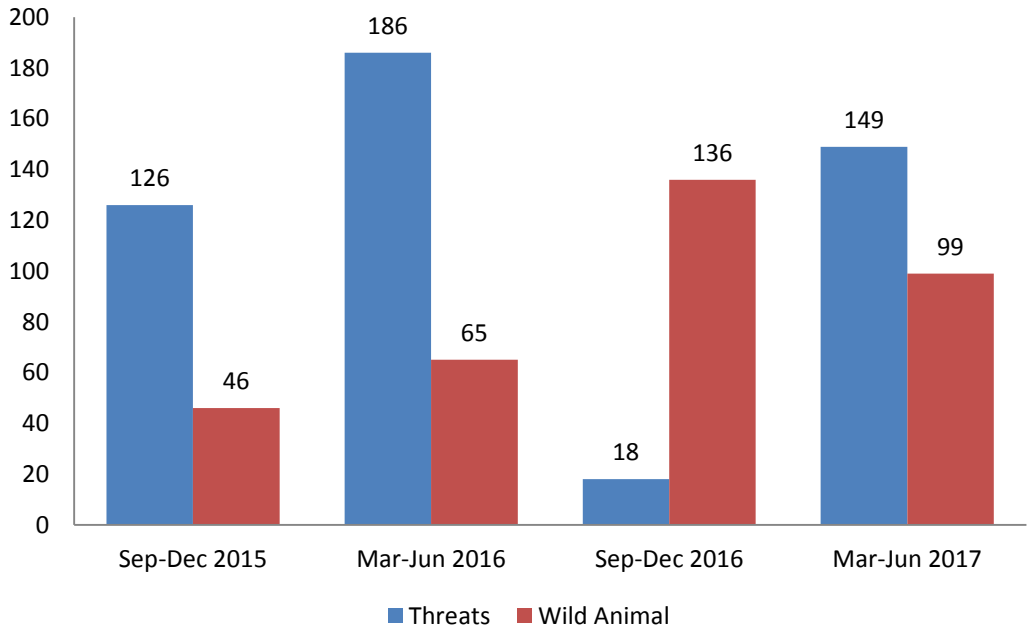

Figure 13. Findings of threats and wild animal in each period of patrol at the Resort Way Nipah

The threat findings in each patrol period experienced a significant decrease or increase. High threats findings were showed in March-June both in year 2016 and 2017, while during the patrol period the month of September-December experienced a decline or a low in both 2015 and 2016. This is because in March-June is the harvest season for crops coffee or cocoa, so that people who work on gardens in the area tend to return to managing the gardens during this periods was the harvest season for coffee and cocoa plantation. Although according to the Indonesian Agricultural Information Center (2018), the coffee harvest season in Indonesia is uncertain, it is between May to September with yielding period is between 10-14 days [5].

Based on the findings, the amount of the threats did not seem to affect the wildlife significantly, as shown in the last period March-June 2017, even though the threats were high the wildlife activities

were still high. GAPKI (2018), stated that illegal logging, poaching and fires in protected areas affect the wildlife activities, and they will come to settlement areas plantations. Wildlife kills were another pressure to face [3].

4. Congclusion

The conclusion of this study is SMART Patrol based forest security systems were able to identify the threats and disturbances in Way Nipah Resort, and wildlife. High human activities in Way Nipah Resort, Bukit Barisan Selatan National Park may be pressure for the wildlife and its natural habitat.

Acknowledgment

Our thank you to Bukit Barisan Selatan National Park and WWF-Indonesia Southern Sumatran Program for research supports.

References

[1] Bukit Barisan Selatan National Park (TNBBS) 2017 Accessed on October 15, 2017 *htpps: //www.tnbbs.org*
[2] Francis C M 2008 *A Field Guide To The Mammals of Thailand and South East Asia* (London:v New Holland Publishers Ltd.)
[3] GAPKI 2018 Accessed on April 22, 2018 *https://gapki.id/*
[4] International Union for Conservation of Nature (IUCN) 2018 Accessed on March 20 2018 *htpps: //www.iucn.org*
[5] Indonesian Agricultural Information Center 2018 Accessed on April 21, 2018 *http://www.pertanian.go.id/*
[6] Kruuk H 2006 *Otters: Ecology, Behavior, and Conservation* (New York: Oxford University Press)
[7] Ministry of Environment and Forestry 2018 Accessed on March 21, 2018 *http://www.menlhk.go.id/*
[8] Ministry of Agriculture 2016 *Outlook Coffee Subsector of Plantation Agriculture Commodities* (Jakarta:Data Center and Agricultural Information Systems)
[9] Ministry of Forestry 1995 Minister of Forestry Decree No: 506/Kpts-II/1995 concerning Technical Guidelines for Functional Forest Security in Level II Areas
[10] Puspita R O et al. 2015 *SMART Application Module (Spatial Monitoring AndReporting Tool)* (Bogor: Wildlife Conservation Society-IP)
[11] Wiratno 2010 Directions for management of conservation areas going forward *Meeting Paper Coordination of Management of Resort-Based Conservation Areas* (Makassar: Ministry of Forestry, Directorate General of Forest Protection and Nature Conservation)