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Article

Promoting Private Conservation in Patra Seroja Ecopark, Dumai Municipality, Riau Province, Indonesia

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Abstract. This paper documents the voluntary conservation practices in Patra Seroja Ecopark Forest by Indonesia's state-owned oil and gas company, Pertamina Ltd. - Refinery Unit II Dumai, Province of Riau, west coast of Sumatera Island. The company voluntarily allocated, financed, and managed 102 hectares of land in their private area to conserve and protect its in-situ biodiversity and preserve environmental service as a secondary objective. The results of studies and assessments carried out, the management application has fulfilled the Privately Protected Area (PPA) management criteria by IUCN regarding the orientation, biodiversity, management model, and utilization. However, PPA is not recognized legally as an addition to traditionally government-led governance of conservation forests in Indonesia: KSA (Nature Reserve Area), KPA (Nature Conservation Area), TB (Hunting Park) model. Considering the potential width of Privately Protected Area application in Indonesia to support national target achievement on Convention on Biological Diversity (CBD) and Aichi 11 Target and fostering the voluntary initiatives by private in conserving biodiversity, the state may recognize the practices and initiate the legal instrument for PPA application in Indonesia.

Keywords: Biodiversity, Essential ecosystem area, Conservation, Privately protected area

INTRODUCTION

Conservation area is an effort to manage an area to protect particular habitats and species, including abiotic resources and aesthetic and cultural values. Globally, there are several typologies for this conservation effort. The International Union for Conservation of Nature (hereafter referred to as "IUCN") divides three types of conservation management systems: Protected Area (hereafter referred to as "PA"), Other Effective Area-based Conservation Measure (hereafter referred to as "OECM"), and Privately Protected Area (hereafter referred to as "PPA") (Stolton et al., 2013; Mitchell et al., 2018; IUCN-WCPA, 2019). Meanwhile, Disselhoff (2015) distinguished between two types of conservation areas: publicly protected areas and non-publicly protected areas. Borrini-Feyerabend et al. (2013) divide the management system of conservation areas into four types based on who manages it: by government, shared management, by the private sector, and by indigenous and local communities.

Indonesia government divides conservation areas into three categories: KSA/Kawasan Suaka Alam (Nature Reserve Area), KPA/Kawasan Pelestarian Alam (Nature Conservation Area), TB/Taman Buru (Hunting Park) and determined as the protected area as IUCN formulated, the state manages all three (Siswanto, 2017). One more type of conserved area management is the Essential Ecosystem Area (hereafter

referred to as "EEA"), which is applied on a shared basis between local governments and the private sector. EEA is located outside or as a buffer zone for conservation areas and does not always have protection as a primary objective. The EEA concept has similarities with the OECM concept instead of Protected Areas which put biodiversity protection as (always) a primary objective (Stolton et al., 2013). However, the management of conservation areas by the private sector in the form of PPA does not exist in Indonesia.

One type of EEA that is relatively well established is the Biodiversity Park because legally, the regulations regarding the Biodiversity Park format were already present before the concept and regulations on EEA were released. The legality of Biodiversity Parks has a basis in the Ministry of Environment and Forestry Republic of Indonesia (hereafter referred to as "MoEF") Regulation No. 03/2012 on Biodiversity Park and the Directorate General of Conservation of Natural Resources and Ecosystem (hereafter referred to as "KSDAE) Regulation No. P.5/KSDAE/BPE.2/KSA.4/8/2020 on Technical Guidelines for Preparing Basic Design (Vegetation Design and Infrastructure Design) of Biodiversity Park. Until 2020, 84 unit of Biodiversity Park have been established. A total of 29 units have been verified by MoEF and the remaining are in the verification process. Of the total 29 unit of Biodiversity Parks, 3 units are managed by the provincial government, 20 units are managed by district/municipal governments, 4 units by corporates and 2 units by universities (Pandu, 2020; BPEE, 2021).

However politically, the legality of the Biodiversity Park's existence as part of a EEA is still in uncertainty. In 2021, MoEF foll issued Regulation of the Director General of KSDAE No. P.1/2021 on Technical Guidelines for Assessing the Effectiveness of EEA Management, but a year later MoEF revoked the regulation by Decree of the MoEF No. 682/2022 on Revocation of Regulation of the Director General of KSDAE No. P.1/2021. The implication is that the Biodiversity Park as a type of EEA is in a limbo and has lost the legal basis for assessing its effectiveness. In the State of Indonesia's Forest 2022 document (Nurofiq et al., 2022), the EEA record is lost and is no longer mentioned by MoEF as a conservation achievement. This means that EEAs are demise in regulation and the initiation of Biodiversity Park is no longer underway, the only opportunity for corporate participation in conservation has disappeared.

Conservation outside the protected areas by private governance (PPA) has been applied globally such as Australia, South Africa, North and South America, and Southeast Asia (Stolton et al., 2014; Bingham et al., 2017; Mitchell et al., 2018; Singh et al., 2021). According to World Database on Protected Areas, 32 PPAs managed by profit and 7,362 PPAs by non-profit organizations. Furthermore, there are 5,339 units managed by individual landowners, while 1,562 are still uncleared (Bingham et al., 2017). In Indonesia, though the PPA has not been integrated into the Indonesian conservation areas management system, some practices by business entities have applied its concept (Gunawan & Sugiarti, 2015; Kurniawan, 2018; Christian et al., 2020).

The 2010 Convention on Biological Diversity (hereafter referred to as "CBD") targets to provide at least 17% of terrestrial and inland waters and 10% of coastal and marine areas globally to be effectively conserved and managed. These areas should be ecologically sustainable and connected to protected and OECM areas, integrated with the land and sea landscape (Jonas et al., 2017). The CBD conservation targets may be governed through four models: by the government, collaborative, individual or organization, and indigenous and local communities (Coad et al., 2019).

As one of the parties, Indonesia only has government-led conservation and collaborative governance through the EEA pioneered in 2015. Private and community-based conservation management is not yet recognized nor has a legal instrument. Therefore, this paper conveys the viability of Ecopark Patra Seroja as a model practice in privately managed land by Pertamina Ltd., an Indonesian state-owned oil and gas company. The Patra Seroja Ecopark is a parcel of land situated in the company's area under the long-term concession between the government of Indonesia and Pertamina Ltd. It is located in Dumai Municipality, Province of Riau, west coast of Sumatera Island. The purpose of Ecopark is to conserve and protect its in-situ biodiversity as the main objective and the preservation of environmental service as a secondary objective.

MATERIAL AND METHODS

The diversity of flora and fauna were collected using an exploration approach and interviews with managers (Enke et al., 2012; Ganzevoort et al., 2017; Young et al., 2018). Field data collection in September 2018 and

April 2019 in the Patra Seroja Ecopark Forest Area, Dumai, Riau Province. Data collection involved bird census using point count, mammalian observation by line-transect (Sutherland et al., 2004; Megantara et al., 2019; Tohir et al., 2020). Additionally, visual encounter surveys and a time search approach were applied to reptiles and amphibians (Sung et al., 2011; Karthik et al., 2018). The nested square plot sampling technique was also used to collect data on the tree communities (Kent, 2012; Bonham, 2013; Master et al., 2013). A literature study was conducted further to analyze the concepts of PPA, OECM, and EEA. Analyze flora and fauna descriptively to describe their potential, then compare it with other areas that follow government criteria. The analysis involved describing and comparing the field observation results with the status of similar areas in other locations. The paper specifically discusses the non-state governance of conservation forests.

The study was conducted in 102.61 hectares of Patra Seroja Ecopark Forest within Pertamina Ltd. - Refinery Unit II (Pertamina RU II), Dumai, Riau, the Indonesian national oil and gas concession area (see Figure 1). The flora survey was spread across three habitat types, namely disturbed forest, primary forest and secondary forest. Each habitat type is represented by three paths, each path consisting of three sample plots. The bird survey was spread across 10 observation stations which were placed randomly. Mammal and fauna surveys are carried out on the same one-kilometer-long trail that follows the patrol routes. Pertamina RU II, the area manager, divides the Ecopark into the core, limited, and common use zones for the management. There is no regulation on privately managed land conservation in Indonesia. Therefore, the zonation in Ecopark adopted the conservation area principles. The zonation was addressed to decide the space for further biodiversity and habitat management to accommodate the users' interests. Therefore, the zonation in Ecopark is an initial and simplification of the conservation area model. It aligns with the MoEF Decree No. 76 year 2015 on the Criteria of management block of Strict Zone of Nature Reserve, Wildlife Reserve, Grand Forest Park, and Nature Recreation Park. The factors considered in the zonation include representation, originality, amenity, security, naturalness, uniqueness, and accessibility (Andrade & Rhodes, 2012; Ban et al., 2013; Sahide et al., 2018). However, zonation is applied adaptively and considering the importance of a vital national object, biodiversity, and public use (Stolton et al., 2014).

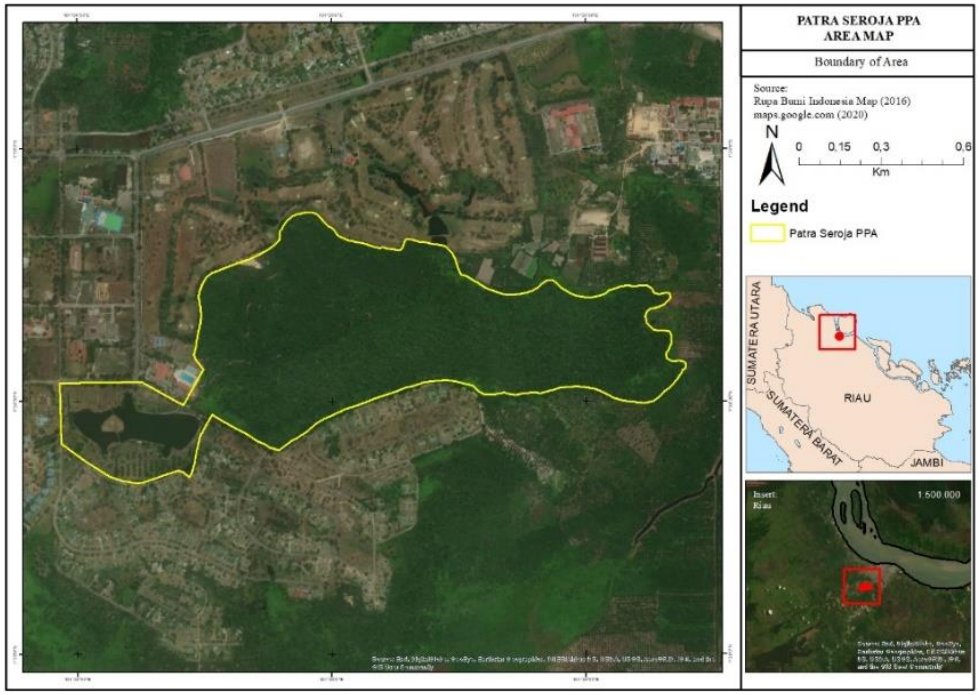

Figure 1. Patra Seroja Ecopark boundary map

RESULTS

From the field identification of flora and fauna in the Patra Seroja Ecopark. 52 species from 23 families of flora were identified (presented in **Table *1***), 64 species from 34 families of avifauna, 13 mammal species from eight families, seven reptile species from five families, and two amphibian species from two families were identified (presented in Table 2). Of the 52 species of flora, three species are included in the IUCN Red List as Endangered Species (EN), none of which are included in the Protected category according to Indonesian national law but four species are included in Appendix II of CITES. For the fauna category, there is one avifauna with Critically Endangered (CR) status, two with Vulnerable (VU) status, and two with Near Threatened (NT) status. At the same time, seven species are included in Appendix II of CITES, and ten species are in the Protected category according to Indonesian national laws. For the mammal category, one species is included in the Critically Endangered (CR) category according to the IUCN Red List, namely *Panthera tigris sumatrae*, two species are Vulnerable, and three species are Near Threatened. A total of two mammal species are in Appendix I of CITES, and five species are included in Appendix II of CITES. In comparison, six mammal species are declared Protected by Indonesian law. In the reptile category, one species is Endangered (EN), one species is Vulnerable (VU) according to the IUCN Red List, while five reptile species are included in Appendix II of CITES. From national protection law, no reptile species are categorized as Protected. For the amphibian category, nothing is included in the Red List, CITES Appendix, or protected species status according to the protection law in Indonesia.

Table 1. List of tree species (flora) in Patra Seroja Ecopark

No.	Family	Local Name	Scientific Name	IUCN	CITES	PIL
1	Anacardiaceae	Tepis	*Bouea oppositifolia*	NE	-	NP
2	Anacardiaceae	Macang Beruk	*Mangifera torquenda*	NE	-	NP
3	Apocynaceae	Pulai	*Alstonia scholaris*	LC	-	NP
4	Arecaceae	Rotan	*Calamus* sp.	-	-	NP
5	Arecaceae	Sawit	*Elaeis guineensis*	LC	-	NP
6	Arecaceae	Asam paya/Kelubi	*Eleiodoxa conferta*	NE	-	NP
7	Arecaceae	Nibung	*Oncosperma tigilarium*	NE	-	NP
8	Polypodiaceae	Pakis	*Polypodium* sp.	-	-	NP
9	Bombacaceae	Durian Payo	*Durio excesus*	NE	-	NP
10	Bombacaceae	Balam	*Coelostegia griffithii*	NE	-	NP
11	Burseraceae	Terentang putih	*Campnosperma auriculatum*	NE	-	NP
12	Burseraceae	Kenari	*Canarium littorale*	LC	-	NP
13	Buseraceae	Damar	*Canarium intermedium*	NE	-	NP
14	Combretaceae	Ketapang Hutan	*Terminalia copelandii*	LC	-	NP
15	Dilleniaceae	Simpur	*Dillenia indica*	NE	-	NP
16	Dipterocarpaceae	Kelat Putih/Merawan	*Hopea mengarawan*	CR	-	NP
17	Dipterocarpaceae	Meranti Bunga	*Shorea acuminata*	LC	-	NP
18	Dipterocarpaceae	Meranti Kuning	*Shorea gibosa*	NE	-	NP
19	Dipterocarpaceae	Meranti Mata Kucing	*Shorea javanica*	EN	-	NP
20	Dipterocarpaceae	Meranti Batu	*Shorea platyclados*	EN	-	NP
21	Dipterocarpaceae	Meranti Mata Kucing	*Shorea* sp.	-	-	NP
22	Elaeocarpaceae	Petai Hutan	*Elaeocarpus* sp.	-	-	NP
23	Euphorbiaceae	Seserang	*Baccaurea racemosa*	NE	-	NP
24	Euphorbiaceae	Jangka/Tukulan	*Blumeodendron tokbrai*	NE	-	NP
25	Euphorbiaceae	Mahang	*Macaranga mappa*	LC	-	NP
26	Euphorbiaceae	Makaranga	*Macaranga trilobata*	NE	-	NP
27	Fabaceae	Angsana	*Pterocarpus indicus*	EN	-	NP
28	Flacourtiaceae	Pisang-pisang	*Lithocarpus conocarpus*	NE	-	NP
29	Guttireae	Keterung	*Garcinia dioca*	NE	-	NP
30	Guttireae	Manggis Hutan	*Garcinia* sp.	-	-	NP
31	Lauracaeae	Medang	*Alseodaphne oblanceolata*	NE	-	NP

No.	Family	Local Name	Scientific Name	IUCN	CITES	PIL
32	Lauraceae	Ulin	*Eusideroxylon zwageri*	VU	-	NP
33	Lauraceae	Medang Kuning	*Litsea firma*	NE	-	NP
34	Leaceae	Mamali	*Leea indica*	LC	-	NP
35	Fabaceae	Kempas	*Koompassia excelsa*	NT	-	NP
36	Fabaceae	Jengkol Hutan	*Parcidendron jiringa*	NE	-	NP
37	Moraceae	Terap	*Artocarpus elasticus*	LC	-	NP
38	Moraceae	Cempedak Hutan	*Artocarpus* sp.	-	-	NP
39	Moraceae	Sedarah	*Artocarpus* sp.	-	-	NP
40	Moraceae	Beringin Kerbau	*Ficus elastica*	NE	-	NP
41	Moraceae	Beringin	*Ficus* sp.	-	-	NP
42	Myristicaceae	Pala Hutan	*Myristica fragrans*	DD	-	NP
43	Myristicaceae	Kopi Hutan	*Myristica* sp.	-	-	NP
44	Myrtaceae	Kelat Jambu	*Eugenia* sp.	-	-	NP
45	Myrtaceae	Salam	*Syzygium polyanthum*	NE	-	NP
46	Myrtaceae	Jambu Hutan	*Syzygium jambos*	NE	-	NP
47	Myrtaceae	Ki serem	*Syzygium lineatum*	NE	-	NP
48	Nepenthaceae	Kantong semar	*Nepenthes ampullaria*	LC	II	NP
49	Pandanaceae	Pandan	*Pandanus amaryllifolius*	NE	-	NP
50	Pandanaceae	Pandan Duri	*Pandanus tectorius*	LC	-	NP
51	Sapindaceae	Rambutan Hutan	*Nephelium maingayi*	NE	-	NP
52	Verbenaceae	Laban	*Vitex pubescens*	NE	-	NP

Note: IUCN = Redlist IUCN category, CITES = CITES Appendix, PIL = Protected by Indonesian Law. NE = Not Evaluated, LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered. I = Appendix I, II = Appendix II. P = Protected, NP = Not Protected

Table 2. List species of fauna in Patra Seroja Ecopark

No.	Family	Local Name	Scientific Name	IUCN	CITES	PIL
			Aves			
1	Accipitridae	Elang ular bido	*Spilornis cheela*	LC	II	P
2	Accipitridae	Elang brontok	*Nisaetus cirrhatus*	LC	II	P
3	Accipitridae	Elang laut perut-putih	*Haliaeetus leucogaster*	LC	II	P
4	Aegithinidae	Cipoh kacat	*Aegithina tiphia*	LC	-	NP
5	Alcedinidae	Cekakak belukar	*Halcyon smyrnensis*	LC	-	NP
6	Apodidae	Walet sapi	*Collocalia esculenta*	LC	-	NP
7	Artamidae	Kekep babi	*Artamus leucorynchus*	LC	-	NP
8	Bucerotidae	Kangkareng perut-putih	*Anthracoceros albirostri*	LC	II	P
9	Campephagidae	Sepah hutan	*Pericrocotus flammeus*	LC	-	NP
10	Capitonidae	Takur ungkut-ungkut	*Megalaima haemacephala*	LC	-	NP
11	Capitonidae	Takur tenggeret	*Megalaima australis*	LC	-	NP
12	Caprimulgidae	Cabak kolong	*Caprimulgus concretus*	VU	-	P
13	Chloropseidae	Cicadaun sayap-biru sumatera	*Chloropsis moluccencis*	LC	-	P
14	Cisticolidae	Perenjak jawa	*Prinia familiaris*	LC	-	NP
15	Cisticolidae	Cinenen belukar	*Orthotomus atrogularis*	LC	-	NP
16	Cisticolidae	Cinenen kelabu	*Orthotomus ruficeps*	LC	-	NP
17	Cisticolidae	Perenjak rawa	*Prinia flaviventris*	LC	-	NP
18	Columbidae	Punai gading	*Treron vernans*	LC	-	NP
19	Columbidae	Perkutut jawa	*Geopelia striata*	LC	-	NP
20	Corvidae	Gagak hutan	*Corvus enca*	LC	-	NP

No.	Family	Local Name	Scientific Name	IUCN	CITES	PIL
21	Corvidae	Ekek geling	*Cissa thalassina*	LC	-	P
22	Cuculidae	Wiwik uncuing	*Cacomantis sepulcralis*	LC	-	NP
23	Cuculidae	Kangkok ranting	*Cuculus saturatus*	LC	-	NP
24	Cuculidae	Bubut besar	*Centropus sinensis*	LC	-	NP
25	Cuculidae	Kedasi hitam	*Surniculus lugubris*	LC	-	NP
26	Cuculidae	Kadalan beruang	*Rhopodytes diardi*	NT	-	NP
27	Dicaeidae	Cabai jawa	*Dicaeum trochileum*	LC	-	NP
28	Dicaeidae	Cabai bunga-api	*Dicaeum trigonostigma*	LC	-	NP
29	Dicruridae	Srigunting hitam	*Dicrurus macrocercus*	LC	-	NP
30	Dicruridae	Srigunting bukit	*Dicrurus remifer*	LC	-	NP
31	Estrildidae	Bondol Peking	*Lonchura punctulata*	LC	-	NP
32	Hirundinidae	Layanglayang batu	*Hirundo tahitica*	LC	-	NP
33	Laniidae	Bentet coklat	*Lanius cristatus*	LC	-	NP
34	Laniidae	Bentet kelabu	*Lanius schach*	LC	-	NP
35	Laniidae	Bentet loreng	*Lanius tigrinus*	LC	-	NP
36	Megalaimidae	Takur kuping-hitam	*Psilopogon duvaucelii*	LC	-	NP
37	Megalaimidae	Takur ungkut-ungkut	*Psilopogon haemacephalus*	LC	-	NP
38	Meropidae	Kirikkirik senja	*Merops leschenaulti*	LC	-	NP
39	Monarchidae	Seriwang asia	*Terpsiphone paradisi*	LC	-	NP
40	Motacillidae	Apung tanah	*Anthus novaeseelandiae*	LC	-	NP
41	Nectariniidae	Pijantung besar	*Arachnothera robusta*	LC	-	NP
42	Nectariniidae	Pijantung kecil	*Arachnothera longirostra*	LC	-	NP
43	Nectariniidae	Burung madu sriganti	*Cinnyris jugularis*	LC	-	NP
44	Nectariniidae	Burung madu ekor-merah	*Aethopyga temminckii*	LC	-	NP
45	Nectariniidae	Burung madu rimba	*Hypogramma hypogrammicum*	LC	-	NP
46	Passeridae	burung gereja erasia	*Passer montanus*	LC	-	NP
47	Picidae	Pelatuk besi	*Dinopium javanense*	LC	-	NP
48	Pittidae	Paok sintau	*Hydrornis caeruleus*	NT	-	P
49	Psittacidae	Betet biasa	*Psittacula alexandri*	LC	II	P
50	Psittacidae	Serindit melayu	*Loriculus galgulus*	LC	II	P
51	Pycnonotidae	Merbah cerukcuk	*Pycnonotus goiavier*	LC	-	NP
52	Pycnonotidae	Merbah corok-corok	*Pycnonotus simplex*	LC	-	NP
53	Pycnonotidae	Merbah mata-merah	*Pycnonotus brunneus*	LC	-	NP
54	Pycnonotidae	Merbah kacamata	*Pycnonotus erythropthalmos*	LC	-	NP
55	Pycnonotidae	Cucak gelambir-biru	*Pycnonotus nieuwenhuisii*	DD	-	NP
56	Strigidae	Beluk ketupa	*Ketupa ketupu*	LC	II	NP
57	Sturnidae	Perling kumbang	*Aplonis panayensis*	LC	-	NP
58	Sturnidae	Kerak kerbau	*Acridotheres javanicus*	VU	-	NP
59	Sylviidae	Cinenen pisang	*Orthotomus sutorius*	LC	-	NP
60	Sylviidae	Cinenen belukar	*Orthotomus atrogularis*	LC	-	NP
61	Timaliidae	Pelanduk semak	*Malacocincla sepiarium*	LC	-	NP
62	Timaliidae	Tepus merbah-sampah	*Stachyris erythroptera*	LC	-	NP
63	Timaliidae	Tepus dahi-merah	*Stachyris rufifrons*	LC	-	NP
64	Zosteropidae	Kacamata biasa	*Zosterops palpebrosus*	LC	-	NP

No.	Family	Local Name	Scientific Name	IUCN	CITES	PIL
			Mammals			
1	Cercopithecidae	Monyet ekor-panjang	*Macaca fascicularis*	LC	II	NP
2	Cercopithecidae	Simpaihitam sumatera	*Presbytis sumatrana*	EN	II	P
3	Cynocephalidae	Kubung melayu	*Cynocephalus variegatus*	LC	-	NP
4	Felidae	Harimau sumatera	*Panthera tigris*	CR	I	P
5	Felidae	Kucing emas	*Catopuma temminckii*	NT	II	P
6	Felidae	Kucing hutan	*Prionailurus bengalensis*	LC	II	P
7	Hystricidae	Landak sumatera	*Hystrix sumatrae*	LC	-	NP
8	Lorisidae	Kukang sunda	*Nycticebus coucang*	VU	I	P
9	Sciuridae	Bajing tiga-warna	*Callosciurus prevostii*	LC	-	NP
10	Sciuridae	Jelarang	*Ratufa bicolor*	NT	II	NP
11	Sciuridae	Bajing ekor-kuda	*Sundasciurus hippurus*	NT	-	NP
12	Suidae	Babi hutan	*Sus scrofa*	LC	-	NP
13	Ursidae	Beruang madu	*Helarctos malayanus*	VU	I	P
			Reptile			
1	Geoemydidae	Kura-kura matahari	*Heosemys spinosa*	EN	II	NP
2	Varanidae	Biawak asia	*Varanus salvator*	LC	II	NP
3	Pythonidae	Sanca batik	*Malayopython reticulatus*	LC	II	NP
4	Agamidae	Kadal terbang sumatera	*Draco haematopogon*	LC	-	NP
5	Elapidae	Cobra sendok jawa	*Naja sputatrix*	LC	II	NP
6	Elapidae	King cobra	*Ophiophagus hannah*	VU	II	NP
7	Elapidae	Ular weling	*Bungarus candidus*	LC	-	NP
			Amphibian			
1	Dicroglossidae	Katak tegalan	*Fejervarya limnocharis*	LC	-	NP
2	Ranidae	Bangkong tuli	*Limnonectes kuhlii*	LC	-	NP

Note: IUCN = Redlist IUCN category, CITES = CITES Appendix, PIL = Protected by Indonesian Law. LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered. I = Appendix I, II = Appendix II. P = Protected, NP = Not Protected

In **Figure *2*** shown some of the important species listed on the IUCN Red List, protected by Indonesian Law and regulated by CITES found in the area of Patra Seroja Ecopark. This finding proved that the area stores important biodiversity globally and needs to be managed and protected under specific mechanisms.

Figure 2. Some important species of flora and fauna. (A) Nepenthes ampullaria is listed in Appendix II CITES, (B) Caprimulgus concretus is a Vulnerable species and Protected by Indonesia Law, (C) Heosemys spinosa is included in Appendix II CITES and Endangered species (Document by: MAK Budiman, 2018)

Referring to several conservation management concepts defined by the IUCN (Stolton et al., 2014; Mitchell et al., 2018), OECMs and PPAs are two forms of conservation carried out outside the state forest area. Meanwhile, in Indonesia, the concept of conservation outside the state forest area is called the

Essential Ecosystem Area (EEA) (BPEE, 2021). All three have similarities and differences. Table 3 indicates the differences and similarities. From the category based on CBD, OECMs, and EEAs are areas that do not put biodiversity conservation as a primary goal but positively impact biodiversity in the conserved area. PPAs, on the other hand, have biodiversity conservation as their primary objective. The area of the PPA is relatively wide to accommodate the complex nature of biodiversity, while the EEA may be smaller. Legally, PPAs have clear and spatially demarcated boundaries. OECMs and EEAs are managed and utilized by various parties as a shared governance and shared usage while PPAs are exclusive and under the full control of the area manager including financial.

On the other hand, PPAs, OECMs, and EEAs are similar in that they are all located outside conservation areas. Another similarity is that these three forms of conservation areas are all managed for long-term and sustainable purposes. Therefore, all three require legality to continue to be protected from conversion to non-conservation uses. OECMs and PPAs are similar in terms of evaluation in that both follow the evaluation variables compiled by IUCN. EEAs follow Indonesian national regulations as they are only applicable in Indonesia.

Table 3. Matrix of characteristics of OECM, EEA, and PPA

No.	Variable	IUCN-WCPA-OECM	EEA-Biodiversity Park	IUCN-PPA
1	Common category (based on CBD)	Conserved Areas	Conserved Areas	Protected Areas
2	Legal Status	Recognized	Recognized	Legal binding
3	Location	Outside protected areas	Outside protected areas	Outside (state) protected areas
4	Primary objective	Sustainable use and life support system	Sustainable use	Preserve in situ biodiversity and conserve nature
5	Secondary objective	In situ diversity conservation	In-situ and ex-situ diversity conservation	Maintain ecosystem services and cultural values
6	Governance	State, indigenous, local community, private, or shared	Collaborative stakeholders (shared governance)	Private (individuals, NGOs, research entities, companies, and religious entities)
7	Form of recognition	National and Sub-National Govt.	Sub-National Government	National and Sub-National Govt.
8	Boundary	Maybe demarcated or only geographically defined	Geographically defined	Demarcated borders
9	Access to public	Relatively loose (Inclusive)	Rather loose (inclusive)	Fairly Strict (Exclusive)
10	Duration of governance	Long term	Long Term	Long Term
11	Financial scheme	Government, private, indigenous, shared	Private or Shared funding	Private funding
12	Evaluation	Following the IUCN definition of OECMs	Following National regulations on EEA	Following the IUCN definition of Protected Areas
13	Wide of the area	Relatively big and has complex and natural biodiversity	Varied from small to wide natural or semi-natural conserved area	Relatively wide and natural complex biodiversity

Source: Stolton et al. (2014); Mitchell et al. (2018); BPEE (2021) and MoEF Decree No. 03/2012

The company applied management for the Ecopark by the zoning approach (presented in Table 4 and illustrated in Figure 3), which is indicatively divided into Common Use (15.55 ha), Limited Use (39.24 ha), and Protected Zone (47.82 ha). The public only accesses the Common and Limited Use Zones. The public cannot enter the protected zone due to its inaccessibility and potentially higher risk of accidents or possible encounters with wild animals (for the example tiger, snake, or bear) in the protected area. This condition allows the management to apply the national park management system (Sahide et al., 2018). The matrix of zonation management of Patra Seroja Ecopark is shown in Table 4 while the zoning map of Patra Seroja Ecopark is shown in Figure 3.

Table 4. Zoning management of Ecopark Patra Seroja

No.	Zonation	Large (hectares)*	Habitat type
1	Core zone (Protected)	47.82	Peat swamp forest, heath forest, lowland forest
2	Limited use zone	39.24	Peat forest, heath forest, peat swamp, freshwater swamp, ecotone
3	Common use zone	15.55	Artificial lake, yards, freshwater swamps
	Total	**102.61**	

* Indicative area based on imagery interpretation and ground check (2020)

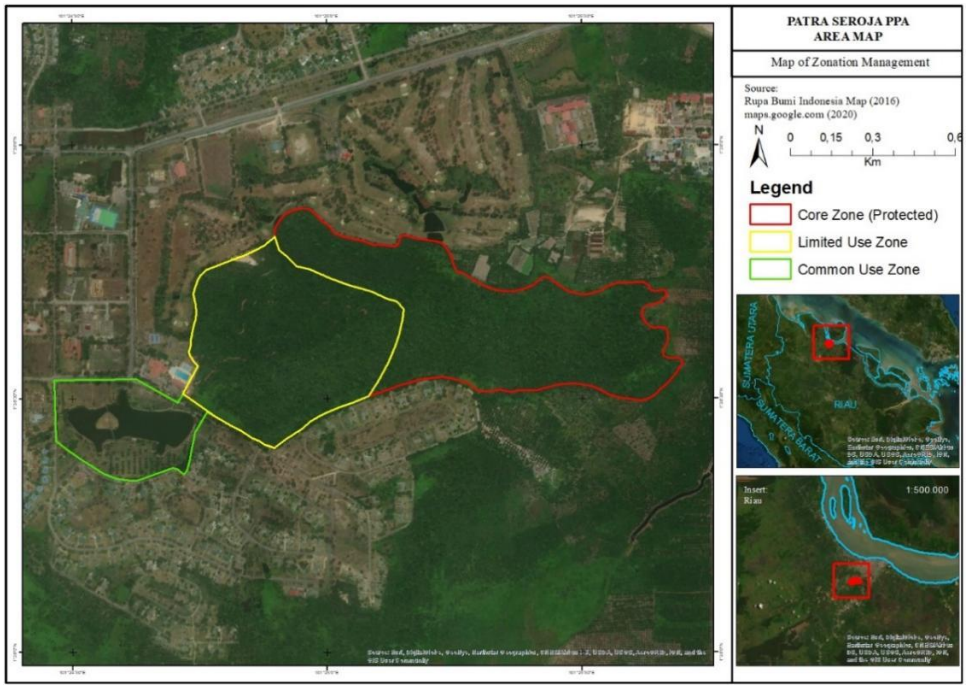

Figure 3. Ecopark Patra Seroja management zoning map

DISCUSSION

Indonesian government divides forests based on ecosystem characteristics and functions, which are: 1) conservation forests for biodiversity and ecosystem conservation, 2) protection forests for life-supporting systems, and 3) production forests for timber and non-timber production. The country has 27.13 million hectares of conservation forest out of 125.9 million hectares of forest area (Agung et al., 2018). The conservation (forest) area is divided into Nature Conservation Area (NCA), Nature Reserved Area (NRA), and Hunting Park Area (HPA). As of 2018, Indonesia had 554 conservation forests. When 29.7 million hectares of protected forest are added to the conservation area, the total conserved area becomes 56.8 million hectares. It is equivalent to around 45 % of the entire forest area, or 27.06% of Indonesia's land (Sahide et al., 2018; KSDAE, 2019).

The Indonesian conservation forest increased from 2013 to 2015, reaching 27.5 million hectares but decreased to 27.13 million hectares in 2018. This decline is feared to threaten Indonesia's conservation areas and their biodiversity. Furthermore, a gap analysis study by the government in 2010 showed that 80% of protected and Endangered (EN) faunas are outside conservation areas (Risman et al., 2010). These faunas could be in production, protected, or in private forests. Still, they could be in non-forest areas, such as plantations, farming fields, settlements, or other private lands. Therefore, the government involves the community and business entities by initiating shared governance conservation outside the government-managed or state forest areas with communities or companies. It is accomplished by determining the EEA in several locations to conserve their biodiversity and ecosystem (Sahide et al., 2020).

The World Conservation Strategy (WCS) defines conservation as the supervision of human utilization of the biosphere for the greatest sustainable benefits to current generations (IUCN-UNEP-WWF, 1980). Additionally, conservation involves preserving the biosphere's capability to meet the needs and purposes of impending generations. The WCS formula aims to maintain essential ecological processes and life-support systems, preserve genetic diversity, and ensure the sustainable utilization of species and ecosystems (IUCN-UNEP-WWF, 1980; Waas et al., 2011; Holden et al., 2014; Blewitt, 2018). The WCS definition, regardless of the distinction between Protected Forest Areas and Conservation Forest Areas because living resources (biodiversity), the ecological quality, and the life-support system of forests are inseparable, including in non-state governed EEA. The Indonesian government has established 909,580.521 hectares of the EEA as conservation efforts (BPEE, 2021). This EEA concept is conceptually more or less similar to the OECM in the IUCN formula (Maxwell et al., 2020).

Indonesia determined two types of conservation: government-managed conservation (NCA, NRA, and HPA) and shared-managed Essential Ecosystem Area (EEA). Meanwhile, globally, the IUCN categorized two types the protected areas based on governance: State-legally bordered protected areas and non-state conserved areas such as OECM, Indigenous People and Local Community Conserved Area (ICCA), and PPA.

The EEA is a valuable ecosystem outside the NRA, NCA, and HPA. Essentially, EEA supports the continuity of life through biodiversity conservation efforts for society's welfare and the quality of human life. It consists of four management forms, including Biodiversity Park, Wildlife Corridor, High Conservation Value Areas, and Wetlands Ecosystems (BPEE, 2018). The OECM is geographically determined beside a PA, arranged and managed to achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity. Moreover, OECM is associated with ecosystem functions and services and, where applicable, cultural, spiritual, socioeconomic, and other locally relevant values (Belle et al., 2020; Maxwell et al., 2020). PPA are land conserved under private governance, including individuals, non-governmental organizations (NGOs), and commercial companies and corporations voluntarily set up by private owners to manage PPAs. Other private governance forms are for-profit owners and research or religious entities (Stolton et al., 2014).

Those three IUCN's conservation efforts implement protection and conservation outside protected areas traditionally established by the government. PPAs are derived explicitly from protected areas, implying that the definition also refers to the criteria according to the IUCN. According to IUCN, a Protected Area is a clear area that is recognized, dedicated, and managed by legal or another effective way to achieve the long-term conservation of nature with associated ecosystem services and cultural values (IUCN-WCPA, 2019). Thus, the type of governance of OECM, PPA, and EEA has slight similarities. Several characteristics of the three forms of conservation area management follow the formulation of Borrini-Feyerabend et al. (2004), Mitchell et al. (2018), and Kusters et al. (2020). These characteristics are identified based on 13 variables: general category, legal status, location, primary object, secondary object, governance, recognition, boundaries, public access, duration of governance, financial scheme, evaluation, and area width.

The Indonesian regulation version of the EEA is similar to the OECM criteria by IUCN-WCPA. However, there are some loose variables in EEA implementation compared to OECM formulated by IUCN. As many as 43 EEA locations in Indonesia are practically managed by a single institution or multistakeholder (BPEE, 2015; BPEE, 2018). Similarly, EEA varies from five to hundreds of hectares in natural and semi-natural environments. On the other hand, OECM aims at a complex ecosystem, in situ conservation, and high naturalness (Mitchell et al., 2018; Belle et al., 2020; Maxwell et al., 2020).

The PPA is more specific than OECM or EEA with the following characteristics. First, PPA is a Protected Area according to the IUCN definition but has not yet been recognized globally or nationally. Second, PPA's

main objective or priority is the natural conservation of biodiversity and its ecosystem. Third, as a Protected Area, PPA should be included in the national conservation area system, which currently only accommodates Nature Conservation Area (NCA), Nature Reserved Area (NRA), and Hunting Park Area (HPA). Fourth, management is carried out by private/non-state actors. Therefore, the state should provide recognition, legal protection, monitor achievements based on the IUCN version of the Protected Area criteria, and implement incentives for actors. Fifth, PPA actors could exclude other parties from utilizing relevant biological resources to protect biodiversity and its ecosystem. Above the previous five reasons, PPA has a substantial additional value: voluntariness. In many countries, conservation is usually mandatory, as a Corporate Social Responsibility (CSR) obligation, for instance, and it is not common to open up opportunities for private initiatives. So, the existence of a voluntary initiative to manage a protected area, including financing its management, deserves appreciation and attention from the state (Disselhoff, 2015).

PPA can bring the following advantages and benefits when managed well. First, it is cheaper for the state because it is managed voluntarily by the user or owner. Second, PPA is relatively more protected from exploitation and free-riders. Third, implementation opportunities in other regions are significant because the Other Utilization Area (APL) or private land is more extensive than state forests (Graham et al., 2003; Ladle et al., 2013; Stolton et al., 2014). However, the challenges posed by PPAs are also prominent because Indonesia's national legalization of PPA does not exist. PPA replication could make essential contributions other than biodiversity conservation, such as domestic water, irrigation, hydropower, food security and livelihood, and poverty reduction. Moreover, PPAs could contribute to health, mitigation of natural disasters and climate change, cultural and spiritual values, ecotourism, education and knowledge sources, materials, iconic wilderness values, scientific and socio-political stability (Lopoukhine, 2008; Le Saout et al., 2013; Mayer & Job, 2014; Cooke & Lane, 2019).

Corporate Social Responsibility could be expanded socially, economically, and environmentally integrated and sustainable (Hajdúchová et al., 2019). Pertamina Ltd. - RU II Dumai tries to integrate the three interests into the company's internal performance. Through biodiversity in the Ecopark Patra Seroja forest, the company realizes its environmental responsibilities more sustainably by providing the strategic plan and legal structure to manage the forest and its surroundings. The effort is expected to positively and directly or indirectly impact environmental quality. As a result, it could be presented to the community as part of an ecosystem service effort (Jonas et al., 2017).

The finding of flora and fauna diversity at the study site is a variable for determining the area protected as PPA. The flora encountered during the exploration consisted of 52 species from 24 families. Dipterocarpaceae was the most identified family, which takes a long time to grow, indicating an excellent condition to support the Ecopark Patra Seroja forest (El-taguri & Latiff, 2016; Harnelly et al., 2018; Amelia et al., 2019). The fauna species observed consists of four taxa including aves, reptiles, amphibians, and mammals. Observation of the four taxa was carried out to measure the Ecopark Patra Seroja area's environmental health indicators. The fauna species encountered indirectly through footprints, hair, food marks, mudholes, and feces comprised 64 species of aves, 13 mammals, seven reptiles, and two amphibians.

The encounter in 2019 shows a positive trend from the previous study. In 2016, Heriyanto et al. (2019) encountered 41 species of flora in the Ecopark Bukit Datuk, while in this study 52 species were found in 2019. Fauna exploration conducted in 2016 found 33 species of birds, one species of mammals, and two species of reptiles from the snake group (Heriyanto et al., 2019). Therefore, this forest has a high potential for biodiversity protection.

Several species of flora have a high threat of extinction, with one species Critically Endangered, three are Endangered, and one is Vulnerable. In contrast, one species of flora listed in CITES Appendix II is *N. ampullaria*. Furthermore, the observation of fauna shows the diversity of essential species in this region, with one species being Critically Endangered, two species being Endangered, and three species being Vulnerable. Three species are included in the CITES Appendix I list, while 17 are included in the CITES Appendix II list. Based on species protection law in Indonesia, 16 species of fauna are included in the protection list according to Minister of Environment and Forestry Decree No. P.106 in 2018.

The study area's landscape consists of peat and heath forests integrated with an artificial lake (Tirta Patra Lake), creating a wetland ecosystem with freshwater lakes and peat swamp forests. Patra Seroja Ecopark has the properness for the PPA formulation by IUCN at the site level (Mitchell et al., 2018). As its

primary object, the forest area in Ecopark Patra Seroja has various important species based on the IUCN, CITES, and national law categories. It makes the area function as an in-situ habitat sanctuary.

Ecopark Patra Seroja area is protected from anthropogenic disturbances affecting wildlife. The legal status showed that this area is legally binding as a long-term concession area for Pertamina Ltd., with RU II Dumai as the land manager. Moreover, this area is located in Other Utilization areas (APL), meaning it is outside the state (forest) control domain. In terms of managing, controlling, and evaluating the area, the company established the Task Force for Integrated Environmental Management of Refinery Unit II Dumai-Pertamina Ltd. in 2018 to ensure the quality and sustainability of the site.

The achieved secondary objective is to preserve environmental services, with many parties benefiting from this area. Some of the benefits are clean air, control of forest and land fires, habitat for wildlife, providers of germplasm, and governance of water for agriculture by the surrounding community. According to Maron et al. (2013), extensive benefits of a private conservation area reduce threats from damage. Therefore, the area's services are essential in minimizing the worst possibilities (Young et al., 2013).

Thus, the Patra Seroja Ecopark landscape is ecologically suitable as a site for a Privately Protected Area. The Ecopark area protects vital in-situ biodiversity as a primary objective. In addition, the secondary objective is to preserve environmental services for the company and the wider community. The only absent indicator for PPA implementation is the unavailability of national legal regulation. In case it exists, it is still in general issue as stated in Law No. 32 of 2009 on Environmental Protection and Management. The law states that everyone must preserve environmental functions and play a role in their protection (Chapter X). This regulatory gap needs to be advocated more broadly for the government (in this case, Ministry of Environment and Forestry Republic of Indonesia) to issue at least a ministerial-level regulation for conservation efforts to receive formal legal recognition. Furthermore, it may contribute to the registration of Indonesia's achievements for the Aichi Target 11 and further interest in strengthening the environmental carrying capacity.

CONCLUSION

Patra Seroja Dumai has huge biodiversity potential, so it needs to be managed through habitat conservation as a Private Protected Area with its primary objective to preserve in-situ biodiversity and conserve nature. At this location there are 52 species of flora, 64 species of avifauna, 13 mammal species, seven reptile species, and two amphibians. The strict protection (because the area is a concession and restricted area), well-managed and sustain financing, and supportive management policies make this location a high conservation value. Management carried out also uses a zoning approach. However, the management carried out does not meet the requirements to be designated as a conservation area by the existing Indonesian national law. The suggestion that can be given to Indonesia's Ministry of Environment and Forestry is to adopt conservation management with the PPA approach. There are three advantages that can be obtained: First, it is cheaper for the state because it is managed voluntarily (or mandatory as corporate responsibility) by the user or owner. Second, PPA is relatively more protected from exploitation and free-riders. Third, implementation opportunities in other regions are significant because the Other Utilization Area (APL) or private land is more extensive than state forests.

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AUTHOR CONTRIBUTIONS

Mokhamad Asyief Khasan Budiman: research conceptualization, field study, data analysis, manuscrip writing, map making; Yoppie Christian: member contributor, field study, literature study, manuscrip writing;

Andy Afandy: research coordinator, manuscrip writing; Budi Prabowo: member contributor, supporting map making; Desmiwat Desmiwati: member contributor, literature study, research implementer.

CONFLICTS OF INTEREST

The authors declare there is no conflict of interest related to financial funding and authorship order for this article.

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