



# Legal aspects and development of Bandar Bakau Dumai, Indonesia as a mangrove conservation and ecotourism area

<sup>1</sup>Emilda Firdaus, <sup>1</sup>Dodi Haryono, <sup>1</sup>Mexsasai Indra, <sup>2</sup>Irwan Effendi

<sup>1</sup> Faculty of Law, University of Riau, Pekanbaru, Indonesia; <sup>2</sup> Faculty of Fisheries and Marine Sciences, University of Riau, Pekanbaru, Indonesia. Corresponding author: E. Firdaus, emilda.firdaus@lecturer.unri.ac.id

**Abstract.** One of the nations with the world's greatest mangrove forest areas is Indonesia. Mangrove forests serve to avoid abrasion but are also advantageous for the socioeconomic well-being of the neighborhood. Bandar Bakau Dumai (BBD) is a mangrove conservation and ecotourism area located on the outskirts of Dumai City, Indonesia. The study aims to examine the legal aspects of BBD as an ecotourism destination and mangrove conservation area. The work was conducted by observation, interviews, unstructured in-depth interviews, and literature studies. In general, the legal aspects of the BBD as a mangrove conservation and ecotourism area in Dumai City are not yet comprehensive. The physical condition of the area, flora, and fauna of the BBD mangroves are still relatively good. However, supporting facilities and infrastructure are generally less maintained. To reverse this role, the recommended development strategies include; 1) the formulation of a Regional Regulation of the City of Dumai concerning the management of the BBD area in a holistic, integrative, and participatory manner; 2) the development of facilities and infrastructure needed by BBD through government programs; 3) development of human resources managing ecotourism and mangrove conservation at BBD; 4) construction of embankments to resist coastal abrasion by the government or industry.

**Key Words:** city layout, ecotourism services, legal aspect, local government regulation, public service.

**Introduction.** Mangrove ecosystems have an important meaning for the function and role of mangrove forests, for this reason, mangrove forests are urgently needed to be managed according to their function and land use through sustainable exploration, conservation, and rehabilitation efforts (Friess 2017; Ginantra et al 2020). Mangrove ecotourism has the main object of landscape, flora, and fauna biodiversity (Das & Chatterjee 2015; Afonso et al 2022). The concept of ecotourism in general is expected to reduce the destruction of areas by the community and have an impact on improving the economy by increasing regional economic growth (Effendi et al 2018; Subur et al 2022).

Bandar Bakau Dumai (BBD) can be accessed very easily by road and has a large area of mangrove forest (31 ha). The existing mangrove forest area is a tourist destination with very minimal facilities and infrastructure. This area has been busy with tourists since the mangrove forest has been managed by a village tourism awareness group (Mulyadi et al 2021; Subur et al 2022). The availability of toll road access from Pekanbaru to Dumai is a separate factor that cannot be ignored. In addition, this area also has a fairly adequate diversity of biota. These facts create conditions that require planning for the development of mangrove ecotourism in this area.

The legal aspects of a mangrove conservation and ecotourism area are very important. This will become the legal basis for all operational activities in an area while protecting the area. The Indonesian government has regulated matters concerning conservation areas and ecotourism, starting from the level of laws, government regulations, ministerial regulations, provincial regional regulations, and up to the district/mayor regional regulations level. At the national level, the central government has issued Law No. 31/2004 juncto Law No. 45/2009 concerning Fisheries, Law No. 32/2009 concerning Environmental Protection and Management, Law No. 10/2009

concerning Tourism, and Law No. 23/2014 concerning Regional Government, Law No. 32/2014 concerning Maritime Affairs. In Riau Province and City of Dumai level, among others, in: Riau Province Regional Regulation No. 8/2014 concerning Environmental Management and Compliance with Environmental Laws in Riau Province; Riau Province Regional Regulation No. 7/2016 concerning Tourism Development and Tourism Destinations; Riau Province Regional Regulation No. 12/2017 concerning Amendments to Regional Regulation Number 9/2009 concerning the Riau Province Regional Long-Term Development Plan for 2005-2025; Riau Province Regional Regulation No. 10/2018 concerning the 2018-2038 Riau Province Regional Spatial Planning; Dumai City Regional Regulation No. 5/2017 concerning Environmental Protection and Management; Dumai City Regional Regulation No. 15/2019 concerning the 2019-2039 Dumai City Spatial Planning; and Dumai City Regional Regulation No. 6/2021 concerning the Medium-Term Development Plan for the City of Dumai for 2021-2026.

Even though it has been proven that mangrove communities have the function of protecting erosion and beach abrasion, spawning grounds, playing and nursery areas for fish, inhibiting seawater intrusion, and so on, mangroves continue to be threatened by loss and degradation worldwide (Panigrahi & Mohanty 2012; Kristian & Oktorie 2018). In the tropics, where the institutional capacity for administration and protection is relatively weak, such pressures are very common (Hastuti & Yuliati 2017). For effective management of mangrove ecosystems, it is very important to understand the dynamic patterns of changing land cover patterns. Land use activities have an impact on the loss of mangrove vegetation cover. To prevent further loss of mangrove areas, proper management is needed, as well as appropriate land cover management planning (Idris et al 2021).

Economic incentives play a major role in some locations leading to the partial success of ecotourism. Economic incentives, on the other hand, will not help conservation unless accompanied by socio-cultural reforms and competent site management (Henri & Ardiawati 2020). Putting the environment above people will not help conserve natural resources. The interaction of the three main stakeholders, resources, communities, and tourists, is critical to the success of ecotourism and must be managed carefully (Uddin et al 2013; Das & Chatterjee 2015). In addition, there is a need for holistic, integrative, and participatory legal policies in developing the management of mangrove ecosystems and their ecotourism (Sidik et al 2018; Haryono 2022). This study aims to analyze the legal aspects of this area, the current and past conditions, and formulate a development strategy for the future.

## **Material and Method**

**Research methodology.** This research was carried out from May to December 2022 in the Bandar Bakau Dumai mangrove conservation area, Dumai City, Indonesia. This study used a survey method, namely by observing, structured interviews using questionnaires, and unstructured in-depth interviews and literature studies. For the needs of mangrove analysis, observation stations were determined based on representative mangrove locations, namely station 1 (close to residential areas), station 2 (close to the shoreline), and station 3 (close to the riverbank).

**BBD legal aspect analysis.** Analysis of legal aspects was carried out using a statutory approach related to mangrove conservation and ecotourism. At the national level, it is regulated in Law no. 31/2004 Jo. Law No. 45/2009 concerning Fisheries, Law No. 32/2009 concerning Environmental Protection and Management, Law No. 10/2009 concerning Tourism, and Law No. 23/2014 concerning Regional Government, and Law No. 32/2014 concerning Maritime Affairs. In Riau Province and the City of Dumai, among others, in: Riau Province Regional Regulation No. 8/2014 concerning Environmental Management and Compliance with Environmental Laws in Riau Province; Riau Province Regional Regulation No. 7/2016 concerning Tourism Development and Tourism Destinations; Riau Province Regional Regulation No. 12/2017 concerning Amendments to Regional Regulation Number 9/2009 concerning the Riau Province Regional Long-Term

Development Plan for 2005-2025; Riau Province Regional Regulation No. 10/2018 concerning the 2018-2038 Riau Province Regional Spatial Planning; Dumai City Regional Regulation No. 5/2017 concerning Environmental Protection and Management; Dumai City Regional Regulation No. 15/2019 concerning the 2019-2039 Dumai City Spatial Planning; and Dumai City Regional Regulation No. 6/2021 concerning the Medium-Term Development Plan for the City of Dumai for 2021-2026.

**Analysis of mangrove flora and fauna.** The mangrove area is 300 m from the shoreline to the mainland and 100 m wide and is plotted as an observation station. Each station has 3 line transects (100 x 100 m), and each line transect consists of 3 plots (10 x 10 m). The number of individuals for each plot was calculated for each species and then differentiated between trees, saplings, and seedlings. Identification of mangrove species was carried out by observing and photographing several parts of the mangrove morphology such as roots, stems, leaves, flowers, and fruit (Kitamura et al 1998; Noor et al 2006; DAHFH 2008; Mulyadi & Amin 2016; Garner et al 2020). Fauna was identified through observation, interviews with local people, and literature studies from several sources. It included mammals, reptiles, birds, and coastal invertebrates. Identification was carried out by referring to several references (Giesen et al 2006; Garner et al 2020).

**Mangrove ecotourism.** The conditions and potential of the BBD mangrove ecotourism area were analyzed from some elements, namely object attractiveness, services, facilities, infrastructure, market potential, security, socio-economic conditions of the surrounding community, institutional elements, environmental quality, and accommodation. Data for prospective visitors were collected directly at the research location through direct interviews with respondents and filling out questionnaires.

## Results and Discussion

**BBD legal aspect analysis.** Legal aspects related to mangrove conservation areas and ecotourism have been regulated in various statutory regulations in the Republic of Indonesia. At the national level of Indonesia, it is regulated in Law No. 31/2004 Juncto Law No. 45/2009 concerning Fisheries, Law. No. 32/2009 concerning Environmental Protection and Management, Law No. 10/2009 concerning Tourism, and Law No. 23/2014 concerning Regional Government, Law No. 32/2014 concerning Maritime Affairs (Suryaningsih 2016; Harto et al 2021; Subur et al 2022). Various forms of implementing regulations have also been formed to spell out the provisions for mangrove conservation areas and ecotourism in more detail.

Arrangements for mangrove conservation areas and ecotourism at the regional level, especially in Riau Province and Dumai City, are spread out in various Regional Regulations. In Riau Province, among others, in Riau Province Regional Regulation No. 8/2014 concerning Environmental Management and Compliance with Environmental Laws in Riau Province; Riau Province Regional Regulation No. 7/2016 concerning Tourism Development and Tourism Destinations; Riau Province Regional Regulation No. 12/2017 concerning Amendments to Regional Regulation Number 9/2009 concerning the Riau Province Regional Long-Term Development Plan for 2005-2025; and Regional Regulation of Riau Province No. 10/2018 concerning the Riau Province Regional Spatial Plan for 2018-2038 (Harto et al 2021; Yoswaty 2021). Meanwhile in the City of Dumai, among others, in Dumai City Regional Regulation No. 5/2017 concerning Environmental Protection and Management, Dumai City Regional Regulation No. 15 2019 concerning the 2019-2039 Dumai City Spatial Planning, and Dumai City Regional Regulation No. 6/2021 concerning the 2021-2026 Dumai City Regional Medium-Term Development Plan (Syaiful & Yuliani 2022).

When referring to the various laws and regulations above, the arrangements for mangrove conservation and ecotourism in Bandar Bakau Dumai are not specific. The arrangement is only partially found in the City of Dumai Regional Regulation No. 15/2019 and Dumai City Regional Regulation No. 6/2021. The Dumai City Regional Regulation refers to the Decree of the Minister of Environment and Forestry No. 903/2016

concerning Riau Spatial Planning, and Riau Province Regional Regulation No. 10/2018. Some of these regulations focus more on determining the status of the mangrove ecotourism land of Bandar Bakau Dumai as a Limited Animal Production Forest (Hamid et al 2021; Mulyadi et al 2021). So, existing regulations do not comprehensively regulate the management of mangrove conservation and ecotourism in BBD.

Recent developments in the BBD mangrove area are facing several threats in the form of tidal flooding and coastal abrasion, city development and conversion of mangrove forest functions, and solid waste pollution from Dumai City (Harto et al 2021). This slowly causes damage to mangrove forests which is exacerbated by the use of mangrove wood for firewood, panglong charcoal, houses, and others by certain parties. The condition of damaged mangroves will cause various environmental impacts such as reduced coastal areas due to coastal abrasion, decreased diversity of flora, for example, *Rhizophora* spp. and *Bruguiera* spp., and reduced fish populations because mangroves are fish spawning grounds. The loss of mangrove forests also has an impact on increasing seawater intrusion (Effendi et al 2022). In the end, this condition will have an impact on reducing the attractiveness of tourism development in the mangrove area of BBD.

The various facts above show that regulations on mangrove conservation and ecotourism, especially in BBD, still need to be strengthened. A more comprehensive legal policy is needed in the form of a Regional Regulation so that it has more legal certainty (Pratama et al 2021). In order for these regional regulations to be effective, their formation must be carried out holistically, integratively and participatively (Haryono 2022; Tjahjono et al 2022). In this way, it is hoped that the development of mangrove conservation and ecotourism at BBD will run optimally.

**BBD as a mangrove conservation area.** The BBD area is overgrown with mangrove forests and was originally a development area for PT. Port of Indonesia I Dumai Branch. The designation of this area as a mangrove conservation area began around 1998. At that time the condition of the mangrove forests in this area was in a state of severe damage due to abrasion and was used by the community without considering the role of its carrying capacity of the regional ecosystem. Trees are felled for building materials, charcoal production, and other logging activities. Based on the Riau Province Regional Regulation number 10/2018 concerning the Riau Province Spatial Plan for 2018-2038, and the Decree of the Minister of Environment and Forestry of Indonesia number 903/2016 regarding the Riau Area Spatial Plan and Dumai City Regional Regulation Number 15/2019 regarding the Layout Plan Dumai City Area Space 2019-2039, the BBD mangrove conservation area has been plotted with an area of 31 hectares located at the mouth of the Dumai River. These regional regulations have confirmed the status of BBD mangrove land as Limited Production Forest (Sholeh et al 2019; Mulyadi et al 2021).

If viewed from the perspective of mangrove conservation, the current condition of BBD has not changed much compared to previous years. From the observations of the 3 stations, it can be seen that there are still quite a lot of mangrove species, namely 14 true mangrove species and 15 associated mangrove species (Table 1 and Table 2). All of these plant species are still in the category of Least Concern (LC) or not yet threatened with extinction according to the International Union for the Conservation of Nature (IUCN).

In this mangrove forest, some mammals live there permanently and others that are only present for part of the year. Long-tailed macaques (*Macaca fascicularis*), southern pig-tailed macaques (*Macaca nemestrina*), silvery langurs (*Trachypithecus cristatus*), and wild boars (*Sus scrofa*) are the mammals found in the area (Table 3). Bird species found at the study site included *Copsychus saularis*, *Leptocoma calcostetha*, *Prinia familiaris*, *Haliastur indus*, *Rhipidura javanica*, *Corvus enca*, and *Halcyon smyrnensis*. These birds can be either seen directly or heard their sound in the area. Kingfishers and bee-eaters are colorful birds commonly seen in mangrove forests. The most common birds found in the mangrove area are herons, which are easily recognized by their long legs. Predator birds are also found, for example, sea eagles, swallows, and fish-eating eagles (Table 4). The species of reptiles found at the study site included *Varanus salvator*, *Emoia atrocostata*, and *Trimeresurus* sp. (Table 5).

Table 1

True mangrove species recorded in Bandar Bakau Dumai, Dumai, Indonesia

No.	Family	Scientific name	Common name
1	Acanthaceae	<i>Avicennia alba</i>	Api-api putih or white api-api
2		<i>Avicennia marina</i>	Grey mangrove or white mangrove
3	Arecaceae	<i>Nypa fruticans</i>	Nipa or mangrove palm
4	Combretaceae	<i>Lumnitzera littorea</i>	Black mangrove
5		<i>Lumnitzera racemosa</i>	Tonga mangrove
6	Lythraceae	<i>Sonneratia alba</i>	Apple mangrove
7	Meliaceae	<i>Xylocarpus granatum</i>	Cedar mangrove
8	Rhizophoraceae	<i>Bruguiera gymnorhiza</i>	Large-leaved orange mangrove
9		<i>Bruguiera parviflora</i>	Small-leaved orange mangrove
10		<i>Ceriops tagal</i>	Spurred mangrove or Indian mangrove
11		<i>Rhizophora apiculata</i>	Red mangrove
12		<i>Rhizophora mucronata</i>	Loop-root mangrove
13		<i>Rhizophora stylosa</i>	Spotted mangrove
14	Rubiaceae	<i>Scyphiphora hydrophyllacea</i>	Greek Scyphiphora

Table 2

Associated mangrove plant species recorded in Bandar Bakau Dumai, Dumai, Indonesia

No.	Family	Scientific name	Common name
1.	Fabaceae	<i>Acacia mangium</i>	Black wattle or hickory wattle
2.	Apocynaceae	<i>Cerbera manghas</i>	Sea mango
3.		<i>Gymnanthera paludosa</i>	Climbing vine
4.	Araceae	<i>Colocasia esculenta</i>	Taro
5.	Combretaceae	<i>Terminalia catappa</i>	Indian almond
6.	Flagellariaceae	<i>Flagellaria indica</i>	Whip vine or hell tail
7.	Lamiaceae	<i>Vitex pubescens</i>	Vitex tree
8.	Malvaceae	<i>Hibiscus tiliaceus</i>	Sea hibiscus or beach hibiscus
9.		<i>Thespesia populnea</i>	Portia tree
10.	Melastomataceae	<i>Melastoma candidum</i>	Melastoma
11.		<i>Melastoma septemnerium</i>	Senduduk
12.	Moraceae	<i>Ficus microcarpa</i>	Chinese banyan
13.	Pandananaceae	<i>Pandanus odoratissimus</i>	Odor pandanus
14.		<i>Pandanus tectorius</i>	Beach pandanus
15.	Rubiaceae	<i>Morinda citrifolia</i>	Noni

Table 3

Mammalian species recorded in Bandar Bakau Dumai, Dumai, Indonesia and the IUCN (The International Union for Conservation of Nature) status

No.	Family	Scientific name	Common name	IUCN status
1	Cercopithecidae	<i>Macaca fascicularis</i>	Long-tailed macaque	(EN)
2		<i>Macaca nemestrina</i>	Southern pig-tailed macaque	(EN)
3		<i>Trachypithecus cristatus</i>	Silvery langur	(EN)
4	Suidae	<i>Sus scrofa</i>	Wild boar	(LC)

Table 4

Species of birds recorded in Bandar Bakau Dumai, Dumai, Indonesia

No.	Family	Scientific name	English name
1	Accipitridae	<i>Haliastur indus</i>	Brahminy kite
2		<i>Spilornis cheela</i>	Crested serpent eagle
3	Alcedinidae	<i>Alcedo meninting</i>	Blue-eared kingfisher
4		<i>Pelargopsis capensis</i>	Stork-billed kingfisher
5		<i>Halcyon smyrnensis</i>	White-throated kingfisher
6	Ardeidae	<i>Egretta garzetta</i>	Little egret
7	Cisticolidae	<i>Prinia familiaris</i>	Bar-winged prinia
8	Corvidae	<i>Corvus enca</i>	Slender-billed crow
9	Hirundinidae	<i>Hirundo rustica</i>	Barn swallow
10	Muscicapidae	<i>Copsychus saularis</i>	Oriental magpie-robin
11	Nectariniidae	<i>Anthreptes malacensis</i>	Brown-throated sunbird
12		<i>Arachnothera longirostra</i>	Little spiderhunter
13		<i>Arachnothera robusta</i>	Long-billed spiderhunter
14		<i>Leptocoma calcostetha</i>	Copper-throated sunbird
15	Psittaculidae	<i>Loriculus galgulus</i>	Blue-crowned hanging parrot
16	Rhipiduridae	<i>Rhipidura javanica</i>	Malaysian pied fantail
17	Strigidae	<i>Ketupa ketupu</i>	Buffy fish owl

Table 5

Reptile species in Bandar Bakau Dumai, Dumai, Indonesia

No.	Family	Scientific name	Common name
1	Elapidae	<i>Naja</i> sp.	Cobra
2	Scincidae	<i>Emoia atrocostata</i>	Lizard
3	Varanoidea	<i>Varanus salvator</i>	Asian water monitor

The number and composition of flora and fauna species are not much different from those reported by previous researchers in this area and its surroundings. For example, For example, Susanto et al (2016) reported that the condition of the mangrove forest in the BBD of Pangkalan Sesai Village, West Dumai Regency, was in moderate condition; a number of 14 true mangrove species and 15 associated mangrove species were found in this research. Rahmadany et al (2014) reported that mangroves in Purnama Village, West Dumai Regency, have 6 families with 10 species, namely *X. granatum*, *R. apiculata*, *B. gymnorrhiza*, *B. cylindrica*, *C. tagal*, *L. littorea*, *A. marina*, *S. alba*, *Excoecaria agallocha*, and *N. fruticans*. The dominant mangrove species in this area are *X. granatum* and *R. apiculata*. Based on the diversity and density of mangroves, birds, mammals, and reptiles in the study area, it can be mentioned that the condition of the mangroves is at a moderate stage. A similar finding was also reported by previous researchers (Susanto et al 2016; Mulyadi et al 2021).

**BBD as a mangrove ecotourism area.** According to residents, the use of the BBD mangrove conservation area as an ecotourism area began around 1998. Regional Regulation of Riau Province Number 10/2018, Decree of the Minister of Environment and Forestry Number 903/2016 and Regional Regulation of Dumai City Number 15/2019 confirm the status of conservation land mangrove BBD is also a mangrove forest ecotourism area. This area is very strategically located, close to downtown Dumai, the road to the location is in good condition, and it is close to the port of PT. Port of Indonesia I, Dumai Branch, and Dumai Fisheries Port. Tourist activities carried out by visitors at this time are enjoying the panoramic views of nature and the sea while having drinks and culinary delights in stalls, gazebos/family halls, and relaxing tables without umbrellas. Meanwhile, visitors who want to enjoy tourism in the mangrove forest, can

watch the diversity of mangrove vegetation, and the cool and comfortable air in the mangrove forest and take selfies.

The potential of mangrove ecotourism products can be categorized into mangrove special interest ecotourism products and mangrove ecotourism supporting products (Lisova et al 2017). Existing mangrove ecotourism activities include: exploring the mangrove forest while enjoying the beauty of mangrove vegetation; visitors can also enjoy the coolness and humidity of the mangrove ecosystem, and take fun photography against the backdrop of the beauty and uniqueness of the mangrove forest; in addition, visitors can also observe the various existing mangrove animals (Effendi et al 2019; Harto et al 2021; Mulyadi et al 2021).

Currently, the management of BBD is run by a non-governmental organization (NGO) Lovers of Marine Nature (MNL). This NGO has applied for a management permit from the Municipal Government of Dumai several years ago. Previously there were 5 (five) programs implemented by MNL in protecting the BBD mangrove ecosystem, namely a) Bandar Bakau Nature School; b) Mangrove Banks Program; c) Rivers and Beaches Cleaning Program; d) Environmental-based Community Programs, and e) the use of BBD area as a tourist destination. Based on the MNL agreement with the City Government of Dumai, MNL is given the right to explore the BBD as a conservation and ecotourism area. Until early 2019, MNL's activity in managing the mangrove ecotourism area was quite high. The NGO has received environmental awards from various institutions, including the Environmental Preservation Group, Adibakhti Minabahari, and Conservation Cadre. But entering early 2021, the Covid 19 pandemic outbreak severely limited people's activities outside the home. As a result, community tourism activities were almost non-existent and ecotourism infrastructure was not used (Effendi et al 2022).

Supporting facilities and infrastructure are determining factors in the development of ecotourism areas (Ginantra et al 2018; Effendi et al 2021). Ecotourism-supporting facilities in BBD include restaurants, stalls, outlets, a main building, a homestay (1 unit), a library building, a family hall/gazebo, relaxing tables without umbrellas, a yard or wharf, and art and cultural facilities. In 2018, even though these supporting facilities were still lacking in terms of quantity compared to the area available, most of them were still in good condition. However, in 2022 these facilities were too old and barely usable (Table 6). Supporting facilities such as toilets, prayer rooms, information centers, and souvenir centers were also not maintained.

Table 6

Name and status of supporting facilities in Bandar Bakau Dumai ecotourism area, Dumai, Indonesia

<i>No.</i>	<i>Tourism facilities</i>	<i>Qty (unit)</i>	<i>Condition (2018*)</i>	<i>Condition (2022)</i>
1.	Art/cultural facilities	1	Good	Poor
2.	Ecotourism location plate	1	Good	Good
3.	Food outlet	8	Good	Poor
4.	Food stall	7	Good	Poor
5.	Gazebo	41	Good	Poor
6.	Home stay	1	Good	Poor
7.	Information centre	1	Good	Poor
8.	Islamic prayer room	1	Good	Poor
9.	Library	1	Good	Poor
10.	Main office	1	Good	Good
11.	Mangrove wood bridge	4	Good	Broken
12.	Nature School Program	1	Good	Stop
13.	Parking area	1	Good	Good
14.	Planting platform	1	Good	Less maintained
15.	Table without umbrella	12	Good	Unmaintained
16.	Rubbish bin	10	Good	Broken
17.	Souvenir center	1	Good	Closed
18.	Toilet	2	Good	Well maintained
19.	Tourist restaurant	1	Good	Well maintained

\* Effendi et al (2022).

This condition was exacerbated due to the Covid 19 pandemic which has not yet subsided. Recently, it can be said that mangrove ecotourism activities have almost completely stopped. People who visit BBD are only to eat and drink and sit back while enjoying the beach atmosphere. This condition cannot be allowed to drag on. Existing facilities must be repaired, properly supplied and maintained. Conditions like this will create a negative image of society towards BBD ecotourism. Given the condition of the coastal ecosystem, it is better if the facilities and infrastructure are specially designed with permanent construction. It is clear that the ecotourism manager at BBD will not be able to build these facilities due to the lack of financial capability. For this reason, assistance from the government, industry or tourism businesses is the recommended solution (Purwowibowo et al 2020; Harto et al 2021; Mulyadi et al 2021).

**Conclusions.** The legal aspects of BBD as a mangrove conservation and ecotourism area have not been specifically regulated. This arrangement is still partial, namely through the Regional Regulation of the City of Dumai No. 15/2019 and the Regional Regulation of the City of Dumai No. 6/2021. A more comprehensive legal policy is needed in the form of regional regulations to have more legal certainty. The physical condition, flora, and fauna of the mangrove area show that the BBD mangrove area is still relatively good. However, the role of mangrove ecotourism has gone even further. Supporting facilities and infrastructure are generally damaged and no longer maintained. To reverse this role, the recommended development strategies include; 1) the formulation of a Regional Regulation of the City of Dumai concerning the management of the BBD area in a holistic, integrative, and participatory manner; 2) the development of facilities and infrastructure needed by BBD through government programs; 3) development of human resources managing ecotourism and mangrove conservation at BBD; 4) construction of embankments to resist coastal abrasion by the government or industry.

**Conflict of interest.** The authors declare that there is no conflict of interest.

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Authors:

Emilda Firdaus, Faculty of Law, University of Riau, Kampus Gobah, Pattimura street, No. 9, Pekanbaru 28131, Indonesia, e-mail: emilda.firdaus@lecturer.unri.ac.id

Dodi Haryono, Faculty of Law, University of Riau, Kampus Gobah, Pattimura street, No. 9, Pekanbaru 28131, Indonesia, e-mail: dodispakning@gmail.com

Mexasai Indra, Faculty of Law, University of Riau, Kampus Gobah, Pattimura street, No. 9, Pekanbaru 28131, Indonesia, e-mail: helpingirwan@gmail.com

Irwan Effendi Faculty of Fisheries and Marine Sciences, University of Riau, Kampus Bina Widya, Pekanbaru 28293, Indonesia, e-mail: helpingirwan@gmail.com

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