Marine Mammal Migration Through the Indonesian Archipelagic Sea Lane Passage

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Abstract

Chapter XII UNCLOS 1982 mandates that every state to protect marine mammals. This protection is not limited to protecting its marine ecosystem, but also applies to marine mammals crossing the territorial waters of a state. However, some marine mammal migratory routes intersect with shipping routes. Accordingly, in this paper, we will discuss whether a state can prioritize marine mammal migration over shipping. This writing methodology uses a library study methodology by analysing existing regulatory framework provisions. The results of this study found that these both uses of territorial waters coexist under the provisions of UNCLOS and IMO as well as the principle of sustainable development that environmental interests are prioritized. However, it is the interests of shipping to adjust its practices to protect migratory crossings through science and technology so that marine mammals will still be able to cross, while allowing shipping to still be carried out.

Keywords: *vessel passage, migratory marine mammal passage, priority routes*

I. INTRODUCTION

The sea is a symbiotic ecosystem, where each ocean space is interconnected with another. As with any ecosystem, each marine space hosts an annual or sporadic migration[1] for several forms of marine life. Some long-distance migration is caused by climate change, from cold waters to warmer areas, as well as availability of food sources, calving, and mating.[2]

'Migration' is a word in common parlance and most of us, layperson, or scientists, have a sense of what it means. Nonetheless, it is difficult to find a generally agreed

[1] David A. Milton, "Living in Two Words: Diadromous Fishes, and Factors Affecting Population Connectivity Between Tropical Rivers and Coasts," in *Ecological Connectivity Among Tropical Coastal Ecosystem*, ed. Ivan Nagelkerken (Springer: New York, 2009), 334.

[2] Ben Lascelles, et.al, "Migratory Marine Species: Their Status, Threats and Conservation Management Needs," *Aquatic Conservation: Marine and Freshwater Ecosystems* 24, no. S2 (2014): 112.

definition and there are almost as many interpretations as there are books on the subject. Those who study different animal groups tend to use the term in different ways.[3] Based on Art. 1 (1) Convention on the Conservation of Migratory Species of Wild Animals/CMS, 1979 mention that:

> "Migratory species means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.

In general, marine mammals are not the only migratory species. Various birds, sharks, turtles, and tuna have also been observed migrating. If these migration routes and activities are disrupted or destroyed, the balance of the population in the parts they usually pass through will be impacted. This cycle starts with the emergence of predators that damage the order of the ecosystem to excessive populations of certain species that will cause disturbances to the balance of the ecosystem.[4] This study, however, is focused specifically on the migration of marine mammals.

Every migrating marine mammal crosses several aquatic regions in the instinctive routes they take. Changes in ecosystems and migration routes of marine mammals have been degraded because there are still many countries in the world that have not regulated and provided legal protection for ecosystems and migration routes for marine mammals, including dolphins.[5] Changes in the environment, ecosystems, and human behaviour have also had an impact on the survival of these marine mammals, considering that the history and origin of marine mammals is very different from fish.[6] As such, humans are responsible for their protection.

Marine mammals follow migratory routes that often pass through, stopover, and even find themselves stranded in the territorial waters of Indonesia.[7] Some Indonesian seas, such as the Savu Sea, are significant for foraging and mating by marine mammals.[8] Several straits in Indonesia are marine mammal crossings because the sea is deep and has strong currents. However, the problem is that this sea mammal crossing routes intersects with busy shipping routes such as the Sunda

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3 Julian Metcalfe, Geoff Arnold and Robert McDowall, "Migration," in *Handbook of fish Biology and Fisheries Vol. 1*, ed. Paul J.B Hart and John D. Reynolds (Oxford: Blackwell Publishing, 2002), 175.

4 *Ibid*.; Lascelles, et.al., "Migratory Marine Species", 112-113.

5 Erich Hoyt, *Marine Protected Areas for Whales, Dolphins and Porpoise, A World Handbook for Cetacean Habitat Conservation* (Earthscan: London, 2005), 5.

6 Lyne Morisset, Villy Christensen, and Daniel Pauly, "Marine Mammal Impacts in Exploited Ecosystems: Would Large Culling Benefit Fisheries?" *Plos One* 7, no 9, (2012): 14.

7 Ebed de Rosary, "Tercatat Pertama Kali, Paus Orca Melintasi dan Terdampar di Perairan Flores Timur. Bagaimana Nasibnya?", mongabay.co.id, accessed 6 March 2021, https://www.mongabay.co.id/2020/05/03/tercatat-pertama-kali-paus-orca-melintasi-dan-terdampar-di-perairan-flores-timur-bagaimana-nasibnya/ .

8 Kementerian Perikanan dan Kelautan, "Profil Kawasan Konservasi Perairan Nasional Taman Nasional Perairan Laut Sawu dan Sekitarnya di Provinsi Nusa Tenggara Timur," accessed 3 May 2021, https://kkp.go.id/djprl/bkkpnkupang/page/352-profil-tnp-laut-sawu; Keputusan Menteri Kelautan dan Perikanan Nomor 5/KEPMEN-KP/2014, tentang Kawasan Konservasi Perairan Nasional Laut Sawu dan Sekitarnya di Provinsi Nusa Tenggara Timur. *See also* Mustika, "Marine Mammals in the Savu Sea (Indonesia) Indigenous Knowledge, Threat Analysis And Management Options" (Thesis, James Cook University, 2006), 92-94.

Strait and Lombok Strait on the southern side of Indonesia, while for the northern side of Indonesia the Sulawesi Strait, Karimata Strait, and Arafuru Sea, are points where marine mammals are encountered passing by with their entourage often to their peril. For example, in Probolinggo[9] and Rote,[10] a dead Ballen was found with slashes suspected to have been caused by a ship's propeller.

These marine mammal routes are sometimes also the shipping routes of commercial ships. Thus, when marine mammals pass along with the movement of ships on the same route, it will have an impact in the form of injury to marine mammals and even loss of directions for mammals caused by the sound of passing ships.[11] Because of this, the crossing routes need to be protected to maintain the sustainability of marine mammal life, by prioritizing such migrations over commercial activity.

II. CHARACTERISTICS OF MARINE MAMMALS

Marine mammals are a collection of species exhibiting unique physical characteristics which distinguish them from other marine life. For instance, they breathe air through lungs, are warm-blooded, have hair (at some point during life), and produce milk to nurse their young. Living in a marine environment of extreme temperatures, depths, pressure, and darkness, marine mammals are classified into four different taxonomic groups: cetaceans (whales, dolphins, and porpoises), pinnipeds (seals, sea lions, and walruses), sirenians (manatees and dugongs), and marine fissipeds (polar bears and sea otters).[12]

The order, Cetaceans (whales, dolphins, and porpoises) is comprised of 80 species worldwide, about 30 of which live in the Western Central Pacific.[13] Indonesian waters host 33 species of whales and dolphins. Based on the IUCN categories, three species are included in the Endangered/EN category such as cell whales, blue whales, and fin whales, three species are in the vulnerable/VU category which includes finless dolphins, Mahakam dolphins, and sperm whales, one species is in Near Threaten status/ NTs such as the Indo Pacific humpback dolphin, as well as Bryde's Whale and Omura's Whale which currently does not have IUCN status, and the remaining 24 species are listed as Least Concern/LC or Data Deficient/DD.[14]

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9 Liputan6.com, "Nasib Paus Bungkuk Usai Terkena Baling-Baling Kapal", accessed 5 August 2021, https://www.liputan6.com/regional/read/3553215/nasib-paus-bungkuk-usai-terkena-baling-baling-kapal.

10 Media Indonesia, "Paus dengan Delapan Bekas Luka Sayatan Terdampar di Rote, accessed 5 August 2021, https://mediaindonesia.com/nusantara/123535/paus-dengan-delapan-bekas-luka-sayatan-terdampar-di-rote.html.

11 Vanessa Pirotta, et. al., "Consequences of Global Shipping Traffic for Marine Giants, The Ecological Society of America," *Frontiers in Ecology and the Environment* 17, no. 1 (2019): 40.

12 National Oceanic and Atmospheric Administration, "Marine Mammals," accessed 4 June 2021, https://www.noaa.gov/education/resource-collections/marine-life/marine-mammals.

13 C. C. Kinze, "Marine Mammals," accessed 3 May 2021, http://www.fao.org/3/y0870e/y0870e67.pdf.

14 Agus Dermawan et. al. (eds), *Rencana Aksi (RAN) Konservasi CETACEA Indonesia Periode I: 2016-2020* (Jakarta: Direktorat Konservasi dan Keanekaragaman Hayati Laut Kementerian Kelautan dan Perikanan RI, 2015), 9. *See also* WWF Indonesia, "Mamalia Laut (cetacea)," WWF Indonesia, accessed 3 May 2021, https://www.wwf.id/spesies/mamalia-laut.

Table 1

Cetacean species found in Indonesian waters

No	Species	Indonesian Name	Global Red List Status (ver 3.1)	Distribution
1	Balaenoptera acutorostrata	Paus minke umum	Least Conrcern (LC)	Ma, Pa, Nt, Ti
2	Balaenoptera borealis	Paus sei	Endangered (EN)	Ja, Ma, Pa, NT, Sum, Ti
3	Balaenoptera brydei	Paus Bryde	Not Evaluation (N.E)	Ma, Pa, NT, Ti
4	Balaenoptera edeni	Paus Bryde kerdil	Data Deficient (DD)	Ja, Ma, Pa, NT, Sum, Ti
5	Balaenoptera musculus	Paus biru	EN	Ja, Ma, Pa, NT, Sum, Ti
	5.1 Balaenoptera brevicauda	Paus biru kerdil	NE	Ma, Pa, NT, Ti
6	Baleanoptera omurai	Paus Omura	NE	Ma, Pa, NT, Ti
7	Balaenoptera physalus	Paus sirip	EN	EK, Ja, Ma, Pa, Nt, Ti
8	Delphinus capensis	Lumba-lumba umum paruh panjang	DD	EK, WK, Sum
9	Delphinus delphenis	Lumba-lumba umum paruh pendek	LC	EK, Sum, Na
10	Feresa attanuata	Paus pembunuh kerdil	DD	Ba, EK, Ma, Pa, NT, Ti
11	Globicephala macrorhynchus	Paus pemandu sirip pendek	DD	Ba, EK, Ja, Ma, Pa, NT, Sum, Ti
12	Grampus griseus	Lumba-lumba Risso	LC	Ba, Ek, Ma, Pa, NT, Ti
13	Hyperoodon planifrons	Paus hidung botol selatan	LC	Ma, Pa, NT, Ti
14	Kogia breviceps	Paus sperma kerdil	DD	Ka, Pa, Ba (genus only)
15	Kogia sima	Paus sperma cebol	DD	Ma, Pa, NT, Ti, Ba (genus only)
16	Lagenodelphis hosei	Lumba-lumba Fraser	LC	Ek, Ba, ma, Pa, Nt, Sul, Ti
17	Megaptera novaeangliae	Paus bongkok	LC	Ek, Ba

No	Species	Indonesian Name	Global Red List Status (ver 3.1)	Distribution
18	Mesoplodon densirostris	Paus Blainville berparuh	DD	Ma, Pa, NT, Ti
19	Mesoplodon ginkgodens	Paus berparuh gigi ginkgo	DD	Sul
20	Neophocaena phocaenoldes	Lumba-lumba tanpa sirip	Vulnerable (VU)	Ka, Ja, Ma, Pa, Sum, NT, Ti
21	Orcaella brevirostris	Pesut Mahakam	VU	Coastal: Ek, Wk, Ja, Sum, ja, Pa: Freshwater: MR
22	Orcinus orca	Paus Pembunuh	DD	Ba, EK, Ma, Pa, NT, Ti
23	Peponocephala electra	Paus kepala melon	LC	Ba, EK, Ma, Pa, NTSul, Ti
24	Pyseter macrocephalus	Paus sperma	VU	Ba, EK, Ja, Ma, Pa, NT, Sul, Sum, Ti
25	Pseudorca crassidens	Paus pembunuh palsu	DD	EK, Ja, Ma, Pa, NT, Sum, Ti
26	Sousa chinensis	Lumba-lumba bongkok Indo Pasifik	Near Threatened (NT)	EK, Ma, Pa, NT, Ti, WK
27	Stenella longirostrisis	Lumba-lumba spinner	DD	Ba, EK, ja, Ma, Pa, NT, Sul, Sum, Ti
	27.1 Stenella longirostrisis longirostris	Lumba-lumba spinner Hawaii/ Grey	NE	Ba, EK
	27.2 Stenella longirostrisis roseiventris	Lumba-lumba spinner Asia Tenggara (kerdil)	NE	Ba, EK
28	Stenella coeruleoalba	Lumba-lumba strip	LC	EK, Ja
29	Stenella attenuata	Lumba-lumba totol	LC	Ba, Ek, Ja, Ma, Pa, NT, Sul, Sum, Ti
30	Steno bredanensis	Lumba-lumba gigi	LC	EK, Ma, Pa, NT, TI
31	Tursiops aduncus	Lumba-lumba hidung botol Indo Pasifik	DD	Ba, EK
32	Tursiops truncatus	Lumba-lumba hidung botol umum	LC	Ba, EK, ja, Ma, Pa, NT, Sul, Sum, Ti
33	Ziphius cavirostris	Paus berparuh Cuvier	LC	EK, Ja, Ma, Pa, NT, Ti

Note :

BA=Bali, EK=East Kalimantan, Ja=Java, Ka=Kalimantan, Ma=Maluku, NI=Natuna Island, NT=Nusa Tenggara, Pa=Papua, Sul=Sulawesi, Sum=Sumatra, Ti=Timor, WK=West Kalimantan

III. MARINE MAMMAL LEGAL PROTECTION

Currently, protection of marine mammals is regulated in UNCLOS 1982 Articles 64 and 65 which state:

> Article 64:
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> The coastal State and other States whose nationals' fish in the region for the highly migratory species listed in Annex I shall cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone. In regions for which no appropriate international organization exists, the coastal State and other States whose nationals harvest these species in the region shall cooperate to establish such an organization and participate in its work.
>
> Article 65:
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> Nothing in this Part restricts the right of a coastal State or the competence of an international organization, as appropriate, to prohibit, limit or regulate the exploitation of marine mammals more strictly than provided for in this Part. States shall cooperate with a view to the conservation of marine mammals and in the case of cetaceans shall in particular work through the appropriate international organizations for their conservation, management and study.

The Convention on the Conservation of Migratory Species of Wild Animals/ CMS, 1979, which in appendix I, effective 22 May 2020 has stated that there are several species of marine mammals which are protected.[15] Indonesia has not yet ratified the CMS or become a member of the CMS, the ratification of which has been signed by the new Indonesian government regarding the protection of the Marine Turtle Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia and the dugong (where Indonesia is still in the range state status).[16]

> The International Union for Conservation of the Nature/IUCN Red List is:
>
> a critical indicator of the health of the world's biodiversity. Far more than a list of species and their status, it is a powerful tool to inform and catalyse action for biodiversity conservation and policy change, critical to protecting the natural resources we need to survive. It provides information about range, population

[15] Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 23 June 1979) 1651 UNTS 333, *entered into force* 1 Nov. 1983, Art. 3.

[16] Convention on Migratory Species, "State Parties" accessed 3 May 2021, https://www.cms.int/country/indonesia.

size, habitat and ecology, use and/or trade, threats, and conservation actions that will help inform necessary conservation decisions.[17]

Article 2 of the Convention on Biological Diversity (CBD) sets forth that one of the purposes of the Convention is the variety among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems and another purpose to the conservation of components of biological diversity outside their natural habitats (Ex-situ conservation).

Annex I (Identification and monitoring) migratory species is part of CBD:

Ecosystems and habitats: containing high diversity, large numbers of endemic or threatened species, or wilderness; required by migratory species; of social, economic, cultural or scientific importance: or, which are representative, unique or associated with key evolutionary or other biological processes:

The International Whaling Commission (IWC) is the global body charged with the protection conservation of whales and the management of whaling. The IWC currently has 88 member governments. The Commission's role has expanded since its establishment in 1946. In addition to regulating whaling, today's IWC works to address a wide range of conservation issues including bycatch and entanglement, ocean noise, pollution and debris, collision between whales and ships, and sustainable whale watching.

Based on data from Maritime Transport, the worldwide seaborne trade in 2019 reached $11.1 billion. In line with Asian economies' strong contribution to global trade and their high integration into global shipping networks, Asia is by far the largest seaborne trading region. In 2019, Asian seaports handled 4.5 billion tons of goods loaded, and 6.9 billion tons of goods unloaded. Other continents recorded much smaller volumes.[18] Developing economies still accounted for the largest share of global seaborne trade, both in terms of exports and imports. They loaded 58 percent and unloaded 65 percent of the worldwide total. With a volume of 4.3 billion tons loaded and 6.1 billion tons unloaded, Asian and Oceanian developing economies contributed the largest share of that volume.[19] Thus, the high level of seaborne trade in the Asian region will increase the potential for disturbance of marine mammal ecosystems that are sensitive to several forms of ship activity, including noise and potential injury from ship propellers.[20]

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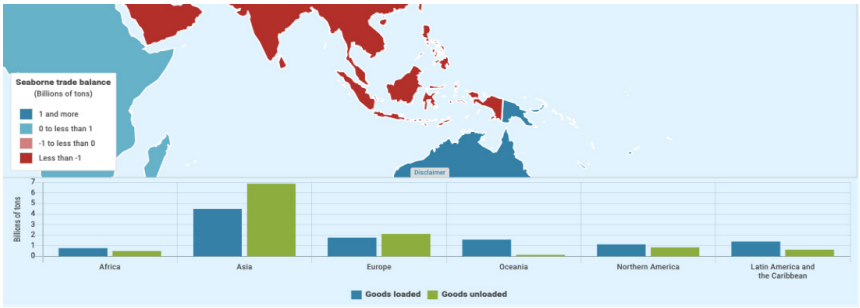
17 International Union for Conservation of the Nature Red List, "Background and History" accessed 3 May 2021, https://www.iucnredlist.org/about/background-history.

18 United Nations Conference on Trade and Development/ UNCTAD*, 2020 Handbook of Statistics*, (United Nations: Geneva, 2020), 72.

19 *Ibid.*

20 Christine Erbe, et.al, The Effects of Ship Noise on Marine Mammals- A Review, *Frontiers in Marine Science* 6, no.606 (October 2019), 3-5.

Figure 1
Tonnage loaded and unloaded, 2019



Sources: UNCTAD, World seaborne trade, 2020, https://stats.unctad.org/Handbook/MaritimeTransport/WorldSeaborneTrade.html, accessed 3 October 2021.

Under the current provisions of Indonesian national law, the protection of marine mammals has begun to be regulated (as explained in the next paragraph). The focus of the protection is on the determination of water conservation areas, where the protection is focused on the ecosystem of a designated area. Meanwhile, there are no specific provisions regarding the protection of marine mammals and their migration routes. However, given the many cases of beached whales every year in Indonesia,[21] the government has made special regulations regarding whales.

1. Decree of the Minister of Marine Affairs and Fisheries Number 79/Kepmen-KP/2018 concerning the National Action Plan for Marine Mammal Conservation, 2018-2022.

The National Action Plan for Marine Mammal Conservation 2018-2022 (RAN Marine Mammal Conservation) was promulgated to protect and rescue marine mammals in Indonesia, to maintain and ensure the sustainability of marine mammals. For now, RAN focuses on protecting a. Dugong (Dugong dugon) and b. Cetaceans include all types of whales and all types of marine dolphins.[22] The RAN for Marine Mammal Conservation includes strategies, activities, indicators, outputs, locations, periods, people in charge, and related work units references for each organizational unit within the Ministry of Marine Affairs and Fisheries and related agencies, through their duties and respective functions to implement conservation of marine species.[23]

[21] Ebed de Rosary, "Tercatat Pertama Kali, Paus Orca Melintasi dan Terdampar di Perairan Flores Timur. Bagaimana Nasipnya?," mongabay.co.id, accessed 3 May 2020 https://www.mongabay.co.id/2020/05/03/tercatat-pertama-kali-paus-orca-melintasi-dan-terdampar-di-perairan-flores-timur-bagaimana-nasibnya/.

[22] Keputusan Menteri Kelautan dan Perikanan Tentang Rencana Aksi Nasional Konservasi Mamalia Laut, Tahun 2018-2022.

[23] *Ibid.*

This Ministerial Decree has several targets, starting with efforts to provide integrated and updated baseline data and information through a national online information system development strategy by developing an online data and information centre, including 1) Population distribution; 2) Biological, medical, and pathological; 3) Condition, area, and distribution of habitat; 4) Conditions and models of interaction (social, economic and cultural) of local communities in the use of dugongs, both legal and illegal; 5) The cause of the decline in the population and distribution of dugongs, as well as damage/reduction in the area and distribution of their habitat. The next activity is to establish related databases recording: 1) Population distribution; 2) Biological, medical, and pathological; 3) Condition, area, and distribution of habitat; 4) Conditions and models of interaction (social, economic, and cultural) of local communities in the use of dugongs, both legal and illegal; 5) The cause of the decline in the population and distribution of dugongs, as well as damage/reduction in the area and distribution of their habitat. The next strategy is to increase the capacity of data and information management, then survey, study, and monitor dugongs and their habitats, as well as upload and update baseline data and information into the online system.[24]

The second target is the protection of dugong habitat, designating marine conservation areas through the strategy of identifying the locations for potential dugong conservation areas and their habitats. The next strategy is the determination of dugong conservation areas and their habitats that are integrated into Indonesian marine spatial planning and a zoning map of marine conservation areas through the activity of establishing dugong habitats as new conservation areas. With the goal in mind of increasing dugong populations and habitats, the second target also focuses on management of existing marine conservation areas, developing conservation area networks and Integrating dugongs and their habitats into national marine spatial planning.[25]

The third target of this decree is the strategic management of dugongs and their habitats. Develop institutions for managing dugongs and their habitats at the national level and the operational level in the field by carrying out technical studies on the establishment of institutions for managing dugongs and their habitats both at the national level and at the operational level in recommendations from experts in the field. Form a network of conservation stakeholders for dugongs and their habitats based on biophysics, ecology, social and economics. Establish an agency for managing marine conservation areas for dugongs and their habitats and forming a group/task unit for protecting dugongs and their habitats. The next strategy is to develop mechanisms and improve the handling of beached and bycaught dugongs by preparing technical instructions or guidelines for handling stranded dugongs and

[24] *Ibid.*
[25] *Ibid.*

mitigate dugong bycatch in fishery activities. The last strategy is to increase efforts to conserve dugong habitat, as well as operationalize institutions for managing dugongs and their habitat.[26]

The fourth target is the realization of the sustainable and responsible observation of dugongs and their habitats with a strategy of developing the protection of dugongs and conservation of seagrasses as their habitat by conducting studies on the use of "non-extractive dugongs and their habitats, covering aspects of 1) Ecology of dugongs and their habitats; 2) The carrying capacity of the marine conservation area as a "mermaid" marine tourism area; 3) Willingness to pay "mermaid" marine tourism tourists; 4) Model of local community interaction in utilization; dugongs and their habitats 5) Ex-situ use of dugongs, and Develop "non-extractive" use of dugongs and seagrasses as their habitat. The next strategy is to regulate the use of dugongs and their habitats with activities ranging from preparing technical instructions or guidelines on dugong-based marine tourism activities to monitoring utilization for ex-situ tourism.[27]

The fifth target is strategic materialization of broad public awareness of the importance of conserving dugongs and their habitats. Development and implementation of public awareness models in the conservation of dugongs and their habitats with activities starting from the preparation of technical guidelines on socialization and public campaigns (public engagement) in the conservation of dugongs and dugongs. Build a dugong information centre. The next strategy is to raise public participation in the conservation of dugongs and their habitats through activities including forming a community group "Friends of the dugong" to conduct education on the conservation of dugongs and their habitats.[28]

The last target is the formalization of law enforcement efforts to comply with and enforce the law with activities related to the conservation of dugongs and their habitats as well as the establishment of Community Monitoring Groups (POKMASWAS) for the conservation of dugongs and their habitats. The next strategy is controlling the illegal poaching of dugongs, as well as developing supporting facilities for law enforcement with activities ranging from conducting supervision and law enforcement at designated entry and exit gates to providing monitoring, controlling, and surveillance (MCS) support facilities.[29]

Unfortunately, this provision regulates more about the protection and rescue of dugongs while for cetaceans no protections appear on the horizon. As observed, whales and dolphins are the types of cetaceans that are often reported to be stranded,

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26 *Ibid.*

27 *Keputusan Menteri Kelautan dan Perikanan Tentang Rencana Aksi Nasional Konservasi Mamalia Laut, Tahun 2018-2022* (Minister of Ocean and Fisheries Affairs Decree on National Action Plan for Marine Mammal Conservation, 2018-2022).

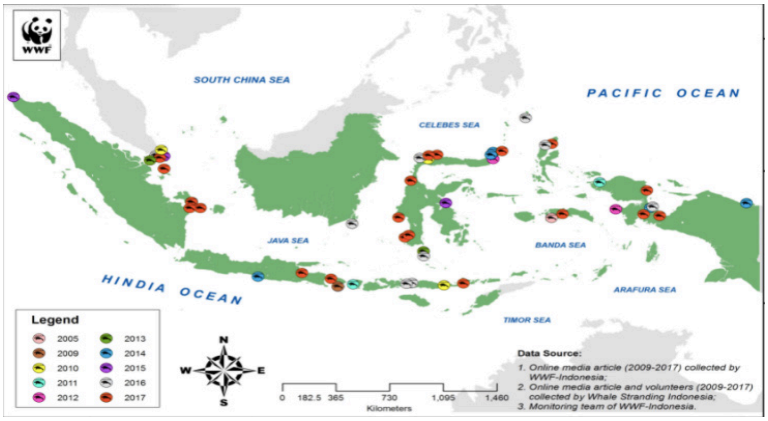
28 *Ibid.*

29 *Ibid.*

injured, lost and dead.[30] For now, research for dugongs has only been carried out in areas that are ecosystems of dugongs, even though the dugong itself as a marine mammal that lives on the coast with seagrass ecosystems is still not protected from capture or death due to being entangled by fishing nets. The figure below shows the dugong ecosystem in Indonesia.[31]

Figure 2

Dugong Stranding Map[32]



Sources : Dugong & Seagrass Conservation Project, access at https://www.dugongconservation.org/news/list-of-reports-and-maps-submitted-by-indonesia-project-2-id2-in-2017/map_dugong-stranding-map/, accessed on 3 October 2021.

2. Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 6/KEPMEN-KP/2014, concerning the Management and Zoning Plan of the Savu Waters National Park and its Surrounding Areas in the Province of East Nusa Tenggara 2014-2023.

This Ministerial Decree establishes the Savu Sea Waters National Park. The waters of the Savu Sea, especially the decreed location of the Savu Sea Waters National Park, are important corridors for the passage of marine mammals. These crossings are important to efforts to manage the area of the Savu Sea Waters National Park itself, so they need attention. In the waters of the Savu Sea Waters National Park, 22 species of marine mammals have been identified, consisting of 14 species of whales, seven species of dolphins, and one species of dugong.[33]

30 *Ibid.*

31 World Wildlife Fund, "Dugong in Indonesia", wwf.id, accessed 15 August 2021, https://www.wwf.id/spesies/dugong.

32 World Wildlife Fund, "Dugong and Seagrass Conservation Project", accessed 15 August 2021, https://www.dugongconservation.org/news/list-of-reports-and-maps-submitted-by-indonesia-project-2-id2-in-2017/map_dugong-stranding-map/.

33 Indonesia, Minister of Marine Affairs and Fisheries Decision No. 6/KEPMEN-KP/2014 on Management Plan and Zone of National Park of Savu Sea and its surrounding in the Nusa Tenggara Timur Province year 2014-2023, 42.

3. Decree of the Minister of Fisheries and Maritime Affairs Number 24/ KEPMEN-KP/2014 concerning the Nusa Penida Aquatic Conservation Area, Klungkung Regency in Bali Province.

This this decree regulates the preservation, protection, and utilization of the diversity of marine life and aquatic ecosystems in Nusa Penida, Klungkung Regency in Bali Province such as Mola-mola and Pari Manta, where it establishes Nusa Penida Klungkung Regency in Bali Province as a marine conservation area. [34]

As of 2019 in the Nusa Penida marine conservation area, there were 189 Protected Marine Areas, a total area of 23,145,684 million hectares boasting 1,025,103,191 million hectares of coral. There is also a mangrove area that functions as a carbon store and an area for marine cultivation activities. Nusa Penida is famous among underwater lovers because of marine life such as manta rays, sunfish, and turtles. The Marine Conservation Area includes the main island of Nusa Penida, and two other smaller islands, Nusa Ceningan and Nusa Lembongan.[35]

IV. MAMMALS AND VESSEL ROUTES

The marine mammals discussed above follow their instinctive trajectory and travel in herds, passing through deep-sea routes. As a State that connects the Pacific and Atlantic Oceans, Indonesia has favourable crossing routes for these marine mammals where the marine topography includes deep seas with strong currents.[36] The southern gateway areas for sea crossings in Indonesia can be found in the Banda and Ceram Seas,[37] the Savu Sea,[38] and the Lombok Strait.[39]

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34 *Ibid.*

35 Luh de Suriyani, "Kawasan Konservasi Perairan Nusa Penida Dideklarasikan sebagi Hope Spot. Apa Itu?", mongabay.co.id, accessed 7 June 2021, https://www.mongabay.co.id/2020/06/02/kawasan-konservasi-perairan-nusa-penida-dideklarasikan-sebagai-hope-spot-apa-itu/.

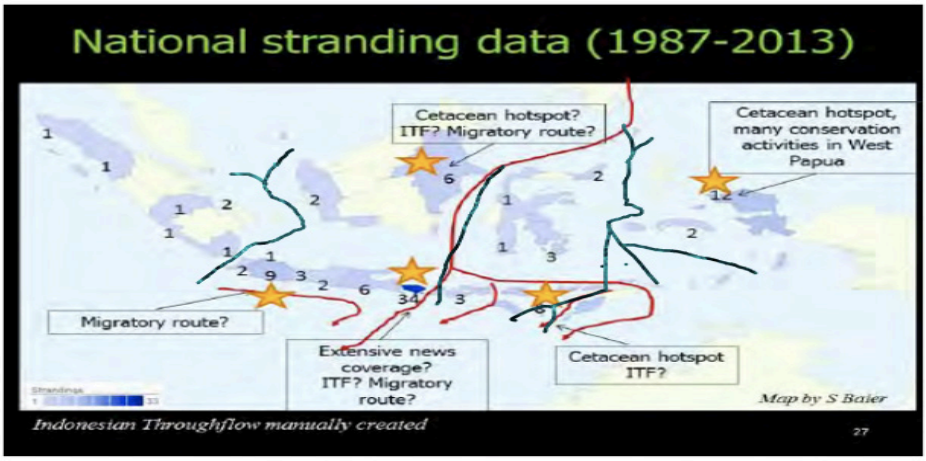
36 Erict Hoyt, *Marine Protected Areas for Whales, Dolphins and Porpoises: A World Handbook 2nd edition* (Earthscan: London, 2011), 54-55. *See also* Benjamin Kahn (prepared), *Technical Report TA2-16A: A Rapid Ecology Assessment (REA) for Oceanic Cetaceans in the Banda and Ceram Seas, Maluku, Indonesia (FMA 714 and 715), a Critical Habitat for Pygmy Blue Whales (Balaenoptera Musculus Brevicauda)*, (USAID:2017), 14.

37 Benjamin Kahn (prepared), *Technical Report TA2-16A: A Rapid Ecology Assessment (REA) for Oceanic Cetaceans in the Banda and Ceram Seas, Maluku, Indonesia (FMA 714 and 715), a Critical Habitat for Pygmy Blue Whales (Balaenoptera Musculus Brevicauda)*, (USAID: 2017), 14.

38 Achmad Sahri, et.al, "A Critical of Marine Mammal Governance and Protection in Indonesia", *Marine Policy* 117, (2020), 12.

39 *Ibid,* Achmad Sahri, 10.

Figure 3
Mammals and Ships Overlapping Routes



Note: the green line shows international shipping routes in Indonesia (archipelagic sea lanes passage)

Sources : Map Modification from UNEP/CMS Secretariat, *Report of the Third Southeast Asian Marine Mammal Symposium (SEAMAM III) - CMS Technical Series No. 32*, (Bonn : UNEP/CMS Secretariat, 2015), 472.

The current problem is that many marine mammals are found dead, stranded, or beached in Indonesian waters. Based on data from the Ministry of Fisheries and Maritime Affairs, in 2020 there[40] were 107 marine mammals harmed, reaching 66 in February 2021 alone.[41] The increasing frequency of stranded whales, some of whom eventually died in Indonesian waters indicates the hazards whales face when their migratory routes intersect with busy shipping lanes. If in the North (Norway for example) dead whales are often found as a result of plastic waste,[42] while in Indonesia shipping activity pose the greatest threat to for marine mammals e.g. whaling, pollution form busy vessel routes, dangerous international sea lanes, and the average whale t dies with lacerations on its body, as well as whales who stray from their pods as a result of losing their way.

In Indonesia, thus far in 2021, many dead marine mammals have been found, stranded until only found in the form of skeletons. In February 2021 alone, 49 whales were found stranded and dead in Bangkalan, Madura, allegedly due to sonar interference.[43] In April 2021, two cases of stranded whales were found, namely in

40 *Ibid,* Benjamin Kahn (prepared), 22.

41 Kementerian Perikanan dan Kelautan, "Database Paus Terdampar", kkp.go.id, accessed 15 August 2021, https://kkp.go.id/djprl/bpsplpadang/page/4144-database-paus-terdampar. *See also* CNN Indonesia, *Ratusan Mamalia Laut Terdampar di Indonesia Setiap Tahun*, accessed 7 March 2021.

42 University Museum of Bergen, "Science Found 30 Plastic Bags in Whale's Stomach 2017", accessed 7 June 2021, https://www.uib.no/en/universitymuseum/104913/scientists-found-30-plastic-bags-whales-stomach.

43 Amir Baihaqi, "Penyebab 49 Paus Terdampar di Madura Terjawab", *Detik.com*, accessed 15 August 2021, https://news.detik.com/berita-jawa-timur/d-5469292/penyebab-49-paus-terdampar-di-madura-terjawab.

Tulungagung and Cirebon. Communities on the coast of Tulungagung found a stranded whale shark that had died.[44] Likewise in Cirebon, fishermen found stranded whales on the coast of Cirebon, West Java, and fishermen stated that the sea area was indeed a whale migration route.[45] Even more recently, in June 2021, Lombok, West Nusa Tenggara, witnessed a dead pilot whale found with holes in his body.[46]

The use of sea shipping services is still the main logistics contributor in terms of global trade; almost 80% of the total cargo still uses sea shipping services.[47] Likewise in developing countries, the use of sea transportation services supports their trade because the cost of transportation using ships is cheaper.[48] These countries loaded an estimated 58.8 percent of their shipping volume onto cargo vessels in 2018 and unloaded 64.5 percent.[49]

Based on the above discussion, the legal protections exist for marine mammals starting from their habitat to their migration. This protection covers the jurisdiction of a State or outside the jurisdiction of a State. Considering that these far-flung mammals can enter the territorial waters of a State, a State is responsible for protecting and ensuring these marine mammals pass safely and peacefully through its sea area. However, if it has entered the high seas area, the responsibility shifts to all States under the provisions of international law.

For many populations of these marine giants, the consequences of interactions with shipping vessels remain largely unknown. This knowledge gap exists for several reasons: difficulty in studying species because of their behaviour, rarity, or remoteness; changes in species movement over time, affecting the ability to predict interactions;[50] or under-reporting of interactions. To be able to reduce the impact of ship traffic, lane boundaries and speed limits on shipping lanes[51] that intersect with mammal migration should be imposed.

The real impact of shipping is noise pollution. This noise pollution comes from the sound emitted from the ship's propeller. This noise pollution can interfere with mammals' directional sonar. Mammals in navigating the oceans and communicating

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44 Destyan H.Sujarwoko, "Ikan Hiu Paus Terdampar di Pantai Tulungagung Akhirnya di Kubur", *Antara*, accessed 15 Agust 2021, https://www.antaranews.com/berita/2118570/ikan-hiu-paus-terdampar-di-pantai-tulungagung-akhirnya-dikubur.

45 Panji Prayitno, "Nasib Tragis Pau Terdampar di Perairan Bungko Cirebon", *Liputan6*, accessed 15 August 2021, https://www.liputan6.com/regional/read/4529126/nasib-tragis-paus-terdampar-di-perairan-bungko-cirebon.

46 Fatkhul Maskur, "Bangkai Paus Terdampar Susah Dikubur, Begini Solusinya"*, Bisnis.com*, accessed 15 August 2021, https://ekonomi.bisnis.com/read/20210613/99/1404928/bangkai-paus-terdampar-susah-dikubur-begini-solusinya.

47 United Nations Conference on Trade and Development/UNCTAD, *50 Years of Review of Maritime Transport, 1968-2018: Reflecting on The Past, Exploring the Future*; (United Nation: Geneva, 2018), 4. *See also* Vanessa at.al, Consequences of Global Shipping Traffic for Marine Giants, *The Ecological Society of America, Front Ecol Environ* 17, no. 1, (2019), 39.

48 United Nations Conference on Trade and Development/UNCTAD, *50 Years of Review of Maritime Transport, 1968-2018: Reflecting on The Past, Exploring the Future*, (United Nation: Geneva, 2018), 7-8.

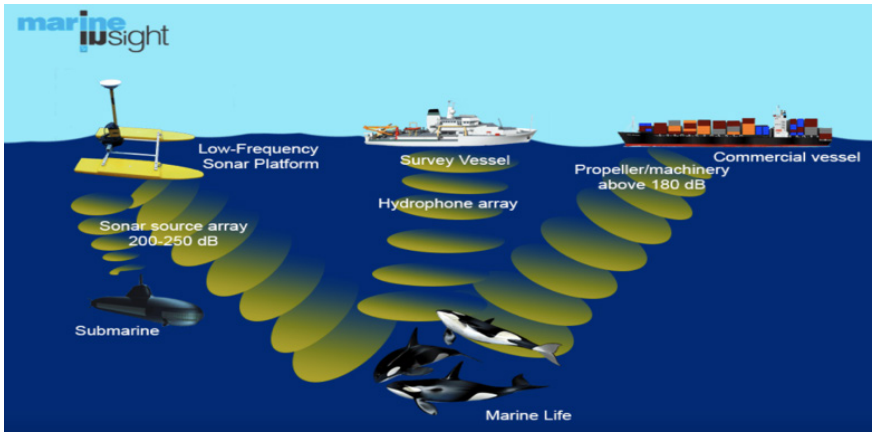
49 United Nations Conference on Trade and Development/UNCTAD, *Review of Maritime Transport 2019*, (United Nation: Geneva, 2019), 6.

50 *Ibid*, Vanessa Pirotta, 41.

51 *Ibid*, Vanessa Pirotta, 44.

with their groups use sonar at a certain frequency, and the impact of noise pollution caused by ship propellers disrupts the ability of marine mammals to use this sonar to determine their route as well as communication within the group.[52] As a result, multiple cases of stranded marine mammals (whales) off the coast of Indonesia, are often found stranded in groups.[53]

Figure 4
Noise Pollution from Ships



Sources: Marine Insight, https://www.marineinsight.com/environment/effects-of-noise-pollution-from-ships-on-marine-life/, last accessed on16 August 2021.

Another harm of ship propellers to migrating whales is slash wounds. Currently, the concern is that marine mammals that are stranded, there are also cases of dead marine mammals found with wounds on their bodies which were obviously caused by the propellers of passing ships.[54] These cases are not exclusive to Indonesia, but around the world as well. In 2019, Francis Perez, a photographer published a photo of a whale calf with an almost severed tail.[55]

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52 John Barton, et.al, Cost-Effective Sensors, Interoperable With International Existing Ocean Observing Systems, To Meet EU Policies Requirements, *Proceedings of the 8th International Conference on Sensing Technology*, (Liverpool, Sep. 2-4, 2014), 2-6-207.

53 *Ibid*, Vanessa Pirotta, et.al; Andrew J. Wright, Reducing, *Impacts of Human Ocean Noise on cetaceans: Knowledge Gap Analysis and Recommendations,* (WWF International : Gland, Switzerland, 2014), 38-40.; G. Carleton Ray, *Marine Conservation: Science, Policy, and Management*, (Wiley Blackwell: West Sussex, UK, 2014), 27; Linda S. Weilgart, Brief Review of Known Effects pf Noise on Marine Mammals, *International Journal of Comparative Psychology*, Vol. 20, no. 2, (2015), 163-164; Christine Erbe, et.al, "The Effects of Ship Noise on Marine Mammals-A Review", *Frontiers in Marine Science* 6, no.606, (2019), 13.

54 Luh De Suriyani, "Tiga Hiu Paus Terdampar Lalu Mati di NTT", mongabay.co.id, accessed 15 August 2021, https://www.mongabay.co.id/2017/10/02/tiga-hiu-paus-terdampar-lalu-mati-di-ntt/. *See also* Theresia Felisiani, "Bangkai Paus Sperma dengan Tubuh Penuh Luka Mengmbang di Perairan Serangan Denpasar", Tribun, accessed 15 August 2021, https://www.tribunnews.com/regional/2020/11/17/bangkai-paus-sperma-dengan-tubuh-penuh-luka-mengambang-di-perairan-serangan-denpasar.

55 Francis Perez (@francisperez000), "A Whale Calf with an Almost Severed Tail Canary Island Spain", Instagram photo 15 August 2021, https://www.instagram.com/FrancisPerez000/?utm_source=ig_embed. *See also* Secretariat of the Convention on Biological Diversity, *CBD Tecchnical Series No. 67 Impacts of Marine Debris on Biodiversity: Current Status and Potential Solutions*, (Secretariat of CBD; Quebec, 2012), 9.

Figure 5
Whale with Sliced, at Nangalili Beach, Manggarai, NTT, Indonesia, 2017.

Sources: Mongabai, Tiga Hui Paus Terdampar Lalu Mati di NTT, https://www.mongabay.co.id/2017/10/02/tiga-hiu-paus-terdampar-lalu-mati-di-ntt/, last accessed 15 August 2021.

In addition to the two hazards above, shipping activities also cause water pollution that damages marine biodiversity.[56] In 2017, a Bergen University study surprisingly found a lot of plastic waste in a whale's stomach,[57] like many mammals (whales) that because stranded and died in Indonesia in 2018 and 2019.[58]

Dumping is another contributor to marine pollution, and if law enforcement officials do not carry out proper supervision, ships may illegally dump their waste while sailing.[59] These human activities cause damage to the marine ecosystem where these marine mammals live and migrate.

The protection of marine mammal migration routes has been regulated in various laws and regulations. The IMO and its various regulations have regulated safe shipping procedures to protect marine mammals. These regulations started from the regulation regarding noise pollution (MSC91/22/Add.1, Annex 1), Pollution from the ship (The International Convention for the Prevention of Pollution from Ships), Dumping (Convention on the Prevention of Marine Pollution by Dumping of

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56 *Ibid,* Secretariat of CBD, 8; This book explains that the major perceived threats to marine biodiversity include the effects of climate change, ocean acidification, invasive species, overfishing and other extractive activities, pollution and marine debris, habitat degradation, fragmentation and loss, human population expansion, tourism, and the impact of a wide range of human activities in the coastal zone.

57 The Straits Times, "Thirty Plastic Bangs Found in Dying Whale's Stomach", Straits Times, accessed 20 August 2021, https://www.straitstimes.com/world/europe/thirty-plastic-bags-found-in-dying-whales-stomach.

58 Sari Novita, "Perut Bangkai Paus Penuh Sampah, Masih Mau Buang Sampah Ke Laut?", Pusat Riset Laut Kelautan (PUSRIKEL) Kementerian Kelautan dan Perikanan, accessed 20 August 2021, http://pusriskel.litbang.kkp.go.id/index.php/home/2076-perut-bangkai-paus-penuh-sampah-masih-mau-buang-sampah-ke-laut. *See also* Wahyu Candra and Jay Fajar, "Ditemukan 5.9 Kg dalam Perut Paus Sperma di Wakatobi, Kok Bisa?", mongabay.co.id, accessed 20 August 2021, https://www.mongabay.co.id/2018/11/20/ditemukan-59-kg-sampah-dalam-perut-paus-sperma-di-wakatobi-kok-bisa/.

59 Athanasios Valavanidis and Thomais Vlachogianni, "Marine Litter: Man-made Solid Waste Pollution in the Mediterranean Sea and Coastline. Abundance, Composition and Source Identification," *Science Advances on Environmental Chemistry, Toxicology and Ecotoxicology*, (January 2012), 3.

Wastes and Other) Matter 1972 and the London Convention). The implementation of these provisions is expected to prevent harm to whales, considering that whales cannot adapt to humans, but humans with science and technology will be able to accommodate whales.

The above will certainly be different from the protection of mammal migration routes in the Indonesian Archipelagic Sea-lane. Considering that there are provisions regarding "unobstructed passage" in it, there should be no restrictions on shipping there.[60] Indonesia already has three ASL routes (ASL I, ASL II, and ASL III) which require every State to travel only on these routes.[61] However, it is contested whether Indonesia can impose restrictions on ship sailings by prioritizing mammals. At this time there are many marine mammals stranded in several parts of Indonesia, which is thought to be due to the disruption of mammalian explorer sonar from noise pollution released from ships.

According to the research analysis, when faced with prioritizing passing mammals over passing ships, the answer should certainly be to prioritize passing mammals. Even though there is an unobstructed passage requirement, the government must take steps to record the exact schedule for the passing mammal group and inform IMO so that it can implement procedures for crossing in ASL Indonesia to cross marine mammals. For example, Alaska has implemented voluntary codes of conduct that regulate the safety of shipping and marine mammals simultaneously.[62] This arrangement does not mean to disturb or prevent ships from passing with inherent unobstructed rights. However, it only regulates the time-division between ships and marine mammals.[63]

Currently, the Indonesian government has promulgated Decree of the Minister of Transportation of the Republic of Indonesia Number Km 129 of 2020 concerning Route Determination in the Lombok Strait, determining that a shipping separation chart for ships coming from the north and south and sailing along with the traffic separation chart (traffic separation scheme). Lombok Strait must be aware of two conservation areas or protected areas, namely Nusa Penida and Gili Matra (Gili Meno, Gili Air, and Gili Trawangan).[64] Currently, the Indonesian government and the international community must pay attention to the meaning of 'unobstructed passage.' Art 53, UNCLOS 1982, states that there should be no unobstructed passage for ships passing through right archipelagic sea lanes passage.

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60 Art. 53 (1) UNCLOS 1982

61 Annex 9, Resolution MSC 72(69), Adoption, Designation and Substitution of Archipelagic Sea Lanes, adopted on 19 May 1998.

62 Today at Glacier Bay National Park and Preserve has specific marine mammal regulations. Vessel entry permits are required - consult National Park Service officials. *See also* NOAA Fisheries 150th Anniversary, accessed 26 August 2021, https://www.fisheries.noaa.gov/alaska/marine-life-viewing-guidelines/alaska-marine-mammal-viewing-guidelines-and-regulations,

63 National Oceanic and Atmospheric Administration, *5 Thing You Can Do to Reduce the Risk of Whale Strike*, NOAA, accessed 26 August 2021, https://media.fisheries.noaa.gov/dam-migration/2016-06-17_top_5_flyer.pdf.

64 Indonesia, Minister of Transportation Decision No. KM 129 of 2020 on Route Designation within Lombok Strait, 26.

This raises a dilemma for the Indonesian archipelagic state if it restricts sailing procedures as Atlanta applies safe shipping procedures to marine mammal crossing routes. Accordingly, in the future, it is necessary to have a common perception regarding the meaning of unobstructed passage and rearrangement of procedures for crossing the ALS zone that overlaps with marine mammal crossing routes.

V. CONCLUSION

The interests of marine mammal migration and shipping interests can be harmonized considering that humans with reason, science, and technology are able to adapt to the habits of marine mammals that cannot be changed and are essential to the survival of their species. (we do not change nature, but humans with their intellect, science, and technology should adapt to the environment). In this case, with science and technology, it is shipping that must adapt to nature, we must not change the habits and sailing routes of marine mammals because they have determined their routes naturally.

It is proper for the law to prioritize the protection of marine ecosystems over purely commercial interests, especially marine mammals along with marine mammal crossing routes as regulated in Article 64 UNCLOS on highly migratory species. IMO as a special organization that regulates commercial shipping, in its arrangement, that every ship sailing must protect the environment. UNCLOS has also regulated environmentally friendly sailing procedures to regulations regarding noise levels from ships so as not to disturb the frequency of the sound of the animals in the sea which in this case are marine mammals. The rigidity of the provisions that have been issued by IMO regarding sailing procedures, up to the type of ship sailing, proves that the interests of environmental protection are a priority in terms of shipping, this is in accordance with the principle of sustainable development that development must be protected by environmental protection

Regarding Indonesia, currently, there are no special provisions regarding migratory aquatic mammals. Considering that several straits in Indonesia are intersections between shipping routes and sea mammal migration routes, it is appropriate for the Indonesian government together with IMO and user states to make provisions regarding sailing procedures at certain seasons for marine mammals to pass. Inner ships pass when crossing certain straits in the seasons these marine mammals pass in the same sea. This does not mean that the Indonesian government forbids ships to pass, considering that some seas in Indonesia are archipelagic sea lanes that have unobstructed passage provisions.

This restriction does not interfere with shipping or prohibits sailing, but merely regulates shipping in certain straits and does not interfere with passing marine mammals. Ships using the right of archipelagic sea passage should also comply with environmental interests even though the unobstructed principle is attached to them,

and the Government of Indonesia must begin to record the seasons, types, habits of marine mammals and at what depth these marine mammals swim so that the interests of fish crossing with the interests of navigation can be synced.

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