The International Legal Framework of Marine Sand Mining and its Environmental Impact: A Comparative International, Regional and National Analysis

Author: Riley Weyman
R.Weyman@Dal.ca
514-715-0261
5656 Morris Street, Unit 1,
Halifax, NS, B3J 1C5

Abstract

With the important role marine sand plays in the global economy, safe and environmentally sound extraction practices are necessary to preserve and protect the environment. This paper will look at the international legal framework for regulating marine sand extraction. It analyses key international and regional treaties and legal mechanisms relating to marine sand mining. It also provides a case study of a country in each region discussed. This paper finds that the current international legal framework for regulating marine sand extraction lacks cohesive global standards and monitoring mechanisms. A lack of awareness concerning the issue and the shortfalls of the legal framework have allowed for marine sand and aggregate extraction to cause significant damage to marine and coastal environments around the world. This paper calls for the implementation of clear global standards, industry best practice and monitoring mechanisms for marine sand and aggregate extraction. This paper looks at expanding successful regional organization models or incorporating specific requirements into international conventions as possible methods for establishing these measures.

Table of Contents

Introduction

Marine sand mining is becoming an increasingly popular way to meet the global demand for sand, but unfortunately the current international legal framework governing the extraction process has been unable to prevent serious damage to the marine environment.[1] This paper will provide an overview of the reasons for the rise in demand for marine sand and discuss the environmental consequences of the extraction process. It will then analyse the existing international legal framework for the regulation of marine sand mining and examine ways to increase accountability for the resulting environmental damage. It will also review certain regional and national regulatory models in an effort to suggest ways to strengthen regulations in the future. This will be done through an overview of some of the key international treaties for protecting the marine environment as well as a discussion on the regional cooperative efforts being made in the North Atlantic, South Pacific, and South East Asian regions.[2] The regional discussion will be followed by a case study profiling a country in each region (the United Kingdom, New Zealand and Cambodia). The paper will then outline some key areas and opportunities for change in an effort to bring more exposure to the issue and more clarity to the legal framework for regulating marine sand mining.

The Rise in Demand for Marine Sand and its Environmental Consequences

Sand has long been an important resource in our global economy. Spurred by our insatiable appetite for development and the construction projects necessary to meet it, sand has

[1] Pascal Peduzzi, "Sand, rarer than one thinks", online: (2014) 11 Environmental Development 208 at 210-212, 214 <www.journals.elsevier.com/environmental-development> [Peduzzi].

[2] The international treaties that will be discussed are: the *United Nations Convention on the Law of the Sea*, the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* (*London Convention*) and the *Convention on Biological Diversity*. The regional treaties what will be discussed are: the *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region* (*Noumea Convention*), the *Convention for the Protection of the Marine Environment of the North-East Atlantic* (*OSPAR Convention*) and agreements made by the Association of Southeast Asian Nations (ASEAN).

become the second most consumed natural resource in the world after fresh water.[3] A large part of the increased global demand for sand stems from it being a main component in construction materials such as cement and brick, but its diversity of uses in glass, plastics and technology components have also contributed to its increased demand.[4]

A consequence of the increased demand for sand has been the depletion of some countries' terrestrial sand reserves and an increasing need for alternate sources of sand such as marine sand and seabed aggregate.[5] One might question the need for marine sand when some countries have vast amounts of desert sand at their fingertips. Unfortunately, not all types of sand can be used for all purposes. Wind is a much more abrasive force than water, and as a result, desert sand consists of significantly finer and smoother grains than marine sand.[6] This results in desert sand being unsuitable for most construction uses as the smooth grains are not able to stick together as effectively. This means that marine sand has become a much more necessary and profitable commodity even though it must be washed of the corrosive salt content before it can be used to make cement and other construction material.[7]

The coarseness and consistency of sea sand also makes it a suitable material for large-scale land reclamation initiatives. These efforts to artificially extend countries' coast lines have been a major player in the demand for marine sand. Some of the first land reclamation projects were to expand ports and harbours to increase ship access and improve the flow of trade.[8] More recently, with population pressures and as urban land prices skyrocket, countries like Singapore

---

[3] Marius Dan Gavriletea, "Environmental Impacts of Sand Exploitation. Analysis of Sand Market", online: (2017) 9:7 Sustainability 1118 at 1 <www.mdpi.com/journal/sustainability> [Gavriletea].
[4] *Ibid*.
[5] Peduzzi, *supra* note 1 at 210.
[6] Gavriletea, *supra* note 3 at 2.
[7] Peduzzi, *supra* note 1 at 210.
[8] René Kolman, "New Land By the Sea: Economically and Socially, Land Reclamation Pays", (May 2012), International Association of Dredging Companies, online: <www.iadc-dredging.com/en/90/publications/articles/> at 1.

and Dubai have used major land reclamation projects to expand their borders or create artificial islands for urban housing. Dubai's series of artificial islands including the luxury residential developments "The Palm Jumeirah" and "The World" required more than 800 million tonnes of sand and exhausted the entirety of the city's marine sand resources.[9] To meet the demands of their rapidly growing population and the corresponding infrastructure demands, Singapore has artificially expanded their land area by over 20% in the last 40 years.[10] This series of land reclamation projects has been a contentious issue with Singapore's neighbouring South East Asian nations and led to numerous bans on exporting marine sand to Singapore.[11]

Many of these bans were triggered by the serious environmental impact extracting marine sand can have on the environment.[12] Much of the marine sand used in these construction and land reclamation projects is extracted through a process called dredging. Dredging involves either suctioning sand directly from the sea floor, or drilling into the sea floor and suctioning the sand and aggregate that comes loose. It is then either transported on the dredging boat or piped to the coastal area where the sand is offloaded or deposited. This process has been shown to have significant direct impacts on seabed flora and fauna, and resulting impacts on local livelihoods.[13] It can also lead to serious cases of coastal beach erosion which place populations in low lying island states at risk.[14]

[9] Peduzzi, *supra* note 1 at 210.
[10] *Ibid* at 211.
[11] *Ibid*.
[12] *Ibid* (i.e. Indonesia's ban was triggered by the disappearance of over 20 Indonesian sand islands that was reportedly caused by dredging sand for export to Singapore).
[13] *Ibid* at 210-212.
[14] *Ibid* at 212.

One of the main reasons marine aggregate extraction operations continue to pose such a serious risk to the environment is the lack of clear and cohesive legislation over marine aggregate exploitation.[15] There are currently no comprehensive global standards and governance is left to a layered patchwork of international and regional treaties and national regulations.[16] Coastal states enjoy the exclusive rights to explore and exploit natural resources in the seabed of the waters of their territorial seas, exclusive economic zone and continental shelf.[17] With the bulk of marine aggregate extraction carried out at depths of less than 50 meters, extraction operations are largely regulated and licensed at the national level.[18] These national regulations should however reflect the coastal state's international and regional commitments.

International Treaties and Legal Mechanisms

International treaties drafted to protect the marine environment were largely driven by concerns over pollution from ships and land-based sources.[19] As a result, the early treaties were often focused on pollution prevention and abatement, but have evolved to include conservation efforts and the protection of biodiversity.[20] This evolution highlights the incorporation of many customary international legal and soft law principles and approaches to environmental management into international environmental treaties.[21] An in-depth analysis of these key environmental legal principles and approaches is beyond the scope of this paper.[22]

---

[15] *Ibid* at 214.
[16] *Ibid* at 216.
[17] Rolandas Radzevičius et al, "Marine Aggregate Extraction Regulation in EU Member States" (2010) Journal of Coastal Resources 15 at 17 [Radzevičius].
[18] Peduzzi, *supra* note 1 at 216.
[19] Cecilia A Low, "Marine Environmental Protection in Joint Development Agreements" (2012) 30:1 Journal of Energy & Natural Resources Law 45 at 49 [Low].
[20] *Ibid*.
[21] See e.g. *Convention on Biological Diversity*, 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) [*CBD*].
[22] For further reading on the precautionary principle, the transboundary harm principle, the ecosystems approach, sustainable development and others, see generally Phillippe Sands and Jacqueline Peel, with Adriana Fabra and Ruth Mackenzie, *Principles of International Environmental Law*, 3rd ed (Cambridge: Cambridge University Press, 2012) at ch 6 (overview of general principals and rules relating to international environmental law) [Sands]; Ved P Nanda

There are currently over 200 multilateral treaties and agreements that govern the protection of the marine environment.[23] Many of these treaties are broad, foundational documents that can be directly or indirectly applied to the governance of marine sand extraction. However, the broad scope of these treaties and agreements reduce their effectiveness at directly combating the environmental problems caused by marine sand mining. This paper will highlight the application of the *United Nations Convention on the Law of the Sea* ("*UNCLOS*")[24], the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter* ("*London Convention*")[25] and the *Convention on Biological Diversity* ("*CBD*")[26] to marine sand extraction.

United Nations Convention on the Law of the Sea

UNCLOS is a comprehensive legally binding convention that was established with the goal of bringing legal order to the sea and promoting the peaceful, equitable and efficient use of its resources while striving to protect and preserve the marine environment.[27] It was adopted in 1982 and has since been ratified by 168 parties.[28] Article 192 gives States a wide ranging and unfettered obligation to protect and preserve the marine environment.[29] *UNCLOS* also delineates the maritime zones that provide coastal states with the sovereign rights to explore, exploit,

---

& George (Rock) Pring, *International Environmental Law and Policy for the 21st Century*, 2nd revised ed (Leiden: Martinus Nijhoff, 2013) at ch 2 [Nanda]; Alistair Rieu-Clarke, *International Law and Sustainable Development: Lessons from the Law of International Watercourses*, (London: IWA 2005) at chs 2-4 (Overview of sustainable development in the international law context).

[23] International Union for Conservation of Nature, United Nations Environment Program & Food and Agriculture Association of the United Nations, "Treaties" (19 April 2018), ECOLEX, online: <www.ecolex.org/result/?type=treaty> (filters: sea + multilateral).

[24] *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) [*UNCLOS*].

[25] *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 29 December 1972, 1046 UNTS 120 (entered into force 30 August 1975) [*London Convention*].

[26] *Supra* note 21.

[27] *UNCLOS*, *supra* note 24 at 25.

[28] *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 3, online: United Nations Treaty Collection <treaties.un.org> (status of treaty).

[29] *UNCLOS*, *supra* note 24 at 101.

manage and conserve the natural resources of the seabed and its subsoil.[30] When read together, Articles 208 and 214 call for coastal states to adopt and enforce laws and regulations to "prevent, reduce and control pollution of the marine environment arising from or in connection with seabed activities subject to their jurisdiction".[31] These articles would directly capture marine aggregate extraction activities and create a legally binding obligation for States to regulate these activities within their jurisdiction with a goal to limit their impact on the environment. Unfortunately, the treaty does not elaborate on or provide guidance as to the substance of such laws and regulations, or potential guidelines to minimizing the impacts of these activities. It only notes that "such laws, regulations and measures shall be no less effective than international rules, standards and recommended practices and procedures".[32] With no direct international standards for marine aggregate extraction, this provision falls back on applying the precautionary approach and employing best environmental practice, a strategy that leaves significant room for varied interpretation.[33]

Article 194(2) provides that "States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment".[34] This essentially codifies the long standing customary principle of international law to prevent transboundary environmental harm. It is especially relevant to sand mining in South East Asia due to the proximity of the neighbouring countries and the trade of dredged sand. This will be considered further when analysing Cambodia's domestic regulation of sand mining later in this paper.

---

[30] *Ibid* at 43-44.
[31] *Ibid* at 104, 108.
[32] *Ibid* at 104.
[33] Peduzzi, *supra* note 1 at 10-11.
[34] *UNCLOS*, *supra* note 24 at 101.

UNCLOS also contains a provision mandating the monitoring of risks and effects of pollution of the marine environment and requiring the results be compiled into reports, published and made available to the international community.[35] States are also compelled to undertake environmental assessments when the State has "reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment".[36] These are also important measures for protecting the marine environment from pollution, but by leaving the extent of the monitoring and environmental assessment to the discretion of the member parties, their effectiveness remains tied to the member country's national regulatory efforts.

As a binding treaty, *UNCLOS* contains provisions outlining the responsibility and liability for ratifying states in respect to their commitments to protect and preserve the marine environment. Article 235 clearly provides that all parties are responsible for fulfilling these obligations under the convention and are consequently liable in accordance with international law.[37]

Despite the liability provisions, few countries have been held accountable under *UNCLOS* for the environmental damage their dredging and land reclamation activities have caused. This is largely because countries have been reluctant to initiate a dispute under *UNCLOS* for environmental damage resulting from these activities unless the activities also threatened their sovereignty. The only disputes under *UNCLOS* relating to the environmental impacts of dredging and land reclamation found to have been decided through arbitration are the *South*

[35] *Ibid* at 103.
[36] *Ibid* at 104.
[37] *Ibid* at 116.

China Sea Arbitration[38] and *Malaysia v Singapore*.[39] Although China does not accept the ruling, the *South China Sea Arbitration* resulted in the decision that (amongst other things) China's land reclamation initiatives breached several *UNCLOS* provisions relating to the preservation and protection of the marine environment.[40] However, these findings were auxiliary to the main thrust of the arbitration which centered around sovereignty claims. Similarly, in *Malaysia v Singapore*, in addition to their ruling on sovereignty issues, the International Tribunal for the Law of the Sea found that Singapore had violated several provisions of *UNCLOS* and directed Singapore not to conduct its reclamation in ways that might cause serious harm to the marine environment.[41] These rulings show that states can be held responsible for the environmental damage caused by their marine aggregate extraction operations, but they also highlight the reluctance of states to bring forward environmental claims on their environmental merits alone.

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter

Another key international treaty regulating pollution and damage to the marine environment is the 1972 *London Convention* and its corresponding *1996 Protocol*.[42] The *London Convention* was crafted to establish a global commitment to promote the control of all sources of pollution in the marine environment, emphasizing the prevention of polluting the sea by dumping matter that creates hazards or harm to living resources and marine life.[43]

---

[38] *The South China Sea Arbitration* (*The Republic of Philippines v The People's Republic of China)* (2016), PCA Case No 2013-19 (Permanent Court of Arbitration) [South China Sea Arbitration].
[39] *Land Reclamation in and around the Straits of Johor (Malaysia v Singapore)* (2003), ITLOS Case No 12 at 10 (International Tribunal for the Law of the Sea) [*Malaysia v Singapore*].
[40] Harriet Moynihan, "China's Evolving Approach to International Dispute Resolution", (29 March 2017), Chatham House, The Royal Institute of International Affairs, online: <www.chathamhouse.org/research/publications> at 4; *South China Sea Arbitration*, *supra* note 38 at 397.
[41] *Malaysia v Singapore*, *supra* note 39 at 28.
[42] *1996 Protocol to the Convention on the Prevention of Marine pollution by Dumping of Wastes and Other Matter*, 7 November 1996, 36 ILM 1(1997) (entered into force 24 March 2006) [*1996 Protocol*].
[43] *London Convention*, *supra* note 25 at 1-2.

The *London Convention* uses a reverse listing method for determining whether a particular activity is covered by the convention. Unfortunately, despite the significant negative impacts aggregate dredging and land reclamation projects can have on the marine environment,[44] dredged material and any "matter directly arising from, or related to the exploration, exploitation and associated off-shore processing of sea-bed mineral resources" are explicitly exempt from its definition of dumping.[45] This exemption is largely because of the ability to qualify the deposit of dredged material as "placement" instead of "dumping" as the dredged material is often deliberately placed and free from additional harmful substances.

In an effort to strengthen the regulations under the initial convention, the contracting parties agreed to adopt the *1996 Protocol*. The *1996 Protocol* keeps the same wording and reverse listing process for determining what constitutes "dumping", but added several annexes that specify certain wastes and types of matter that may be considered for dumping.[46] Annex 1 specifically lists dredged material as matter that may be considered for dumping as long as the objectives and aims of the convention and protocol are met.[47] This allows for dredged material to be "dumped" or "placed" as long as a permit is obtained from the contracting party's proper authority.[48]

At the 35th Consultative Meeting of the Parties to the *London Convention*, the parties adopted specific guidelines for the assessment of dredged materials that provide clarifications on certain risks inherent in the dredging process and how to enable compliance with the annexes of

[44] Carl H Hobbs "Considerations in Marine Sand Mining and Beach Nourishment" (2007) *OCEANS 2007* 1 at 2 [Hobbs].
[45] *London Convention*, *supra* note 25 at 2, 12.
[46] *Supra* note 42 at 2.
[47] *Ibid* at 17.
[48] *Ibid* at 4.

the *1996 Protocol*.[49] The guidelines offer recommendations for dredge disposal site selection, permit conditions, monitoring and other best practices.[50] Unfortunately, the guidelines are largely focused on how to properly characterize the composition of dredge material and are not as relevant to aggregate dredging and sand extraction as they are to navigation and maintenance dredging.[51]

The *London Convention* could be a potential avenue for strengthening the international governance of sand mining. The *London Convention's* guidelines for assessment of dredged material show that the parties to the convention are aware of the impact dredging is having on the marine environment. Expanding these guidelines to include explicit reference to aggregate dredging and building the guidelines into Annex 1 or a new annex of the *1996 Protocol* could potentially serve as an important tool for establishing more international protection for the marine environment from the consequences of marine aggregate dredging.

Convention on Biological Diversity

The 1992 *Convention on Biological Diversity* is another important international environmental law source relevant to sand mining. The *CBD* was created in an effort to conserve biodiversity and species' natural surroundings, including a requirement to rehabilitate degraded ecosystems.[52] The *CBD* applies to marine sand mining as parties to the convention are required to protect biodiversity and ecosystems from processes and activities that may adversely affect them.[53] They have duties to identify and monitor the impacts of these activities, as well as

[49] *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, "Revised Specific Guidelines for Assessment of Dredged Material" (2013), LC 35/15 Annex at 2 [Dredged Material Guidelines].
[50] *Ibid* at 20, 26-27.
[51] *Ibid* at 14, 4.
[52] *Supra* note 21 at 1, 6.
[53] Alison Swaddling, "Pacific ACP States Regional Environmental Management Framework for Deep Sea Minerals Exploration and Exploitation", (June 2016), Pacific Community, online: <dsm.gsd.spc.int/index.php/publications-and-reports> at 87 [Swaddling].

establish protected areas (including within the marine environment) and conduct environmental impact assessments.[54] This can have an impact on sand mining if mining is carried out in or in proximity to a protected area as the increased water turbidity and other effects of sand dredging have been shown to have serious detrimental effects on ecosystems and biodiversity.[55]

The *CBD* and subsequent work of the parties to the convention create a strong framework for environmental impact assessment ("EIA") and strategic environmental assessment ("SEA") that should be applied to sand mining operations. Article 14 of the *CBD* requires contracting parties to carry out an environmental impact assessment of any proposed project "likely to have significant adverse effects on biological diversity".[56] Through meetings of the parties to the convention, the parties have subsequently endorsed several sets of voluntary guidelines for considering biodiversity and ecosystem services in EIA and SEA.[57] The most recent guidelines were specifically crafted to address EIA and SEA in marine and coastal areas.[58] This series of sets of guidelines advise parties on adequate screening, scoping, assessment, reporting and monitoring practices that should be used to monitor and reduce the environmental impacts of projects like sand mining operations.[59] These guidelines are intended to be adopted by parties and regional authorities and introduced into their national legislation and regulatory schemes.[60]

---

[54] *CBD*, *supra* note 21 at 5-6, 9.
[55] Peduzzi, *supra* note 1 at 212.
[56] *Supra* note 21 at 9.
[57] Secretariat of the Convention on Biological Diversity, "Biodiversity-Inclusive Impact Assessment in the Context of the CBD and the 2030 Agenda: Ways Forward" (Background Paper prepared for the 2017 Annual Conference of the International Association for Impact Assessment, 4-7 April 2017).
[58] *Convention on Biological Diversity, "*Voluntary Guidelines for the Consideration of Biodiversity in Environmental Impact Assessments and Strategic Environmental Assessments in Marine and Coastal Areas" (5 December 2012), UNEP/CBD/COP/DEC/XI/18 at 7 [Marine EIA Guidelines].
[59] *Convention on Biological Diversity, "*Voluntary Guidelines on Biodiversity-Inclusive Environmental Impact Assessment" (15 June 2006), UNEP/CBD/COP/DEC/VIII/28 [EIA Guidelines].
[60] EIA Guidelines, *supra* note 59 at 1; see also Marine EIA Guidelines, *supra* note 58 at 7.

This unfortunately leaves them largely unenforceable at the international level, but offers great guidance on how EIAs and SEAs for sand mining projects should be carried out.

The transboundary environmental harm principle is also codified in Article 3 of the *CBD* requiring States to "ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction".[61] Similar to the transboundary harm provision in *UNCLOS*, this can be an important tool for holding neighbouring countries accountable for the environmental damage caused by their sand mining operations or construction projects. This will be discussed further in relation to Cambodian sand mining operations later in this paper.

Regional Conventions

These international conventions have been supplemented by numerous regional conventions that attempt to provide more guidance for marine sand mining and aggregate extraction. This paper will highlight how the *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region* ("*Noumea Convention*")[62], the *Convention for the Protection of the Marine Environment of the North-East Atlantic* ("*OSPAR Convention*")[63] and agreements made by the Association of Southeast Asian Nations ("ASEAN") relate to marine sand mining.[64]

---

[61] *Ibid* at 4.
[62] *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region*, 24 November 1986, [1986] PITSE 15 at 307 (entered into force 22 August 1990) [*Noumea Convention*].
[63] *Convention for the Protection of the Marine Environment of the North-East Atlantic*, 22 September 1992, 2354 UNTS 67 at 5 (entered into force 25 March 1998) [*OSPAR Convention*].
[64] For further reading on regional conventions relating to marine environmental protection and applicable to marine sand mining see generally Sands, *supra* note 22 at 352-358 (Regional Arrangements); see generally Nanda, *supra* note 22 at 447-452 (Regional and International Conventions).

Convention for the Protection of the Natural Resources and Environment of the South Pacific Region

The *Noumea Convention* is a regional treaty that was adopted in 1986. It was adopted with the objectives of preventing, reducing and controlling pollution from any source, and ensuring sound environmental management and development of natural resources in the South Pacific Region.[65] Article 8 of the convention requires parties to "take all appropriate measures to prevent, reduce and control pollution in the Convention Area, resulting directly or indirectly from exploration and exploitation of the seabed and its subsoil".[66] This would cover sand mining and marine aggregate extraction, but the convention also makes a more explicit reference. Article 13 requires parties to take "all appropriate measures to prevent, reduce and control environmental damage in the Convention Area, in particular coastal erosion caused by coastal engineering, mining activities, sand removal, land reclamation and dredging".[67] This explicit reference to coastal erosion from sand mining identifies one of the major environmental consequences of sand mining and offers an important potential protection for the low-lying island states in the South Pacific Region.

Convention for the Protection of the Marine Environment of the North-East Atlantic

The *OSPAR Convention* is an excellent example of a regional convention that expands on the requirements set out in *UNCLOS* and the *CBD* for protecting the marine environment from sand mining. It was developed recognizing the importance of adopting more stringent regional measures for preserving and protecting the marine environment from pollution and human activities than are afforded by global international conventions or agreements.[68] Annex V was

[65] Swaddling, *supra* note 53 at 86.
[66] *Noumea Convention*, *supra* note 62 at 307.
[67] *Ibid* at 308.
[68] *OSPAR Convention*, *supra* note 63 at 5.

adopted in 1998 and deals with the protection and conservation of the marine environment, focusing on impacts from human activities. It requires contracting parties to "take the necessary measures to protect and conserve the ecosystems and the biological diversity of the maritime area, and to restore, where practical, marine areas which have been adversely affected".[69] Marine sand mining and aggregate extraction would meet the criteria listed in Appendix 3 that helps identify human activities for the purpose of Annex V as sand mining is an intense human activity that can cause adverse and irreversible effects on specific habitats and ecological processes.[70]

Identifying the risks caused by dredging and marine aggregate extraction, the OSPAR Commission adopted a specific agreement on marine aggregate extraction: the "Agreement on Sand and Gravel Extraction".[71] This agreement requires member states to take the "International Council for the Exploration of the Sea ("ICES") Guidelines for the Management of Marine Sediment Extraction" into account when authorising marine sediment extraction.[72] These are best practice guidelines created by the ICES for OSPAR in an attempt to promote more environmentally responsible marine aggregate extraction.[73] This agreement also requires parties' national authorising procedures to take into account the ecosystems approach and strategic environmental assessments.[74]

---

[69] *Ibid* at 27; see also Radzevičius, *supra* note 17 at 18.
[70] *OSPAR Convention*, *supra* note 63 at 32.
[71] *Convention for the Protection of the Marine Environment of the North East Atlantic*, "Agreement on Sand and Gravel Extraction", (2003), OSPAR 2003-15 at para 4.17 [*OSPAR* Sand Agreement]; see also Radzevičius, *Supra* note 17 at 18.
[72] *Ibid*.
[73] The ICES Guidelines for the Management of Marine Sediment Extraction are no longer accessible through ICES' online library of publications, nor are they readily available through standard academic search portals. As a result, a more in depth review of them in this paper is not possible at the moment. The guidelines were however complemented by OSPAR's own "OSPAR Guidelines for the Management of Dredged Material at Sea" in 2014. The new OSPAR guidelines cover dredged material management options, site selection, permitting, monitoring and reporting. See generally *Convention for the Protection of the Marine Environment of the North East Atlantic*, "OSPAR Guidelines for the Management of Dredged Material at Sea", (2014), OSPAR 2014-06.
[74] *OSPAR* Sand Agreement, *supra* note 71 at para 4.17; see also Radzevičius, *Supra* note 17 at 18.

Not only does the *OSPAR Convention* identify sand and gravel extraction and offer guidelines on sustainable management practices, the OSPAR Commission also maintains monitoring and reporting functions and publishes assessments. In their 2009 assessment of sand and gravel extraction, they identified that at the time of reporting, most but not all parties had adopted the ICES guidelines into their national regulation and guidance, and urged all contracting parties to adopt the guidelines. This highlights, that despite the positive initiatives the OSPAR Commission is making in an effort to address the environmental effects of marine sand extraction, there is still a disconnect from countries international/regional promises and their national regulations.

ASEAN Agreements and Policies

In South East Asia, the international environmental agreements and policies adopted by ASEAN have been more disjointed and less effectively implemented than some of the conventions in other regions. The 1985 ASEAN *Agreement on the Conservation of Nature and Natural Resources* ("*1985 Agreement*") is considered the region's only "hard law" or legally binding agreement relating to natural resources and relevant to marine sand mining.[75] Even with this designation, the agreement has not yet entered into force as only three of the six signatory states have ratified it.[76] In the years since the *1985 Agreement*, the ASEAN cooperation has produced numerous other environmental action plans and agreements (i.e. the *ASEAN Strategic Plan on the Environment*, the *2008-2012 ASEAN Environmental Education Action Plan II)* that were considered "soft law instruments" and not fully enforced.[77] The state of environmental

[75] Erlyn Rachelle K Macarayan, Melissa Curley & Mark Western, "The Southeast Asian Politics of Natural Resource Use: Impacts on Food and Health Inequalities" (Paper delivered at the Australian Political Studies Association Annual Conference 2013, 30 September 2013) at 3-4 [Macarayan].
[76] *Ibid* at 3; see also ASEAN Legal Instruments, "ASEAN Agreement on the Conservation of Nature and Natural Resources" (19 April 2018), ASEAN, online: <http://agreement.asean.org> (filters: Natural Resources).
[77] Macarayan, *supra* note 75 at 4.

cooperation in South East Asia is particularly disappointing in relation to sand mining as the region has been facing some of the most intensive environmental impacts from these mining activities.

The inadequate enforcement of these agreements has been attributed to the heterogeneity in the governance structures of the countries, and the lack of a central ASEAN bureaucracy.[78] These political and institutional issues have been linked to the "ASEAN Way" which embraces principles of non-interference, consensus and organizational minimalism.[79] With no central ASEAN bureaucracy, implementation of the environmental policies and regional cooperation is entirely dependent on the individual countries and their environment ministers.[80]

National Legislation

With international conventions mandating the adoption of state laws and regulations to protect and preserve the marine environment and biodiversity, and regional conventions offering more guidance, but again deferring licensing and permitting to states, the bulk of marine sand mining legislation is established and enforced at the national level. This paper will profile the national regulation of marine sand mining of a country from each of the regions discussed above to analyse the implementation of regional and global commitments at the national level. The countries profiled will be Cambodia, New Zealand and the United Kingdom.

Cambodia

After the constitution, Cambodia's primary document for the protection of the environment is the *1996 Law on Environmental Protection and Natural Resource Management* ("*Law on Environment*"). The general provisions of the *Law on Environment* require the state to

[78] *Ibid* at 4.
[79] *Ibid* at 2, 4.
[80] *Ibid* at 4.

"protect and promote environmental quality and public health through the prevention, reduction, and control of pollution" and to "ensure rational and sustainable conservation, development, management, and use of the natural resources of the kingdom of Cambodia".[81] They also require the state to, assess the environmental impact of all proposed projects prior to issuance of a decision by government, encourage and engage public participation and suppress any harmful acts to the environment.[82] Article 8 is of particular relevance to sand mining as it includes "sand" as a natural resource that shall be conserved, developed, managed, and used in a rational and sustainable manner.[83] The *Law on Environment* also contains provisions for monitoring, record-keeping and inspections as well as extensive penalties for violating the provisions including fines and jail time.[84]

Following their continued effort to provide guidelines for EIA, in 1999, Cambodia adopted the *Sub-Decree on Environmental Impact Assessment* ("*Sub-Decree*").[85] The *Sub-Decree* expands on the provisions in the *Law on Environment* and explicitly includes mining and dredging in the attached annex of activities requiring EIA.[86] Cambodia continues to make efforts to update their EIA framework, working on draft EIA legislation that adopts the precautionary principle and appears to fall in line with international standards.[87]

---

[81] Food and Agriculture Organization of the United Nations, "Law on Environmental Protection and Natural Resource Management (Cambodian Legislation)" (24 December 1996), FAOLEX, LEX-FAOC019300 at 1, online: <www.fao.org/faolex/country-profiles/en> (more accessible translation of official Cambodian legislation) [*Law on Environment*].
[82] *Ibid*.
[83] Cambodian Center for Human Rights, Briefing Note, "The Human Rights Impacts of Sand Dredging in Cambodia" (September 2016), online: <https://cchrcambodia.org> at 4 [CCHR].
[84] *Law on Environment*, *supra* note 81 at 3-5.
[85] Food and Agriculture Organization of the United Nations, "Sub-Decree on Environmental Impact Assessment Process (Cambodian Legislation)" (11 July 1999), FAOLEX, LEX-FAOC027446, online: <www.fao.org/faolex/country-profiles/en> (more accessible translation of official Cambodian legislation) [*Sub-Decree*].
[86] *Ibid* at 10-11.
[87] CCHR, *supra* note 83 at 5.

In Cambodia, the management of sand and other mined mineral resources is controlled by the 2001 *Law on Mineral Resource Management and Exploitation* ("*Law on Resources*").[88] This law requires all companies extracting mineral resources to hold a valid license issued by the government and conduct operations in accordance with the *Law on Environment*.[89] Under the *Law on Resources*, Cambodia has also recently put the Ministry of Mines and Energy in charge of issuing sand dredging licenses and turned the Committee on Sand Resources Management into an oversight and advisory body.[90]

It appears that Cambodia has a substantial legal framework for regulating marine sand mining and mitigating its environmental damages, but enforcement has been a serious problem. Part of this has been attributed to the government's policy regarding marine sand mining being in a constant state of flux over the last decade.[91] Following the lead of several other South East Asian nations, Cambodia banned the exportation of dredged sand in 2009 until further environmental assessment could be completed.[92] The exports were being made in an effort to meet Singapore's insatiable demand for sand to continue their construction and land reclamation projects after they exhausted their local resources.[93] However, there is evidence that dredging and exports along Cambodia's coast have actually increased since the ban was made in 2009.[94] Though there is a lack of transparency in the allocation of licenses for marine sand mining in Cambodia, it appears that the bulk of licenses have been awarded to two main actors with strong political ties who made their fortunes through logging and extracting other Cambodian

---

[88] *Ibid*.
[89] *Ibid*.
[90] *Ibid*.
[91] *Ibid* at 7.
[92] *Ibid*.
[93] Global Witness, Report, "Shifting Sands: How Singapore's demand for Cambodian sand threatens ecosystems and undermines good governance" (May 2010), online: <www.globalwitness.org/en/reports/shifting-sand> at 27-28 [Global Witness].
[94] Global Witness, *supra* note 93 at 7; see also CCHR, *supra* note 83 at 8.

resources.[95] Some of these operations have even been granted licenses to dredge in protected areas without evidence of substantial EIAs and management plans.[96]

These circumventions of Cambodia's laws are not only in clear contravention of domestic laws, but also their international commitments under *UNCLOS* and the *CBD*. There is clear transparency and capacity issues at play here hindering enforcement on the domestic level.

However, it appears that Singapore should also share in the blame. Singapore considers itself a regional leader in environmental policy and sustainable development, yet it continues to be the main driver of Cambodia's sand exports and the environmental degradation that it causes.[97] As a signatory to *UNCLOS* and the *CBD*, Singapore (and its nationals) have the same responsibilities as Cambodia to protect the marine environment and ecosystems within their jurisdiction from degradation, but also the marine environment at large.[98] As noted earlier, Article 194(2) of *UNCLOS* requires that "States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment".[99] This transboundary harm principle is also re-iterated in the *CBD*.[100]

Global Witness, a prominent environmental and human rights NGO has compiled a report showing direct ties between the Cambodian dredging companies, Singaporean sand importers, construction companies and the Singaporean government.[101] The report also contains

[95] Global Witness, *supra* note 93 at 5.
[96] *Ibid* at 23.
[97] *Ibid* at 30, 2.
[98] *Ibid* at 31.
[99] *Supra* note 28 at 101.
[100] *Supra* note 21 at 4.
[101] Global Witness, *supra* note 93 at 32.

evidence that these Singaporean companies are sourcing their imported sand from dredge sites inside Cambodia's recognized protected areas or close to internationally significant habitats.[102]

Singapore has denounced these claims in a statement claiming "the import of sand to Singapore is done on a commercial basis. The Singapore government is not a party to any agreement or contract for the import of sand".[103] If these claims of Singapore's government action in the import of Cambodian sand can be substantiated, they may potentially be susceptible to liability for transboundary harm under *UNCLOS* or the *CBD* due to their contractual involvement in Cambodian sand mining.[104]

Substantiating claims of the Singapore government's involvement in importing Cambodian sand could also pressure them to adopt a sustainable sand sourcing policy or risk losing their status as an international leader in environmental sustainability.[105] If the claims are substantiated, Singapore's environmental management practices would be undermined by their involvement with environmentally unsound practices in Cambodia. Adopting a sustainable sand sourcing policy that would restrict imports from environmentally unsound and unsustainable suppliers would protect their status and would pressure Cambodia to become more environmentally conscious or lose out on their largest export market for their dredged sand.[106] Adopting a strong stance on sustainable sourcing of sand could also prove to effect greater regional cooperation on marine sand mining as exemplified by the success of the Singapore led initiative to combat transboundary haze.[107]

---

[102] *Ibid*.
[103] *Ibid* at 29.
[104] A full analysis of the transboundary harm principle in relation to marine sand mining is beyond the scope of this paper, but an interesting area for further research. For further reading on the transboundary harm principle's application to international environmental law see Nanda, *supra* note 22 at 23.
[105] Global Witness, *supra* note 93 at 3.
[106] *Ibid.*
[107] *Ibid* at 32.

New Zealand

In New Zealand, marine sand mining and aggregate extraction along with all offshore mining activities are controlled by the *Crown Minerals Act 1991*.[108] Under the act, permits and regulatory compliance are managed by the New Zealand Petroleum and Minerals agency.[109]

Environmental protection from minerals activities is either provided by the *Resource Management Act 1991* ("RMA") or the *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* ("EEZ Act") depending on the location of the activity.[110] The RMA covers activities in the coastal areas or territorial sea up to 12 nautical miles from the mean high water line.[111] The EEZ Act covers activities from beyond 12 nautical miles to the extended continental shelf boundary.[112] The two acts serve similar purposes as they were both created to promote the sustainable management of natural resources by restricting activities and requiring assessments of their potential environmental effects and impacts.[113] They also contain many similar provisions for managing environmental impacts as outlined in Table 1 below.[114]

Table 1
Comparison of RMA and EEZ Act approaches to managing environmental impacts.

Attribute	EEZ Act	RMA
Purpose of the Act - promote the sustainable management of natural resources	Yes – s10	Yes – s5
Meaning of environmental effect – including cumulative effects; regardless of scale, intensity, duration, or frequency; consider potential effect of high probability, and low probability with high impact	Yes – s6	Yes – s3
Requirement for assessment of effects of an activity	Yes – s39 (Impact assessment)	Yes – s88(2)(b) Assessment of Environmental Effects (AEE) plus Schedule 4
General duty to avoid, remedy or mitigate effects	Yes – s25(1)(a)	Yes – s17
National instruments	Yes – Regulations e.g., to define permitted and non-notified activities	Yes – national policy statements e.g., coastal and freshwater management; national environmental standards; air quality
Regional instruments	No	Policy statements and plans
Different classes of activities and consenting regime	Yes – s35, 36, 37 permitted, discretionary, prohibited	Yes – s77A(2) permitted, controlled, restricted discretionary, discretionary, non-complying or prohibited
Risk based approach to effects management	Yes – evidenced by categories of activities, definition of effect, level of detail required for impact assessment based on scale and significance of activity, use of adaptive management and bonds	Yes – evidenced by categories of activities, definition of effect, level of detail required in AEE based on scale and significance of activity, use of bonds (Rouse & Norton 2010)
Precautionary approach	Explicit – s61	Implicit
Adaptive management	Explicit – s64	Implicit

[108] *Crown Minerals Act 1991* (NZ), 1991/70 RS; see also Joanne I. Ellis et al, "Environmental Management Frameworks for Offshore Mining: the New Zealand Approach" (2017) 84 Marine Policy 178 at 180 [Ellis].
[109] Ellis, *supra* note 108 at 180.
[110] Ellis, *supra* note 108 at 180; *Resource Management Act 1991* (NZ), 1991/69 RS; *Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012* (NZ), 2012/72 RS [EEZ Act].
[111] Ellis, *supra* note 108 at 180.
[112] *Ibid*.
[113] *Ibid* at 181.
[114] *Ibid.*

An important part of the environmental impact assessment approaches for both acts is genuine and effective participation with the Māori and assessing a project's impact on cultural values.[115] This is one of the reasons why New Zealand is internationally recognized for their environmental management and regulatory frameworks.[116] Both the EEZ Act and RMA recognize the important connection between the Māori and the oceans and work this cultural element into their resource consenting processes through consultation.[117]

Through their mandatory EIAs, cultural competence and other requirements, these acts show that New Zealand has an extensive framework for managing environmental impacts from and licensing the extraction of marine minerals, but they are not providing guidance directly for marine sand mining.

In their most recent *Coastal Policy Statement* (a national policy statement under the RMA), they briefly refer to sand mining as a commercial activity demanding coastal resources, but they do not refer to it as one of their key issues facing the coastal environment.[118] This is unfortunate as they have numerous references to coastal erosion as a key issue (Policies 10, 19, 24), but unlike Article 14 of the *Noumea* Convention, none list sand mining as a cause.[119] This shows a potential missed opportunity for adopting their regional commitments to regulate sand mining at the national level.

The United Kingdom

As a party to *UNCLOS*, the *CBD*, and the *OSPAR Convention*, the United Kingdom has worked to incorporate their international commitments to protect the marine environment into

[115] *Ibid* at 182.
[116] *Ibid* at 178.
[117] *Ibid* at 178, 182.
[118] New Zealand Department of Conservation, *New Zealand Coastal Policy Statement 2010*, (Wellington: Publishing Team Department of Conservation, 2010) at 5 [*Coastal Policy Statement*].
[119] *Coastal Policy Statement*, *supra* note 118 at 16, 20, 24.

their national legal framework. Their core document protecting the marine environment and coastal natural resources is the *2009 Marine and Coastal Access Act* ("MCAA").[120] The MCAA under Article 66(9) requires a marine license before any form of dredging in the UK marine licensing area can occur. The Marine Management Organization ("MMO") oversees the issuance of marine licenses in England.[121] In order to qualify for a license for marine aggregate extraction, the MMO facilitates forming a contract between the applicant and the land-owner (typically the Crown Estate).[122] Once permission from the land-owner is approved by the MMO, the MMO ensures that EIA regulations and the requirements of the regulations on conservation of habitats and species are applied.[123] The process is supposed to be transparent and provide extensive opportunities for pre-consultation and public engagement.[124] There is additional non-statutory consultation that is supposed to be carried out after a draft proposal is submitted in order to identify outstanding concerns and afford the applicant an opportunity to propose ways to manage, mitigate and monitor the concerns.[125] The final check, if the environmental consequences are deemed acceptable, is to ensure that the application is compliant with existing government policy and marine plans (i.e. UK Marine Policy Statement).[126]

Having identified the environmental damages arising from aggregate dredging, the goal of this approach is to ensure the long-term sustainability of the available resources by minimising

[120] *Marine and Coastal Access Act* 2009 (UK), c 23; see also International Council for the Exploration of the Sea, Report, No 330, "Effects of Extraction of Marine Sediments on the Marine Environment 2005-2011" (February 2016), online: <www.ices.dk/publications> at 160 [ICES Report].
[121] ICES Report, *supra* note 120 at 161.
[122] Marine Management Organisation, "Guidance on Activities that May Require a Marine Licence" (2 October 2014), Government of the United Kingdom, online: <www.gov.uk/government/publications>.
[123] British Marine Aggregate Producers Association & The Crown Estate, Guidelines, "Good Practice Guidance: Extraction by Dredging of Aggregates from England's Seabed" (April 2017), online: <www.bmapa.org> at 5 [BMAPA Guidelines].
[124] BMAPA Guidelines, *supra* note 123 at 5.
[125] *Ibid*.
[126] *Ibid*.

the footprint of dredging on the seabed, minimising adverse environmental impacts, and mitigating the effects of dredging on other seabed users.[127] To facilitate meeting these goals, the government has released a series of Marine Minerals Guidance Notes offering guidance on mitigation, environmental assessment and monitoring criteria.[128] The Marine Minerals Guidance Notes incorporated the ICES Best Practice Guidelines mandated by the *OSPAR Convention*, but have recently been supplanted by a 2017 good practice guideline report produced by the Crown Estate and the British Marine Aggregate Producers Association ("BMAPA").[129] The new report offers extensive guidance and justification for continued regional environmental assessment, coastal impact studies, resource assessment surveys, and pre, post and operational phase monitoring.[130]

Some of the practices outlined in the report are simply guidelines of best practice, but the report also outlines where a certain practice is required. One of the strongest monitoring provisions is the requirement for all dredging vessels extracting aggregate within national jurisdiction to operate an Electronic Monitoring System ("EMS").[131] These monitoring systems have been installed on "every dredging vessel working licensed areas since 1993" and automatically transmits secured data on the location and nature of the dredging taking place.[132] The data is then reviewed monthly and compared to the conditions of the vessel's dredging license. Each license is also audited annually to ensure operations are within the imposed regulatory conditions.[133] This monitoring and review capacity is key to the successful enforcement of the UK's marine sand mining regulations.

---

[127] *Ibid*.
[128] ICES Report, *supra* note 120 at 160.
[129] BMAPA Guidelines, *supra* note 123 at 2.
[130] *Ibid* at 10-13.
[131] *Ibid* at 13.
[132] *Ibid*.
[133] *Ibid*.

The BMAPA is the trade association for Britain's aggregate extraction industry. In addition to partnering with the Crown Estate to develop the good practice guidelines for the industry, in a concerted effort at transparency, BMAPA has been producing annual sustainability reports and making them publicly available on their website. These annual reports are supposed to provide background data which may be useful for other organizations, government policy makers and marine planning authorities.[134] Unfortunately the most recent sustainable development report available on their website is from 2014, so it appears that they are not fully meeting their transparency goals.[135]

A Call for Change

The multi-layered nature of the international legal framework for the protection of the marine environment makes a comprehensive review on the regulation of the aggregate extractive industry difficult. Despite their international and regional commitments, it is often challenging to find up to date information on national efforts to combat the issue, and up to date national legislation is not always readily available.[136] Even in countries where institutional capacity should not be an impediment, transparency and reporting are not always carried out.[137] The lack of clear and consistent monitoring and reporting is an issue that must be addressed by the international community. Some of the regional bodies under regional conventions have done a good job of clarifying and advising on implementation of international commitments and best practices for the industry, but others have lagged behind.

[134] *Ibid* at 17.
[135] British Marine Aggregate Producers Association, "Reference Library" (19 April 2018), BMAPA, online: <www.bmapa.org/downloads/reference.php>.
[136] It can be very difficult to find up to date and English versions of Cambodian laws.
[137] Radzevičius, *supra* note 17 at 35.

A full-fledged international moratorium on sand mining and aggregate extraction is not feasible, nor desirable. It has shown to be an important economic driver in many countries and is integral to the construction supply chain.[138]

What is needed is more uniform international monitoring and reporting as well as implementation of international best practices guidelines. This could be an effective way to bring clarity to the regulatory sphere and ensure that marine aggregate extraction is carried out in a sustainable and minimally impairing way. For practical and sovereignty reasons, the licensing and permitting of marine dredging in coastal waters must be executed at the national level, but establishing international monitoring and reporting standards and creating a global monitoring mechanism would bring clarity and help to bridge the current knowledge and data gap attached to marine sand mining.[139] A global monitoring and data collection mechanism would also increase exposure to the issue and raise the level of political concern attached to the problem, hopefully leading to an international framework that improves extraction governance.[140]

A model for this monitoring and data collection mechanism could be the International Council for the Exploration of the Sea. ICES is a regional organization committed to sustainable ocean use and protection of the marine environment. They promote and conduct research as well as coordinate oceanic and coastal monitoring to advise international commissions and governments on marine policy and management.[141] ICES generates and delivers scientific reports, information and management advice to its 20 member countries as well as international commissions like the OSPAR Commission and the Baltic Marine Environment Protection

[138] BMAPA Guidelines, *supra* note 123 at 2.
[139] Peduzzi, *supra* note 1 at 215.
[140] *Ibid*.
[141] *Convention for the International Council for the Exploration of the Sea*, 12 September 1964, 652 UNTS 237 at 1-2 (entered into force 22 July 1968).

Commission (HELCOM).[142] They produce regular consolidated reviews on marine sand mining and the effects of marine sediment extraction on the marine environment which outline the regulatory efforts, achievements and shortcomings of all their member countries.[143] They also publish annual reports on the findings and efforts of their expert working group on the effects of extraction of marine sediments on the marine environment. They only service the North-Atlantic Region, but their effective monitoring and reporting methods could be a model for a global monitoring mechanism. This could be effected either by expanding ICES's service area to the global scale, or having other regional organizations adopt the same standards and functions. More research would need to be done on the feasibility of expanding ICES' mandate on such a wide scale and whether there are enough adequate regional organizations with the capacity to implement the ICES standards and functions in their respective regions.[144]

Another option for bringing clarity to the regulatory sphere would be to build uniform guidelines into the *London Dumping Convention* or another international convention. The parties to the *London Dumping Convention* could expand their *Revised Specific Guidelines for Assessment of Dredged Material* to include specific monitoring and reporting requirements as well as incorporating industry best practices similar to the ICES or BMAPA guidelines. This could be a more feasible option as it could be done relatively easily through a decision at a meeting of the parties. For this to be successful it would be important to promote their use and mandate uniform regional and national adoption.

---

[142] International Council for the Exploration of the Sea, "What We Do" (19 April 2018), ICES, online: <www.ices.dk>.
[143] see e.g. ICES Report, *supra* note 120.
[144] One potential option could be to have ICES' standards and functions implemented through Regional Seas Programmes, see "Why does working with regional seas matter?" (accessed 20 January 2019), online: *United Nations Environment Programme* <www.unenvironment.org/explore-topics/oceans-seas/what-we-do/working-regional-seas/why-does-working-regional-seas-matter>.

A possible way to improve regional cooperation in South East Asia, where some of the environmental impacts of marine sand mining are most prevalent, is to create international and regional obligations to source sustainable sand for construction and land reclamation projects. This would need to be joined by increased transparency, but could be an effective way to bring change in the region. With Singapore being the world's largest importer of sand, if they committed to and enforced sustainable sand sourcing it would force more sustainable extraction practices in countries like Cambodia or bar them from an important market.[145] This would need to come in tandem with the increased transparency and monitoring, but could be effective given Singapore's current global rank of #6 on Transparency International's 2017 Corruption Perceptions Index.[146]

An alternative to obligations to source sand sustainably would be Singapore implementing an ethical buying provision for their sand imports.[147] This could include a portion of the export tax paid by the importing country being allocated to an environmental protection fund in the exporting country.[148] These two options should be explored further as the current export bans in the region have been ineffective as they inflated the price of sand and appear to have increased illegal sand mining and trafficking.[149]

---

[145] Peduzzi, *supra* note 1 at 211.
[146] Transparency International, Index, "Corruption Perceptions Index 2017" (21 February 2018), online: <www.transparency.org>.
[147] Maria Franke, "When One Country's Land Gain is Another Country's Land Loss…: The Social, Ecological and Economic Dimensions of Sand Extraction in the Context of World-Systems Analysis Exemplified by Singapore's Sand Imports" (2014) Institute for International Political Economy Berlin Working Paper No 36/2014 at 32 [Franke].
[148] Franke, *supra* note 147 at 32.
[149] *Ibid*.

Conclusion

Driven by the world's appetite for development, the current use rates for sand far exceed their natural renewal rates. The exhaustion of certain terrestrial reserves has brought sand mining into the oceans and brought with it complex environmental and regulatory issues.

The current international legal framework for regulating marine sand mining and aggregate extraction consists of a multi-layered web of international and regional commitments, but regulation is largely left to national legislation and implementation. The lack of awareness concerning the issue and absence of global standards and monitoring mechanisms have allowed the detrimental effects of dredging to occur around the world.[150]

While alternatives to sand are being explored for use in the construction industry, the demand for sand is continuing to grow exponentially in certain countries.[151] Before widespread alternatives are commercially available and demand decreases, increased international cooperation is necessary to combat the detrimental environmental effects of marine sand mining.

Global standards for monitoring, data collection and reporting as well as international guidelines on industry best practices need to be adopted and implemented at the national, regional and international level. With this comes a need for increased transparency and sustainable sand sourcing policies. Possible options for establishing these global standards are expanding the ICES model to other regional organizations, or incorporating specific monitoring and reporting requirements as well as industry best practices for marine sand mining into the *London Convention* guidelines. These measures would help bring clarity and coherence to the international legal framework for regulating marine sand mining and aggregate extraction, and hopefully lead to increased awareness and more sustainable development practices.

[150] Peduzzi, *supra* note 1 at 215.
[151] Gavriletea, *supra* note 3 at 1.