

Cracks in the Sandbox: Mobilizing Existing International Legal Tools to Fill Gaps in Sand Mining Regulations

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Abstract

Sand sustains the foundations of modern economies, but almost nothing exists in the way of global sand regulation and governance. Despite the documented risks posed by rampant, unregulated extraction, a global governance regime is unlikely to emerge any time soon. This Comment argues that possible governance solutions will need to come from what we currently have in the legal toolbox. In other words, existing frameworks, principles, and lessons from case law must be drawn upon and refitted to tackle some of the most salient issues caused by sand mining. This Comment aims to illustrate that even a highly fractured legal landscape can still offer invaluable guidance moving forward. To that end, this Comment also explores the first possible steps toward a global governance framework. Specifically, countries should take advantage of low-hanging fruit—easy opportunities to integrate sand into existing frameworks and concepts—in order to patch critical regulatory gaps and establish a foundation for future cooperative efforts.

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I. INTRODUCTION

The modern world may run on oil and gas, but it is built on sand.¹ Without sand, there would be “no concrete, no asphalt, no glass to build the necessary schools, hospitals, roads, solar panels, and other necessary infrastructure” of modern civilization.² Sand is a crucial component not only for buildings and infrastructure, but also for the very ground beneath our feet—land reclamation creates valuable real estate through the use of sand.³ In many ways, sand sustains the foundations of modern economies.

The global economy depends on sand and the world uses nearly fifty billion tons of it every year.⁴ Indeed, “no other resource is extracted and traded on such an epic scale, bar water.”⁵ Between the years of 2011 and 2013, China used more cement than the United States did during the entire 20th century (the use of sand and cement are tightly correlated).⁶ By 2030, it is predicted that the global demand for sand will rise to nearly sixty billion tons per year as a result of increasing population, urbanization, and economic growth in Asia, Africa, and Latin America.⁷

The voracious consumption of sand has not been without consequence—sand is fast becoming a scarce resource.⁸ At first blush, this idea may seem entirely improbable; sand is often assumed to be infinite in nature.⁹ Yet, only certain kinds of sand are commercially valuable.¹⁰ Specifically, the sand found in shorelines and from the beds of rivers and lakes is most ideal for construction purposes,¹¹ while sand taken from the ocean and desert is undesirable because of

¹ See Marco Hernandez et al., *The Messy Business of Sand Mining Explained*, REUTERS (Feb. 18, 2021), <https://perma.cc/SKQ8-ET2V>.

² U.N. ENV'T PROGRAMME, SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS FOR ENVIRONMENTAL GOVERNANCE OF GLOBAL SAND RESOURCES 1 (2019) [hereinafter SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS], <https://perma.cc/MA9C-5PE5>.

³ Vince Beiser, *Why the World Is Running Out of Sand*, BBC (Nov. 17, 2019), <https://perma.cc/DQR7-26W7>.

⁴ Cam Dinh, *Asia's Hunger for Sand Is Harmful to Farming and the Environment*, ECONOMIST (Jan. 17, 2020), <https://perma.cc/454C-R93E>.

⁵ *Id.*

⁶ *Id.*

⁷ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 3.

⁸ *An Improbable Global Shortage: Sand*, ECONOMIST (Mar. 30, 2017), <https://perma.cc/AZ5D-3NL7>.

⁹ U.N. ENV'T PROGRAMME, SAND AND SUSTAINABILITY: 10 STRATEGIC RECOMMENDATIONS TO AVERT A CRISIS 8 (2022) [hereinafter SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS], <https://perma.cc/FJ3Y-LMDQ>.

¹⁰ See *An Improbable Global Shortage: Sand*, *supra* note 8.

¹¹ See Hernandez et al., *supra* note 1.

its size and shape.¹² Inherent limitations on the use of sand coupled with increasing demand have proven problematic as extraction rates outpace existing supply and the natural rate of replenishment.¹³ The global sandbox is leaking—fast.

While sand is a crucial resource for economic development and growth, the same rules, practices, and ethics do not govern usage worldwide.¹⁴ Gaps in the current governance structure for managing sand resources have led to severe social, economic, and international consequences.¹⁵ Unregulated sand mining has disrupted local livelihoods, devastated aquatic ecosystems, and completely erased at least two dozen islands in Indonesia.¹⁶ Sand extraction has also become a serious cross-border issue due in part to “sand extraction bans, international sourcing of sand for land reclamation projects, and . . . uncontrolled sand extraction beyond national borders.”¹⁷ China has been accused of illicitly hauling and selling off thousands of tons of sand taken from Taiwanese waters.¹⁸ And Singapore’s prodigious consumption of sand for land reclamation triggered a series of export bans from neighboring Indonesia, Malaysia, Vietnam, and Cambodia.¹⁹

Although sand mining has received more coverage in recent years, current legal frameworks have been found wanting.²⁰ Existing international treaties, laws, standards, and best practices merely provide “[an incomplete] foundation.”²¹ Where sand extraction is currently implicated or discussed by international convention, it confusingly “crosses extractives, water management, coastal zone management, biodiversity conservation legal systems and best practices.”²² Moreover, scholarship on the matter remains scattered and underdeveloped as sand mining continues to elude popular attention and notice.²³

¹² See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 3.

¹³ See *id.* at 1.

¹⁴ See *id.* at 6.

¹⁵ See *id.* at 6–7.

¹⁶ See Vince Beiser, *Sand Mining: The Global Environmental Crisis You’ve Probably Never Heard Of*, GUARDIAN (Feb. 27, 2017), <https://perma.cc/M952-3HKL>.

¹⁷ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 7.

¹⁸ See Elisabeth Braw, *China Is Stealing Taiwan’s Sand*, FOREIGN POL’Y (July 11, 2022), <https://perma.cc/C88N-5JXF>; see also Christina Lu, *The Great Sand Grab*, FOREIGN POL’Y (Feb. 2, 2022), <https://perma.cc/C7HS-UVTV>.

¹⁹ Beiser, *supra* note 3.

²⁰ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at xv.

²¹ *Id.* at 19.

²² *Id.* at xv.

²³ See SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at VII (“global attention about the sheer scale and impact of sand extraction remains limited”).

“If we can get a grip on how to manage the most extracted solid material in the world, we can avert a crisis.”²⁴ In the shadow of uncertainty, addressing the issues caused by sand mining will require reaching for tools that we currently have access to. Although these tools may be flawed because they require modification to suit a different purpose and context, deliverance in the form of a perfect solution (like a comprehensive, governing treaty) simply may not arrive in time. Thus, the fundamental question this Comment seeks to address is how existing international legal tools could be utilized to tackle some of the most salient issues caused by sand extraction.

This Comment proposes and envisions several possibilities for filling gaps in sand mining regulations. It proceeds as follows. Part II provides an overview of sand and why it is so critically important to modern development. Attention is given to the value of sand, methods of extraction, and the dangers posed by ever-increasing consumption. Importantly, this Part preemptively limits the scope of this Comment by recognizing that the most problematic extraction of sand occurs in rivers and on seashores.

Part III reviews background law and provides a sketch of the current governance structure on sand. Several international conventions and principles are selected for their promise in addressing concerns with sand.

Part IV analyzes three critical cases from international environmental law: the Pulp Mills dispute, the Nicaragua-Costa Rice dispute, and the South China Sea Arbitration. Lessons from these cases illustrate the value of existing international law when applied to sand extraction. From these lessons, a possible global governance standard and the first steps toward such a standard are envisioned. Arguably, “low-hanging fruit” opportunities should be exploited first;²⁵ sand should be integrated into preexisting frameworks that would most easily accommodate the inclusion of sand while still addressing its most serious ailments.

Part V concludes by recognizing that any potential framework should go beyond sub-national and national standards. Without an internationally integrated view on the governance, planning, and management of sand, extraction risks falling between the cracks into informal, or even illegal, practices.²⁶ Although local solutions will be important, sand mining has firmly established itself as a cross-border issue with international ramifications. International law is the right tool to patch the cracks in the sandbox.

²⁴ Press Release, U.N. Env’t Programme, Our Use of Sand Brings Us “Up Against the Wall”, Says UNEP Report (Apr. 26, 2022), <https://perma.cc/UH8H-6LH2>.

²⁵ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 22.

²⁶ *Id.* at xv.

II. WHY DOES SAND MATTER?

A. Defining Sand

The United Nations (U.N.) Environmental Programme (UNEP) distinguishes between two primary types of sand: mineral sands and aggregates.²⁷ The former contains metals and minerals (like ilmenite, rutile, and zircon) that can be used in the industrial production of pigments, plastics, and other products.²⁸ Mineral sand is typically mined from river banks and coasts.²⁹ “Aggregates,” on the other hand, is a generic term that refers to crushed rock, sand, and gravels.³⁰ Aggregates (hereinafter used interchangeably with “sand” or “sand resources”) are the primary point of concern since more aggregates are extracted from nature than any other material after water.³¹

B. Extracting Sand

Generally, sand and gravel are mined from terrestrial and marine deposits.³² Terrestrial sand deposits include areas suitable for open pit mining (such as floodplains, glacial sediments, and dunes) and freshwater systems like riverbanks and river channels.³³ Marine aggregate extraction occurs “in shallow waters and during the dredging of ports, nourishment operations, and land reclamation.”³⁴ Methods of extraction range from dredging boats with powerful vacuums to just bare hands and shovels.³⁵ Aggregate extraction is not a particularly difficult or complex process; “it’s easy to pull [sand] grains up with suction pumps or even buckets, and easy to transport once you’ve got a full boatload.”³⁶

Sand mining involves a wide range of actors, from large, formal companies to smaller, individual miners who often mine “in circumstances of poverty” as a cash-in-hand livelihood.³⁷ As a consequence, the sand mining industry is “highly fragmented” and “dominated by small and medium-sized companies, with the

²⁷ *Id.* at 3.

²⁸ *Id.*

²⁹ *Id.*

³⁰ *Id.*

³¹ *Id.* at 4.

³² See Aurora Torres et al., *Sustainability of the Global Sand System in the Anthropocene*, 4 ONE EARTH 639, 641 (2021).

³³ *See id.*

³⁴ *Id.*

³⁵ See Mette Bendixen et al., *Time Is Running Out for Sand*, NATURE (July 2, 2019).

³⁶ Beiser, *supra* note 3.

³⁷ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 3.

top ten producers combined representing less than 5% of global production.”³⁸ Industry fragmentation hinders the ability to monitor actors involved in the sand trade; the field has been left both unregulated and underregulated as a result.³⁹

The paucity of solid information plagues any discussion of sand mining.⁴⁰ The global sand supply is unknown; “very few countries know with enough detail the extraction quantities per year, the uses, and related environmental and socio-economic issues.”⁴¹ Even the U.N. has been forced to rely on cement production data to roughly approximate the annual rate of sand extraction.⁴² Current estimates are simply “too unreliable” and “undoubtedly too low.”⁴³ No one knows exactly how much sand is being pulled from the earth, nor where, nor under what conditions.⁴⁴

C. Appraising Sand

Sand is the unrecognized hero of human development.⁴⁵ All countries and most economic sectors require sand in some shape or form.⁴⁶ At a basic level, sand helps maintain ecological biodiversity, support economic development, and secure local livelihoods.⁴⁷ But perhaps more crucially, sand has become a “foundational” material in construction and industrial production worldwide.⁴⁸ It is an essential element of “urbanisation and infrastructure, water treatment, land reclamation, hydrological fracturing techniques (better known as gas fracking) and industrial production of electronics, cosmetics and glass.”⁴⁹ For construction purposes alone, nearly 50 billion metric tons of sand are consumed on an annual basis—there is little sign that demand will abate any time soon.⁵⁰

Sand is all around us—whether in its natural state or as a component of our modern life. The widespread proliferation of sand can be attributed to three

³⁸ See Aurora Torres et al., *supra* note 32, at 642.

³⁹ See SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 3.

⁴⁰ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 9.

⁴¹ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 33.

⁴² Lu, *supra* note 18.

⁴³ Bendixen et al., *supra* note 35.

⁴⁴ Beiser, *supra* note 3.

⁴⁵ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at VII.

⁴⁶ See *id.*; see also Morning Edition, *World Faces Global Sand Shortage*, NPR (July 21, 2017), <https://perma.cc/D57T-B63Q> (discussing how sand is used in concrete, glass, and silicon chips).

⁴⁷ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at VII.

⁴⁸ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 1.

⁴⁹ *Id.* at 3.

⁵⁰ Sam Meredith, *A Sand Shortage? The World Is Running Out of a Crucial—But Under-Appreciated—Commodity*, CNBC (Mar. 5, 2021), <https://perma.cc/EP56-8FZQ>; see also R.S., *Why There Is a Shortage of Sand*, ECONOMIST (Apr. 24, 2017), <https://perma.cc/L3CT-5QPX>.

factors: low cost, versatility, and ease of acquisition.⁵¹ Yet, as mentioned above, not all kinds of sand are actually useful. Ocean and desert sands are entirely unsuitable for construction since the former is too salt-riddled while the latter (though plentiful) is “unusable for most purposes because its wind-smoothed grains render it non-adherent for the purposes of industrial concrete.”⁵² The most optimal sand grains have angular edges and can lock together; they are typically extracted from rivers, coastlines, quarries, and the seabed.⁵³

Inherent limitations on the kinds of sand that can be used form the basis for current global concerns: limited deposits of valuable sand are being consumed faster than the natural rate of replenishment, leading to shortage.⁵⁴ We simply cannot extract more than fifty billion tons of sand per year without leading to massive impacts on the planet and on people’s lives.⁵⁵

D. Limitations on Comment Scope

The multifaceted nature of sand extraction requires certain limitations on scope. To begin, this Comment is chiefly concerned with sand mining in rivers and on sea shores, as this is where extraction has surged the most to meet increased global demand for sand.⁵⁶ Although sand extraction of this type constitutes approximately 10% of total global demand (with the remaining 90% coming from terrestrial quarries and sand and gravel pits), this “relatively small part of aggregates consumption [causes] severe concern due to negative environmental and social impacts.”⁵⁷

While this Comment recognizes that sand mining is a highly localized issue, a cross-border perspective remains the priority for analysis.⁵⁸ Demand for sand knows no national boundaries: “sand is the world’s most extracted resource after water, accounting for the vast majority—nearly 85%—of global mining operations.”⁵⁹ Countries like the United Arab Emirates and Saudi Arabia have stomached high transportation costs to import sand from Australia—a phenomenon emblematic of sand mining’s international reach.⁶⁰ And while the

⁵¹ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 1.

⁵² *Id.* at 3.

⁵³ See Meredith, *supra* note 50.

⁵⁴ See R.S., *supra* note 50.

⁵⁵ See Beiser, *supra* note 3.

⁵⁶ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 4.

⁵⁷ *Id.* at 4.

⁵⁸ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 6, 13 (“Every location from where sand is extracted has a unique environmental, social, political, and economic setting that shapes its sustainability”).

⁵⁹ See Lu, *supra* note 18.

⁶⁰ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 8.

economics of sand extraction usually dictate that locally extracted sand service local markets,⁶¹ mining in areas like the Mekong River illustrate how a global issue can be played out even at the local scale.⁶² An international perspective is necessary as the activities of millions of individuals mining sand in thousands of places accumulate at the local, national, and (ultimately) global level.⁶³

E. International Consequences of Sand Extraction

“Sand is ‘perceived as cheap, available and infinite and that is partly because the environmental and social costs are pretty much not priced in.’”⁶⁴ These costs—the impacts of sand extraction—should be discussed. While sand mining is often viewed as a localized industry with purely local consequences, extraction is fast becoming a cross-border issue with serious international ramifications.⁶⁵ Two examples should be considered: (1) the rise of land reclamation and (2) the impact on shared bodies of water.

1. Land Reclamation

Consider the international impact of land reclamation. To put it simply, reclamation involves filling bodies of water with sand, soil, and rock to extend and create new physical areas for development.⁶⁶ Sand is a crucial ingredient in this process and enables the conversion of rivers, bays, and oceans into valuable living and economic spaces.⁶⁷ Since 1985, coastal regions around the world have gained more than 5,237 square miles of land through reclamation.⁶⁸ Reclaimed land accounts for 25% of Hong Kong’s developed land, with 70% of Hong Kong’s business activity concentrated on such land.⁶⁹ Dubai has even built entire artificial landmasses from scratch.⁷⁰

⁶¹ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 13.

⁶² Beth Timmins, *How the Scramble for Sand Is Destroying the Mekong*, BBC (Dec. 19, 2019), <https://perma.cc/HX4G-QNWM> (illustrating further that Singapore continues to import sand from Cambodia despite a supposed ban in place).

⁶³ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 13.

⁶⁴ See Meredith, *supra* note 50 (quoting Louise Gallagher, environmental governance lead at the Global Sand Observatory, an initiative of the UNEP and GRID-Geneva).

⁶⁵ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 5.

⁶⁶ See Philip Heller, *Walking on Water: The Significance of Land Reclamation in Hong Kong and Singapore*, FORBES (May 26, 2021), <https://perma.cc/BLX3-ET5P>.

⁶⁷ *Id.*

⁶⁸ Alister Doyle, *Coastal Land Expands as Construction Outpaces Sea Level Rise*, REUTERS (Aug. 25, 2016), <https://perma.cc/NMZ8-CVNN>.

⁶⁹ See Heller, *supra* note 66.

⁷⁰ Beiser, *supra* note 3.

Singapore's experience with land reclamation exemplifies the international consequences lurking behind domestic sand consumption. Over the past twenty years, Singapore has used nearly 517 million tons of sand for land reclamation;⁷¹ its territory expanded by an additional fifty square miles as a result.⁷² Territorial growth is an essential component of Singapore's economic development and success;⁷³ its main airport (Changi) and central business district were constructed on reclaimed land.⁷⁴

But Singapore has been forced to import its sand from other countries.⁷⁵ It ran out of its own stock a long time ago.⁷⁶ To fuel its growth, Singapore reached out across the region; mining operations in neighboring Indonesia, Malaysia, Thailand, and Cambodia flourished in response to this demand.⁷⁷ Over time, the consequences of excessive mining began to manifest and sparked a series of export bans in its wake.⁷⁸ Nationalists grew to resent the sale of even a single grain of their territory;⁷⁹ sand miners were decried for “digging [up their countries] and giving her to other people.”⁸⁰

Yet, these bans on sand extraction did little to deter demand and have ultimately been of little consequence.⁸¹ Singapore simply reorganized its sand-supply network in response.⁸² Western Australia became a key supplier in 2020 and has since shipped more than 1.1 million tons of sand to Singapore.⁸³ Since land reclamation (and by extension, a steady supply of sand) forms an essential element of Singapore's continued fiscal and political success, sand remains a resource that appears well worth the environmental harm and geopolitical tension that it produces.⁸⁴

⁷¹ See Heller, *supra* note 66.

⁷² Beiser, *supra* note 3.

⁷³ *Such Quantities of Sand*, ECONOMIST (Feb. 26, 2015), <https://perma.cc/B9ZA-WQMZ>.

⁷⁴ See Heller, *supra* note 66.

⁷⁵ *Id.* (noting that Singapore is “the world’s largest sand importer”).

⁷⁶ *Such Quantities of Sand*, *supra* note 73.

⁷⁷ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 8.

⁷⁸ See *Such Quantities of Sand*, *supra* note 73.

⁷⁹ *Id.*

⁸⁰ Heller, *supra* note 66.

⁸¹ See Aurora Torres et al., *supra* note 32, at 643; see also *Feeding Singapore’s Hunger for Sand*, ASEAN POST (Nov. 26, 2018), <https://perma.cc/8A26-85GE> (noting that “the volume of sand that has been leaving Cambodia over the last 10 years is absolutely illegal; way beyond the government’s permitted limits”).

⁸² See Aurora Torres et al., *supra* note 32, at 643.

⁸³ *Id.*

⁸⁴ See Joshua Comaroff, *Built on Sand: Singapore and the New State of Risk*, HARV. DESIGN MAG. (2014), <https://perma.cc/VQX8-9V7X>.

2. Shared Bodies of Water

Increased demand for sand has produced dangerous consequences for the health of rivers, lakes, and coastlines shared between neighboring countries.⁸⁵ Some of the most problematic extraction occurs in these dynamic environments where stakeholders at multiple levels hold an interest.⁸⁶ Aggressive extraction leads to pollution and changes in pH levels, increased flood frequency, and the loss of key species.⁸⁷ Moreover, coastal and river systems can be destabilized by aggressive aggregate removal: “riverbed incision, reduced sediment flow, and the degradation of coastal habitats can impair a system’s resilience, leading to riverbank collapse and delta erosion thereby threatening local communities.”⁸⁸ In the Hanjiang River basin of China, sand mining has seriously undercut water levels and negatively impacted the riverine environment and the spawning grounds of migratory fish.⁸⁹

But a bigger problem looms on the river banks far south of the Hanjiang—river sand mining is contributing to the “slow-motion disappearance” of the Mekong.⁹⁰ The Mekong River runs through six countries (China, Myanmar, Thailand, Laos, Cambodia, and Vietnam) from its source on the Tibetan Plateau to its mouth at the South China Sea.⁹¹ Sand plays a “vital role” for the Mekong’s health: it replenishes soil, carries nutrients, and preserves the physical shape of the river beds and delta.⁹² Succinctly put, sand is critical to the ecological functioning of the Mekong River basin.⁹³

Despite the vital importance of the Mekong, nearly fifty-five million tons of sand⁹⁴ are indiscriminately extracted every year through riverbed mining for use in land reclamation and construction.⁹⁵ The Mekong River basin, which was “pristine” until just two decades ago, is now divided between multiple

⁸⁵ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 5.

⁸⁶ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 23.

⁸⁷ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 6.

⁸⁸ Aurora Torres, et al., *supra* note 32, at 643.

⁸⁹ See Weiwei Hu, *Impacts of Human Activities in the Hanjiang River Basin, China*, 96 J. COASTAL RES. 68, 74 (2019) (noting that the Hanjiang is emblematic of the issues facing rivers in southeastern China).

⁹⁰ Beiser, *supra* note 3.

⁹¹ Christian Jordan et al., *Sand Mining in the Mekong Delta Revisited: Current Scales of Local Sediment Deficits*, 9 SCI. REP. 1, 2 (2019).

⁹² WORLD WILDLIFE FUND, THE SANDS ARE RUNNING OUT 1 (2018), <https://perma.cc/AB2C-D643>.

⁹³ *Id.*

⁹⁴ Fred Pearce, *The Hidden Environmental Toll of Mining the World’s Sand*, YALE SCH. OF THE ENV’T (Feb. 5, 2019), <https://perma.cc/364N-K5TD>.

⁹⁵ THE SANDS ARE RUNNING OUT, *supra* note 92, at 2.

economies fighting over “natural resources and disputable infrastructure projects.”⁹⁶

Indeed, sand mining has become a politically sensitive issue with cross-border implications for *all* lower Mekong countries.⁹⁷ Since 2000, Vietnam and Indonesia have banned the exportation of river and offshore sand.⁹⁸ Cambodia permanently banned sand exports in 2017,⁹⁹ but indiscriminate sand dredging continues to occur along the Mekong “at a record pace.”¹⁰⁰ Cambodia’s weaker institutional framework in tandem with perpetually strong incentives to mine for sand illustrate the difficulties faced by Mekong River countries; successful transboundary coordination of sand has yet to emerge.¹⁰¹

Without a system in place to regulate extraction, an international ecosystem remains at peril.¹⁰² River levels have dropped by more than three feet, with dire consequences for rice fields and fisheries that feed more than sixty million people.¹⁰³ The loss of the Vietnamese Mekong delta would be particularly catastrophic as it is a central region for food production: it is known as the “rice bowl” of Vietnam¹⁰⁴ and contributes more than 27% of the national GDP.¹⁰⁵ For centuries, the delta has been naturally replenished by sediment, but the increase in sand extraction has exacerbated the delta’s erosion. At the current rate of extraction, it is believed that “nearly half of the delta will be wiped out by the end of this century.”¹⁰⁶ As a shared resource, the survival of the Mekong rests on finding appropriate cross-border solutions.

⁹⁶ Sepehr Eslami et al., *Tidal Amplification and Salt Intrusion in the Mekong Delta Driven by Anthropogenic Sediment Starvation*, 9 SCI. REP. 1, 1 (2019).

⁹⁷ Jean-Paul Bravard et al., *Geography of Sand and Gravel Mining in the Lower Mekong River*, 26 ECHOGÉO 1, 2 (2013) (emphasis added).

⁹⁸ *Id.* at 4.

⁹⁹ *Cambodia Bans Sand Exports Permanently*, BBC (July 13, 2017), <https://perma.cc/FP2N-UL4J>.

¹⁰⁰ Fred de Sam Lazaro & Sarah Clune Hartman, *In Cambodia, Sand Mining is Big Business: But It Comes at a Price*, PBS NEWSHOUR (Sept. 18, 2019), <https://perma.cc/2BJ5-MHVF>; see also Michael Sullivan, *Houses on the River Will Fall: Cambodia’s Sand Mining Threatens Vital Mekong*, NPR (Feb. 27, 2020), <https://perma.cc/E33K-K49U> (discussing how sand mining in Cambodia along the Mekong continues to threaten communities, livelihoods, and the environment).

¹⁰¹ Bravard et al., *supra* note 97, at 4; see also Dan Southerland, *Environmental Damage, Corruption as Poorer Southeastern Asian States Ship Sand to Singapore*, RADIO FREE ASIA (Apr. 13, 2018), <https://perma.cc/SN7L-3H2V> (noting that Cambodia’s elite violate the country’s own laws in order to profit off of sand mining).

¹⁰² Timmins, *supra* note 62.

¹⁰³ Pearce, *supra* note 94.

¹⁰⁴ Jordan et al., *supra* note 91, at 1.

¹⁰⁵ THE SANDS ARE RUNNING OUT, *supra* note 92, at 2.

¹⁰⁶ Beiser, *supra* note 3.

III. BACKGROUND LAW, RULES, AND PRINCIPLES

A. International Environmental Law

The world faces environmental challenges that can only be addressed through international cooperation.¹⁰⁷ Historically, local environmental issues have been recognized to have transboundary, then regional, and then ultimately global consequences.¹⁰⁸ In 1996, the International Court of Justice (ICJ) finally recognized general rules of international environmental law; states have an obligation to “ensure that activities within their jurisdiction and control respect the environment of other states or of areas beyond national control.”¹⁰⁹

International law and institutions provide the principal framework for efforts to protect the local, regional, and global environment.¹¹⁰ This international legal order regulates the activities of states, international organizations, and non-state actors.¹¹¹ Of course, states continue to hold a primary role in this legal ordering. The sovereignty and jurisdiction that states possess over their own territory means that they alone have the “competence” to develop policies and laws in respect to the natural resources and environment of their territory.¹¹²

Yet, a legal framework that attributes exclusive sovereign rights, responsibilities, and jurisdiction to individual states conflicts with environmental realities.¹¹³ Ecosystems are interdependent and do not respect “artificial national territorial boundaries.”¹¹⁴ The use of natural resources in one state’s territory will “invariably” impact the use of resources in another state.¹¹⁵ Moreover, international society does not solely consist of state actors; non-state actors (in other words, individuals and organizations not affiliated with governments) also play an important role for the resolution of environmental problems.¹¹⁶

¹⁰⁷ PHILIPPE SANDS, *PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW* 3 (2d ed. 2003).

¹⁰⁸ *Id.* at 4.

¹⁰⁹ *Id.* (quoting *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I.C.J. 226, 242 (July 8)).

¹¹⁰ *Id.* at 12.

¹¹¹ *Id.* at 13.

¹¹² *Id.*

¹¹³ *Id.* at 14.

¹¹⁴ *Id.*

¹¹⁵ *Id.* (noting specifically that “this is evident where a river runs through two or more countries, or where living resources migrate between two or more sovereign territories”).

¹¹⁶ *Id.* at 15.

B. Current Governance Attempts: Cracks in the Sandbox

The legal landscape on sand mining is fractured.¹¹⁷ Sand extraction is not governed by the same rules, practices, and ethics around the world.¹¹⁸ These variations can be largely attributed to the fact that sand is a locally consumed resource.¹¹⁹ Policy institutions in different countries simply reflect the “particularities” of their localities by evolving to mediate access and use of these materials over long time frames in those places.¹²⁰ Thus, local geography and governance continue to inform most approaches to sand regulation: “national mining and environmental protection legislation provide the basic framework” for most countries.¹²¹ However, this governance structure has often left small administrative entities with the heavy burden of managing large-scale policy implementation and enforcement without adequate human resources or financial capacity.¹²²

Existing international standards could supplement or even provide an alternative to national frameworks for regulating sand mining, but no attempt has yet been made to meaningfully corral the disparate frameworks.¹²³ More specifically, none of these potential standards (even if applicable to resolving the question of sand governance) addresses sand extraction and consumption

¹¹⁷ ALLEN SPRINGER, *CASES OF CONFLICT: TRANSBOUNDARY DISPUTES AND THE DEVELOPMENT OF INTERNATIONAL ENVIRONMENTAL LAW* 18 (2016).

¹¹⁸ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 6.

¹¹⁹ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 13 (emphasizing that because of the “economics of transportation, locally extracted sand typically services local markets”).

¹²⁰ *Id.* at 25.

¹²¹ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 6. For example, India classifies sand as minor materials under the Mines and Minerals (Development and Regulation) Act of 1957. Section 15 of the Act empowers state governments to make rules for regulating the grant of mineral concessions “in respect of minor materials and for purposes connected therewith,” thereby leading to vastly different local approaches to sand governance. See *Guidelines for Sand Mining*, GOV’T OF INDIA (Dec. 15, 2016), <https://pib.gov.in/newsite/PrintRelease.aspx?relid=155423>. Vietnam has taken a similar approach in that sand is deemed a “common construction material” under its 2010 Mineral Law with mining licenses handled purely at the provincial level. See Dinh Tuyen, *In Vietnam’s Mekong Delta, Sand Mining Means Lost Homes and Fortunes*, ECO-BUSINESS (July 6, 2022), <https://perma.cc/KC43-DENQ>; *The International Comparative Legal Guide to Mining Law*, GLOB. LEGAL GRP. 227 (2018), <https://perma.cc/AN46-KHPP>.

¹²² SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 6; see also Perrine Mouterde & Mathias Depardon, *India’s ‘Sand Mafias Have Power, Money and Weapons’*, LE MONDE (Sept. 12, 2022), <https://perma.cc/Q5F2-STA9> (highlighting the example of India where sand mining is legally prohibited in certain areas, yet remains as a flourishing black-market industry); *An Improbable Global Shortage: Sand*, *supra* note 8 (noting that India’s weak sand governance is of particular consequence since disjointed and unregulated extraction has created an illicit market worth \$2.3 billion a year).

¹²³ See SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 15.

directly.¹²⁴ If the global sand supply were likened to a sandbox, then the lack of specific legal standards would be the so-called “cracks” in the box. The sandbox runs the risk of running dry without a way to patch these cracks—we need to develop targeted standards on sand governance.

The need for targeted standards has been well-recognized. In 2019, the fourth session of the U.N. Environmental Assembly (UNEA) adopted Resolution 19 on mineral resource governance, thereby directing the UNEP to collect further information on sustainable practices, knowledge gaps, and implementation strategies for sand management.¹²⁵ In turn, a 2022 resolution has reiterated the UNEA’s desire to “strengthen scientific, technical and policy knowledge with regard to sand, and to support global policies and action regarding the environmentally sound extraction of sand.”¹²⁶ Global recognition of the need for more targeted action demonstrates burgeoning international efforts to take the formative steps necessary to address gaps in sand governance.¹²⁷

But until those formative steps materialize, existing tools (namely, international conventions, principles, and case law) will have to suffice. Yet, in their current forms, these tools are only relevant to varying degrees as possible solutions; plugging the cracks in the sandbox will require tuning their application to sand governance.¹²⁸

C. The Role of Conventions

Conventions are legally binding international law for signatory countries; they “spur” national governments to create national legal frameworks with accompanying regulations, economic instruments, and voluntary mechanisms for action and enforcement.¹²⁹ The UNEP has identified a range of conventions that could be relevant to filling gaps on sand governance, such as the Convention on Biological Diversity, the International Watercourses Convention, and the World Heritage Convention.¹³⁰ These conventions could provide the basis for legal rights and best practices on sand extraction because they all, to

¹²⁴ *Id.* (noting possibilities for a coherent framework for global sand governance with adjustments).

¹²⁵ UNEA Res. 19, at 1 (Mar. 11–15, 2019); *see also* U.N. ENV’T PROGRAMME, INTERNATIONAL GOOD PRACTICE PRINCIPLES FOR SUSTAINABLE INFRASTRUCTURE 24 (2022) (“the environmental and material footprint of each stage of the [infrastructure] life cycle must be assessed and cumulative impacts considered. This includes . . . inputs [like] energy, construction materials like *sand*.”) (emphasis added).

¹²⁶ UNEA Res. 12, at 2 (Mar. 2, 2022).

¹²⁷ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 4.

¹²⁸ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 15.

¹²⁹ *Id.*

¹³⁰ *Id.*

some degree, touch on common sand extraction areas: transboundary seas and rivers.¹³¹ Yet, the UNEP's report is largely silent as to how these frameworks could be applied in a cohesive manner. It is an open question as to which conventions truly matter from the shortlist provided.

Reconciling overlapping (and potentially discordant) conventions could be achieved in a number of different ways, but the combination of (1) the U.N. Convention on the Law of the Sea (UNCLOS), (2) the Espoo Convention, and (3) the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) weaves a promising thread.

1. Convention on the Law of the Sea

UNCLOS is perhaps the most promising framework when it comes to addressing the issue of sand mining on coastlines and in oceans—even though the convention never explicitly refers to “sand” or “aggregates” in its text.¹³² As its overarching goal, UNCLOS aims to establish a “legal order for the seas and oceans which will facilitate international communication, and will promote the peaceful uses of the seas and oceans, [and] the equitable and efficient utilization of their resources.”¹³³ It is one of the most far-reaching and influential global environmental agreements,¹³⁴ and is now widely supported with 169 States Parties.¹³⁵

The Convention's relevancy to sand stems from its powerful environmental provisions, which are largely captured in part XII, consisting of forty-six Articles divided into eleven Sections, all of which elaborate on a single directive: “the obligation to protect and preserve the marine environment.”¹³⁶ Through part XII, States Parties to UNCLOS have wide-ranging obligations to protect and preserve the marine environment and to take necessary measures to prevent, reduce, and control pollution.¹³⁷

Two provisions, Articles 193 and 194, are worth noting. First, Article 193 recognizes that states have the sovereign right to exploit their natural resources pursuant to their environmental policies, but also have a concurrent duty to

¹³¹ *See id.*

¹³² *See* U.N. Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

¹³³ *Id.* pmb1.

¹³⁴ Sands, *supra* note 107, at 396.

¹³⁵ *United Nations Convention on the Law of the Sea*, U.N. TREATY COLLECTION, <https://perma.cc/7S39-7KMT>.

¹³⁶ *See* UNCLOS art. 192.

¹³⁷ Rolandas Radzevičius et al., *Marine Aggregate Extraction Regulation in EU Member States*, 96 J. COASTAL RES. 15, 16 (2010).

protect and preserve the marine environment.¹³⁸ Applying Article 193 to the sand issue balances both the realities of sand extraction with governance aspirations. Until alternative materials and substitutes arise, sand will remain a valuable ingredient for the continued growth of modern economies. Any attempt to forbid states from exploiting sand would be simply untenable. Instead, Article 193 requires states to temper exploitation with protection of the environment. UNCLOS establishes a legal basis under international law that permits states to enjoy the use of sand whilst also imposing duties.

Secondly, Article 194 requires states to “take, individually or jointly as appropriate, all measures . . . that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practical means at their disposal and in accordance with their capabilities.”¹³⁹ In the sand context, Article 194 shapes the contours of environmental duties imposed on states by recognizing differing capabilities and access to resources. A non-uniform duty provides a starting point for action without restricting states that have not yet developed effective management systems for sand extraction.¹⁴⁰ Moreover, the language of this Article creates an international standard that is cognizant of local practicalities; it works toward fulfilling the UNEP’s aim of creating “enabling conditions” for national policy, law, and regulation where they do not currently exist.¹⁴¹

It would be a “low-hanging fruit” opportunity to integrate sand into the UNCLOS framework. Articles 193 and 194 may not have been designed with sand in mind, but they can easily accommodate the contours of sand governance. Although other provisions are not mentioned in this section, UNCLOS as a whole should be considered for its promise in aiding the development of rules on substantive matters at the global and regional levels.¹⁴²

2. Environmental Impact Assessment Convention

Any discussion on sand governance is inevitably plagued by a lack of sufficient information: the global sand supply remains unknown and extraction rates are not monitored in the regions that pose the most critical concern.¹⁴³ To shed light on an otherwise opaque process, the 1991 Environmental Impact Assessment (EIA) in a Transboundary Context (referred to as the Espoo

¹³⁸ See UNCLOS art. 193.

¹³⁹ *Id.* art. 194(1).

¹⁴⁰ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 21.

¹⁴¹ *Id.* at 22.

¹⁴² *Id.*

¹⁴³ *Id.* (noting that “high quality studies of sand extraction impacts are not, in fact, the countries where extensive illegal sand extraction is increasingly reported by domestic and international media”).

Convention) holds a degree of promise for sand governance. Espoo creates an obligation among states to investigate the environmental impact of certain activities before they are carried out.¹⁴⁴ In practical terms, the Convention requires states to collect information on the activity in question¹⁴⁵ and then notify and consult each other on the proposed activity when it is likely to have a significant adverse environmental impact across national boundaries.¹⁴⁶ Whether the Convention applies to a given activity is “partly based on judgment,” but Appendix I of the Convention explicitly describes activities like nuclear power plants, oil refineries, and mining as triggers for an assessment. Sand mining—with the environmental harm it can cause—would qualify for a potential EIA under the Convention.

Espoo and the EIA are highly relevant to any discussion on sand mining because they specifically address the UNEP’s call for gathering more information on sand extraction.¹⁴⁷ It is true that the Espoo Convention may have fewer States Parties than UNCLOS,¹⁴⁸ but it remains an important framework because it was one of the first multilateral efforts to provide information on the relationship between economic activities and their environmental consequences.¹⁴⁹ Moreover, Espoo’s EIA framework has come to influence similarly styled regulations in other countries; it is a model that has had an outsized impact on meeting sustainability challenges. EIA projects are the “only tools whose use is required by law, in many countries, and whose results are publicly acknowledged and available.”¹⁵⁰ To date, no country has abandoned EIA or weakened EIA procedures; “any legal amendments that have been made have tended to strengthen [EIA] procedures and increase their scope and effectiveness.”¹⁵¹

¹⁴⁴ See Convention on Environmental Impact Assessment in a Transboundary Context, Feb. 25, 1991, 1989 U.N.T.S. 309 [hereinafter Espoo].

¹⁴⁵ *Id.* app. II.

¹⁴⁶ *Id.*

¹⁴⁷ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at XIV (explaining that Recommendations 6 through 10 specifically argue for “mapping, monitoring, and reporting sand resources” as well as “advancing knowledge and practices” to support governance that is “effective, equitable, responsive, and robust.”).

¹⁴⁸ There are 45 parties for Espoo compared to 169 parties for UNCLOS. See *Convention on Environmental Impact Assessment in a Transboundary Context*, U.N. TREATY COLLECTION, <https://perma.cc/6E75-24WJ>.

¹⁴⁹ C.J. BASTMEIJER & TIMO KOIVUROVA, THEORY AND PRACTICE OF ENVIRONMENTAL IMPACT ASSESSMENT 29 (2008).

¹⁵⁰ HUSSEIN ABABA ET AL., ENVIRONMENTAL IMPACT ASSESSMENT AND STRATEGIC ENVIRONMENTAL ASSESSMENT: TOWARDS AN INTEGRATED APPROACH 6 (1st ed. 2004).

¹⁵¹ *Id.* at 7.

Crucially, because EIAs are creatures of national legislation and policy,¹⁵² legal frameworks established by individual countries differ in “adequacy and integrity” as judged against international standards and local needs.¹⁵³ Despite legitimate concerns that EIA systems can result in “an inflexible, bureaucratic and overly negative approach” that is unrelated to the needs of developing countries, EIAs feature the capacity to include public involvement and consultation.¹⁵⁴ Indeed, public participation is a cornerstone of the Espoo Convention; Articles 2(6), 3, and 4 require specific commitments to facilitate public involvement.¹⁵⁵

In the sand context, stakeholders can be broad and diverse, and range from local communities to multinational corporations.¹⁵⁶ Facilitating public participation helps enable transparency and accountability in an otherwise opaque process. With stakeholder input, the effectiveness of policies can also be measured more accurately.¹⁵⁷ Without effective environmental assessments of sand mining practices, the scale of the problem will remain uncertain, and it is unlikely that anything more than “cosmetic protection” can be achieved.¹⁵⁸ Thus, EIAs take a crucial step forward in filling the information void that pervades discussions on sand mining.

3. Convention for the Protection of the North-East Atlantic

Attempts at addressing sand beyond national and sub-national frameworks have been relatively limited; no global body for sand governance has yet emerged. However, regional agreements can still play important law-making roles on the international stage.¹⁵⁹ Although the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) was not created for the primary purpose of sand governance, it nevertheless provides a legal structure that facilitates cooperation on regulating pollution and addresses harm done to the marine environment.¹⁶⁰

OSPAR’s specific focus on sand extraction must be noted. Around the North-East Atlantic, fifty to sixty million cubic meters of material are extracted

¹⁵² *Id.* at 18.

¹⁵³ *Id.* at 19 (noting also that “in certain countries, EIA legislation based on an imported framework can be inappropriate and dysfunctional”).

¹⁵⁴ *Id.* at 19, 28.

¹⁵⁵ *See* Espoo arts. 2–4.

¹⁵⁶ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 26.

¹⁵⁷ *See id.* at 23.

¹⁵⁸ Sands, *supra* note 107, at 498.

¹⁵⁹ *Id.* at 127.

¹⁶⁰ *Id.* at 409; Radzevičius et al., *supra* note 137, at 18.

from the seabed for the construction industry or for beach nourishment.¹⁶¹ Gravel and sand are the principal materials extracted.¹⁶² In 2003, States Parties to the Convention recognized the issues caused by sand extraction and signed an “Agreement on Sand and Gravel Extraction.”¹⁶³ OSPAR now requires coastal States Parties to conduct an EIA prior to any authorization for aggregate extraction from any ecologically sensitive site.¹⁶⁴

It should be noted that simply replicating OSPAR and transplanting its framework to other regions of the globe (like the Mekong) would be ill advised.¹⁶⁵ OSPAR has taken shape in a region that has had the benefit of developing effective management systems over several decades—its development is simply “not comparable to circumstances in other global regions.”¹⁶⁶ This word of caution should not diminish the overall value of the framework; OSPAR demonstrates that even states in direct competition over rich sand and gravel resources can fold new governance issues into preexisting frameworks.

D. Gap-Filling Principles

International law derives not only from conventions and treaties, but also from the constant reiteration of certain norms or principles.¹⁶⁷ Principles frame the legal context in which conventions are negotiated, interpreted, and applied.¹⁶⁸ They fill gaps in implementation and execution where positive law does not exist or is otherwise silent.¹⁶⁹

In international environmental law, principles embody legal standards, but the standards they contain are “more general than commitments and do not specify particular actions.”¹⁷⁰ Nevertheless, states can still agree on principles that should direct their behavior even if they lack perfect clarity and unanimous support.¹⁷¹ The applicability of principles often turns on the facts and

¹⁶¹ OSPAR COMM’N, SUMMARY ASSESSMENT OF SAND AND GRAVEL EXTRACTION IN THE OSPAR MARITIME AREA 5 (2009), <https://perma.cc/9VVG7-RHGT>.

¹⁶² *Id.*

¹⁶³ Radzevičius et al., *supra* note 137, at 18.

¹⁶⁴ *Id.*

¹⁶⁵ *See* SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 21.

¹⁶⁶ *Id.*

¹⁶⁷ ALEXANDRE KISS & DINAH SHELTON, GUIDE TO INTERNATIONAL ENVIRONMENTAL LAW 89 (2007).

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ Sands, *supra* note 107, at 233.

¹⁷¹ Springer, *supra* note 117, at 18.

circumstances of each situation.¹⁷² In the sand extraction context, where actions often cross multiple areas of concern (like “extractives, water management, coastal zone management, [and] biodiversity conservation legal systems”¹⁷³) and where consensus has not yet been achieved, principles play a valuable role by providing the first point of contact for addressing issues caused by sand mining.

1. Sovereignty and the Prevention of Harm

International environmental law has developed around two fundamental, but sometimes opposing, objectives: (1) that states have sovereignty over their own natural resources and (2) that states must not cause damage to the environment.¹⁷⁴

The principle of state sovereignty allows states to conduct or authorize activities as they choose within their territories—even activities that may have an adverse effect on their own national environment.¹⁷⁵ Environmental damage has been defined in treaties and other international acts to include harm done to “fauna, flora, *soil*, water and climatic factors” and “the landscape and environmental amenity.”¹⁷⁶ Permanent sovereignty over national resources remains an international legal right and a pillar of the current legal order.¹⁷⁷ Indeed, states have frequently invoked this principle of sovereignty in various international environmental agreements.¹⁷⁸ In the sand context, the principle of sovereignty, standing alone, provides a default rule that countries can do as they wish with the sand in their territory even if adverse environmental consequences result.

But states are also subject to a concurrent limit on their sovereignty over natural resources: the principle of preventing transboundary harm. The foundational 1972 Stockholm Conference (the first global conference centered on the environment) enunciated the following formulation:

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and *the responsibility*

¹⁷² Sands, *supra* note 107, at 231.

¹⁷³ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at xv.

¹⁷⁴ Sands, *supra* note 107, at 235.

¹⁷⁵ *Id.* at 236.

¹⁷⁶ *Id.* at 869 (emphasis added).

¹⁷⁷ *Id.* at 236–37.

¹⁷⁸ *Id.* at 237 (noting as an example the Preamble to the 1989 Basel Convention); *see also* Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal preamble, Mar. 22, 1989, 1673 U.N.T.S. 57 (recognizing that “any State has the *sovereign right* to ban the entry or disposal of foreign hazardous wastes in its territory) (emphasis added).

*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.*¹⁷⁹

This statement (referred to as Principle 21) recognizes the principle of sovereignty as well as a concurrent prohibition on transboundary harm. It is now one of the cornerstones of international environmental law;¹⁸⁰ it places legal constraints on the rights of states to carry out activities within their territory or under their jurisdiction.¹⁸¹ Essentially, states do not have unlimited rights over their natural resources; they are subject to “significant constraints of an environmental character.”¹⁸² Application of Principle 21 to sand governance is most relevant in regions where extraction by one nation affects a commonly shared resource that others depend on. One state’s enjoyment of natural resources cannot come at the expense of its neighbors because a certain degree of responsibility to others is imposed.

But what does that responsibility specifically entail? States have brought relatively few claims relying on the exact rule iterated in Principle 21.¹⁸³ International law remains “inconclusive” on general rules regarding the appropriate standard of care for fulfilling environmental obligations; the Principle by itself “[does] not provide guidance either way.”¹⁸⁴ Yet, support for the Principle can still be found via treaties and other international acts that have referenced it, utilized similar language, or even incorporated it wholly.¹⁸⁵ Indeed, the Principle is sufficiently well-established to provide the basis for “an international customary legal obligation,” a violation of which would give rise to a “free-standing legal remedy.”¹⁸⁶ Accordingly, while a level of ambiguity may make it impossible to exactly predict how Principle 21 and the principle of

¹⁷⁹ REPORT OF THE UNITED NATIONS CONFERENCE ON THE HUMAN ENVIRONMENT, U.N. Sales No. E.73.II.A.14 (1972) [hereinafter Stockholm Declaration] (emphasis added).

¹⁸⁰ Sands, *supra* note 107, at 236. The legal basis for this limitation traces even further back to the seminal holding of the 1938 *Trail Smelter* case, which provides that “no state has the right to use or permit the use of territory in such a manner as to cause injury . . . in or to the territory of another.” *Id.* at 242.

¹⁸¹ *Id.* at 241.

¹⁸² *Id.* at 246.

¹⁸³ *Id.* at 242.

¹⁸⁴ *Id.* at 881.

¹⁸⁵ *Id.* at 244.

¹⁸⁶ *Id.* at 232. Indeed, Principle 2 of the 1992 Rio Declaration would later echo *identical* language to that seen in Principle 21 as states were unable to “improve significantly upon, develop, scale back or otherwise alter” the formulation. U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), annex I (Aug. 12, 1992) (declaring “States have . . . the responsibility 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”).

sovereignty precisely apply to sand mining, it is clear that a significant environmental constraint exists and applies to sand governance.

2. Common but Differentiated Responsibility

Though relatively new, the principle of Common but Differentiated Responsibility (CBDR) recognizes that the special needs of developing countries must be taken into account in the development, application, and interpretation of international environmental law.¹⁸⁷ Two consequences flow from this principle: (1) it entitles, or may require, all concerned states to participate in international response measures aimed at addressing environmental problems; and (2) it allows environmental standards with differing obligations to be imposed on states.¹⁸⁸

The first component of CBDR, “common responsibility,” describes the shared obligations of two or more states toward the protection of a particular environmental resource, “taking into account its relevant characteristics and [the] nature, physical location, and historical usage associated with it.”¹⁸⁹ Notably, common responsibility applies in situations where the resource in question “is not the property of, or under the exclusive jurisdiction of, a single state.”¹⁹⁰ In the sand context, “common responsibility” adds another dimension to Principle 21 by creating a *positive* duty to act. While Principle 21 is conceived of as a *negative* obligation not to cause harm, common responsibility creates an affirmative commitment to protect the environment. Moreover, common responsibility does not envision a single state shouldering all the burdens for environmental protection. As for sand, where extraction upstream in the Mekong can produce repercussions for downstream parties, common responsibility as a guiding principle maintains a cooperative element toward any approach.

The second CBDR component, “differentiated responsibility,” yields different legal obligations for developing countries because of specific needs and special circumstances.¹⁹¹ Differentiated responsibility is “widely accepted in treaty and other practices of states”¹⁹² and involves practical benefits like grace periods for delayed implementation and less stringent commitments for developing parties. Moreover (and perhaps most crucially), it encourages the provision of financial, technological, and other assistance to developing countries to help them implement the obligations of particular treaties.¹⁹³ When

¹⁸⁷ Sands, *supra* note 107, at 285.

¹⁸⁸ *Id.* at 286.

¹⁸⁹ *Id.* at 385.

¹⁹⁰ *Id.* at 286.

¹⁹¹ *Id.* at 288.

¹⁹² *Id.* at 287.

¹⁹³ *Id.* at 289.

considered with regard to sand governance, the principle of “differentiated responsibility” incorporates the realities of economic, political, social, and cultural variation between different nations. By allowing the burdens of governing, managing, and planning sand governance to be eased for developing countries, differentiated responsibility acts as an “enabling condition” for new governance frameworks to take shape.¹⁹⁴

IV. CRITICAL CASE LAW

Although no cases under international environmental law have emerged that directly focus on the issue of sand mining, lessons can still be drawn from disputes that raise similar issues in the periphery. Arguably, the main ailments caused by sand mining stem from three issues: (1) the perpetual lack of information and monitoring systems on extraction; (2) inadequate enforcement systems for state and non-state actors; and (3) unclear or ambiguous duties under an international legal framework. The cases described below offer lessons that can be transferred from their original contexts to the sand context, thus offering guidance.

A. *Pulp Mills*

The *Pulp Mills* dispute between Argentina and Uruguay arose from the latter’s unilateral construction of two industrial mills on a shared river between the two nations.¹⁹⁵ Although a 1975 statute established a process involving consultation for potential projects on the river (in other words, an EIA was required), Argentina alleged that Uruguay ignored such procedures before authorizing the construction.¹⁹⁶ Ultimately, the ICJ ruled in favor of Argentina on this claim.

Uruguay had “the duty to *inform*, the duty to *notify*, and the duty to *negotiate in good faith* with a state that might be affected detrimentally by a proposed project.”¹⁹⁷ Specifically, the Court held that international law required an EIA to be conducted “where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a

¹⁹⁴ PETER STUBBE, STATE ACCOUNTABILITY FOR SPACE DEBRIS: A LEGAL STUDY OF RESPONSIBILITY FOR POLLUTING THE SPACE ENVIRONMENT AND LIABILITY FOR DAMAGE CAUSED BY SPACE DEBRIS 212 (2017).

¹⁹⁵ Case Concerning Pulp Mills on the River Uruguay (Arg. v. Uru.), Judgment, 2010 I.C.J. 14 (Apr. 20) [hereinafter *Pulp Mills*]; see also James Harrison, *Significant International Environmental Law Cases: 2015–16*, 22 J. ENV’T L. 499, 499 (2010).

¹⁹⁶ Harrison, *supra* note 195, at 499; see also Springer, *supra* note 117, at 200.

¹⁹⁷ Springer, *supra* note 117, at 210.

shared resource.”¹⁹⁸ In other words, Uruguay had procedural duties that it failed to uphold; it should have used “all the means at its disposal” to avoid activities threatening transboundary harm.¹⁹⁹ As part of its duty to Argentina, Uruguay’s first step was to inform; an adequate EIA should have been carried out to fulfill that step.²⁰⁰

Pulp Mills stresses the importance of carrying out an EIA. When a state’s proposed activities within its jurisdiction have the potential to threaten damage to another state, the EIA obligation follows. This is heartening for addressing concerns on sand mining. If upstream dredging were proposed on the Mekong River (thereby harming downstream users), guidance from *Pulp Mills* emphasizes the need for an EIA. In turn, this provides an opportunity for stakeholders to offer input via the public participation process and to challenge (or shape) the project being proposed. *Pulp Mills* establishes the EIA process in international law, which illuminates the risks of the extraction process.

B. Nicaragua-Costa Rica Border Dispute

In December 2015, the ICJ joined two cases involving Costa Rica and Nicaragua for judgment.²⁰¹ These cases stemmed from a 2010 dispute involving the San Juan River, where both nations allegedly breached environmental obligations. Costa Rica accused Nicaragua of violating environmental rules protecting an ecologically sensitive area,²⁰² while Nicaragua alleged that Costa Rica violated environmental obligations through its construction activities.²⁰³

1. The EIA Obligation

While *Pulp Mills* established an obligation to carry out an EIA, the precise basis and scope of this obligation remained somewhat unclear until it was clarified in *Costa Rica v. Nicaragua*.²⁰⁴ On the first prong, the ICJ reaffirmed the obligation to carry out an EIA as a requirement of general international law;²⁰⁵ Judge Donoghue and Judge *ad hoc* Dugard both affirmed (in separate opinions)

¹⁹⁸ *Pulp Mills*, 2010 I.C.J., ¶ 204; see also *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicar.)*, Judgment, 2015 I.C.J. 665, ¶ 104 (Dec. 16) (citing *Pulp Mills*).

¹⁹⁹ Springer, *supra* note 117, at 210.

²⁰⁰ *Pulp Mills*, 2010 I.C.J., ¶¶ 120–21, 204 (noting that both parties had the obligation to conduct an EIA “for the purposes of protecting and preserving the aquatic environment with respect to activities which may be liable to cause transboundary harm”).

²⁰¹ *Costa Rica v. Nicar.*, 2015 I.C.J. 665 (Dec. 16).

²⁰² *Id.* ¶ 23; see also Harrison *supra* note 195, at 534.

²⁰³ Harrison, *supra* note 195, at 534.

²⁰⁴ *Id.*

²⁰⁵ *Id.*

the holding of *Pulp Mills* that the duty to carry out an EIA existed as an established practice of international law.²⁰⁶

But on the second prong, the ICJ added additional contours to the EIA obligation: (a) EIAs are not constrained to industrial activities; (b) EIAs require a preliminary assessment as a trigger, and such triggers can be found retroactively via judicial determination; and (c) the actions of private (that is, non-state) entities can trigger the EIA. The ICJ recognized that *Pulp Mills* only addressed the EIA obligation in the context of “industrial activities.” But here, for the Costa Rica and Nicaragua case, the ICJ extended *Pulp Mills* to apply “*generally* to proposed activities which may have a significant adverse impact in a transboundary context.”²⁰⁷

While the EIA obligation extended to activities that threatened significant transboundary harm, the threshold for determining that harm was clarified to rest on an initial screening exercise.²⁰⁸ Ascertainment of the risk of transboundary harm requires a preliminary assessment that can be satisfied by expert evidence or judicial determination. Here, the Court possessed no evidence that Costa Rica had carried out such a preliminary assessment. As such, the Court made a judicial determination of “the nature and magnitude of the project and the context in which it was to be carried out.”²⁰⁹ The Court noted that Costa Rica’s construction project was both “substantial” and “could easily affect” the river and Nicaragua’s territory.²¹⁰ In particular, the Court honed in on the fact that Costa Rica’s road would pass through a wetland of international importance in Costa Rican territory and would be located in close proximity to another protected site in Nicaraguan territory. The presence of a protected site “heightens the risk of significant damage because it denotes that receiving environment is particularly sensitive.”²¹¹ Through this reasoning, the Court found Costa Rica’s actions to carry a risk of significant transboundary harm, thereby triggering the need to carry out an EIA.²¹²

Judge Bhandari’s discussion of private companies in the context of EIAs is noteworthy. When private companies propose projects near international

²⁰⁶ *Costa Rica v. Nicar.*, 2015 I.C.J. 782, ¶ 2 (separate opinion of Donoghue, J.) (“I consider that the task before the Court today is the examination of ‘international custom, as evidence of a general practice accepted as law.’”); see also *Costa Rica v. Nicar.*, 2015 I.C.J. 842, ¶ 16–17 (separate opinion of Dugard, J.) (“[I]here can be little doubt that there is an obligation under customary international law to conduct an environmental impact assessment when there is a significant transboundary harm.”).

²⁰⁷ See Harrison, *supra* note 195, at 535; see also *Costa Rica v. Nicar.*, 2015 I.C.J., ¶ 104.

²⁰⁸ Harrison, *supra* note 195, at 535.

²⁰⁹ *Costa Rica v. Nicar.*, 2015 I.C.J., ¶ 155.

²¹⁰ *Id.*

²¹¹ *Id.*

²¹² *Id.*

borders, it is then “the responsibility of the country in whose territory the project is being proposed to provide an EIA to a potentially affected country.”²¹³ Mining would be included as one of many economic activities that would effectively trigger the EIA obligation.²¹⁴ The duty to complete and transmit an EIA to a neighboring country exists “irrespective of the fact that the project falls within the domain of private enterprise.”²¹⁵

To reiterate, two of the main issues with sand governance are the absence of information on extraction and the difficulty in enforcement for state and non-state actions. While EIAs help fill the information void, the fragmentation of the sand mining industry frustrates attempts to monitor its activities. The elusiveness of private actors is a particular problem, as some governments even facilitate illicit extraction. Judge Bhandari’s opinion indicates another possibility in facilitating state cooperation on filling the information void: making both state and non-state actors liable for failing to report mining operations.

2. Compensation for Harm

Nicaragua was found to have also breached several international obligations by excavating canals and affecting the biodiversity in the disputed area.²¹⁶ Under the ICJ’s judgment, Nicaragua had to compensate Costa Rica for material damages. This judgment was significant because it represented “the first time that the ICJ has addressed the question of compensation for environmental harm.”²¹⁷ This aspect of the case is fruitful for future sand governance disputes. If impairment and general harm to the environment can form the basis for compensable injuries, then injuries caused by sand mining—including the loss of livelihoods and the destruction of ecological systems—can also be compensated.

Damage to the environment and the “consequent impairment” or “loss of the ability of the environment” to provide goods and services is compensable under international law.²¹⁸ Compensation not only extends to the costs for restoring the environment, but also to damage to “ecosystem goods and services.”²¹⁹ Costa Rica’s claims focused on timber and other raw materials, as well as gas regulation, natural hazards mitigation, soil formation and erosion control, and biodiversity.²²⁰ But even when removed from economic use, Judge

²¹³ *Costa Rica v. Nicar.*, 2015 I.C.J. 790, ¶ 44 (separate opinion of Bhandari, J.).

²¹⁴ *Id.* (citing the basis provided by Appendix I of the Espoo Convention).

²¹⁵ *Id.*

²¹⁶ James Harrison, *Significant International Environmental Law Cases: 2017–18*, 30 J. ENV’T L. 527, 527 (2018).

²¹⁷ *Id.*

²¹⁸ *Id.* at 528.

²¹⁹ *Id.*

²²⁰ *Id.*

Donoghue explained that Costa Rica could still seek compensation for “pure environmental damage”—“damage caused to the environment, in and of itself.”²²¹

With regard to soil formation and erosion, Nicaragua did not dispute that it removed 9,500 cubic meters of soil from the disputed site.²²² However, the Court rejected Costa Rica’s claim for damages on this issue because the sites were “subsequently refilled with soil” and “substantial revegetation” occurred.²²³ The Court was thus unpersuaded as to the severity of the damage. But claims for other damages (the removal of trees and vegetation at the sites) were more successful; the impairment or loss of “trees, other raw materials, gas regulation and air quality services, and biodiversity” occurred and was considered a direct consequence of Nicaraguan activities.²²⁴ Under this line of thought, while the actual extraction of sand may not rise to the level of an injury, the repercussions it can cause would still be compensable.

Valuation of damage bears further discussion. “International law does not prescribe any specific method of valuation for the purposes of compensation for environmental damage”; it is necessary for the Court to instead consider the specific circumstances and characteristics of each case.²²⁵ Specifically, valuation of damages may be increased where damage or impairment occurs to services in “an internationally protected wetland” where biodiversity is of “high value.”²²⁶ Here, the Court awarded Costa Rica \$120,000 for the impairment and loss of ecosystem goods and services, far lower than the nearly \$2.8 million claimed, but also more than the \$34,987 suggested by Nicaragua.²²⁷

Judge *ad hoc* Dugard took issue with the Court’s valuation.²²⁸ The sum arrived at was a “grossly inadequate valuation damage caused to an internationally protected wetland.”²²⁹ Protection of the environment is enshrined in the Stockholm Declaration; destruction of environment is an internationally wrongful act.²³⁰ Moreover, harm to “highly sensitive ecosystems” like wetlands “should be treated with a high degree of seriousness and this should be reflected

²²¹ Compensation owed by the Republic of Nicaragua to the Republic of Costa Rica (Costa Rica v. Nicar.), Judgment, 2018 I.C.J. 15, 85, ¶ 3 (Feb. 2) (separate opinion of Donoghue, J.).

²²² *Id.* ¶ 74.

²²³ *Id.*

²²⁴ *Id.* ¶ 75.

²²⁵ *Id.* ¶ 52.

²²⁶ *Id.* ¶ 85.

²²⁷ *Id.* ¶¶ 57–58, 85.

²²⁸ Costa Rica v. Nicar., 2018 I.C.J. 15, 119, ¶ 1 (dissenting opinion of Dugard, J.).

²²⁹ *Id.* ¶ 18.

²³⁰ *Id.* ¶ 30.

in the amount of compensation awarded.”²³¹ Though Judge *ad hoc* Dugard offered no precise figure, a higher valuation of environmental losses would have been more appropriate; the “paucity” of the Court’s award would do little to emphasize the protection of an internationally protected environmental site.²³²

Regardless of what method of valuation is chosen, the reasoning elucidated by the Court—that proximity to sensitive ecological systems influences the decision to award compensation—would be highly valuable in creating responsible sand extraction practices. The consequences of sand mining are not tied to just the extraction of sand itself; sand mining can cause a severe impairment of the local environment. Although it remains an open question as to how a proper valuation can be reached, the judicial discussion of harm and damages in this case works to establish sand mining as a compensable injury under international law.

C. The South China Sea Arbitration

Since the 1970s, the South China Sea has been awash with competing claims over natural resources from a number of countries.²³³ Under this backdrop comes the 2013 arbitral proceedings against the People’s Republic of China under Annex VII to UNCLOS.²³⁴ On January 22, 2013, the Philippines brought a number of claims against its neighbor, but largely sought arbitration on maritime rights in the South China Sea, the status of certain maritime geographic features, and whether certain Chinese activities breached international law.²³⁵ While fifteen total submissions were addressed by the tribunal of arbitrators (here, the “Tribunal”), the environmental claims were the most pertinent to the issue of sand mining.

These claims involved two aspects. The Philippines argued that China breached UNCLOS provisions (1) by tolerating or facilitating the activities of Chinese fisherman in harming fragile ecosystems and (2) by constructing artificial islands and engaging in extensive land reclamation, thereby inflicting severe harm on the marine environment.²³⁶

Although China has been a long-standing party to UNCLOS, it was notable that China refused to appear before the Tribunal, participate in the

²³¹ *Id.* ¶ 31.

²³² *See id.* ¶ 32.

²³³ *Territorial Disputes in the South China Sea*, COUNCIL ON FOREIGN RELATIONS (May 4, 2022), <https://perma.cc/ZEA6-XKGM>.

²³⁴ UNCLOS Annex VII.

²³⁵ South China Sea Arbitration (Phil. v. China), Case No. 2013-19, PCA Case Repository, Award, ¶ 2, (Perm. Ct. Arb. 2016), <https://perma.cc/629U-SNL9>.

²³⁶ Harrison, *supra* note 216, at 546.

proceedings, or accept the final award.²³⁷ China has viewed the Tribunal as constituted “at the unilateral request” of the Philippines and therefore having no jurisdiction.²³⁸ Despite thorny issues of sovereignty, the Tribunal’s award does not prejudge or depend on any questions of sovereignty.²³⁹ Rather, the Tribunal emphasized that the environmental obligations detailed in part XII of UNCLOS “apply to States *irrespective* of where the alleged harms took place.”²⁴⁰ The broad application of a UNCLOS obligation to protect and preserve the marine environment allowed the Tribunal to “avoid difficult issues of sovereignty and consider whether the actions of China were lawful.”²⁴¹ The flexibility exercised by the Tribunal in addressing China’s actions supports the governance potential of UNCLOS; it is a preexisting framework that can incorporate sand into its terms more explicitly.²⁴²

The Tribunal concluded China breached Articles 192 and 194(5) in allowing certain fishing activities to go forward in the South China Sea.²⁴³ Evidence before the Tribunal suggested Chinese vessels had harvested endangered species, corals, and giant clams to the detriment of the “fragile marine environment.”²⁴⁴ In particular, the “damaging use of propellers”²⁴⁵ to harvest clams resulted in “complete devastation of the reefs.”²⁴⁶ Expert testimony further showed that “extraction methods employed by Chinese fishermen, which are countenanced by the Chinese Government, [were] extremely destructive . . . to the marine environment.”²⁴⁷

The Tribunal cited UNCLOS Article 192 as the basis for a state’s negative duty “not to degrade the environment” and positive duty to take active measures to protect and preserve the marine environment, including “maintaining or

²³⁷ Ted L. McDorman, *The South China Sea Arbitration*, AM. SOC’Y OF INT’L L. (Nov. 18, 2016), <https://perma.cc/2RW3-SCJV>.

²³⁸ *The Tribunal’s Award in the “South China Sea Arbitration” Initiated by the Philippines is Null and Void*, CHINESE SOC’Y OF INT’L L. (June 10, 2016), <https://perma.cc/NVA7-5M6C>.

²³⁹ Harrison, *supra* note 216, at 546.

²⁴⁰ *Phil. v. China*, Case No. 2013-19, ¶ 927 (emphasis added).

²⁴¹ Harrison, *supra* note 216, at 546.

²⁴² It should be noted that while the Philippines was technically successful in almost all of the claims it raised before the Tribunal, no prospective remedies were ordered and the award remains “purely declaratory in character.” *Id.* at 550. Indeed, the Tribunal noted that “in practical terms, neither this decision nor any action that either Party may take in response can undo the permanent damage that has been done to the coral reef habitats of the South China Sea.” *Phil. v. China*, Case No. 2013-19, ¶ 1178.

²⁴³ *Phil. v. China*, Case No. 2013-19, ¶¶ 941, 945.

²⁴⁴ *Id.* ¶ 960.

²⁴⁵ *Id.* ¶ 848.

²⁴⁶ *Id.* ¶ 847.

²⁴⁷ *Id.* ¶ 851.

improving its present condition.”²⁴⁸ Moreover, Article 192 “extends to the prevention of harms that would affect depleted, threatened, or endangered species indirectly through the destruction of their habitat.”²⁴⁹ China had a concurrent duty to “adopt rules and measures to prevent such acts and to maintain a vigilance in enforcing those rules and measures.”²⁵⁰ The failure to take measures to prevent harm to rare ecosystems or the habitat of depleted, threatened, or endangered species thus constituted a breach of UNCLOS.²⁵¹

Harmful construction activities undertaken by China were also found to have violated several provisions of UNCLOS. Since the end of 2013, China had undertaken a massive island-building project and deployed a large fleet of vessels equipped with heavy “cutter-suction dredge equipment” to create new islands.²⁵² Cutter-section dredging employs a drill that is used to break apart the seabed and extract soil and rock.²⁵³ This material is then pumped and deposited to a reclamation area.²⁵⁴ The effects of these actions include the direct destruction of reefs and water pollution.²⁵⁵ Again, the Tribunal turned to Article 192 to reach the understanding that states have a positive duty to “prevent, or at least mitigate significant harm to the environment when pursuing large-scale construction activities.”²⁵⁶ By damaging coral reefs and other marine life through land reclamation activities, China had violated several obligations imposed under Articles 192, 194(1), and 194(5) of UNCLOS.

If *Pulp Mills* and the Nicaragua-Costa Rica border dispute illustrate the significance of the EIA process, then the South China Sea arbitration illustrates how UNCLOS can be used to challenge sand mining in the ocean and off coasts. While the failure to protect the marine ecosystem acts as a general basis for liability, it is more interesting that the Tribunal took issue with the dredging techniques employed by China. Although the Tribunal never explicitly mentioned the term “sand mining” and although the Philippines did not bring the case on that basis, a technique commonly employed by sand miners was found to be the basis of liability. The Tribunal’s finding in this case offers the strongest argument for incorporating sand mining into UNCLOS; it would be low-hanging fruit to integrate marine sand concerns with the Convention when it has already found a common practice in sand mining as a basis for liability.

²⁴⁸ *Id.* ¶ 941.

²⁴⁹ *Id.* ¶ 959.

²⁵⁰ *Id.*

²⁵¹ *Id.* ¶¶ 960–61.

²⁵² *Id.* ¶ 854.

²⁵³ *Id.* ¶ 855.

²⁵⁴ *Id.*

²⁵⁵ Harrison, *supra* note 216, at 548.

²⁵⁶ *Phil. v. China*, Case No. 2013–19, ¶ 941.

D. Synthesis and Analysis

Suppose an aggrieved country from the lower Mekong were to launch a legal challenge against an upstream neighbor for its sand mining operations. What steps could be taken and what legal basis would ground the claims? When taken together, *Pulp Mills*, the Nicaragua-Costa Rica dispute, and the South China Sea arbitration answer these questions by providing guidance on three major prongs: (1) mandating monitoring and information-gathering mechanisms, (2) identifying enforcement possibilities for state and non-state actions, and (3) clarifying unclear or ambiguous duties under international law.

1. The Duty to Assess

In *Pulp Mills* and the later Nicaragua-Costa Rica border dispute, the ICJ affirmed the obligation to carry out an EIA as a requirement of international law.²⁵⁷ In our hypothetical situation, the lower Mekong country would be able to successfully argue that its neighbor had to assess the environmental consequences of its activities and share the results *before embarking* on the activity. The threshold triggering the obligation for an EIA would not be particularly difficult to reach in our hypothetical. Under the Court's judicial examination in the Costa Rica case, factors like the "nature and magnitude of the project and the context in which it was to be carried out" are all relevant.²⁵⁸ Moreover, the mere proximity of a protected site (which the Mekong River qualifies for) signals the heightened risk of significant environmental damage. Again, it was on this basis in the past that the Court grounded the legal obligation to carry out an EIA.²⁵⁹

Though EIAs may have imperfections, they nevertheless provide a legal framework capable of addressing the information gap that exists on sand mining. The inclusion of public participation in the EIA system makes it a potent tool for sand mining because a large portion of stakeholder activity primarily comes from a disaggregated, individual level. Thus, by setting a low bar for triggering information gathering and by including wider public involvement, the duty to assess counteracts the malaise of illicit sand mining. While information gathering is by itself no panacea, quantifying the damage can be crucial when international law prescribes no specific method of valuation for the purposes of compensation for environmental damage, and where the Court must instead rely on the specific circumstances and characteristics of each case.

²⁵⁷ Harrison, *supra* note 195, at 534.

²⁵⁸ *Costa Rica v. Nicar.*, 2015 I.C.J. 665, ¶ 155.

²⁵⁹ *Id.* ¶ 155.

2. States and Non-State Actors Both on the Hook

Though Judge Bhandari's remarks in the Costa Rica-Nicaragua dispute could be dismissed as mere dicta, his discussion on the role and liability of private entities is important. Sand mining is often carried out by private entities working without the direct knowledge or supervision of a national government. If duties, penalties, and legal coverage were to only affect state entities, then non-state actors could easily slip through the gaps while states simply wash their hands of liability. Judge Bhandari's conception of the role of private entities places them on the same legal hook as states. When private companies propose projects near international borders, the state carries the responsibility to provide an EIA to a potentially affected country.²⁶⁰

Moreover, in the South China Sea case, ships involved in the dredging process were considered to be under the jurisdiction and control of China. As a consequence, China had a duty under international law to adopt rules and measures to prevent harmful environmental acts and to maintain vigilance in enforcing such rules and measures. In our hypothetical example, the actions of any of the stakeholders in the multilayered sand extraction process (the "farmers or local day laborers, drivers, boat owners, extraction companies, contractors, officials," and states themselves)²⁶¹ may all be liable for environmental harm.

3. Clear Duties to the Environment

By incorporating Principle 21 into its structure, part XII of UNCLOS offers a strong legal basis for challenging harmful sand extraction activities. As seen in the South China Sea arbitration, the Tribunal's citation of Article 192 as the basis for a state's negative duty "not to degrade the environment" and positive duty to take active measures to protect and preserve the marine environment, including "maintaining or improving its present condition" is a powerful pronouncement that applies in the context of aggressive sand extraction.²⁶² The Tribunal also turned to Article 192 to reach the understanding that states have a positive duty to "prevent, or at least mitigate significant harm to the environment when pursuing large-scale construction activities."²⁶³ And since sand extraction can be particularly injurious to fauna and flora, Article 192's extension to the "prevention of harms that would affect depleted, threatened, or endangered species indirectly through the destruction of their habitat" adds an additional limit to sand extraction.²⁶⁴

²⁶⁰ *Costa Rica v. Nicar.*, 2015 I.C.J. 665, 790, ¶ 44 (separate opinion of Bhandari, J.).

²⁶¹ Mouterde & Depardon, *supra* note 122.

²⁶² *Phil. v. China*, Case No. 2013-19, ¶ 941.

²⁶³ *Id.*

²⁶⁴ *Id.* ¶ 959.

To close our hypothetical, excessive extraction of sand from the Mekong River implicates transboundary harm to all nations that share in its resources. In an era involving an “unprecedented globalization”²⁶⁵ of environmental risks and harms caused by accelerated resource use, development, and trade, the Tribunal’s holding in the South China Sea arbitration affirms that state duties to the environment are backed by the corpus of international law; transboundary harm to the environment forms the basis for liability. Here, the aggrieved lower Mekong nation (and its adjacent neighbors) is owed a duty of responsible management and consumption.

4. Stepping Toward a Framework

An ideal governance framework on sand should (1) find justification through commonly accepted principles of international law; (2) build upon the recommendations of the UNEP by incorporating requirements for monitoring and assessment; and (3) actively encourage public participation.

Existing frameworks and past lessons are flexible and dynamic enough to accommodate inserting sand into the mix. In the absence of a single, coherent framework on sand governance, all “low-hanging fruit” (in other words, easily transferable, highly analogous legal concepts) should be considered potential opportunities to provide short-term governance solutions on sand. Although a new governance framework is unlikely to emerge at this point in time, existing frameworks and principles have featured these concepts to varying degrees. Existing tools may not have been designed with sand mining in mind, but they remain tried and tested. Conventions like UNCLOS, Espoo, and OSPAR, in tandem with principles like CBDR and the prevention of transboundary harm, are low-hanging fruit that can address sand governance concerns. Before an ideal governance framework emerges, working with these tools should be considered as an important first step.

Moreover, public participation, as encouraged by Espoo, can address the pressing information void surrounding sand mining practices. Sand might be available for a low price in bags at local stores, but this ostensible accessibility and abundance should not be relied upon for policy decisions. It is the perspective of individuals at the ground level actually digging in riverbanks and on coastlines that is required to truly understand the scale of the issue. OSPAR, for its part, is demonstrative of a regional agreement that has the potential to address sand extraction issues while retaining localist elements in its participatory

²⁶⁵ Peter H. Sand, *Environmental Dispute Settlement and the Experience of the U.N. Compensation Commission*, 54 JAPANESE Y.B. INT’L L. 151, 152 (2011).

input.²⁶⁶ The first steps toward a new international framework on sand can be built off of the lessons provided by current tools.

V. CONCLUSION

Guidelines for governing sand extraction at the international scale are sorely needed. After all, sand respects “no anthropogenic boundaries such as territories, jurisdictions, administrations, product markets or habitats.”²⁶⁷ With certain preexisting frameworks, we have tools that can start chiseling away at the problems caused by unsustainable sand extraction.

It is true that these tools may not be perfect; they may not be ideal for long-term governance of sand extraction and consumption. This Comment recognizes the “pitfalls of one-size-fits-all solutions,” given that sand extraction varies widely across localities.²⁶⁸ Moreover, this Comment also recognizes the availability and possibility provided by alternative materials and procurement methods.²⁶⁹ Promising alternative substitutes include fly ash from waste incineration, waste foundry sand, and even fine desert sand.²⁷⁰ Recycling concrete and reusing waste aggregates from construction sites can also help reduce sand consumption.²⁷¹ However, discussion on the efficacy of these materials and methods is beyond the scope of this Comment.

Despite recent interest and attention, sand mining remains a relatively obscure issue; “the sand and sustainability challenge remains off the radar for governments, financial institutions, the construction sector, and other key stakeholders.”²⁷² Yet, the growing demand of sand should be ample reason for concern. Confronting population growth, migration, infrastructure development, climate change adaption efforts, and meeting the U.N.’s seventeen Sustainable Development Goals by 2030 will all require sand in some form.²⁷³ International law may not provide all of the solutions to address sand mining, but it does provide some of the right tools to begin fixing the leaking sandbox.

²⁶⁶ SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at VII (noting the need for “improved governance of sand resources” and calls for “urgent global management of marine and coastal sand resources”).

²⁶⁷ *Id.* at 30.

²⁶⁸ *Id.* at XIV.

²⁶⁹ *An Improbable Global Shortage: Sand*, *supra* note 8.

²⁷⁰ SAND AND SUSTAINABILITY: FINDING NEW SOLUTIONS, *supra* note 2, at 11.

²⁷¹ *Id.* at 12.

²⁷² SAND AND SUSTAINABILITY: 10 RECOMMENDATIONS, *supra* note 9, at 62.

²⁷³ *Id.*