

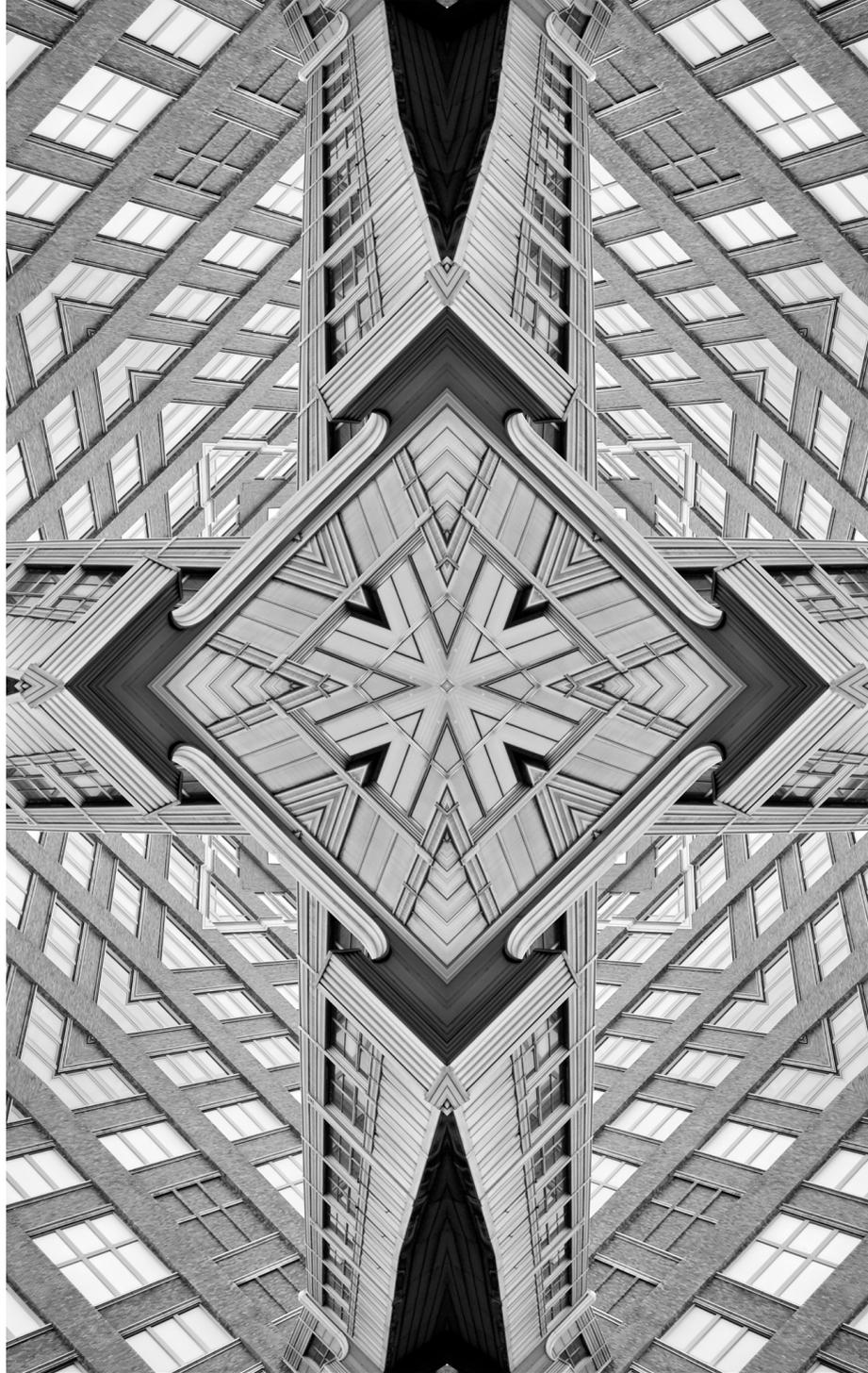
# Issue

---

# Brief

---

**ISSUE NO. 449**  
**MARCH 2021**



© 2021 Observer Research Foundation. All rights reserved. No part of this publication may be reproduced, copied, archived, retained or transmitted through print, speech or electronic media without prior written approval from ORE.

# In Deep Water: Current Threats to the Marine Ecology of the South China Sea

**Pratnashree Basu and Aadya Chaturvedi**

## **Abstract**

Territorial disputes in the South China Sea are traditionally viewed through the standpoint of China's military expansionism, where the threats are more visible. The environmental impacts of China's activities, which will be long-lasting, remain underexplored. China's island construction, drilling activities, and overfishing have pushed the marine ecosystem of the region to the brink of collapse, and the destruction of coral reefs and the marine life they support is threatening the food and energy security of the littorals. This policy brief analyses the environmental impacts of China's activities in the South China Sea and highlights its implications for the entire region.

The South China Sea, spread over an area of 3.477 million sq km, is one of the most resource-rich marine areas in the world. It has known reserves of 190 trillion cubic feet of natural gas and 11 billion barrels of oil,<sup>1</sup> and is home to diverse ecosystems<sup>2</sup> with 3,000 species of fish and 600 species of coral reef, a variety of mangrove and seagrass species, and turtles and seabirds that use the islands for resting, breeding, and wintering. The waters are bordered by China, Vietnam, Indonesia, Malaysia, Brunei, and the Philippines.

### Figure 1: South China Sea: Territorial jurisdictions and China's Nine-Dash Line



Source: Foreign Policy<sup>3</sup>

The SCS has become the subject of intense discussions in recent years owing to its geopolitical and security knots. It is one of the most disputed maritime areas in the world, with competing territorial claims and poorly demarcated rights that give rise to further conflict among countries bordering the sea. Of these countries, China is the only one which not only claims a vast portion of these waters –beyond what is placed under its sovereignty by the UNCLOS<sup>a</sup> – but has also involved itself in multiple activities on the various rocks, shoals and reefs that dot these waters. These activities have provoked massive concern from the littorals and the international community for their security ramifications. Yet, another serious impact of these activities has received less attention: the environmental damage being wrought on the local ecosystems.

Indeed, the marine ecosystem of this region was already reeling under the pressures of being one of the world’s busiest international sea-lanes.<sup>4</sup> These pressures have since been compounded by the overfishing, clam extraction, dredging for construction of artificial reefs, and hydrofracking<sup>b</sup> being done by China. Rising sea temperatures and sea levels due to climate change threatens to render this damage permanent.<sup>5</sup>

In more recent years, the international community on several occasions has begun recognising climate change—and its manifold impacts—as nothing less than security threats. The 1987 Brundtland Report,<sup>6</sup> the 1992 UN Conference on Environment and Development,<sup>7</sup> the UN Security Council meetings in 2007,<sup>8</sup> 2011,<sup>9</sup> 2018<sup>10</sup> and 2019,<sup>11</sup> and the Paris Climate Record have all highlighted the looming global environmental crisis.

This policy brief makes an account of the slew of activities that China is undertaking in the South China Sea region. The brief aims to contribute to emerging discussions on China’s belligerence, from a non-traditional security point of view. The consequent environmental damage from these activities may not manifest itself conspicuously and immediately, but early indications show that its implications on the entire region will be nothing less than insidious.

To be sure, other players<sup>c,12</sup> in the region have also partaken in the activities as they assert their own claims on the disputed island territories. (Except for the dredging activities, which are China’s sole domain.) However, there is little doubt that China’s activities are far bigger in scale and more advanced in pace and, according to various studies, have caused the most visible impairments.

---

a The United Nations Convention on the Law of the Seas (UNCLOS) also referred to as Law of the Sea Convention or the Law of the Sea treaty, came into effect in 1982. It is the legal framework delineating the geographic jurisdictions of coastal states and defining rights and responsibilities governing marine and maritime exploitation and conservation.

b Hydrofracking or fracking, is a technique for oil and gas extraction from areas with fossil energy deposits that are inaccessible to drilling. Unregulated fracking is detrimental to the quality of air and ground and surface water, as well as harmful for marine and wildlife.

c Vietnam, the Philippines, Malaysia and Taiwan have reinforced land features in the South China Sea.

# China's Activities in the SCS: Overview and Analysis

## Fishing

Fisheries in the South China Sea provide food and jobs to millions of people inhabiting the 10 littoral countries and territories.<sup>13</sup> Decades-long, unabated fishing has resulted in declining fish stocks and given rise to one of the biggest non-traditional security threats to the region – overfishing. This in turn threatens food security in the densely populated region.

For China, fisheries are crucial to ensuring food security for its burgeoning population. The needs have only heightened with the expansion of the middle class who have significant spending power and heightened domestic consumption.<sup>14</sup> Estimates project that by 2030, the expanding middle class in China will account for 38 percent of global fish consumption,<sup>15</sup> with domestic production outstripping demand.<sup>16</sup> As far back as in 1986, China introduced a fisheries law with a view to expanding the country's fishing activities. By 2018, according to the 2020 Food and Agriculture Organization's *Yearbook of Fishery and Aquaculture Statistics*,<sup>17</sup> China accounted for 15 percent of the total global catch. This translated to 62.2 MMT a year, including 47.6 MMT of aquaculture production and 14.6 MMT of capture production. It is also the world's biggest exporter of fisheries, with exports amounting to 21.6 MMT in 2018. The fishery industry in China employs 14 million people.<sup>18</sup>

**Table 1:**  
**Fish and Seafood Consumption per capita in the South China Sea**

	China	Vietnam	Philippines	Malaysia	Taiwan	Indonesia
2010	32.16 kg	33.90 kg	34.88 kg	60.55 kg	29.99 kg	27.22 kg
2011	32.86 kg	33.31 kg	32.69 kg	56.16 kg	32.97 kg	28.87 kg
2012	34.68 kg	32.99 kg	32.14 kg	60.75 kg	35.49 kg	28.52 kg
2013	34.47 kg	32.67 kg	31.58 kg	58.97 kg	35.41 kg	28.17 kg
2014	35.93 kg	30.88 kg	29.66 kg	57.44 kg	32.95 kg	36.96 kg
2015	37.49 kg	35.47 kg	29.88 kg	57.52 kg	31.79 kg	38.28 kg
2016	37.96 kg	35.92 kg	28.55 kg	57.99 kg	29.76 kg	39.32 kg
2017	38.17 kg	37.66 kg	28.14 kg	57.62 kg	29.69 kg	44.67 kg

Source: Author's own<sup>19</sup> using data from *Fishery and Aquaculture Statistics, Annual Report, FAO, 2018*

# China's Activities in the SCS: Overview and Analysis

The overfishing—and illegal and unregulated fishing—has resulted in the rapid depletion of fish stocks in China's coastal areas. The country has lost<sup>20</sup> half of the coastal wetlands, 57 percent of mangroves and 80 percent of coral reefs in its own Exclusive Economic Zone (EEZ)—these are important for the spawning, nursing and feeding of the fish stocks. In order to sustain their fisheries demand, China has expanded its fishing fleets, sending them as far as Africa and South America. Chinese fleets have been caught trawling in the EEZs of countries such as Argentina, Somalia and South Korea.<sup>21</sup> In the South China Sea, which accounts for 16.6 MMT of catch per year, fishing stocks have plunged by a third over the past 30 years; it is estimated that the stocks will fall further by 59 percent by 2045.<sup>22</sup>

“Decades-long, unabated fishing in the South China Sea has given rise to one of the biggest threats in the region: depleting fish stocks.”

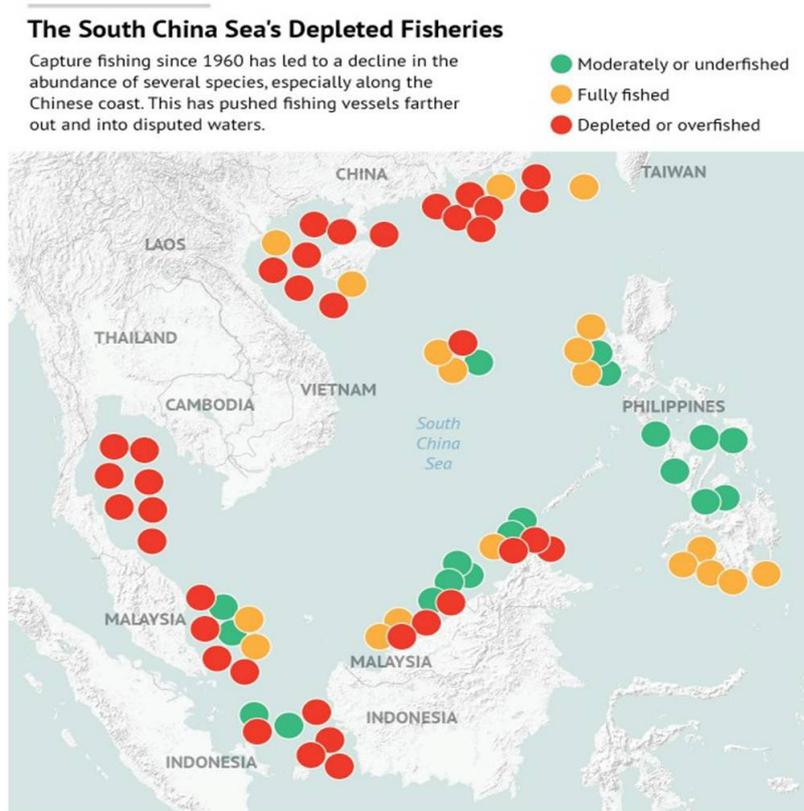
It is not only China's fishing stocks that have declined due to the country's fishing activities; those of other countries<sup>23</sup> have dwindled as well. Many small Chinese vessel owners are paid or given fuel subsidies to fish in the EEZs of other countries. According to the submissions<sup>24</sup> to the Permanent Court of Arbitration (PCA) by the Philippines in the historic case, *Philippines v. China*, Chinese fishermen have illegally harvested corals, marine turtles, clams, sharks, eels and other marine animals from the waters of other countries on several occasions.

As fish stocks near coastal areas reduce and the Catch Per Unit Effort (CPUE) sharply decline<sup>25</sup> over the years, fishermen are moving out farther and deeper into the sea and utilising techniques such as cyanide<sup>d</sup> and dynamite fishing,<sup>e,26</sup> which in turn are causing further damage to marine life. Methods such as blasting using dynamite and cyanide poisoning kill or impair scores of fish at one go, so as to increase the volume of each catch. Dynamite blasts not only kill their subjects but also destroy the coral reefs that serve as breeding grounds for stocks and are integral in maintaining carbon-dioxide levels in the ocean. Cyanide, meanwhile, accelerates the bleaching of coral reefs and sometimes

d In cyanide fishing, fish are stunned by squirting them with poison. The live fish are then caught and end up in expensive live seafood restaurants and hotels.

e In dynamite fishing, dozens of fish are killed at once with homemade underwater bombs.

**Figure 2:  
Depletion in fish stocks in the South  
China Sea**



Source: Stratfor<sup>27</sup>

outrightly kills them. These methods are also used at greater depths, thereby impacting the seabed as well.

The expert report submitted by the Philippines to the PCA has also analysed the impacts of the Chinese construction activities and overfishing on the fishing stocks of the region. According to a study<sup>28</sup> quoted by the Philippines' report, the Spratly Islands<sup>f</sup> are an important source of fish larvae that get transported to other regions as well. For example, this study suggests, healthy marine wildlife populations on the Spratly Islands could have beneficial effects in helping sustain fisheries in the western Philippines. Conversely, the overexploitation of fisheries resources on the Spratly Islands will have a negative impact on fish stocks and fisheries in the Philippines. Another study<sup>29</sup> cited in the Philippines' report found that since most of the reefs constructed by China in the Spratlys are in the

<sup>f</sup> The Spratly islands located in the South China Sea are an archipelago comprising islands, islets, reefs and submerged atolls which are claimed in whole or part by China, Taiwan, Malaysia, the Philippines, Vietnam, and Brunei.

# China's Activities in the SCS: Overview and Analysis

western part and are diametrically far from the stock-rich region in the east of the islands, any loss of fisheries in the Spratlys would not be recoverable quickly.

Both of these studies reveal the existence of some larval exchange among the Spratly Islands, Scarborough Shoals, Paracel Islands, and reefs of the main Philippine islands. Such connectivity doubtless has evolutionary importance in maintaining the biodiversity of the Spratly Islands. This regional role of the islands, as a source of fisheries replenishment, could easily be diminished through the loss of habitat quality and worsening of local fisheries exploitation because of the construction of permanent dwellings. Field-verified models have established that a loss of reef habitat reduces the productivity of the fishery

**Table 2:  
Total No. of Fishing fleets operating in  
the South China Sea (2018)**

	China	Vietnam	Philippines	Malaysia	Taiwan	Indonesia
<b>Motorised</b>	556150	34563	183998	49352	21537	460658
Un-motorised	307742	-	292180	3204	370	165050

Source: Author's own<sup>30</sup>

**Table 3:  
Total Fish Capture in the South China  
Sea (Both inland and marine) (2018)**

China	Vietnam	Philippines	Malaysia	Taiwan	Indonesia
<b>14647819</b>	347039	2049572	1457621	814911	7215215

Source: Author's own<sup>31</sup>

# China's Activities in the SCS: Overview and Analysis

threefold. Therefore, the constructions will greatly compromise the reefs' capacity not only to sustain local fisheries, but also to help replenish the fisheries of neighbouring seas.

A study conducted by the Centre for Strategic and International Studies (CSIS)<sup>32</sup> shows the extensive fishing activity in the SCS. The two images in Figures 3 and 4 show<sup>g</sup> the increase in night-time fishing activity in the SCS between January 2013 and May 2018. The same study revealed the vast difference between the fishing vessels reportedly out at sea, and the actual number of vessels that are traversing the waters: most vessels either deliberately escape detection, or data cannot be collected because the boats are not modern enough. A greater concentration of fishing vessels is also near Chinese outposts, especially close to the Subi and Mischief Reefs.

The tracking data shows that many of these vessels are not engaged in fishing at all, despite being big modern trawlers. Rather, the signals indicate that they remain stationed for prolonged periods in specific parts of the waters – especially around the Spratly islands. As many Chinese fishing vessels also double as the country's maritime militia, their mere presence can escalate the tenuous situation with the very real possibility of clashes with fishing vessels of other countries.<sup>35</sup> China's maritime militia adds to the armed forces personnel deployed by the different littorals—compounding the securitisation of the sea space. These fishing vessels are also dubbed “dark fishing fleets”<sup>36</sup> and are engaged in “unseen”<sup>37</sup> fishing activities –in other words, they are engaged in patrolling, resupply and surveillance operations in the area.

---

<sup>g</sup> The study utilised data from Visible Infrared Imaging Radiometer Suite (VIIRS) Boat Detection, which detects bright light sources at sea to pinpoint fishing activities; and Synthetic Aperture Radar (SAR) which provides the approximate vessel count at any given time and location.

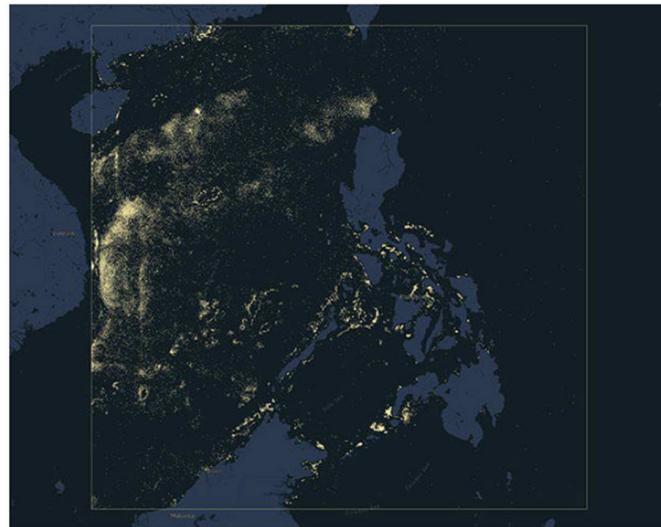
# China's Activities in the SCS: Overview and Analysis

**Figure 3:  
Bright lights reveal fishing activity in  
the SCS at night in January 2013**



*Source: CSIS<sup>33</sup>*

**Figure 4:  
Bright lights reveal fishing activity in  
the SCS at night in May 2018**



*Source: CSIS<sup>34</sup>*

# China's Activities in the SCS: Overview and Analysis

## Dredging and Construction

Since 1947, China has laid a “historical” claim over much of the South China Sea. Chinese national maps reflect this entire area to be within the bounds of the U-shaped “nine-dash line”<sup>38</sup> that runs alongside the coasts of Taiwan, the Philippines, Malaysia, Brunei, Indonesia and Vietnam. In 1974, it drove out Vietnamese troops and laid claim to many islands and rocks in the region. Since the 1980s, it has chased out the fishing troops of other countries and taken over many reefs. Beginning in 2015, it has aggressively reclaimed land in these islands and reefs either by increasing their size or creating new ones, such as the Subi Reef on the Spratly Islands. It has constructed ports, military installations, and airstrips—particularly in the Paracel and Spratly Islands,<sup>39</sup> where it has, respectively, 20 and seven outposts. It has deployed fighter jets, cruise missiles, and a radar system on the Woody Island in the Paracels.

Dredging on these islands—carried out as preparation for constructions—has been found to be primarily responsible for the destruction of reef flats.<sup>40</sup> Dredgers sweep in a back-and-forth motion, cutting through all sorts of material, hard rocks to soft sediments, and thus destroying life along its path.<sup>h</sup>

China claims that it is dredging only in shallow waters—and therefore not posing significant danger. However, marine scientists, using satellite imagery, have found that China is indeed carrying out dredging activities in the deep waters as well.<sup>41</sup> The dredging activities have been found to send up plumes of sediment and corrosive sand,<sup>42</sup> laced with metal and oil from the dredging ships, which is visible as dark blue clouds on satellite imagery. These plumes wash back into the sea and smother<sup>43</sup> the species underwater by blocking sunlight and oxygen. Increased sedimentation in the water columns of these reefs has also decreased the absorption and chlorophyll in the region, which is essential for the survival of phytoplankton and which in turn provide food for a wide range of marine life.

Alteration of the coral reefs has also disrupted the dynamics of resuspension and deposit of sediments on the seafloor. The periodic dredging to clear built-up sediments will prevent most reef organisms from settling, and will likely create a chronic problem of sand and silt plumes for surrounding marine ecological zones. These activities have led to increased turbidity<sup>44,i</sup> and sedimentation on the lagoons surrounding these reefs. This has caused live coral reef species to be buried and killed under the reef flats due to the construction activities. Once a coral reef has been buried under tonnes of sand and gravel, it is virtually dead.<sup>45</sup> Deep dredging cuts through thousands of years of reef limestone and

---

h Coral reefs are an important breeding ground for marine species and are responsible for protecting the coasts. They are the focal point of marine life and their death causes the entire ecosystem to unravel.

i The level of transparency of water; used as a basic measure to check for the apparent pollution of a water body

# China's Activities in the SCS: Overview and Analysis

these sediments are particularly hazardous to soft and hard corals.<sup>46</sup> They can reduce growth rates, cause lesions, and inhibit sexual reproduction amongst species. The weakened corals may become susceptible to diseases. According to the expert report<sup>47</sup> submitted to the PCA in the case of *Philippines v. China*, 27 percent of the shallow reef area of the seven reefs in the South China Sea have been permanently lost (i.e., buried or excavated beyond visibility from the surface). Channel dredging has affected 1.4 sq km of reef on the seven reefs considered in this brief, while the amount of shallow reef area affected by dredging for the gathering of fill materials is 39.3 sq km.

Elevated sediment levels have also affected the survival of the fish stocks in the region. This is because the plumes and sediment clouds that rise from dredging operations inhibit<sup>48</sup> the visual and chemical cues of the fishes, making them less capable of finding their foraging spots and habitat, as well as identifying predators and prey. In the Great Barrier Reef in Australia, for example, clownfish pods developed mucous in their gills and pathogenic bacteria due to prolonged exposure<sup>49</sup> to such sediments.

Added to this damage caused by construction-related dredging activities are an estimated 68.8 sq km of shallow reef damage believed to be caused by clam excavation that uses boat propellers.<sup>j</sup> According to satellite imagery, most of the damage has been made (and sediment stirred up) by numerous small Chinese propeller boats that have been used to extract giant clams<sup>50</sup> from the shallow waters surrounding the reefs. Although fishers from the Philippines and Vietnam also harvest wild giant clams, only fishers from China have been known to use the method of digging up the bottom of the sea with boat propellers.

“China’s dredging activities on the islands dotting the SCS are destroying the coral reefs and threatening the diverse marine life dependent on them.”

## Hydrofracking

Beginning in the 1980s, China carried out seismic surveys<sup>51</sup> in the South China Sea region and estimated that the Spratly Islands held deposits of 25 billion

---

j These clams are used for commercial products such as decorative shells.

# China's Activities in the SCS: Overview and Analysis

cubic meters of natural gas and 105 billion barrels of oil. Many years later, in 2003, China revised its estimates of natural gas reserves in the region to 980 billion cubic meters. Other studies have reckoned the presence of about 40 billion tonnes of gas hydrate reserves<sup>52</sup> at 11 hotspots across the South China Sea.

Indeed, China has carried out oil and gas exploration activities in the region since the 1990s. In 1992, it signed a contract with Crestone Energy Corporation, owned by the Houston-based Natural Resources Inc.,<sup>53</sup> to conduct oil exploration activities on the Vanguard Bank in the Spratly Islands, which Vietnam claimed to be in its continental shelf. In 1994, Crestone, along with the China National Offshore Oil Corporation (CNOOC) commenced exploration activities in the Wan-an-bei-21 (WAB-21 block) in the Spratly Islands. In 1997, the Chinese Kantan-3 oil rig drilled in the Da Nang area near the Spratlys, which Vietnam claims as Block 113. CNOOC has also collaborated with other companies such as Devon Energy Corporation, based in Oklahoma, US.<sup>54</sup> and Husky Oil China Limited<sup>55</sup> to carry out drilling operations in the area. According to official figures published by CNOOC<sup>56</sup> in 2019, it was producing 286,790 barrels/day of crude oil and 709.1 mmcf/day of natural gas from their oil fields in the Western and Eastern South China Sea areas. Beijing has also placed a 10-storey oil drilling platform<sup>57</sup> in the area disputed with Vietnam, which can dig up to a depth of 9,000 meters.

Offshore oil and gas operations pose significant environmental danger<sup>58</sup> since these activities release huge amounts of liquids, solids and gas into the waters, damaging the ecosystems and endangering the species that inhabit them. The preliminary seismic surveys, the rig installation and drilling, the hydrocarbon production, and the transportation of the oil and natural gas cause damage to the seabed. From drilling to recovery of the oil, the impacts on the marine environment vary across the stages. Big projects that dig deeper for extraction are more impactful. Seismic surveys cause noise, emissions and discharges that harm the fish pods that are dependent on auditory and visual cues as they traverse their habitat. Drilling operations dispose slurry consisting of mud, cuttings, wash water, drainage, and sewage into the ocean. They also cause harmful emissions with frequent leakage and spillage of the extracted hydrocarbons.

“Offshore oil and gas operations release huge amounts of emissions into the waters, damaging the ecosystems.”

# Implications of China's Activities

Table 2 showed that Chinese fleets in the South China Sea are far more than those deployed by other littoral States in the region. Similarly, Table 3 showed that China's total fish capture from the SCS far exceeds that of its next competitor in the region, Malaysia. China's overzealous fishing activities in the region have put the fisheries in near-collapse. Its encroachment upon the EEZs (which were designed to safeguard<sup>59</sup> food security since most of the fish stocks are within 200 miles of a shore) of other countries in the region and driving out their fishing vessels from their own waters, threatens to jeopardise the sourcing of a staple food of large populations in the region. The South China Sea is also important for global fish demand as it supplies 12 percent of the global fish catch. However, over the past two decades, fish stocks have fallen by 66-75 percent.<sup>60</sup> As discussed earlier in this brief, the ability of fishery stocks to replenish has been severely hampered by China's dredging and construction activities.

Over the past few decades, climate change and rising sea temperatures have become a significant threat to global fisheries. It has caused sea temperatures to rise and oceans to become acidic, and has altered the oxygen and carbon concentration in the waters, making the sustenance of marine life difficult. The South China Sea is amongst one of three "epicentres"<sup>61</sup> that have been touted to be severely impacted by this phenomenon.<sup>k</sup> Rising ocean-surface temperatures have the potential to force fish stocks to migrate farther north towards East China Sea and Sea of Japan. This will make fishing harder for countries like Vietnam, Malaysia, Indonesia, and the Philippines, which lack the resources to fish in distant waters.

China's heavy-handed approach in this region has also put the energy security of its neighbours in jeopardy, with the Philippines and Vietnam being the worst hit. Almost half of the Philippines' energy mix is produced at the Malampaya gas field in Luzon Islands, which is predicted to start running dry by 2024.<sup>62</sup> Though the Reed Bank remains its best possible alternative, preparing a new gas field takes at least 10 years. With China unrelenting in its claims over Reed Bank, this alternative seems similarly bleak. Meanwhile, Vietnam's ability to attract foreign investments has suffered after it was forced to end its deal with Repsol (a Spanish energy and petrochemical company based in Madrid) amidst pressure from China. It might also have to pay damages to the company which had invested an estimated \$200 million for offshore gas drilling. Petro Vietnam, Vietnam's state-owned energy company, has admitted that its crude oil production will fall by 10 percent per year up to 2025 due to its inability to explore new gas reserves.<sup>63</sup>

---

k The other two epicentres are the Arctic and the African great-lakes.

# Implications of China's Activities

## Contravention of International Law

In the international law regime, there are broadly two ways through which a State upholds its international legal obligations: on its own volition, or it is coerced by other powerful States. China's case is confounding since it walks neither of these paths. That China remains unfazed amidst allegations of violating provisions of international law<sup>64</sup> is best exemplified by its refusal to honour the decision of the PCA in the case filed against it by the Philippines. Lack of policing and implementation mechanisms with international multilateral organisations leaves the compliance of their orders at the discretion of States. China's rising economic and military might make it difficult for other global powers to challenge it successfully.

China's activities in the South China Sea amount to a flagrant violation of international law and environmental treaties. The UNCLOS,<sup>65</sup> which China has ratified, mandates that the “*states have the obligation to protect and preserve the marine environment.*” Article 194 of the Convention imposes an obligation upon Member-States 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.*” They also have the responsibility to protect the “*rare or fragile ecosystems*” in order to protect the endangered marine species. China has also ratified the Convention on Biological Diversity<sup>66</sup> which mandates the member states to ensure that their activities do not cause environmental damage beyond their national jurisdiction.

China is also party to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972,<sup>67</sup> which stipulates reporting requirements and adherence to compliance procedures from its Parties. It has also acceded to the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004.<sup>68</sup> China claims that it has carried out its island building activities with full regard of “*science-based evaluation*”<sup>69</sup> and has followed all the international environmental protection standards to ensure ecological and fishery preservation. However, the Chinese government has<sup>70</sup> provided neither sufficient evidence to back these claims, nor any assessment reports to international organisations.

Perhaps the most scathing criticism of China's island-building activities from the standpoint of international law was contained in the PCA's decision in the *Philippines v. China*.<sup>71</sup> The Philippines claimed that China was interfering with its fishing rights around the Scarborough Shoal and in its EEZ. It also demanded a determination on the use of the ‘nine-dash line’ as a means of maritime delimitation over the rules set under the UNCLOS. Announcing the

# Implications of China's Activities

award in favour of the Philippines, the PCA made pertinent observations with respect to the impact of Chinese activities on the ecosystem of the South China Sea. The PCA noted that the “nine-dash” line had no basis in law and therefore, China does not have sovereignty over areas beyond its own EEZ. It held China’s island-building activities and fishing activities to be violative of the Philippines’ rights over its own EEZ. It held that these activities were responsible for substantive coral reef damage, depletion of endangered species, plunge in fishing stocks, and disturbance to the structural integrity of the islands and reefs in the region. It criticised the use of cyanide and dynamite by the Chinese trawlers and acknowledged its harmful effects on the oceanic biosystems. It noted that despite diplomatic communications and several warning, China willingly continued its illegal activities.

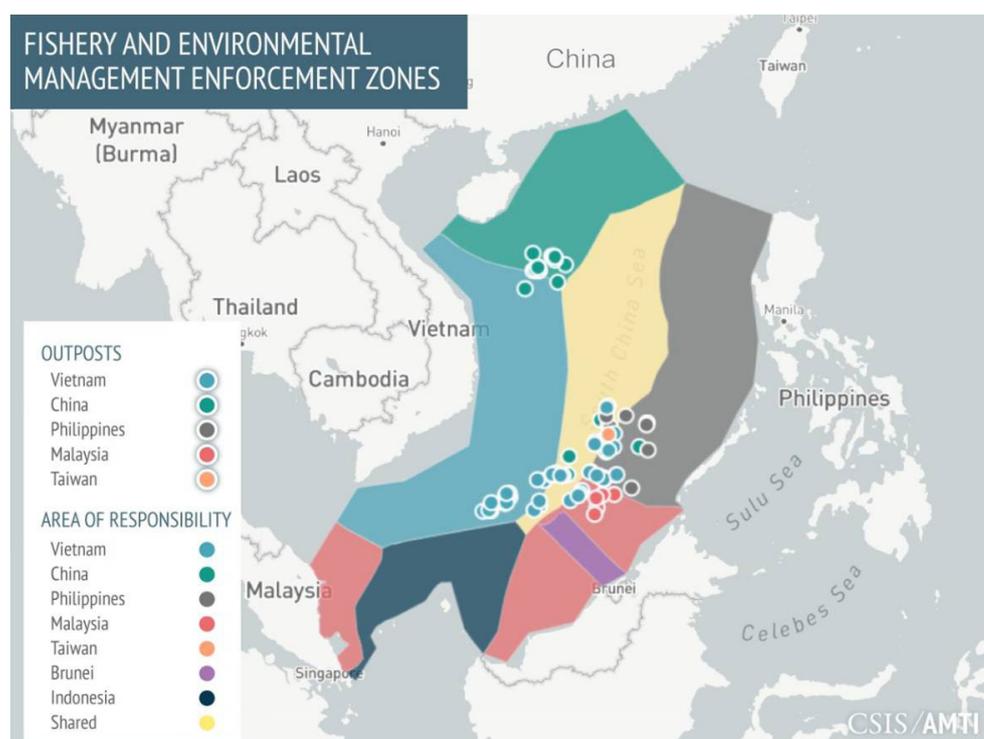
The PCA held China to be in violation of Articles 192, 194 (1) and 194 (5) of the Convention which obligated them to preserve and protect the marine environment. It was also held to have violated Article 197 and 123 of the Convention which requires the States, especially those surrounding a closed or semi-enclosed area, to cooperate on a regional basis in order to formulate standard practices and protocols for the same. Article 206 of the Convention too was held to be violative, which requires States to assess the potential effects of their activities on the marine environment if it has reason to believe that such activities will cause “significant and harmful change” to the same. It noted that at the scale of China’s constructions, there is no reason to believe that it would have been unaware of the consequences of such operations. Under the aegis of this provision, China was obligated to provide an Environmental Impact Assessment (EIA) Report of its activities to the International Maritime Organization; Beijing refrained. It is estimated that even if the island building project is scrapped, it would take decades for the environment to recover.<sup>72</sup>

Also, China has come to capture<sup>73</sup> the top jobs in key international bodies and has become the second largest contributor to the UN by providing for 12 percent of its regular budget. Therefore, multilateral forums, which could have at least condemned China’s actions, have avoided doing so. This is best typified by the World Health Organization’s (WHO) silence<sup>74</sup> about criticisms that China failed to inform the international community early enough about the initial outbreak of the novel coronavirus.

“China is unfazed by allegations that its activities in the SCS are violative of international law.”

Many Southeast Asian countries have established regional bodies for managing the fisheries in the South China Sea region. These bodies, notably, include the Asia-Pacific Fishery Commission (APFIC), the Southeast Asian Fisheries Development Center (SEAFDEC), and the Regional Plan of Action to Promote Responsible Fishing Practices (RPOA). However, most of these entities play only an advisory role in policymaking or simply carry out assessment and research related to fishery management. Most of the agreements that provided for the setting up of these organisations are worded in non-binding language. They require simply voluntary implementation of the recommendations and leave the execution on co-management and cooperation, which is largely absent. One such working group launched by the US Center for Strategic and International Studies and comprising marine biologists, policy strategists and professionals of maritime law, proposed a blueprint for environmental cooperation in the SCS and identified areas of responsibility for the management of fisheries with the zones ideated by this blueprint given in Figure 5.

**Figure 5:**  
**Fishery and Environmental Management Zones in the South China Sea**



Source: Asia Maritime Transparency Initiative <sup>75</sup>

# Conclusion

**Pratnashree Basu** is Associate Fellow at ORF Kolkata. **Aadya Chaturvedi** is a 4th year law student at the West Bengal National University of Juridical Sciences.

China has refused to participate in these efforts, making the future of cooperation bleak. The proposed ASEAN-China Code of Conduct (COC),<sup>76</sup> issued in 2002 and meant to regulate conduct of the parties in the South China Sea, is seen as a step in the positive direction. However, it has so far not produced a final agreement mainly due to lack of consensus amongst the parties although ASEAN and China hope to finalise it in 2021.

Regional fisheries management organization (RFMO) plans and similar recommendations are no doubt welcome and contribute to a better and more real understanding of the impact of the loss of fisheries alongside the impairment of the marine ecosystem and simultaneously offer solutions for the administration of the same. However, it is unlikely that these recommendations would create any measurable difference in a reality where the creation of facts on the ground, unilateral assertions of might, and actions that blatantly contravene the multilaterally established rules-based order exist. What is needed instead are political incentives that would make the premium for violation greater than adherence to the same.<sup>77</sup> In the context of creating scope for the recovery of the ecology in the South China Sea, this would imply the formulation of political incentives with the support of scientific evidence and measures for the recovery of the marine environment. 

“Talks for an ASEAN-China Code of Conduct for the South China Sea have not produced a final agreement.”

- 1 “South China Sea Energy Exploration and Development”, *Asia Maritime Transparency Initiative*, <https://amti.csis.org/south-china-sea-energy-exploration-and-development/#:~:text=The%20South%20China%20Sea%20holds,with%20much%20more%20potentially%20undiscovered>
- 2 Chloe Houdre, “Environmental Ramifications of the South China Sea Conflict: Vying for Regional Dominance at the Environment’s Expense”, *Georgetown Environmental Law Review*, 12 July 2018, [https://www.law.georgetown.edu/environmental-law-review/blog/environmental-ramifications-of-the-south-china-sea-conflict-vying-for-regional-dominance-at-the-environments-expense/#\\_ftn7](https://www.law.georgetown.edu/environmental-law-review/blog/environmental-ramifications-of-the-south-china-sea-conflict-vying-for-regional-dominance-at-the-environments-expense/#_ftn7)
- 3 Robert Manning and Patrick M. Cronin, “Under Cover of Pandemic, China Steps Up Brinkmanship in South China Sea”, *Foreign Policy*, 14 May 2020, <https://foreignpolicy.com/2020/05/14/south-china-sea-dispute-accelerated-by-coronavirus/>
- 4 “How Much Trade Transits the South China Sea?”, *China Power*, CSIS, <https://chinapower.csis.org/much-trade-transits-south-china-sea/>
- 5 Wilson VornDick, “Thanks Climate Change: Sea-Level Rise Could End South China Sea Spat” *The Diplomat*, 8 November 2012, <https://thediplomat.com/2012/11/can-climate-change-wash-away-south-china-sea-dispute/>
- 6 “Report of the World Commission on Environment and Development: Our Common Future”, <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>
- 7 “United Nations Conference on Environment and Development (UNCED), Earth Summit”, <https://sustainabledevelopment.un.org/milestones/unced>
- 8 “Security Council Holds First-Ever Debate on Impact of Climate Change on Peace, Security, Hearing over 50 Speakers”, UN, 17 April 2007, <https://www.un.org/press/en/2007/sc9000.doc.htm>
- 9 UNSC 6587<sup>th</sup> Meeting, 20 July 2011, [https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s\\_pv\\_6587.pdf](https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s_pv_6587.pdf)
- 10 UNSC 8307<sup>th</sup> Meeting, 11 July 2018, [https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s\\_pv\\_8307.pdf](https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s_pv_8307.pdf)
- 11 Letter dated 4 February 2019 from the Chargé d’affaires a.i. of the Permanent Mission of the Dominican Republic to the United Nations addressed to the Secretary-General, UNSC, 7 February 2019, [https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s\\_2019\\_113.pdf](https://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s_2019_113.pdf)
- 12 Dolven, et. Al, “Chinese Land Reclamation in the South China Sea: Implications and Policy Options”, *US Congressional Research Service Report*, 18 June 2015, <https://fas.org/sgp/crs/row/R44072.pdf>
- 13 Rachel Bale, “One of the World’s Biggest Fisheries Is on the Verge of Collapse”, *National Geographic*, 29 August 2016, <https://www.nationalgeographic.com/news/2016/08/wildlife-south-china-sea-overfishing-threatens-collapse/>
- 14 Dominic Barton, “The Rise of the Middle Class in China and Its Impact on the Chinese and World Economies”, in *US-China Economic Relations in the Next 10 years*, *China-US Focus*, [https://www.chinausfocus.com/2022/index-page\\_id=1461.html](https://www.chinausfocus.com/2022/index-page_id=1461.html)

- 15 “Fish to 2030: Prospects for Fisheries and Aquaculture”, *World Bank*, 2013, <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/458631468152376668/fish-to-2030-prospects-for-fisheries-and-aquaculture>
- 16 Beatrice Crona, et. al, “China at a Crossroads: An Analysis of China’s Changing Seafood Production and Consumption”, *One Earth*, Volume 3, Issue 1, 24 July 2020, <https://www.sciencedirect.com/science/article/pii/S259033222030302X>
- 17 “Fishery and Aquaculture Statistics”, *Food and Agriculture Organisation of the UN*, 2020, [http://www.fao.org/fishery/static/Yearbook/YB2018\\_USBcard/booklet/web\\_CB1213T.pdf](http://www.fao.org/fishery/static/Yearbook/YB2018_USBcard/booklet/web_CB1213T.pdf)
- 18 Employment Statistics, *OECD*, [https://stats.oecd.org/Index.aspx?DataSetCode=FISH\\_EMPL](https://stats.oecd.org/Index.aspx?DataSetCode=FISH_EMPL)
- 19 Compiled using data from Fishery and Aquaculture Statistics, Annual Report, *FAO*, 2018
- 20 Ling Cao, et, al., “Opportunity for marine fisheries reform in China”, *ONAS*, 17 January 2017, <https://www.pnas.org/content/114/3/435.abstract>
- 21 Matthew Sedacca, “China has fished itself out of its own waters, so Chinese fishermen are now sticking their rods in other nations’ seas”, *Quartz*, 4 April 2017, <https://qz.com/948980/china-has-fished-itself-out-of-its-own-waters-so-chinese-fishermen-are-now-sticking-their-rods-in-other-nations-seas/>
- 22 Michael Perry, “Maritime Law Enforcement and Overfishing in the South China Sea”, *The Maritime Executive*, 4 October 2020, <https://www.maritime-executive.com/editorials/maritime-law-enforcement-and-overfishing-in-the-south-china-sea>
- 23 Perry, “*Maritime Law Enforcement and Overfishing in the South China Sea*”, a
- 24 Arbitration under Annex VII of the United Nations Convention on the Law of the Sea, 30 March 2014, <https://files.pca-cpa.org/pcadocs/The%20Philippines%27%20Memorial%20-%20Volume%20III%20%28Annexes%201-60%29.pdf>
- 25 Adam Greer, “The South China Sea Is Really a Fishery Dispute”, *The Diplomat*, 20 July 2016, <file:///C:/Users/DELL/OneDrive/Documents/Env%20South%20China%20Sea/The%20South%20China%20Sea%20Is%20Really%20a%20Fishery%20Dispute%20%E2%80%93%20The%20Diplomat.html#!/>
- 26 Ralph Jennings, “Overfishing Continues to Harm Sea Life in South China Sea”, *VOA*, 14 May 2020, <https://learningenglish.voanews.com/a/overfishing-continues-to-harm-sea-life-in-south-china-sea/5412163.html#:~:text=Researchers%20say%20sea%20life%20in,action%20to%20protect%20the%20area.&text=Brunei%2C%20Malaysia%2C%20the%20Philippines%2C,claim%20parts%20of%20the%20sea>
- 27 Rodger Baker et. al., “Fish: The Overlooked Destabilizer in the South China Sea”, *Stratfor*, 12 February 2016, <https://worldview.stratfor.com/article/fish-overlooked-destabilizer-south-china-sea>
- 28 Patrick R. Pata and Aletta T. Yñíguez, “Larval connectivity patterns of the North Indo-West Pacific coral reefs”, *PLoS ONE*, Volume 14, Issue 723 July 2019, <https://doi.org/10.1371/journal.pone.0219913>
- 29 Jeffrey G. Dorman, “Modeled connectivity of *Acropora millepora* populations from reefs of the Spratly Islands and the greater South China Sea”, *Coral Reefs*, Vol. 35, 25 September 2015, <https://link.springer.com/article/10.1007/s00338-015-1354-3>

- 30 Compiled using data from Fishery and Aquaculture Statistics, Annual Report, FAO, 2018
- 31 Compiled using data from Fishery and Aquaculture Statistics, Annual Report, FAO, 2018
- 32 Gregory B. Poling, “Illuminating the South China Sea’s Dark Fishing Fleets”, *CSIS*, 9 January 2019, <https://ocean.csis.org/spotlights/illuminating-the-south-china-seas-dark-fishing-fleets/>
- 33 Poling, “*Illuminating the South China Sea’s Dark Fishing Fleets*”
- 34 Poling, “*Illuminating the South China Sea’s Dark Fishing Fleets*”
- 35 Poling, “*Illuminating the South China Sea’s Dark Fishing Fleets*”
- 36 Zhang Hongzhou, “Beijing has a maritime militia in the South China Sea. Sound fishy?”, *South China Morning Post*, 3 March 2019, <https://www.scmp.com/week-asia/geopolitics/article/2188193/beijing-has-maritime-militia-south-china-sea-sound-fishy>
- 37 Gregory B. Poling, “Illuminating the South China Sea’s Dark Fishing Fleets”, *CSIS*, 9 January 2019, <https://ocean.csis.org/spotlights/illuminating-the-south-china-seas-dark-fishing-fleets/>
- 38 Liu Zhen, “What’s China’s ‘nine-dash line’ and why has it created so much tension in the South China Sea?” *South China Morning Post*, 12 July 2016, <https://www.scmp.com/news/china/diplomacy-defence/article/1988596/whats-chinas-nine-dash-line-and-why-has-it-created-so>
- 39 China Island Tracker, *Asia Maritime Transparency Initiative*, <https://amti.csis.org/island-tracker/china/>
- 40 “What is China’s ‘magic island-making’ ship?”, BBC, 6 November 2017, <https://www.bbc.com/news/world-asia-china-41882081#:~:text=China%20has%20unveiled%20a%20new,the%20disputed%20South%20China%20Sea.&text=China%20has%20been%20accused%20of,claims%20over%20the%20contested%20waters>
- 41 Ke-Fu Yu, et. al., “Storm cycles in the last millennium recorded in Yongshu Reef, southern South China Sea”, *Palaeogeography, Palaeoclimatology, Palaeoecology*, Volume 210, Issue 1, 23 July 2004, Pages 89-100
- 42 Johnny Langenheim, “Preventing Ecocide in South China Sea”, *The Guardian*, 15 July 2015, <https://www.theguardian.com/environment/the-coral-triangle/2015/jul/15/preventing-ecocide-in-south-china-sea>
- 43 Leland Smith et. al., “Evidence of Environmental Changes Caused by Chinese Island-Building”, *Scientific Reports*, Article no. 5295, 28 March 2019, <https://www.nature.com/articles/s41598-019-41659-3#citeas>
- 44 Paul L.A. Erfemeijer and Roy R. Robin Lewis, Environmental impacts of dredging on seagrasses: A review, *Marine Pollution Bulletin*, Volume 52, Issue 12, 2006, <https://www.sciencedirect.com/science/article/abs/pii/S0025326X06003778>
- 45 John W. McManus, “Offshore Coral Reef Damage, Overfishing, and Paths to Peace in the South China Sea”, *The International Journal of Marine and Coastal Law*, Vol. 32, Issue, 2, 2017, [https://brill.com/view/journals/estu/32/2/article-p199\\_2.xml](https://brill.com/view/journals/estu/32/2/article-p199_2.xml)

- 46 John W. McManus, “Offshore Coral Reef Damage, Overfishing, and Paths to Peace in the South China Sea”, *The International Journal of Marine and Coastal Law*, Vol. 32, Issue, 2, 2017, [https://brill.com/view/journals/estu/32/2/article-p199\\_2.xml](https://brill.com/view/journals/estu/32/2/article-p199_2.xml)
- 47 Sebastian C.A. Ferse and Selina Ward, “Assessment of the potential environmental consequences of construction activities on seven reefs in the Spratly Islands in the South China Sea”, *Permanent Court of Arbitration*, 14 October 2015, <https://www.pcacases.com/web/sendAttach/1809>
- 48 A.S Wenger, et. al., “Suspended sediment alters predator–prey interactions between two coral reef fishes”, *Coral Reefs*, Vol. 32, June 2013, <https://link.springer.com/article/10.1007/s00338-012-0991-z#citeas>
- 49 Sybille Hess, et. al., “Exposure of clownfish larvae to suspended sediment levels found on the Great Barrier Reef: Impacts on gill structure and microbiome”, *Scientific Reports*, June 2015, <https://pubmed.ncbi.nlm.nih.gov/26094624/>
- 50 Victor Robert Lee, “Satellite Imagery Shows Ecocide in the South China Sea”, *The Diplomat*, 15 January 2016, <https://thediplomat.com/2016/01/satellite-images-show-ecocide-in-the-south-china-sea/>
- 51 John W. Garver, “China’s Push Through the South China Sea: The Interaction of Bureaucratic and National Interests”, *The China Quarterly*, 12 February 2009, <https://www.cambridge.org/core/journals/china-quarterly/article/abs/chinas-push-through-the-south-china-sea-the-interaction-of-bureaucratic-and-national-interests/A3E17E30FF3AE1F37000B904F1E2CB62>
- 52 Nguyen Nhu Trung, “The gas hydrate potential in the South China Sea”, *Journal of Petroleum Science and Engineering*, Volumes 88–89, 2012, Pages 41-47, <https://doi.org/10.1016/j.petrol.2012.01.007>
- 53 “Accord seen possible off China, Viet Nam”, *Oil and Gas Journal*, <https://www.ogj.com/home/article/17234573/accord-seen-possible-off-china-viet-nam>
- 54 “Devon, CNOOC sign deepwater production-sharing contracts”, *Oil and Gas Journal*, 12 December 2006, <https://www.ogj.com/exploration-development/article/17281056/devon-cnooc-sign-deepwater-productions-sharing-contracts>
- 55 “Husky, CNOOC sign South China Sea exploration agreement”, *Oil and Gas Journal*, 17 August 2004, <https://www.ogj.com/exploration-development/article/17291110/husky-cnooc-sign-south-china-sea-exploration-agreement>
- 56 CNOOC Annual Report, 2019, <https://www.cnooltd.com/attach/0/f6a7aa6b93294582889a1b0aec07c8f1.pdf>
- 57 Ralph Jennings, “Beijing Preps 10-Story Oil Drilling Platform for South China Sea despite Wary Vietnam”, *VOA*, 30 September 2019, <https://www.voanews.com/east-asia-pacific/beijing-preps-10-story-oil-drilling-platform-south-china-sea-despite-wary-vietnam>
- 58 Yann-Huei Song, “The Potential Marine Pollution Threat from Oil and Gas Development Activities in the Disputed South China Sea/Spratly Area: A Role that Taiwan Can Play”, *Ocean Development & International Law*, 39:2, 2008, <https://doi.org/10.1080/00908320802013768>

- 59 James Kraska, “The Lost Dimension: Food Security and the South China Sea Disputes”, *National Security Journal*, Harvard Law School, 26 February 2015, <https://harvardnsj.org/2015/02/the-lost-dimension-food-security-and-the-south-china-sea-disputes/>
- 60 Poling, “*Illuminating the South China Sea’s Dark Fishing Fleets*”
- 61 Caitlin E. Werrell and Francesco Femia, “Epicenters of Climate and Security: The New Geostrategic Landscape of the Anthropocene”, *The Centre for Climate and Security*, June 2017, [https://climateandsecurity.org/wp-content/uploads/2017/06/10\\_fish-conflict.pdf](https://climateandsecurity.org/wp-content/uploads/2017/06/10_fish-conflict.pdf)
- 62 Felix K. Chang, “Running Out of Gas: Philippine Energy Security and the South China Sea”, *Foreign Policy Research Institute*, 6 September 2019, <https://www.fpri.org/article/2019/09/running-out-of-gas-philippine-energy-security-and-the-south-china-sea/#:~:text=Running%20Out%20of%20Gas%3A%20Philippine%20Energy%20Security%20and%20the%20South%20China%20Sea,-Felix%20K.&text=About%2080%20km%20off%20the,main%20domestic%20source%20of%20energy.&text=But%20by%20the%20mid%20to,is%20expected%20to%20run%20dry.>
- 63 “Vietnam crude oil output to fall 10% a year through 2025: PetroVietnam”, *Energy World, The Economic Times*, 24 October 2018, <https://energy.economictimes.indiatimes.com/news/oil-and-gas/vietnam-crude-oil-output-to-fall-10-a-year-through-2025-petrovietnam/66344718>
- 64 “Beijing rejects tribunal’s ruling in South China Sea case”, *The Guardian*, 12 July 2016, <https://www.theguardian.com/world/2016/jul/12/philippines-wins-south-china-sea-case-against-china>
- 65 United Nations Convention on the Law of the Sea, [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf)
- 66 Convention on Biological Diversity, United Nations, 1992, <https://www.cbd.int/doc/legal/cbd-en.pdf>
- 67 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (as amended in 2006), <https://www.wcdn.imo.org/localresources/en/OurWork/Environment/Documents/PROTOCOLAmended2006.pdf>
- 68 International Convention for the Control and Management of Ships’ Ballast Water and Sediments, 2004, *International Maritime Organisation*, <http://library.arcticportal.org/1913/1/International%20Convention%20for%20the%20Control%20and%20Management%20of%20Ships%27%20Ballast%20Water%20and%20Sediments.pdf>
- 69 An Interview on China’s Construction Activities on the Nansha Islands and Reefs, *Ministry of Foreign Affairs of the Peoples’ Republic of China*, 27 May 2015, [https://www.fmprc.gov.cn/mfa\\_eng/zxxx\\_662805/t1267264.shtml](https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1267264.shtml)
- 70 Matthew Southerland, “China’s Island Building in the South China Sea: Damage to the Marine Environment, Implications, and International Law”, *US-China Economic and Security Review Commission*, 12 April 2016, [https://www.uscc.gov/sites/default/files/Research/China’s%20Island%20Building%20in%20the%20South%20China%20Sea\\_0.pdf](https://www.uscc.gov/sites/default/files/Research/China’s%20Island%20Building%20in%20the%20South%20China%20Sea_0.pdf)
- 71 The South China Sea Arbitration Award of 12 July 2016, <https://pcacases.com/web/sendAttach/2086>

- 72 Jackie Northam, “One Result Of China’s Buildup In South China Sea: Environmental Havoc”, *NPR*, 2 September 2016, <https://www.npr.org/sections/parallels/2016/09/01/491395715/one-result-of-chinas-buildup-in-south-china-sea-environmental-havoc#:~:text=One%20Result%20Of%20China’s%20Buildup%20In%20South%20China%20Sea%3A%20Environmental%20Havoc,-Listen%20C%20B%204%3A23&text=University%20of%20Miami,-Coral%20rubble%20remains%20after%20%22chopper%22%20boats%20killed%20branching%20corals%2C,storm%20waves%20of%20blast%20fishing>
- 73 Tung Cheng-Chia and Alan H. Yang, “How China Is Remaking the UN In Its Own Image” *The Diplomat*, 9 April 2020, <https://thediplomat.com/2020/04/how-china-is-remaking-the-un-in-its-own-image/>
- 74 Srinivas Mazumdaru, “What influence does China have over the WHO?”, *DW*, 17 April 2020, <https://www.dw.com/en/what-influence-does-china-have-over-the-who/a-53161220>
- 75 “A Blueprint for Fisheries Management and Environmental Cooperation in the South China Sea” Asia Maritime Transparency Initiative, 13 September 2017, <https://amti.csis.org/coc-blueprint-fisheries-environment/>
- 76 Nguyen Minh Quang, “Saving the China-ASEAN South China Sea Code of Conduct”, *The Diplomat*, 29 June 2019, <https://thediplomat.com/2019/06/saving-the-china-asean-south-china-sea-code-of-conduct/>
- 77 Pratinashree Basu, “High Tide in the South China Sea: Why the Maritime Rules-Based Order is Consequential”, *ORF Issue Brief No. 325*, November 2019, Observer Research Foundation



Ideas . Forums . Leadership . Impact

20, Rouse Avenue Institutional Area,  
New Delhi - 110 002, INDIA  
Ph. : +91-11-35332000. Fax : +91-11-35332005  
E-mail: [contactus@orfonline.org](mailto:contactus@orfonline.org)  
Website: [www.orfonline.org](http://www.orfonline.org)