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# Disputed Vietnamese Territories in the South China Sea: Structure, Physical-Geographical Characteristics, Management of Areas and Development

*Chunjuan Nancy Wei and Mai Frndjibachian*

## Structured Abstract

Article Type: Research Paper

*Purpose*—This paper investigates four inter-related but poorly-understood questions: (1) How many features does Vietnam physically occupy in the Spratly? (2) How does Vietnam administer these features? (3) What are Vietnam's historical, and geopolitical motivations in further reclaiming Spratly's Islands? (4) What are the challenges Vietnam faces in reclaiming said islands?

*Design/Methodology/Approach*—Utilizing sources published in Vietnamese, Chinese and English, this study surveys Vietnam-controlled features in the Spratly as well as their administrative structures and strategic values for reclamation.

*Findings*—Vietnam controls 30 features, including 21 disputed islands, reefs, and cays, along with 5 major underwater banks, and 4 smaller shoals making up Rifleman Bank. It has reclaimed land on at least ten of these at varied speed and scope. It governs via the Truong Sa Island (Spratlys) District, under which three

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administrative hubs—Truong Sa, Song Tu Tay, and Sinh Ton Villages—and one oil economic administration are created. Factors that influence Hanoi's decisions to reclaim include strategic significance, geographical proximity to the hubs or rival-controlled features, costs, logistics, technology, weather patterns and the surrounding sea.

*Practical Implications*—Vietnam is a crucial player in the South China Sea, and its activities influence other players' actions. Hanoi's reclamation results in four big islands—Spratly Island, West Reef, Southwest Cay, and Sin Cowe Island—along with seven little ones.

*Originality/Value*—The paper makes original contributions by clarifying Vietnam's holdings in the contested waters as well as its strategic stance.

Keywords: island reclamation; Sino-Vietnamese territorial disputes; South China Sea; Spratly Islands; Vanguard Bank; Vietnam territory

## I. Introduction

The ongoing standoff between Hanoi and Beijing over the energy-rich Vanguard Bank highlights tensions between the two communist countries over resources in the South China Sea (SCS). On July 3, 2019, Chinese Coast Guard and maritime militia escorted a survey ship toward the oil and gas block 06–01 where a Russo-Vietnam joint venture was operating hydrocarbon drilling. The bank is controlled by Vietnam but claimed by China. Vietnam, the world's 15th-largest nation with 95 million people, views the region as part of its continental shelf within its 200-mile exclusive economic zone (EEZ), resources from which Hanoi is entitled to exploit. China, on the other hand, sees it as a disputed area because it falls in Beijing's nine-dashed line map. To prevent Hanoi from "poaching" its resources, Beijing sent the survey ship accompanied by its Coast Guard. In response, Vietnam reportedly dispatched one of its advanced guided missile frigates manufactured by the Russian factory Zelenodolsk.<sup>1</sup> At the time of writing, the standoff continues, though both countries have downplayed it. Vanguard Bank represents the worst conflict in the SCS since the Haiyang Shiyu 981 oil rig standoff in May 2014.

Vietnam and China constitute only part of the multinational territorial disputes which also involve Taiwan, the Philippines, Malaysia, and Brunei. As a major flash-point in Asia, the SCS repeatedly squeezes itself into international headlines, thanks to their potential to bring the United States, the current security guarantor, and China, the potential challenger, into conflict. To understand the complexity and predict its future course of conflict, scholars and pundits have to understand Vietnam, the second most important claimant in the SCS, which claims both the Spratly and the Paracel archipelagoes just like China. While Hanoi does not control any territory in the Paracels, it occupies the most features in the Spratly Archipelago. Despite its importance, Vietnam's claims and actual holdings in the SCS remain under-studied. This paper aims at shedding light to four inter-related but poorly understood questions: (1) How many features does Vietnam physically occupy in

the Spratly? (2) How does Vietnam administer these features? (3) What are Vietnam's historical, and geopolitical motivations in further reclaiming Spratly Islands? (4) What are the challenges Vietnam faces in reclaiming said islands? It reviews the fraught bilateral relations, surveys the individual islands and reefs within the contested waters, and investigates the challenges faced by Hanoi in defending its holdings in the SCS.

## II. Historical Entanglements

The tensions between China and Vietnam have deeper roots. Modern Vietnamese textbooks teach that the nation was invaded by China 17 times. Nearly all of Vietnam's national heroes have fought its northern neighbor. The country was conquered and integrated with China for a millennium until it gained independence in the 10th century. Chinese records documented repeated rebellions from Vietnam, known as Annam, literally meaning "Pacifying the South." Vietnam characterized this period (111 BCE–938 CE) as Chinese colonization. During the remaining millennium, Hanoi recognized China's pre-eminence, sending tributes to various Chinese dynasties as part of the Sino-centric tributary system until France colonized it in the mid-19th century. To China's chagrin, Western and Japanese encroachment eventually led to the collapse of its tributary system. China and Vietnam each went through a communist revolution and arduous decolonization in order to regain full independence, after which they were enemies again.

Before relations turned bitter, Hanoi and Beijing shared a revolutionary bond described by Mao Zedong as "close as lips and teeth" during the decades of Vietnam's wars against Saigon, Paris and Washington. After the end of World War II, Vietnam was divided between the two Cold War camps. Sino-Vietnamese friendship, carefully nurtured by their communist founders Mao and Ho Chi Minh, was evidenced not only in photos of handshakes, but in the secret deal over an island in the Gulf of Tonkin in 1957. Then, as the Korean War ended and events leading to the Vietnam War escalated; Ho was in Beijing on an important mission. Upon Ho's request, Chinese Premier Zhou Enlai and Mao made the decision to grant Bai Long Vi (BLV),<sup>2</sup> one of the largest islands in the SCS, to Ho's Vietnam so that the latter, their "comrades and brothers," could prevail in its war against the South Vietnam and the United States. The deal resulted in a distribution of the Gulf of Tonkin, granting 53.23 percent to Vietnam and 46.77 percent remaining under Chinese control. This allowed Vietnam to gain strategic depth for the coastal city Haiphong and the inland capital Hanoi. More importantly, this meant that Hanoi has access to more oil, gas, and marine resources than Beijing does. Today's BLV is a highly guarded military frontline while Chinese leaders and netizens are noting the losses resulting from this exchange.<sup>3</sup>

In the 1970s, while China was engaged in the Cultural Revolution and the U.S. "in effect wrote off Indochina as a serious foreign policy priority,"<sup>4</sup> Vietnam achieved two major triumphs and one blunder. First, it spearheaded a national unification in

1975, becoming the first divided nation to accomplish such a feat.<sup>5</sup> Second, it was emboldened to seize unoccupied islets in the SCS, much like the United States occupation of the “guano islands” scattered throughout the Pacific and the Caribbean in the late 19th century, albeit on a much smaller scale.<sup>6</sup> The result was that Vietnam controlled the most islands in the SCS. The blunder it committed was the invasion of Cambodia on Christmas Day, 1978, and the subsequent regime change there. Like the Soviet Union’s ill-fated adventures in Afghanistan, Hanoi’s invasion did not grow out of moral considerations to stop the atrocities committed by Pol Pot’s regime. Rather, it was a calculated decision to consolidate its domination of former French Indochina.<sup>7</sup> This soured the relationship with Beijing. Fierce international resistance eventually led to Vietnamese withdrawal in 1989 after a decade-long occupation.

The triangular relationships between the U.S., China and Vietnam was by no means stable, then as much as now. Cold War-era realignment saw China first in the Soviet bloc and then in the U.S. camp. Hanoi and Beijing’s friendship was first dimmed by Nixon’s China visit, and then buried in Deng Xiaoping’s border war of 1979, in the name of punishing Vietnam for invading Cambodia.<sup>8</sup> Further, two sea skirmishes (against South Vietnam in 1974 and unified Vietnam in 1988) resulted in Hanoi’s loss of control of its half of the Paracel group and six islets in the Spratlys. The ramifications of these actions still vibrate today, in diplomatic settings, online chatrooms, and mass protests.<sup>9</sup> “Vietnamese nationalism is aggressive only toward China, an historical enemy, but not toward any other state in the region,” articulated a leading entrepreneur in Ho Chi Minh city, the former capital of South Vietnam, known as Saigon.<sup>10</sup> This resentment is irrespective of Vietnam’s asymmetric economic dependence on China.

For China, the two skirmishes provided many opportunities. Now it is not only in full control of the entire Paracels; it has also gained a foothold in the Spratlys, the farthest SCS group from its shores, with its southern most islet on the same latitude as Saigon. In addition, since the 1980s the Chinese government has adopted a set of measures, including “patriotic education” campaigns, aimed at improving its citizens’ “maritime consciousness.” An unprecedented public opinion survey on China’s maritime disputes, conducted in five major cities in local languages in March 2013, noted that eight out of ten Chinese surveyed view the disputes in the SCS as a matter of national humiliation, a continuation from the nation’s painful “Century of Humiliation,” thanks to the involvement of the United States.<sup>11</sup> Ironically, people in both China and Vietnam see themselves as victims of the other’s “aggressive” policies in the SCS. These sentiments add to the difficulties for a solution through negotiation.

Worse, different methods of calculation, along with inaccurate and unreliable information often complicate even expert analysis, which in turn causes public confusion as to who occupies which features in the region. By focusing on Vietnam, with research related to both foreign and domestic sources, this paper aims to capture the complete picture of individual islands, reefs, cays, and underwater banks with durable/permanent structures occupied by Vietnam in the hope to provide greater insight into the increased instability in the SCS. With more accurate information,

this study hopes to facilitate understanding and dialogue about the disputed territory.

### III. Geographic Significance and Counting Problems

In its entirety, the Spratly Archipelago consists of approximately 100 islands and/or reefs that are relatively small in size, scattered over an area of nearly 410,000 km<sup>2</sup> (158,000 mi<sup>2</sup>), with rich fishing grounds yielding up to 7.5 tons of fish per square kilometer in addition to potential deposits of oil and gas.<sup>12</sup> However, the natural islands themselves only amount to less than 5 km<sup>2</sup> with 0 percent of arable land. In addition, they represent maritime hazards due to their numerous reefs and shoals. In terms of weather patterns, the Spratlys enjoy cool summers and warm winters, with a dry season spanning from February to early May, and a rainy season from late May to January of the following year. During the dry season, waves are calm, and the sea is relatively peaceful, allowing for fishery activities and tourism.<sup>13</sup> However, the people inhabiting the Spratly Archipelago also experience harsh conditions, with about 131 stormy days per year and at least 13 days of strong winds above level 6 on the Beaufort Scale per month.<sup>14</sup> Nevertheless, the region is considered prime fishing ground for sea turtles, tuna, lobsters, sea cucumbers, and other nutritious cephalopods. Furthermore, the Spratlys hold great strategic significance due to their location near primary shipping lanes and ports.<sup>15</sup> It is estimated that approximately 300 ships sail through the SCS per day, 20 percent of which are large cargo ships weighing more than 30,000 tons.<sup>16</sup> The sea surrounding the Spratlys plays a vital role in international commercial trade.

The Paracel Archipelago is similar to the Spratlys. It consists of about 130 relatively small coral islands and reefs divided into two distinct groups, including the Amphitrite in the northeast and the Crescent in the west, covering an area approximately 7.75 km.<sup>217</sup> Interestingly, another source claims that the archipelago only includes approximately 30 islands, reefs, and cays that are largely submerged below the surface, spanning over 30,000 km.<sup>2</sup> Regardless, the Paracels are short on arable land for agricultural purposes, rendering them uninhabitable in their natural state.<sup>18</sup> The archipelago enjoys hot summers and cool winters. Air temperatures around the Paracels fluctuate from a low of 22° Celsius in January to a high of 29° Celsius in July, then back to 25° Celsius in December. Annual rainfall averages around 1,200–1,600 mm, mostly concentrated in the five-month rainy season from May to October. Humidity year-round averages around 80–85 percent and it is not affected by the change of seasons.<sup>19</sup> In addition, the Paracels are surrounded by rich fishing ground for lobster and sea cucumbers, as well as potential deposits of conventional resources. The archipelago wields much significance in terms of commercial utility for littoral countries to develop their economies.

Similar to China, Vietnam claims both the Spratly (known in Vietnam as Truong Sa) and the Paracel (Hoang Sa) archipelagoes. While Hanoi does not control any

territory in the Paracels, Vietnam has been among the most active claimants, as it controls the largest number of disputed features in the Spratlys and has extended the physical area of ten islets under its occupation. Nevertheless, different sources put forth varied answers as to the exact number of features Vietnam controls. The Vietnamese Communist Party (VCP) claims to occupy only 21 features, but the Asia Maritime Transparency Initiative (AMTI) argues for 27.<sup>20</sup> Most Chinese sources suggest 29, while a 2015 congressional testimony by a senior U.S. defense official specified 48,<sup>21</sup> and the 2018 VOA South China Sea Project asserts 25.<sup>22</sup> This information discrepancy severely hinders expert analysis regarding the development of the SCS disputes; thus, a recounting of all Spratly features under Vietnam's occupation using the number of permanent buildings on top of the features as the measuring unit is needed for enhanced international understanding.

#### **IV. Vietnam's Position and Administrative Structures**

As previously mentioned, Vietnam claims both the Spratly and Paracel archipelagoes, as does China and Taiwan. In 1975, Vietnam's Ministry of Foreign Affairs published a White Paper asserting sovereignty over Truong Sa and Hoang Sa, noting that "their very modest size by no means lesser the importance given them by the Vietnamese: to Vietnamese hearts, these remote insular territories are as dear as could be any other part of the fatherland."<sup>23</sup> In December 2009, the Ministry of Defense published another White Paper in which Vietnam reasserts its sovereignty over both archipelagoes while reminding other contenders, especially the PRC, that it remains open to peaceful negotiations based on protocols established by the 1982 United Nations Convention on the Law of the Sea (UNCLOS), and that the ASEAN-China Declaration on the Conduct of Parties in the South China Sea (DOC) as well as the subsequent Code of Conduct (COC) should be upheld at all times.<sup>24</sup> As a whole, Vietnam's position in the SCS disputes has remained largely consistent as it demands full recognition of sovereignty over both the Paracels and the Spratlys in their entirety.

In an effort to further cement its sovereignty over the archipelagoes, Vietnam passed Decree No. 193-HDBT through the Council of Ministers in 1982, establishing the administration of Khanh Hoa Province (southeast Vietnam) over the Spratly Islands and the administration of Quang Nam Province—Da Nang City (central Vietnam) over the Paracel Islands.<sup>25</sup> In 2007, Hanoi decided through Decree 65/2007/ND-CP that features in the Spratly Archipelago would be administered under Truong Sa Village, Song Tu Tay Village, and Sinh Ton Village—all under Truong Sa Island District (TSID) in Khanh Hoa Province.<sup>26</sup>

Considering Vietnam's unswerving position regarding the disputed features and its reasserting effort, it is not surprising that Vietnamese leaders also practice land reclamation, which can be defined as the gain of land from the sea, wetlands, or other water bodies to provide space via artificial methods, on features under Vietnamese



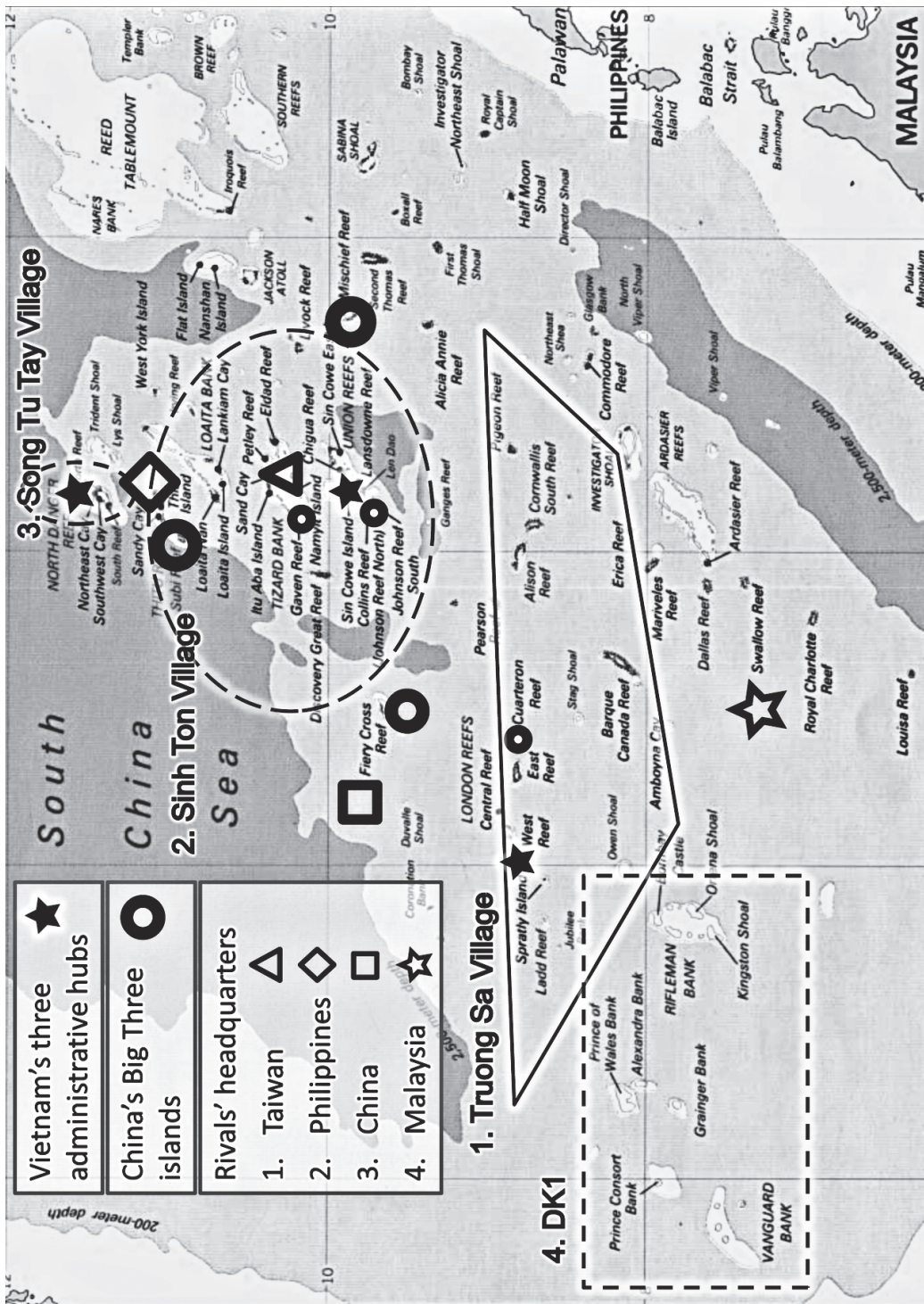


Figure 1: Vietnam's governance structure in the Spratly Archipelago. This original South China Sea image from the Library of Congress (1995) is edited by Nguyen Nguyen.



control. Against the continuous expansion of mainland China and other contenders, Vietnam's reclamation<sup>27</sup> efforts and constructions serve as a means to enhance its physical presence in the disputed region and strengthen the country's territorial claims.

Regardless, the three administrative hubs—Truong Sa Village, Song Tu Tay Village, and Sinh Ton Village—along with the independent administrative unit DK1 rigs make up the full picture of features under Vietnam's occupation.

## V. Features in the Spratly Archipelago Under Vietnamese Occupation

The Truong Sa Island District (TSID) administers Vietnam's disputed territories in four different groups. The first three consist of the 21 features that are organized around their administrative hubs and the last group is based on its categorization as the DK1 area for service stations. In the following pages, a survey of all the three "villages" in the Truong Sa Island District is introduced. Truong Sa Village, the center of Vietnam's SCS presence, manages more than half of the features, followed by the Sinh Ton Village (eight features), and the Song Tu Tay Village (two features). The last group contains the DK1 rigs built on top of nine underwater features.

### A. Truong Sa Village/Island District

Truong Sa Village embodies the most significant group of islands among Vietnam's holdings due to its strategic values. With the Spratly Islands at the western center accompanied by four surrounding bases (West Reef, Central Reef, East Reef, and Ladd Reef), Vietnam forms a "wall" of reefs across the southern part of the contested waters, limiting other countries' opportunities in the disputes. As shown in the solid line box on Figure 1, the "reef wall" aims to prevent China from reaching southward, Malaysia northward, and the Philippines westward, while keeping rival forces on Cuarteron Reef (China) and Commodore Reef (Philippines) in check.

1. *Spratly Island* (see the ★ in the box in Figure 1). Approximately 470 km away from Cam Ranh Bay, at 8°38'30"N, 11°54'50"E, lies the largest feature of Vietnam's territories in the Spratly Archipelago with a shape resembling an isosceles triangle whose base spans 750 meters northeast-southwest and apex 350 meters in distance. Internationally recognized as Spratly Island, also known as 南威岛 (Nanwei Dao) and Dao Truong Sa, the island was formed from the organic remnants of coral and covers an area measuring at 0.15 km<sup>2</sup>, standing 2.4 meters above the high water mark and 3.4 to 5 meters above the lowest tide.<sup>28</sup> On the surface of the island is a lagoon about 2 meters deep, containing brackish water convenient for planting and human needs. Currently, the island is the Administrative Center of Truong Sa Island District in Khanh Hoa Province.<sup>29</sup> Concerning land reclamation, satellite images released in 2016 by AMTI show that the country has reclaimed about 0.15 km<sup>2</sup>, almost doubling the original size of the island.<sup>30</sup> It is also reported that since 2008, 7 Vietnamese

households with 82 civilian residents<sup>31</sup> have inhabited the feature, planting herbs, fruits, and raising poultry for food.<sup>32</sup> Other construction projects, including a lighthouse, civilian shelters, religious pagodas, and memorials, have also been built to satisfy the inhabitants' needs.

2. *West Reef*. Located at 8°51'N, 112°11'E, approximately 37 km to the northeast from Spratly Island.<sup>33</sup> Otherwise known as 西礁 (Xi Jiao) or Da Tay, the reef makes up the larger London Reefs alongside East Reef, Central Reef, and Cuarteron Reef. West Reef resembles an oval shape with an axis running about 10 km long in the northwest-southeast direction and a width of about 5.5 km, covering an area of 40 km<sup>2</sup> that remains largely below the surface of the water, with only 0.008 km<sup>2</sup> above sea level.<sup>34</sup> West Reef dries at its extremities in the east and west; on top of the eastern reef lies a sand dune that can be up to 0.7 meters high.<sup>35</sup> The lagoon in the center is filled with coral heads but can be measured to 14.6 meters deep.<sup>36</sup> West Reef has a short dry season (February–April) and a long rainy season (May–January) with an average temperature of about 30° Celsius and 80 percent humidity.<sup>37</sup> Regarding land reclamation, 2016 satellite images show that the VCP has reclaimed 0.28 km<sup>2</sup> on top of the emerging 0.008 in only 1 to 2 years,<sup>38</sup> turning West Reef into an area for specialized maritime activities as well as fishery logistic services and a pilot aquaculture complex.<sup>39</sup>

3. *Central Reef*. Also a part of London Reefs, Central Reef is 11.1 km to the northeast of West Reef and 24.1 km to the northwest of East Reef at 8°56'6"N, 112°2-0'54"E.<sup>40</sup> Known as 中礁 (Zhong Jiao) in China and Truong Sa Dong in Vietnam, the coral reef resembles a circle covering an area of about 1 km<sup>2</sup> with a sand dune aligning east-west on top that spans 200 meters long and 60 meters wide in the eastern section and up to 15 meters wide in the southern section.<sup>41</sup> It is reported that Central Reef has a thin layer of coral hummus in its soil, making it very difficult to plant trees and vegetables.<sup>42</sup> However, Vietnamese marines have transformed the reef, with rows of eagle trees and coconut trees covering 80 percent of the reef's total habitable area.<sup>43</sup> In addition, the feature is close to several fishing grounds for tuna, sea cucumber, sea turtle, etc., making it a place of frequent fishing activities. The Vietnamese government has also greatly improved living conditions on the reef, providing freshwater tanks, green energy, and medical services for its deployed marines.<sup>44</sup> Regarding land reclamation, by 2016, Vietnam had reclaimed approximately 0.017 km<sup>2</sup> on this reef.<sup>45</sup>

4. *East Reef*. Another feature forming part of the London Reefs is East Reef, also called 东礁 (Dong Jiao) or Da Dong.<sup>46</sup> Lying about 35.2 km to the east from West Reef at 8°49'42"N, 112°35'48"E, the coral reef aligns east-west and becomes steeper from south to north.<sup>47</sup> When tides retreat to a height of about 0.4 meters, the northern section emerges whereas the southern section remains submerged until tides are only 0.2 meters high.<sup>48</sup> East Reef enjoys cooler summers and warmer winters than the mainland of Vietnam; however, days in the dry season are much harsher due to extending heat waves and salt mist, while days in the rainy season tend to have frequent thunderstorms.<sup>49</sup> It is reported that Vietnam has constructed several outposts on the reef to provide stationing platoon facilities for basic activities; however, the government has yet to execute its reclamation project on the reef.

5. *Ladd Reef*. Located at 8°40'42"N, 111°40'12"E, about 25.9 km away from Spratly Island in the west, is Ladd Reef, also called 日积礁 (Riji Jiao) or Da Lat. Aligned in the northeast-southwest direction, the submerged reef runs 5.9 km long and 1.6 km wide, covering an area of about 9.9 km<sup>2</sup> below the surface of the water.<sup>50</sup> When tides retreat, boulders on the reef appear and define a lagoon with white sand at the bottom that seems to not have an entrance.<sup>51</sup> Ladd Reef enjoys short dry seasons (February–April) and long rainy seasons (May–January) with an average temperature of 30° Celsius and 80 percent humidity, alongside salt mist that quickly spoils food and damages military weapons. From July to December, storms with strong gusts of wind above level 6 in the Beaufort Scale tend to be frequent, making it extremely difficult for boats coming to shore.<sup>52</sup> Captain Phan Van Binh, chief commander of the platoon stationed on Ladd Reef, revealed that in June 1994, the first lighthouse was erected on the feature, serving as the brightest lighthouse among the current nine in the area of SCS occupied by Vietnam. It stands 40 meters high with a luminous effect of almost 27.78 km<sup>2</sup> during daytime and 33.34 km<sup>2</sup> at nighttime.<sup>53</sup> Concerning land reclamation, the VCP may have started reclaiming in late 2016. U.S. satellite images noted undeclared ships dredging watercourse and carrying soil onto the reef; however, Vietnam has yet to officially admit or deny the reported activities.<sup>54</sup>

6. *Pearson Reef*. Approximately 26 km to the southwest of Alison Reef, at 8°5-8'6"N, 113°41'54"E, lies Pearson Reef, also known as 毕生礁 (Bisheng Jiao) and Dao Phan Vinh. Dao Phan Vinh was previously called Hon Sap by the Vietnamese; nevertheless, in 1978, the feature was renamed after former Lieutenant Nguyen Phan Vinh—the heroic commander of several unmarked ships during the Vietnam War, to motivate Vietnamese marines to defend the reef when tension escalated in the SCS. Geographically speaking, Pearson Reef is the emerging part of a much larger largely submerged reef and runs 9.3 km long.<sup>55</sup> Overall elevation of the entire feature fluctuates as the cay in the northeast stands 2 meters tall while the southwest stands only 1 meter high.<sup>56</sup> It is reported that in the west of Pearson Reef lies a wrecked ship which emerges above water surface; when tides are the lowest, one can walk from the edge of the reef to the ship ruins.<sup>57</sup> According to satellite images provided by AMTI, by 2016, the VCP had already reclaimed about 0.024 km<sup>2</sup> on this feature, expanding the total area of the reef to approximately 0.03 km<sup>2</sup>—about six times its original size.<sup>58</sup>

7. *Cornwallis South Reef*. It is also known as 南华礁 (Nanhua Jiao) or Da Nui Le. Lying about 44.5 km away from Tennent Reef, this submerged oblong-shaped feature is located at 8°42'36"N, 114°11'6"E and aligns in a north-south direction,<sup>59</sup> running 8.69 km long and 3.78 km wide.<sup>60</sup> When tides are low and the reef is dry, a 9-meter-deep lagoon is exposed and can be entered through a channel spanning 0.36 km wide.<sup>61</sup> Cornwallis South Reef has cool summers and warm winters; however, distribution of rainfall throughout the year is uneven, with continuous heavy rain from May to October.<sup>62</sup> Concerning land reclamation, Vietnam has reclaimed roughly 0.007 km<sup>2</sup> southwest and 0.01 km<sup>2</sup> southeast of Cornwallis South Reef.<sup>63</sup> It is unclear whether this feature is listed as one of the primary subjects for reclamation, but it is expected that the project will continue at varying speeds on the reef.

8. *Tennent Reef*. Located at 8°51'18"N, 114°39'18"E, it is also called 无乜礁 (Wumie Jiao) and Da Tien Nu. This triangular reef covers an area approximately 3.4 km<sup>2</sup>.<sup>64</sup> Reportedly, when tides retreat to a height approximately 0.7 meters, several drying corals in the northern and eastern edge of the reef will surface<sup>65</sup>; when tides remain 0.1 meters high, the entire coral edge spanning 300–500 meters surrounding the feature will emerge above the water's surface,<sup>66</sup> revealing a lagoon about 5.8 km long and 2.3 km wide.<sup>67</sup> In terms of natural conditions, Tennent Reef is similar to other features, however, rainfall is very unevenly distributed. Most often rain will not fall even once during the dry season, while during the rainy season, it can sometimes amount to 300 mm per day.<sup>68</sup> Concerning land reclamation, it seems Vietnam has yet to execute its plan on this coral reef; nonetheless, Tennent Reef remains part of an important chain of communication with other features south of the Spratly Archipelago, including Pearson and Cornwallis South Reefs.

9. *Alison Reef*. Also called 六门礁 (Liumen Jiao) or Da Toc Tan, the feature has an oval shape aligning southeast-northwest with an axis measuring 18.5 km, covering an average area of about 75 km<sup>2</sup>.<sup>69</sup> It lies 11 km away from Cornwallis South Reef in the northwest at 8°48'42"N, 113°59'0"E, closer to the Philippines than to Vietnam. Interestingly, the coral shelf in the north of Alison Reef is wider, with more continuous land mass, whereas the southern coral shelf is narrower and more interrupted by shallow watercourse.<sup>70</sup> Alison Reef is largely submerged, with patches of high drying rocks marking entrances to a lagoon that may be 15–25 meters deep.<sup>71</sup> It is reported that Vietnam has built three durable houses on the reef, namely Toc Tan A in the southeast, Toc Tan B in the northwest, and Toc Tan C in the north.<sup>72</sup> In these structures, marines grow vegetables such as spinach and cabbage in cubes of soil brought from the mainland, and also keep dogs to help guard areas on the feature. Concerning land reclamation, no activity has been detected on Alison Reef.

10. *Amboyna Cay*. Otherwise known as 安波沙洲 (Anbo Shazhou) and Dao An Bang, the cay is claimed by Vietnam as its southernmost land feature, roughly on the same latitude as Vietnam's southernmost tip on the mainland. Located at 7°52'10"N, 112°54'10"E, about 139 km in the southeast from Spratly Island,<sup>73</sup> running 200 meters long and 20 meters wide.<sup>74</sup> With a height of about 2–2.5 meters above high water and an area covering approximately 0.0158 km<sup>2</sup>,<sup>75</sup> Amboyna Cay is surrounded by rough tides that make the cay the most difficult place to reach by boats among all features occupied by Vietnam in the contested waters.<sup>76</sup> Tides also cause great hardship to the lives of Vietnamese marines stationed on the cay, as they tend to wash away soil intended for planting vegetables and chase away nearby fish.<sup>77</sup> Perhaps it is due to the difficulties in navigation that the VCP built only one light-house on the cay in 1995 plus the necessary facilities needed for the stationing of their navy and has yet to reclaim land on Amboyna Cay. Nevertheless, the cay acts as an important linkage between the Spratly Archipelago and Vietnam's southern continental shelf in addition to being an outer shield, along with other reefs, to guard and monitor foreign activities.

11. *Barque Canada Reef*. Also known as 柏礁 (Bai Jiao) and Da Thuyen Chai, this reef lies roughly 38.9 km in the northeast from Amboyna Cay at 8°10'N, 113°18'E

and aligns east-southwest, running 28.7 km long and 3.7 km wide.<sup>78</sup> On the reef, there stands several drying rocks above the surface of the water; at the southwest extremity lies a 4.5-meter-high rock, whereas other unnamed drying rocks emerge along the northeast-southwest side.<sup>79</sup> When Barque Canada Reef dries and the tides retreat to about 0.5 meter, a lagoon and three small sand dunes are revealed.<sup>80</sup> Concerning land reclamation, no activity from the Vietnamese has been reported. Nevertheless, several durable shelters, connected by bridges, have been erected on the reef to serve the navy and the fishermen.<sup>81</sup>

### *B. Sinh Ton Village*

Sinh Ton Village is *the* area in which Vietnam confronts most of its maritime contenders—the Philippines, Mainland China, and Taiwan. Here rivals have set up their own headquarters: Taiwan at the Itu Aba, the largest Spratly Island; the Philippines, at Thitu Island, the second largest, and China, with its Big Three reclaimed islands forming a Subi Reef-Fiery Cross-Mischief Reef triangle, and most of its smaller islands concentrated in this area (See 2 in Figure 1). Obviously, China has the strongest presence in this area. Nevertheless, with Sin Cowe Island and Grierson Reef forming the base, while Sand Cay functions as the cap, Vietnam creates its own circle of influence within the highly sensitive waters. In conjunction with Truong Sa Village, Sinh Ton Village, which has the following features, works to rival China's influence in the region.

1. *Sin Cowe Island*. Otherwise known as 景宏岛 (Jinghong Dao) or Dao Sinh Ton, the island stands on top of small coral patches and runs east-west spanning 400 meters long and 140 meters wide.<sup>82</sup> Located at 9°53'7"N, 114°19'47"E, the feature is only a few nautical miles away from Johnson Reef, which China seized from Vietnam during the 1988 conflict. Thus, to the Vietnamese, Sin Cowe Island plays a strategic role in maintaining the country's presence in the area, making it one of the most prioritized locations for land reclamation. In the ten-year period from 2006 to 2016, an additional 0.1 km<sup>2</sup> was reclaimed, expanding the island's boundary to a total of 0.13 km<sup>2</sup>—five times the original size.<sup>83</sup> Furthermore, public facilities such as energy stations and schools, as well as military barracks have been constructed and consolidated over the years to encourage popular migration onto the island.<sup>84</sup> Regarding natural resources, Sin Cowe has little to offer its inhabitants. The feature does not have freshwater; all water sources for daily activities come from mainland Vietnam, which are stored in underground water tanks. It also does not have fertile soil for farming; all vegetables currently grown on the island were originally planted in layers of soil transferred from the mainland.<sup>85</sup> Nonetheless, living conditions on the island are rapidly improving, so is its physical presence in the South China Sea.

2. *Grierson Reef*. Locating 27.8 km to the east of Sin Cowe Island (thus the alternative name Sin Cowe East Island),<sup>86</sup> it is also called 染青沙洲 (Ranqing Shazhou) or Dao Sinh Ton Dong. The feature is a congregate of coral dunes, with a length of 160 meters and a width of 60 meters<sup>87</sup> surrounded by wide sand shores spanning up



to 10 meters laying on top of submerged coral patches running northwest-southeast.<sup>88</sup> When tides reach their lowest, the reef's surface emerges roughly 3 meters above the water.<sup>89</sup> The reef does not have freshwater reserves, and its land is mainly composed of coral sand; thus, Vietnamese marines can only grow vegetables and fruits in small squares of soil to provide for their nutritional needs.<sup>90</sup> Due to its relative proximity to Sin Cowe Island and China's Johnson Reef, Grierson is also prioritized in Vietnam's land reclamation project. Satellite images captured in 2012 indicate that the reef was expanded roughly 0.01 km<sup>2</sup>; however, images captured in 2016 show that Vietnam has increased the speed of the project as the total area of Grierson Reef now reaches 0.02 km<sup>2</sup>, more than doubling its original size.<sup>91</sup>

3. *Sand Cay*. Sand Cay is a part of the great Tizard Bank and Reefs, located at 10°22'36"N, 114°28'42"E. Also called 敦谦沙洲 (Dunqian Shazhou) or Dao Son Ca, the cay resembles an oval shape running northwest-southeast surrounded by coral shelves.<sup>92</sup> The cay does not have natural freshwater, yet, it possesses fertile layers of soil composed of hummus and guano, which allow for the growing of trees of various kinds that act as habitat for nightingales, giving the cay the name Son Ca in Vietnamese.<sup>93</sup> Besides trees, inhabitants of Sand Cay grow pomelos, jackfruits, and guavas for income and food.<sup>94</sup> In addition, the sea surrounding Sand Cay is home to a variety of fish, such as plaice, tuna, and mackerel, making it a place of frequent fishing and seafood processing with significant commercial benefits.<sup>95</sup> Satellite images from AMTI indicate that Vietnam commenced land reclamation on Sand Cay around 2011. In 2016, images of Sand Cay show that the feature has expanded by 0.37 km<sup>2</sup>, almost doubling the cay's overall size.<sup>96</sup>

4. *Namyit Island*. Situated at 10°10'54" N 114°21'36" E, Namyit Island, also called 鸿麻岛 (Hongxiu Dao) or Dao Nam Yet, is part of the larger Tizard Bank and Reefs.<sup>97</sup> The island has an oval-like shape that spans 650 meters long and 200 meters wide, covering an area of approximately 0.097 km<sup>2</sup>.<sup>98</sup> It also stands roughly 3.5 meters high above the water's surface and is reported to have a relatively steep and deep topography in the southern outer layer, as well as a shallow and wide inner layer facing north.<sup>99</sup> In terms of natural conditions, Namyit Island has an average temperature of about 25° Celsius to 29° Celsius with large amounts of rain and strong winds from August to December, causing great difficulties for boats coming to shore. The average humidity on the island is 79 percent and tends to carry salt mist that quickly spoils food and damages military weapons.<sup>100</sup> Namyit Island provides habitat for 58 types of land animals, 185 phytoplanktons, 141 zooplanktons, 225 benthic organisms, 298 types of corals, 186 coral fishes, and 8 types of sea turtles.<sup>101</sup> Highlighting these geographical characteristics of Namyit Island, the study by An Duc Le et al. prompted the signing of Decree 742/QĐ-TTĐ by Prime Minister Nguyen Tan Dung in 2010,<sup>102</sup> which prompted the 200-km<sup>2</sup> Nam Yet Marine Preservation Zone to be constructed in 2013.<sup>103</sup> So far, Vietnam has yet to carry out its land reclamation project on Namyit Island; nevertheless, from one perspective, the preservation project has already acted as an alternative method for the government to assert its sovereignty over the island.

5. *Petley Reef*. Petley Reef, also called 舶兰礁 (Bolan Jiao) or Da Nui Thi, is yet another part of the Tizard Bank and Reefs, lying 11.1 km from Sand Cay in the north-

east. Situated at 10°25'36"N, 114°34'50"E, the coral reef of Petley Reef is currently administered by Sinh Ton Village of Truong Sa Island District.<sup>104</sup> Spanning roughly 2 km long and 1.3 km wide with an area of about 1.72 km<sup>2</sup>, the reef forms itself into a circular shape, a bit flattened on the two northeast-southwest sides, and becomes steeper as one heads southeast.<sup>105</sup> Regardless, when high tides reach 1.2 meters, the entire reef submerges approximately 0.6 meters under water; even when Petley Reef is 0.3 meters above surface, parts of the middle of the reef remain submerged.<sup>106</sup> The reef enjoys a short dry season (February–April) and a long rainy season (May–January) with an average temperature of 28° Celsius and 80 percent humidity with salt mist that quickly spoils food and damages military weapons.<sup>107</sup> Petley has very strong storms and winds that cause high tidal waves, preventing boats from coming to shore between July and December.<sup>108</sup> At present, there have been no known reports about activities of land reclamation on this reef; it seems that Petley Reef will remain untouched for quite some more time due to difficulties in transportation.

6. *Discovery Great Reef.* Lying 51.9 km southwest from Namyit Island is the Discovery Great Reef, also known as 大现礁 (Daxian Jiao) or Da Lon. Located at 10°03'42"N, 113°51'6"E, the reef aligns north-south in a narrow, steep shape, measuring 18.5 km long and 1.9 km wide with an area of approximately 35.15 km<sup>2</sup>.<sup>109</sup> Compared to other reefs, the Discovery Great Reef has a harsher dry season with extended heat waves from early morning until evening; nonetheless, this is also the time in which the sea surrounding the reef stays calmest, making it convenient for boats and ships to pass through.<sup>110</sup> In terms of commercial significance, the reef is surrounded by fishing grounds that include highly profitable fish such as tuna, mackerel and plaice, along with other nutritious seafood, making it a popular spot for fishery activities.<sup>111</sup> That being said, to the Vietnamese, this reef holds major commercial and strategic importance as it situates near Gaven Reef (Mainland China) and Itu Aba (Taiwan). Between 1988 and 1994, Hanoi built three outposts (A, B, and C) wherein Vietnamese marines reside and keep watchful eyes on the area.<sup>112</sup> So far, there have yet to be any reports on reclamation on Discovery Great Reef; nonetheless, the country is focusing on providing green energy as well as firmer outposts to improve the overall quality of life for the marines living on the reef.

7. *Collins Reef.* At 9°46'13"N, 114°15'25"E, about 17 km to the southwest from Sin Cowe Island, is Collins Reef, regionally called 鬼喊礁 (Guihan Jiao) or Da Co Lin. The reef appears to be similar to a triangle with relatively rounded sides.<sup>113</sup> While most speculate that the reef is a dune formed by coral debris, others insist that it is actually a coral ridge in the shape of a dune.<sup>114</sup> When tides are high, the reef is completely submerged; when tides are low, only a few rocks emerge above the surface of the water.<sup>115</sup> Collins Reef enjoys the typical cool summers, warm winters of the entire Spratly Archipelago with a harsh dry season from February to May in which heat waves extend from 4 a.m. to 7 p.m.<sup>116</sup> The area surrounding the reef includes several profitable fishing areas for tuna, mackerel, and sea cucumber.<sup>117</sup> Regarding land reclamation, it seems that Vietnam has yet to operate on this reef, most likely because of the close proximity between Collins Reef and Johnson Reef the PRC occupies. Nonetheless, Collins Reef remains a major outpost for monitoring foreign activities and serving

as an integral part of the shield protecting the eastern coast of Southern mainland Vietnam, in addition to containing China's Johnson Reef alongside Sin Cowe Island.

8. *Lansdowne Reef*. Lansdowne Reef, also known as 琼礁 (Qiong Jiao) and Da Len Dao, is another reef administered by Sinh Ton Village of Truong Sa Island District.<sup>118</sup> At 9°46'48"N, 114°22'12"E, the reef is roughly 12 km from Sin Cowe Island in the southeast and 24 km from Grierson Reef in the southwest.<sup>119</sup> Topographically, the reef is relatively flat; during high tides, Lansdowne Reef submerges about 1.8 meters below the water's surface and only emerges when tides are lowest.<sup>120</sup> Each year, the wind moves the white sand dune on top of the reef in a full circle with the Vietnamese outpost at the center. Interestingly, several news reporters claim that around March or April when the northeast wind blows, the sand dune moves further down to the southwest of the reef and form a shape resembling mainland Vietnam on the map.<sup>121</sup> That being said, to many Vietnamese, Lansdowne Reef remains an important historical landmark alongside Collins Reef and Johnson Reef that reminds them of the 1988 skirmish with the PRC. So far, the Vietnamese government has yet to start land reclamation project on this feature, most likely due to China's presence near the reef.

### C. Song Tu Tay Village:

Song Tu Tay Village is the group of islands furthest from Vietnam's mainland in the Spratly Archipelago. With Southwest Cay as the main base, Vietnamese authority aims to keep a firm defense against the Philippines forces on Northeast Cay (See 3 in Figure 1).

1. *Southwest Cay*. Also named 南子岛 (Nanzi Dao) and Dao Song Tu Tay,<sup>122</sup> situated at 11°25'79"N, 114°19'78"E, the feature resembles an oval extending 650 meters long and 280 meters wide, at 4 meters above sea level, making it the highest island in the entire Archipelago and the sixth largest feature.<sup>123</sup> This fact is a wonder in itself, for features formed on top of coral reefs from sand accumulation like Southwest Cay tend to be lacking in height and size. Different from most reefs and cays in the Spratly archipelago, Southwest Cay is full of brackish water convenient for raising cattle, planting greens, and human activities.<sup>124</sup> AMTI images from 2016 reveal that 0.03 km<sup>2</sup> of land has been reclaimed on the cay, expanding the total area from 0.155 km<sup>2</sup> to 0.185 km<sup>2</sup>.<sup>125</sup> In addition, other construction projects such as a soccer field, three storage buildings, a weather station and pagodas were constructed to satisfy physical and emotional needs of Vietnamese navy living on the cay.

2. *South Reef*. Lying about 6.6 km southwest from Southwest Cay, at 11°23'31"N, 114°17'54"E, is South Reef, otherwise known as 奈罗礁 (Nailuo Jiao) or Da Nam.<sup>126</sup> Defined in geographic terms as a coral reef and not an island, the feature covers an area of 2.7 km<sup>2</sup> and is shaped like an axe-head.<sup>127</sup> South Reef aligns northeast-southwest; when tides retreat, several individual rocks standing about 0.3 meters emerge above water surface. In the east of the reef lies a small, narrow lagoon about 600 meters long and 150 meters wide that reaches up to 15 meters deep when tides are the lowest.<sup>128</sup> South Reef enjoys an average temperature of 25° to 29° Celsius with 80 percent humidity plus salt mist that quickly spoils food and damages military

weapons.<sup>129</sup> Vietnam reportedly has yet to start a land reclamation project on Da Nam, most likely because Hanoi intends to prioritize scarce resources on primary features with strategic significance.

#### *D. DK1 Rigs: Economic, Scientific and Technological Service Stations*

DK1 rigs is a collection of service stations with complex outpost structures administered by Brigade 171 of Navy Zone 2, roughly 463–648 km from Vietnam's mainland, that are independent of the TSID administration. The features in this area are built upon a continental shelf up to 1,700 meters thick, with layers of corals that have developed overtime. The features here enjoy cool summers and warm winters as well as an average temperature of 28° Celsius with strong gusts of northeastern wind from November to February and southwestern wind from June to September. Storms tend to occur from late October to January, with a climax of frequency in November; thus, April is the safest time to carry out fishery activities, followed by early October. Notably, the banks of DK1 rigs are located at important international sea lanes from Northeast Asia to Southeast Asia with fishing grounds and deposits of natural gas currently used by the Vietnamese authority, making them the major outposts for Vietnam's economic interests.

Nonetheless, it is noteworthy that the DK1 area is responsible for the discrepancy regarding the exact number of features Vietnam occupies in the SCS. On one hand, Hanoi considers the features as part of its southern continental shelf and refuses to identify them as part of the disputed area. On the other hand, the different methods used in identifying individual features located in this area contribute to the confusion of information: On a macro level, six major underwater banks can be identified, including Vanguard (Bai Tu Chinh), Rifleman (Bai Vung May/Ba Ke), Prince of Wales (Bai Phuc Tan), Prince Consort (Bai Phuc Nguyen), Grainger (Bai Que Duong), and Alexandra Banks (Bai Huyen Tran). On a micro scale, the area encompasses more than six features, since Rifleman Bank perceivably consists of four smaller shoals which are not recognized by other contenders nor major maritime organizations. Believing in specificity over generalization with regard to areas of territorial disputes, it is best that the four smaller shoals be counted into the overall number of features Vietnam occupies.

That being said, aiming to mark the country's territorial claims in addition to extracting economic benefits, Vietnam has built several service stations—durable structures—which are listed below.

1. *Vanguard Bank*. Vanguard Bank, or Bai Tu Chinh and 万安滩 (Wan'an Tan), is located at 7°29'N, 109°37'E, with its highest point about 424 km from Vung Tau—Vietnam's southernmost point on the mainland. From 1989 to 1995, Vietnam constructed a total of five service stations on the feature, including DK1/1, DK1/5, DK1/11, DK1/12, and DK1/14. In 1999, after a decade of functioning in harsh weather conditions, DK1/5 collapsed, followed by DK1/14, which was rebuilt in 2001. Currently, only DK1/11, DK1/12, and DK1/14 are in use.<sup>130</sup>

It is at this particular location that the worst Sino-Vietnamese standoff since the 2014 oil rig clash has occurred.<sup>131</sup> In July 2019, Chinese survey ship *Haiyang Dizhi 8* (HD8 [Marine Geology 8]), escorted by its Coast Guard and maritime militia, appeared at the Vanguard Bank in an effort to stop the Russo-Vietnamese joint drilling. However, it remains unclear whether the Hanoi ever deployed *Quang Trung*, for there exists neither governmental statements nor reports from major Vietnamese news channels about the dispatch; thus, some private news websites have considered the action a Vietnamese fluke, suggesting that the vehicle was just a naval patrol ship.<sup>132</sup> Nevertheless, Ryan Martinson, assistant professor in the U.S. Naval War College, claimed the supposed *Quang Trung* left the hotspot to return ashore on August 22.<sup>133</sup> Despite the ship's departure, tension has yet to subside. An article published on September 5 in the *South China Morning Post* reports the appearance of China's over 13,000-ton crane vessel *Lan Jing*, including a 7,500-ton capacity crane with 4,000-ton additional crane and an auxiliary 1,600-ton hook, just 56 miles (approximately 90 km) from the Vietnamese coastline near the region spanning from Da Nang to Quy Nhon.<sup>134</sup> Although HD8, after two months on sea, seems to have positioned itself further from Vietnamese coast than *Lan Jing* has, satellite images from Marine Traffic look as if the two ships are spearheading China's ambitions over its nine-dashed line, pointing directly to Vietnam's South Central Coast and Southeast regions.<sup>135</sup> Vanguard Bank, for the time being, is a crucial location in need of meticulously close surveillance for analysis.

2. *Prince Consort Bank*. Lying southwest of Vanguard Bank is Prince Consort Bank, otherwise known as Bai Phuc Nguyen or 西卫滩 (Xiwei Tan), located at 7°48'N, 109°55'E. In 1990 and 1995, Vietnam built stations DK1/6 and DK1/15, however, a major storm heavily damaged DK1/6 in 1990, leaving the rig foundations with which Brigade 171 built station 2A/DK1/6, which later collapsed in 1998 during a heavy storm. Currently, only DK1/15 is in use.<sup>136</sup>

3. *Prince of Wales Bank*. Located at 8°44'N, 110°35'E is Prince of Wales Bank, also called Bai Phuc Tan or 广雅滩 (Guangya Tan). Among the six banks, Prince of Wales is probably among the most sensitive due to the high volume of fishery activities from Hong Kong and the Philippines, making it a security hotspot. From 1989 to 1997, Vietnamese authorities constructed a total of four service stations on the feature. In 1989, Vietnam constructed DK1/3 on the bank, which collapsed in 1990 during a heavy storm. In 1993, DK1/2 was completed, followed by DK1/16 as well as DK1/17 in 1996 and DK1/18 in 1997, all of which are in use today.<sup>137</sup>

4. *Alexandra Bank*. Alexandra Bank, otherwise known as Bai Huyen Tran or 人骏滩 (Renjun Tan), is located at 8°1'N, 110°37'E. In 1991, Vietnam built DK1/7 on the bank, aiming at creating a network of service among Alexandra, Vanguard, Prince Consort, and Prince of Wales Banks so as to accelerate the speed of organizing facilities for utilizing seaway activities. To this day, DK1/7, accompanied by a lighthouse and a meteorological observatory, is in use.<sup>138</sup>

5. *Grainger Bank*. Located at 7°47'N, 110°29'E is Grainger Bank, also called Bai Que Duong or 李淮滩 (Lizhun Tan). Notably, the bank has one of the most complex weather patterns among the six contested features in DK1 rigs. Here, heavy rain



occurs from late June to early February with strong winds up to level 7 on the Beaufort Scale, resulting in waves about 2.5 meters high on average and 8 meters high at maximum. In 1991, Vietnam built DK1/8 on the feature, followed by DK1/19 in 1997. Currently, both service stations are in use with DK1/8 featuring a lighthouse.<sup>139</sup>

6. *Rifleman Bank*. Rifleman Bank, known as Bai Vung May or 南薇滩 (Nanwei Tan), is located at 7°32'N, 111°45'E. The bank includes four smaller features, Bombay Castle (or Bai Ba Ke and 蓬勃堡), Orleana Shoal (or Bai Dat and 奥南暗沙), Kingston Shoal (or Bai Dinh and 金盾暗沙), and Johnson Patch (or 常骏暗沙—Vietnam does not have a name for this feature). Rifleman Bank in its entirety is another security hotspot due to the high volume of foreign fishery activities as well as scouting military ships from other SCS contenders. In 1989, Vietnam built DK1/4, which collapsed in 1990 due to a heavy storm. In 1993, the country constructed DK1/9 on the feature, followed by DK1/20 and DK1/21 in 1998, all of which are in use today.<sup>140</sup>

## VI. Conclusion

This paper investigates four inter-related but poorly understood questions on the actual number of features Vietnam physically occupies in the Spratly Islands, its administrative structures, the historical, and geopolitical motivations behind Vietnam's reclamation of the Spratly Islands and the challenges Vietnam faces in reclaiming said islands. Although Vietnam claims to occupy and administer a total of 21 features, this study confirms that Hanoi actually controls a total of 30 features, including 5 major underwater banks and 4 smaller banks that make up Rifleman Bank in the DK1 rigs. We note that the country has reclaimed land on at least ten features at varied speed. These efforts have produced Vietnam's "Big Four"—Spratly Island, West Reef, Southwest Cay, and Sin Cowe Island. The remaining six features, Sand Cay, Pearson Reef, Central Reef, Grierson Reef, Cornwallis South Reef, and Ladd Reef, have seen limited land reclamation that is not as significant as the first four when compared to their original sizes. As for the rest of the 20 features, it is uncertain whether Vietnam has plans for reclamation.

To Vietnam, a middle-sized power, reclaiming an island on a large scale in the SCS presents at least three problems: First, the cost. Dredging and reclaiming land in the ocean is expensive. It requires complicated logistical support, transportation, navigation, plus high technological capability. China has passed laws banning export of its most-advanced dredgers. Second, land reclamation damages the environment and could lead to international backlash. Third, since 90 percent of the SCS is in disputed areas, it leads to geopolitical tensions, especially between Vietnam and its northern neighbor, China. At this time, it is anticipated that most of Vietnam's features will remain untouched for quite some time. Adding to the difficulties are weather patterns and the geographical proximity to those features occupied by China. Any sudden move from the Vietnamese side would certainly provoke counteractions from Beijing and further complicate the situation. Regardless of land reclamation, to Vietnam, each and every feature under its occupation holds great commercial and strategic significance.

## Notes

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