

# BRIEFER

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## Climate & Nuclear Security in the South China Sea: The Cases of Indonesia and the Philippines

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### INTRODUCTION

At the time of writing, the global community is struggling to manage the deadly COVID-19 pandemic that has spread throughout the world. The region bordering the South China Sea---made up of China, Malaysia, Brunei, Indonesia, the Philippines, Vietnam, and Singapore---has not been spared. The Council on Strategic Risks's Working Group on Climate, Nuclear, and Security Affairs ranked this part of the globe, and more specifically, the Philippines and Indonesia, as hotspots for the intersections of these issues: whatever transpires in the Philippines and Indonesia will have an outsized influence on tensions either rising or falling in the greater region.

In April of this year, Indonesia surged past the Philippines to record the second-highest number of positive COVID-19 cases behind China. Joblessness has climbed rapidly and 270 regional elections have been postponed to a new date of December 9<sup>th</sup> 2020, with the recognition that they may need to be delayed further.<sup>1</sup> In the Philippines, a strict lockdown was implemented just 5 days after the first internal transmission was recorded in the country.<sup>2</sup> The country's COVID-19 death rate ranks third behind China and Indonesia in Southeast Asia, but a 17.7% unemployment rate is driving pressure to reopen restaurants after three months.<sup>3</sup> Globally, the spread of the novel coronavirus has driven significant anti-Chinese sentiment that has manifested as sinophobia and racism. In the Philippines, on the other hand, these sentiments seem to stem more from the perception that China has used the pandemic to undermine Philippine sovereignty in the region.<sup>4</sup>

The COVID-19 crisis also arrives in a region where climate change, nuclear developments, and existing strains on security are increasingly converging - raising new and potentially unprecedented risks. Most nations bordering the South China Sea, including the Philippines and Indonesia, are exploring nuclear energy to power their growing economies. Many are simultaneously grappling with mounting extremism streaming from Islamic State-affiliated groups within their own borders. Climate change is already altering the physical landscape on which the geopolitical environment rests, and is projected to worsen throughout this century, resulting in potentially significant consequences for regional and global security. At the same time, geopolitical tensions are on the rise for other reasons, as Beijing continues to flex its military muscle in the South China Sea, at times confronting other nations in its bid to expand its territorial control over disputed areas.

In short, a collision of new and traditional security risks is disrupting an already fragile region. This brief attempts to spotlight the climate, nuclear, and security risks unfolding in the key countries of Indonesia and the Philippines, while taking into consideration the wider geopolitical dynamics.

## BACKGROUND

Indonesia is the fourth most populous country in the world with almost 270 million inhabitants and is expected to increase to more than 330 million by mid-century.<sup>5</sup> The country is an archipelago of 13,466 islands, 54,716 km of coastline, and is the second most forested region in the world behind the Amazon. Geographically, its coastal lowlands and equatorial location along the ring of fire make it particularly vulnerable to sea level rise, volcanic activity, monsoons, earthquakes, and tsunami events.<sup>6</sup> The island of Java is home to the capital city of Jakarta and is considered one of the most densely populated areas in the world.<sup>7</sup> The country demonstrated a 2.27% urbanization rate over the past 5 years and is estimated to be 56.6% urban as of 2020. Education rates are high, and the country has identified the next several years as an important window to reduce poverty and avoid falling into a middle-income trap as their population ages.<sup>8</sup>

The Philippines is also an archipelago, with 7,107 islands and 36,289 km of coastline. The country is mostly mountainous with some coastal lowlands and sits astride the Pacific Typhoon Belt, which places it at the highest risk of cyclonic storms in the world. Additionally, its location along the Pacific Ring of Fire expands its environmental risks to include landslides, earthquakes, volcanoes and tsunamis. Its population falls just shy of 110 million and is concentrated around areas of good farmland, mostly on the country's largest island of Luzon with one-eighth of the population residing in the capital city of Manila. Over 40% of the population is 24 or younger and the working population is expected to grow as they age.<sup>9</sup> The Philippines has seen constant economic growth over the last two decades which has accelerated to over 6% annually since 2010 and nearly doubled their GDP in that time. The impacts of COVID-19 are expected to decelerate this growth significantly for 2020 but rebound as the country trends from a lower-middle income country to an upper-middle income country in the near future.



Source: BBC: [http://news.bbcimg.co.uk/media/images/48951000/gif/\\_48951920\\_south\\_china-sea\\_1\\_466.gif](http://news.bbcimg.co.uk/media/images/48951000/gif/_48951920_south_china-sea_1_466.gif)

## Neighboring Country Highlights

### Vietnam

- Began consideration of nuclear energy in 1995 and entered more concrete discussions with Russia and Japan in 2006. However, in 2016 the National Assembly voted to halt plans for the two projects due to a combination of safety concerns, lower demand forecasts, and high costs, pivoting instead to cheaper gas and coal resources.<sup>10</sup>
- Considered one of the most vulnerable countries to climate change effects due to its geography, exposure to extreme environmental events, economic system, and packed civilian centers near major bodies of water such as the South China Sea and the Mekong River Delta.<sup>11</sup>
- The Delta faces siltation, storm surges, salt-water intrusion and more due to anthropogenic activity combined with sea level rise and climate events.<sup>12</sup>
- Heavily reliant on the fishing industry, and climate change impacts could spur migration, food insecurity, and economic stress, potentially leading to conflict.<sup>13</sup>

### Singapore

- Sea level rise is an existential threat; the country's territory is mostly 15 meters above the mean sea level, with about 30% of the country being less than 5 meters above the mean sea level.<sup>14</sup>
- Changes in precipitation patterns are expected to stress the water resources system and intense rainfall could lead to flash floods. The country imports over 90% of its food, making it extremely vulnerable to climatic impacts in other parts of the world, raising food security concerns.
- In 2012, a pre-feasibility study concluded that "nuclear energy technologies presently available are not yet suitable for deployment" in the country mainly due to risks associated with its small land mass and dense population. However, Singapore is dedicated to long term energy security and is reevaluating its position as nuclear technology and safety designs are further advanced.

### Malaysia

- Recently underwent significant political upheaval when its government collapsed after two years.
- Coastal plains and mountains make the country susceptible to floods, landslides, and forest fires.
- Increasingly volatile precipitation rates are predicted, which will lead a quarter of the Malaysian population to be displaced by the year 2030. All of the worst flooding events in the past 30 years have occurred since 2003.<sup>15</sup>
- The country set up a planned path towards nuclear energy in 2012, but has decided not to pursue it due to safety and nuclear waste disposal concerns. The Malaysia Nuclear Power Corporation (MNPC) has been shut down.<sup>16</sup>
- In August 2018, radioactive material that could be weaponized and used in a 'dirty bomb' went missing from a truck, an incident that has plagued the country over a dozen times since the 1990s. In 2017, two missing gamma projectors were later found in a dense housing community close to a scrap metal dealer.<sup>17</sup> Clearly, ensuring the safety and security of nuclear materials is critical even in countries that have not developed a nuclear power program.
- Malaysian authorities are combating ISIL affiliates and other extremist groups within their territory. The country suffered its first ISIL attack in 2016 and is still actively breaking up associated plots and networks.<sup>18</sup>

### Brunei

- Significant petroleum and natural gas reserves one of the richest countries in the world.<sup>19</sup>
- Brunei has medium to high climate change exposure; higher temperatures during already hot months and increased precipitation during the rainy season will usher in higher levels of heat stress and flooding events. Sea level rise is also a major concern considering that there are some areas of the country that are up to 12 meters below sea level.<sup>20</sup>
- An IAEA member state since 2014, it currently holds no concrete nuclear energy plans. The country signed its first country program framework for 2017-2022 meant to address priorities such as food and agriculture and radiation safety and security of radiation sources.<sup>21</sup>

## NUCLEAR DEVELOPMENTS

Nuclear developments in the South China Sea (SCS) region vary greatly across nations. One unifying factor is the Southeast Asia Nuclear Weapon Free Zone (SEANWFZ) Treaty, which entered into force in 1997. It binds Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam in a regional commitment to abstain from nuclear weapon development, possession, or use. It also precludes stationing any weapons throughout these territories. Although the treaty is open to nuclear weapons possessing states, none have signed or ratified it. One unique aspect of the SEANWFZ treaty is that the Zone of Application covers a signatory's territory as well as its continental shelf and EEZ (Exclusive Economic Zone). The inclusion of an EEZ is important to note considering that EEZs have become a sticking point in regional disputes over SCS territorial claims between nuclear-armed China and its neighbors.

China, a nuclear weapons-possessing state with almost 300 weapons in its arsenal, is also a top nuclear power producer. As of May 2020, the country has over 40 nuclear reactors in operation, another dozen under construction, and several more planned.<sup>22</sup> As part of its Belt and Road Initiative, it is actively working to export its nuclear energy expertise around the world, and plans to build at least 30 overseas reactors by 2030.<sup>23</sup>

This overarching nuclear giant casts a wide shadow on the rest of the region, which is hungry for energy. The Philippines, Indonesia, Malaysia, and Vietnam have all signaled their interest in ushering in civilian nuclear power programs around the South China Sea.

The Philippine government, in particular, has been very vocal about their quest for energy security, with Energy Secretary Alfonso Cusi stating that they are willing to “tap any sources that would satisfy our own needs now.”<sup>24</sup> Along with prohibitive electricity costs, the country is struggling to manage widespread power outages because of aging infrastructure issues and high demand. Future projections indicate that energy demands could increase by an average of 5% until 2030. In order to meet these needs, the government is re-exploring the possibility of nuclear power generation.

The country successfully built a \$460 million Westinghouse nuclear reactor in 1984 but never utilized it due to high maintenance costs and physical infrastructure concerns. Around the time of the Chernobyl accident, experts decided that the plant could not be operated because of its proximity to major fault lines; earthquakes and a dormant volcano were major concerns. The site has been maintained ever since, requiring over \$30 million in annual upkeep fees, and even serves as a tourist attraction.<sup>25</sup>

Plans to revive the Bataan nuclear energy plant still appear to be up in the air. According to Russian Ambassador Igor Khovaev, the site is beyond use and plagued by its “absolutely outdated” technology.<sup>26</sup> His statements were informed by a study led by ROSATOM—Russia's state-owned nuclear energy corporation—that analyzed the conditions of the plant. However, in December 2018, the Philippine Nuclear Research Institute (PNRI) disagreed, advising the government that updating the reactor was a good idea. Although the revamp estimates range from P1billion to P3billion, PNRI director Carlo Arcilla stated that the country would only need to “upgrade the turbine and few other machines,” arguing that “the median Filipino family pays more than 10 percent of their take-home pay for electricity compared with the United States, which has about 100 nuclear power plants, where each household pays not even 1 percent of their monthly income.”<sup>27</sup>

In any case, the Philippine government has been working closely with the International Atomic Energy Agency (IAEA) over the last several years in order to establish whether the country could safely pursue its nuclear energy ambitions. In 2016, the Department of Energy created the Nuclear Energy Program Im-

plementing Organization per the IAEA's guidelines. In December 2018, the IAEA was invited by the government to conduct an integrated nuclear infrastructure review.<sup>28</sup> Roughly a year later, the mission was complete, and the IAEA team submitted their phase 1 report to Manila. The country is now in the process of developing a plan of action that incorporates the IAEA's findings and recommendations, some of which include:

1. “.. developing policies for industrial participation and radioactive waste management
2. finalized laws addressing all elements of a comprehensive nuclear law, including the responsibilities of the body of commissioners, decommissioning, nuclear security and radioactive waste
3. enhance its plans for human resource and leadership development
4. assess the existing frameworks for emergency preparedness and response...”<sup>29</sup>

In October 2019, Manila signed a memorandum of understanding with ROSATOM for a pre-feasibility study examining the deployment of Small Modular Reactors. SMRs are considered a possible lower cost solution for the many islands that suffer from unstable energy access. Russia and the Philippines have signed business agreements that total more than \$12 million - including on nuclear cooperation.

Indonesia, a regional neighbor, is a top coal, biofuels, and gas producer, and is in the early stages of nuclear energy exploration to support its growing population. The country's National Nuclear Energy Agency (BATAM) already operates three research reactors along with other facilities and has directed feasibility studies to prepare for a deeper investment in nuclear power. In 2015, the IAEA conducted an Integrated Regulatory Review Service (IRRS) mission to investigate Indonesia's interest and existing safety mechanisms. The team highlighted the country's Nuclear Energy Regulatory Agency (BAPETEN) strengths and provided recommendations to bolster its nuclear safety framework.<sup>30</sup> As a result of this review, Indonesia amended its nuclear law from 1997 to further enhance its legislative nuclear framework. In December 2019, the IAEA returned to the country to review its “significant” progress, and propose more changes including stronger alignment to IAEA standards of spent fuel management, decommissioning, and staff competence.<sup>31</sup>

In July 2019, state owned PT PAL Indonesia and newly established ThorCon International Pte Ltd signed a feasibility study for a proposed 500MW floating reactor with the goal of completing it by 2027. However, it is unlikely that the site will be ready in this time frame due to stalling in regulation approval. In February 2020, a BATAM representative told a local news outlet that it was far more probable that the \$1billion plant would be operational in 2040--in large part due to the fact that thorium technology, which would be used for this plant, has not been deeply explored for commercial use. More specifically, the facilities director stated that the country would “have to wait around 10 years for the technology to mature, then take 10 years to build the facility.”<sup>32</sup> Indonesia has over 100,000 tons of thorium reserves - a naturally occurring slightly radioactive material.

As previously stated, both Indonesia and the Philippines are signatories of the SEANWFZ Treaty and also of the NPT. Although a former Philippine Senate President declared in April 2019 that the only way his home country could match China was to develop nuclear weapons, the current Philippine government quickly announced that it was “not the way to proceed.”<sup>33</sup> The politician's statement seems to stem from tensions over ongoing territorial confrontations between the Philippines and China in the South China Sea.

### Neighboring Country Highlight: China

- A nuclear power with a population of over 1 billion, is increasingly exerting its influence in the South China Sea via its Nine-dash line.
- Domestically, flooding, desertification, and sea level rise are jeopardizing Chinese farming and coastal development. China has major cities that are considered some of the world's most at-risk to climate change effects - including manufacturing hub Guangzhou.
- Ocean warming is already having an impact on China's marine fisheries, and policies to curb greenhouse gas emissions are needed urgently to prevent downstream impacts on future annual catch.<sup>34</sup>
- The headwaters of the Mekong River, a major lifeline for Southeast Asia, begin in the Tibetan Plateau. In addition to climate change affecting these systems, China has been developing hydro projects to accommodate its growing food, water, and energy needs, severely impacting downstream neighbors. A 2020 study claims that one of the worst Mekong droughts ever recorded was caused by China's manipulation of water flow through its large-scale dams.<sup>35</sup>
- China is a nuclear weapons possessing state and a signatory of the NPT. The country is also looking to increase its nuclear power generation by 10% over the next decade.<sup>36</sup>
- In addition to South China Sea skirmishes, Beijing is dealing with ratcheting border tensions with India, persistent protests in Hong Kong, and economic trade wars with the United States among other international disputes.

## THE BROADER SECURITY LANDSCAPE

The potential development of nuclear power programs among the nations surrounding the South China Sea is set against a backdrop of ongoing hegemonic competition. China and its neighbors—including U.S. allies—operate under contradicting interpretations of international law; Beijing leans on its self-appointed sovereign rights and historical claims, while the U.S. and other regional governments support a rules-based order system bolstered by the United Nations Convention on the Law of the Sea (complicated by the fact that the U.S. has not yet ratified the convention). Thus, Beijing claims the majority of the South China Sea utilizing its Nine-Dash Line and by doing so, ignores other nations' EEZs that extend 200 nautical miles offshore. Although the United Nations struck down Beijing's Nine-Dash Line map in 2016, China continues to adhere to it. This has led to numerous physical and diplomatic skirmishes over the past several years between China and other countries - notably Vietnam, the Philippines, and Indonesia. Confrontations range from ramming 'encroaching' fishing vessels, publicly warning other governments, intimidating key partners, and even seizing ships flying rival flags. Some recent examples include:

- June 9, 2019: A Chinese fishing vessel hit and sank a Philippine fishing vessel, abandoning the 22 crew to be rescued by a nearby Vietnamese ship.<sup>37</sup>
- February 17, 2020: A Chinese Navy Destroyer ship lased a U.S. Navy P-8A Poseidon flying over international waters near Guam.<sup>38</sup>
- April 2, 2020: A Chinese ship hit and sank a Vietnamese fishing vessel, "capturing and detaining" the 8 crew members on a nearby island before releasing them that same evening.<sup>39</sup>
- April 21, 2020: China demonstrated "bullying behavior" by conducting surveys close to a Malaysian research vessel; months after following a similar incident with Vietnam in October 2019.<sup>40,41</sup>

The region is thoroughly contested due to its multi-layered strategic importance. Whoever controls a significant fraction of it has access to lucrative oil, natural gas, and mineral reserves, marine fisheries, advantageous military positioning, and economic control; approximately one third of global shipping moves through the South China Sea. Tensions are bound to run hot in this resource-rich and geopolitically-significant zone.

The U.S. Department of Defense (DoD) Indo-Pacific Strategy of 2019 does not hold back in its description of how the United States views Chinese behavior in the area. It states that Beijing:

“ undermines the international system from within by exploiting its benefits while simultaneously eroding the values and principles of the rules-based order. China has continued to militarize the South China Sea by placing anti-ship cruise missiles and long-range surface-to-air missiles on the disputed Spratly Islands and employing paramilitary forces in maritime disputes vis-à-vis other claimants.”<sup>42</sup>

The report goes on to criticize Beijing's violation of a 2015 pledge by Chairman Xi Jinping in which he stated that China did not intend to pursue militarization of the Spratly Islands--which it proceeded to do several years later. Beijing has been building up artificial islands in the area to ramp up its military presence and surveillance capabilities, although rumors attest that construction is falling apart as environmental elements and rising seas chip away at highly exposed infrastructure.<sup>43</sup> In its bid to boost its power in the area, some experts state that China has destroyed sensitive reef systems and contributed to a widespread degradation of the marine environment.<sup>44</sup> Military buildups are not expected to ease off in the coming years and climate change may add another layer to expansion plans. Last year, reports claim that Australian Defense Force Chief Angus Campbell noted that sea level rise could lead to the abandonment of islands, providing the perfect opportunity for territory-hungry governments to encroach on formally out-of-reach territories.<sup>45</sup>

The South China Sea has become a global stage for U.S. and Chinese power plays. U.S. Navy warships conduct periodic freedom of navigation operations near Chinese-claimed islands in an open attempt to enforce the rule of law and serve as a reminder that the U.S. will actively support “the rights, freedoms, and lawful uses of the sea and airspace guaranteed to all nations.”<sup>46</sup> During one such November 2019 mission, China's Southern Theatre Command released a statement urging the United States to “stop these provocative actions to avoid any unforeseeable accidents.” Such language supports the notion that the Chinese government, at least publicly, is irked by the seemingly innocuous but ongoing show of U.S. warships passing through waters Beijing believes fall within its national territory.

The U.S. is firm in its alliances and partnerships within the region. In the aforementioned report, the DoD details its strong partnerships with South China Sea nations.

For example, the Philippines has hosted the United States for over three decades in an annual joint-military exercise known as Balikatan, or “shoulder-to-shoulder” in Tagalog. The 2020 exercise was cancelled for health and safety concerns during the ongoing pandemic.<sup>47</sup> In early 2019, U.S. Secretary of State Pompeo declared that “as the South China Sea is part of the Pacific, any armed attack on Philippine forces, aircraft, or public vessels in the South China Sea will trigger mutual defense obligations under Article IV of our Mutual Defense Treaty.” The U.S. is also prioritizing strengthening relations with Vietnam, Indonesia and Malaysia, with all three countries committed to the region's shared vision for a free and open Indo-Pacific. The U.S. conducts over 200 bilateral military engagements a year with Indonesia, a major recipient of International Military Education and Training (IMET) funds, with future collaborations efforts including cooperation on technology transfer, logistics support, and industrial collaboration.

## LOCAL INSTABILITY

As these nations are engaging in territorial disputes and mounting naval aggression from China, as well as potential nuclear power expansions, Indonesia and the Philippines have been battling a growing extremist faction within their own borders.

Although the Islamic State's (ISIL's) principal territory had been largely diminished in Syria and Iraq, a recent United Nations Security Council letter warns that the group has begun to re-emerge in the aforementioned countries, and is actively staging attacks and "exploiting weaknesses in the security environment" amongst other destabilizing activities.<sup>48</sup> In the years since its peak territorial siege, ISIL's influence has steadily spread from its core conflict zone to established centers in West Africa and Southeast Asia. The Philippines has consequently become the *de facto* center of ISIL affiliates in the region, operating as a ground zero of sorts by attracting militants from Indonesia and Malaysia. These groups are maintaining power by training forces, directing attacks and bombings, and recruiting and fundraising through online mediums.<sup>49</sup>

Violence continues to shake the Philippines, particularly in its southern territories, long after government forces retook the city of Marawi from ISIL-linked militants in 2017. Around the same time that COVID-19 began to spread in the country, a firefight between extremist members and government officers in a southern province resulted in the deaths of 11 soldiers. Government forces had been actively searching for a local terrorist leader, Hatib Hajan Sawadjaan, since he orchestrated a church bombing that killed over 20 congregants in January 2019. Over the last year, militants have launched several small scale, but deadly attacks utilizing either suicide bombers and/or improvised explosive devices, mainly targeting military personnel. In addition to this conflict, the government has been clashing with the NPA, a guerrilla arm of the Communist Party of the Philippines, for decades. In late April 2020, two soldiers were reportedly killed by the NPA, prompting President Duterte to warn that he would reimpose martial law. He supported his argument by stating that the group was stealing pandemic related aid meant for the civilian population.<sup>50</sup> It would not be the first time he has wielded martial law in his presidency; the country was largely adhering to military authority from late 2017 to late 2019 in an attempt to undercut militant groups.

Notably, the Philippines holds a long history of natural resources intertwining with local insurgencies and grievances exploited by terrorist groups. According to a UNDP global report, forests in the southern Philippines have been negatively impacted by conflicts or political violence.<sup>51</sup> The NPA has routinely targeted mining and logging companies, and still demands protection taxes, connecting attacks to environmental degradation. Abu Sayyaf, an extremist separatist group with historical ties to Al-Qaeda, has also been linked to deforestation and other illicit activities.

Meanwhile, Indonesia has also been struggling to contain extremist activities linked to ISIL's network. Fighters in the country are consistently organizing assaults against anti-terrorism units, government officials, and the police. In October 2019, a knife attack on the security minister introduced widespread lockdown measures and earlier in the year a spate of suicide bombings killed dozens in Java. Indonesian authorities are trying to track and thwart militants; for instance, in March 2020, officers apprehended suspects in a deadly operation, confiscating weapons and chemicals in the process.<sup>52</sup>

Such consistent and growing instability becomes more pressing when juxtaposed with the region's nuclear energy ambitions. Securing nuclear sites, fuel, and waste from aggressive non-state actors would be a critical aspect of plant management. In response to these threats, both Manila and Jakarta have introduced counterterrorism measures such as the expansion of police and military power.<sup>53</sup> The two countries along with Malaysia also rely on consistent intelligence sharing to bolster their understanding and coordinated response.<sup>54</sup>

## CLIMATE AND ENVIRONMENTAL SECURITY

Beyond mounting geopolitical clashes and terrorism threats, the South China Sea is also facing existential risks from a changing climate.

The most concerning physical climate change-related impacts for most nations surrounding the South China Sea include higher temperatures, rising seas, extreme weather events, ocean warming and acidification, and a decrease in biodiversity. High population density along coasts and marine reliant economies compound exposure and vulnerability--especially in island nations such as the Philippines and Indonesia. If temperatures were capped at 2°C above pre-industrial levels, seas in the region would rise by .5 m (or roughly 1.5 ft) in 50 years and reach 75 cm by 2090.<sup>55</sup> In fact, sea level rise in Southeast Asia is forecasted to be at least 10% higher than the global mean by the end of the century - with cities like Manila facing the most extreme scenarios.<sup>56</sup> Land subsidence--a process in which land sinks due to natural and/or human-driven activities--would exacerbate the impact of any incremental change in sea levels.

Although studies estimate that the overall frequency of landfalling tropical cyclones in the region will drop off, climate change effects are likely to produce more intense storms--which signifies extreme rainfall and higher maximum wind speeds. In some models, cyclone rainfall is projected to increase by up to a third.<sup>57</sup> This does not bode well for a region that has suffered greatly in the past due to extreme weather events. In November 2013, Typhoon Haiyan, one of the strongest tropical storms ever recorded, killed over 6,000 Filipinos and displaced over 4 million residents.<sup>58</sup> In one Philippine city, the storm surge is estimated to have reached 7.5 m or 24.6 ft in a location that was only 5 m above sea level.<sup>59</sup>

Climate change will significantly affect marine ecosystems in the region, placing increasing stresses on food and economic security, and possibly heightening international tensions. For example, higher ocean temperatures and ocean acidification will have devastating impacts on the local marine environment. Coral bleaching events around the South China Sea could occur as often as once a year by 2030 under 1.5 C degree warming.<sup>60</sup> Under these circumstances, fish stocks are projected to shift poleward, decreasing populations in the tropics, and further driving fishing fleets into heavily-contested waters--a phenomenon that could exacerbate tensions between nations with competing claims.<sup>61</sup> These dynamics could also increasingly draw China and the U.S. into the opposite ends of maritime disputes,<sup>62</sup> with potentially significant implications for both regional and global security.<sup>63</sup>

In Indonesia, more than 50% of animal protein comes from fish and seafood. The country is the second largest fish producer after China and millions of Indonesians are dependent on the industry. The government has prioritized an increase in seafood yields through a combination of policies for better practices, increasing visibility and spurring more private investment into growing the industry.<sup>64</sup> The country has cracked down on foreign fishing vessels and implemented a policy of bombing those operating illegally in Indonesian waters, sinking hundreds of ships and recovering tens of millions of fish stock tonnage since 2014.<sup>65</sup> Climate change is anticipated to negatively impact annual seafood catch as well as hinder agricultural yields by over 17% by 2080, as the country's heavy reliance on natural resources is frequently jeopardized by natural disasters.<sup>66</sup> Indonesia's medium-term development plan has focused on improving food security, nutrition, and resilience to acute food shocks caused by these disasters.<sup>67</sup>

For the Philippines, the last three decades have demonstrated stagnation or decline in the country's annual capture despite fishing efforts going up. Better monitoring is an integral part of preserving and preventing a total exhaustion and collapse of fisheries, which would be devastating to the local communities supported by the industry.<sup>68</sup> After the 2007-2008 Global Food Crisis, the Philippine government implemented policies to focus on self-sufficiency and food security, but gaps in implementation and organization leave them still susceptible to climate change and affected by foreign markets.<sup>69</sup> In January 2020 the government passed a bill to revitalize the Navotas Fish Port Complex (NFPC), to better support economic requirements and to increase the security and stability of the domestic food supply as most of the fish caught is consumed locally.<sup>70</sup> Ocean ecosystems depend on coral reefs which make up 10-15% of the fishing industry in the Philippines, but pollution and illegal fishing practices have forced nearly 40% to

deteriorate into poor conditions.<sup>71</sup> This poor management in combination with coral bleaching impacts both fishing and aquaculture.

Along with extreme rainfall events and rising tides, high temperatures will become the new normal rather than anomalous events. It is not difficult to imagine how densely populated coastal areas and informal settlements will become increasingly more vulnerable to environmental risks such as stronger winds, severe inundations, urban heat island effects, and climate-related infectious disease. Health issues associated with salt water intrusion - such as hypertension, miscarriages, acute respiratory diseases, and diarrheal diseases - are also expected to occur at a higher rate in this region.<sup>72</sup> Freshwater access is already a challenge in both countries. Currently, 7 million Filipinos and 28 million Indonesians lack access to safe drinking water.<sup>73 74</sup> In Metro Manila, flooding events are fast and frequent because much of the city lacks the necessary infrastructure to handle storm surges and drainage properly.<sup>75</sup> Likewise in Jakarta, home to ten million citizens, severe subsidence primarily due to overdevelopment and unsustainable groundwater extraction coupled with rising seas recently prompted authorities to announce ambitious plans to relocate the capital.<sup>76</sup> The \$33 billion move to another island, Borneo, underscores how rapidly the megacity is sinking and the existential risks that climate change poses to island nations in Southeast Asia.

Any nuclear reactor sites must take the aforementioned climate and environmental calculations into consideration. Higher than average seas combined with hotter temperatures, extreme storms, earthquakes, and volcanos, could have disastrous consequences on nuclear infrastructure. Meanwhile, marine and aquaculture related livelihoods will surely be affected, potentially leading to higher levels of unemployment and internal migration to packed (and flooded) urban centers. Tourism in the South China Sea, a lucrative economic pipeline, would also be heavily impacted by climate change. According to the IPCC, the region is expected to experience an annual mean loss in GDP far above the global projected rate by 2100 due to its dependence on climate sensitive marine production and activities.<sup>77</sup> Economic downturns can translate into greater sociopolitical instability and further strain limited government resources.

In 2016, Indonesia began a 5-year Country Partnership Framework (CPF) that identified mitigating and adapting to climate change as one of five mega-trends to impact food, water, fisheries and agriculture, and to ultimately shape the economic trajectory of the country. It recognizes that nearly half of the population is at risk of multiple environmental hazards, and better resource management and disaster mitigation is necessary for alleviating poverty rates. Around 65 million individuals are also considered economically “vulnerable” to any price shocks or illness, and with few safety mechanisms these individuals are at risk of falling into chronic poverty. The El Niño phenomenon has a large effect on Indonesia’s food and water security, and compounds with global economic shocks and volatility.<sup>78</sup> Future climate impacts could exacerbate these effects.

The Philippines began a five-year World Bank CPF in 2019 that focuses on human capital, job creation, climate resilience, peace building and more. The CPF was supported with a development policy loan (DPL) of US\$400 million to support its implementation and strengthen financial resilience to natural disasters and climate change impacts.<sup>79</sup> It acknowledges the nexus of poverty and vulnerability in the Philippines as roughly one million Filipinos are impoverished by natural disasters each year, with 74% of the population vulnerable to natural disasters of some kind. Many are then driven to live in areas of high conflict or continued high vulnerability to environmental risks, increasing the difficulty of breaking out of poverty cycles and threatening national economic growth and inclusion. A large focus is on risk mitigation efforts that can better withstand environmental and disaster events. These multi-sectoral efforts include climate-resilient cropping systems, mangrove protection, water resource management and climate-resilient buildings.<sup>80</sup>

The main avenues for development from 2019 to 2023 are on environmental resilience and malnutrition, followed by peace building, basic education, and continuing economic opening and infrastructure projects. Some of which include the Philippines Seismic Risk Reduction and Resilience Project to reduce seismic risks and increase emergency preparedness, the Philippines Nationally Determined Contribution

(NDC) to support climate resilience objectives, and the Philippine National Energy Efficiency and Conservation Program. In Indonesia future growth is focused on human development, territorial equity, and the main economic sectors of food and energy sovereignty, tourism, maritime and marine industries. The country is susceptible to most major weather events and rising temperatures and increasingly volatile precipitation will jeopardize agriculture, coastal landscapes and cost billions in disaster recovery annually. To mitigate these risks Indonesia is implementing better land management practices for agriculture and resource preservation on a broader scale, as well as investigating alternative energy resources.<sup>81</sup>

## CONCLUSION

The South China Sea is a region where climate change, nuclear developments, and insecurity will increasingly collide. Most nations in the area are looking into nuclear energy to support rising energy demand. By partnering with the IAEA and implementing their recommendations into national nuclear plans, countries such as the Philippines and Indonesia are sending a strong signal that they are taking the necessary steps to ensure a secure nuclear power environment, if they were to proceed with construction. However, domestic terrorism, sociopolitical instability, rising seas, extreme temperatures, and other climate / environmental impacts present challenging obstacles.

Adding to these considerations, there are many unknowns in today's security environment. In a post COVID-19 world, will Beijing become even more emboldened in its quest for territorial dominion around the South China Sea, and if so, will skirmishes in the area lead to higher stakes? Some members of CSR's Working Group have noted that China possesses the catalytic ability to either destabilize the South China Sea or become its principal stabilizing force. Any shift in the global order will surely impact the region's power balance. Another factor to consider as countries attempt to regain their footing is how extremist organizations in states such as the Philippines and Indonesia will react to the crisis; it's possible that these groups could exploit state vulnerabilities and attempt to fill a power vacuum.

As countries in the South China Sea attempt to navigate their altered economic landscapes following a global shutdown, the intersections of climate and nuclear affairs issues remain critical to regional security. Much hinges on how Indonesia and the Philippines, with their growing populations and widening sphere of influence, manage impending challenges in the next decade. With international and regional anticipatory cooperation, the pendulum can swing towards stability; but without a clear path that incorporates analyses of these converging risks, a widespread crisis in either country could shake the entire region.

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