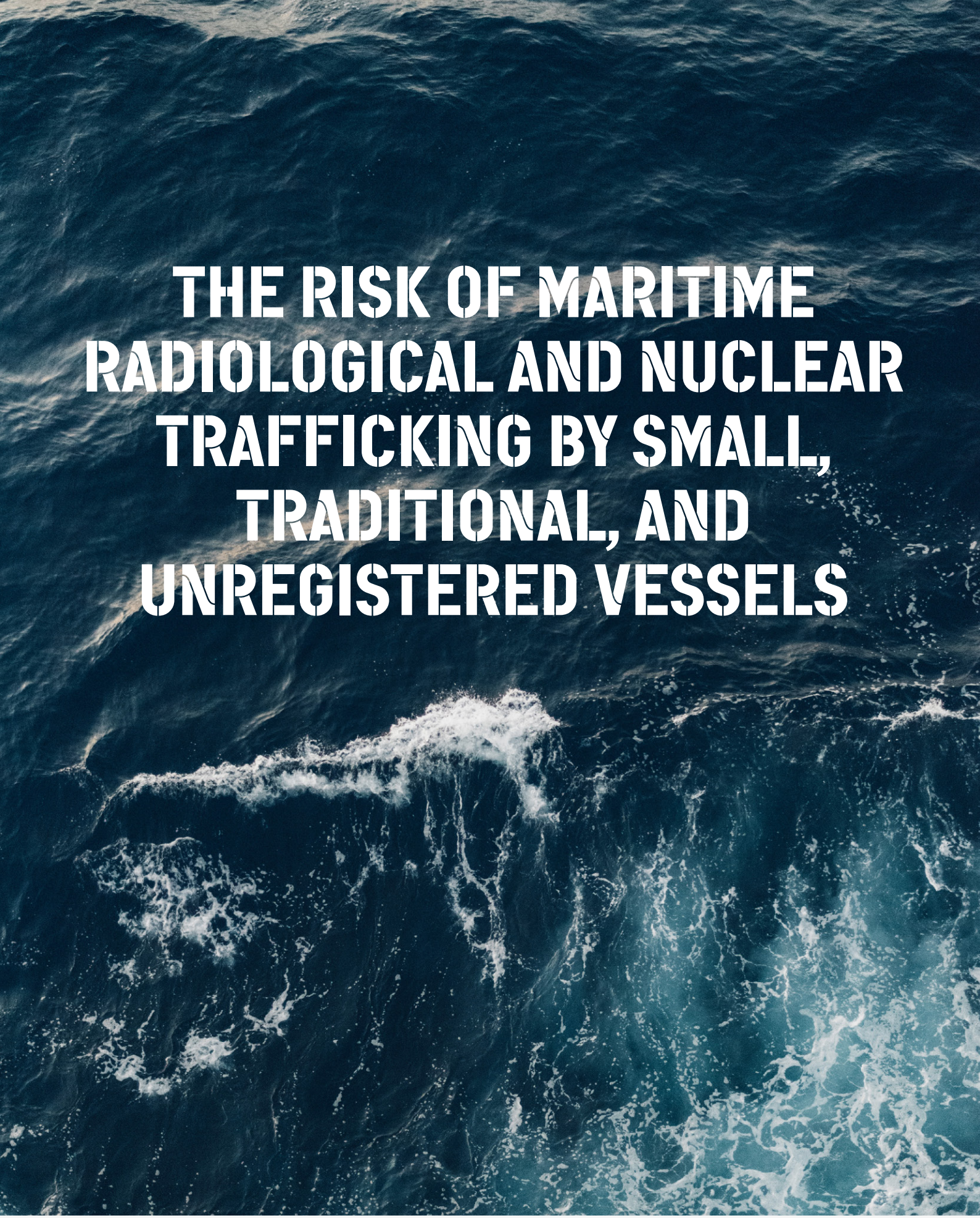

THE RISK OF MARITIME RADIOLOGICAL AND NUCLEAR TRAFFICKING BY SMALL, TRADITIONAL, AND UNREGISTERED VESSELS

STABLE SEAS
Rethinking Maritime Security

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EXECUTIVE SUMMARY

Maritime radiological and nuclear trafficking using small, traditional, and unregulated vessels (STUVs) is an inherently low-probability, high-consequence threat. Known instances of R/N smuggling are relatively uncommon, those known to include maritime trafficking are rarer still. However, the consequences of even one successful incidence of maritime R/N trafficking has the potential to have far reaching and tragic consequences. In light of the potential consequences, this report seeks to shed light on the potential risk of maritime R/N trafficking using STUVs in particular.

The report focuses of four different regions (Brazil, West Africa, the Red Sea, and Indonesia) to assess risk factors that may contribute for R/N trafficking by STUVs. Each geographic area is examined based on its maritime security ad trafficking context and a variety of factors which are thought to potentially impact the risk of maritime trafficking of R/N materiel via STUVs.

After examining these four diverse maritime areas, the report identifies several recurring challenges that heighten the risk of potential R/N trafficking via STUVs. In order to mitigate the risk of R/N trafficking via the maritime domain, several areas of potential policy prioritization are put forward as areas requiring sustained policy attention and resourcing. These include:

- **STUV MONITORING**

Improved monitoring of STUVs would provide maritime law enforcement with a more complete understanding of the pattern of activity in their waters. A broader application of remote detection systems like AIS and VMS would be a significant step. However, to understand the movements of vessels which truly do not wish to be seen, the further proliferation of active detection using tools such long range radar, synthetic aperture radar, satellite imagery, radio frequencies, will be necessary.

- **HUMAN INTELLIGENCE**

In addition to more technology-focused solutions, the more systematic use of human intelligence would be extremely beneficial in countering potential R/N trafficking by STUVs. Civilians at sea and in coastal communities know the normal pattern of life in their local waters and often know when STUV activity my be suspicious. Systems for collecting and utilizing such information could be significantly expanded.

- **INFORMAL PORT MONITORING**

Since STUVs bypass screening and security measures at large formal ports, increased security measures at the sites utilized by such vessels would be beneficial. R/N screening at every ferry landing, local commercial port, fish landing site is logistically and financially unfeasible, but even more general security presence at the multitude of such sites could help deter their utilization for R/N trafficking.

- **COASTAL ECONOMIC SECURITY**

While the core actors potentially involved in maritime R/N trafficking have more entrenched motivations, many of the members of coastal communities which are directly involved in or help facilitate STUV trafficking do so out of basic financial need. It is important to keep in mind that economic insecurity in coastal communities is often at the root of all forms of maritime trafficking and steps to improve the economic security of these communities should be a component of any comprehensive strategy to address it.

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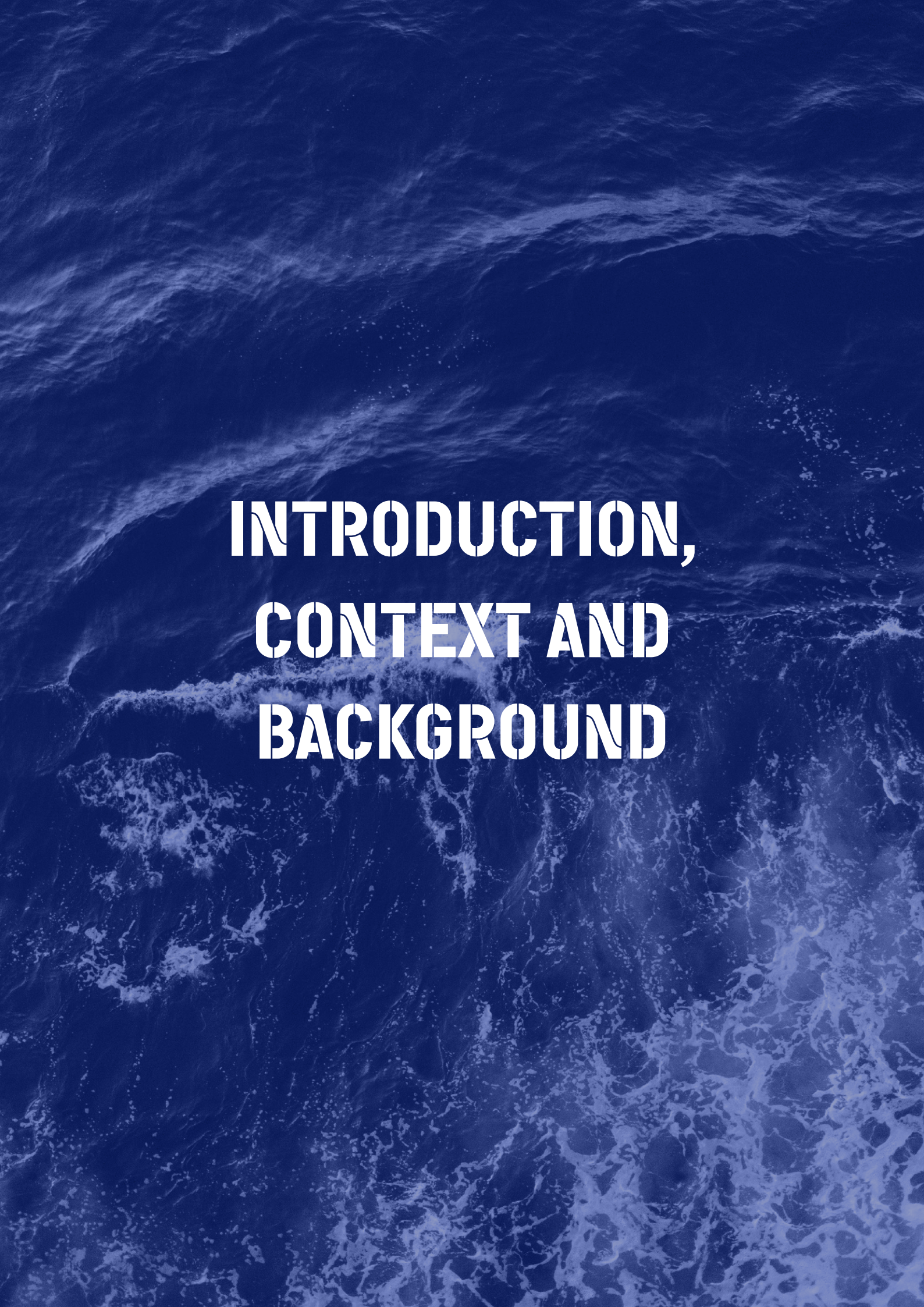
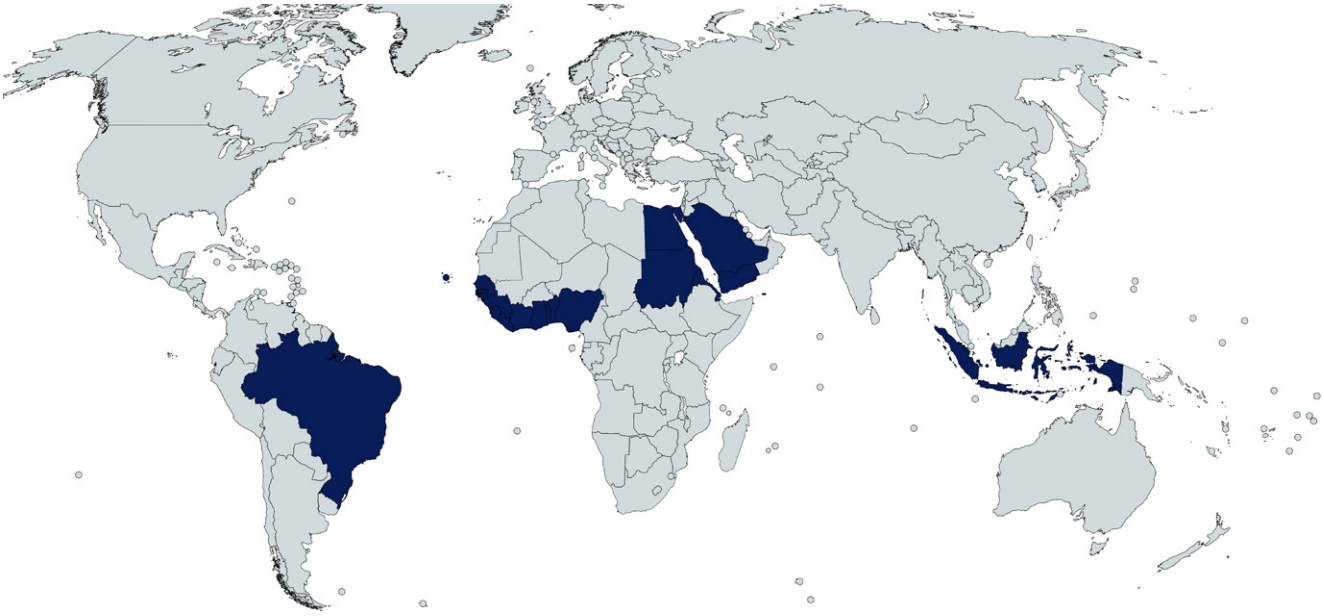


INTRODUCTION, CONTEXT AND BACKGROUND

INTRODUCTION

PURPOSE

The purpose of the report is to provide a high-level overview of the potential risk of maritime smuggling by small, traditional, and unregistered vessels (STUVs) across four marine regions: Brazil, West Africa (including littoral states from Cabo Verde to Nigeria), the Red Sea (including Egypt, Sudan, Eritrea, Yemen, Saudi Arabia, Jordan and Israel), and Indonesia.



STRUCTURE

The first section of the report will provide broad context regarding the unique risk of radiological and nuclear (R/N) trafficking via STUVs. Subsequent sections focused on each region will provide a summary of the maritime security context, prominent trends in maritime trafficking of all kinds, the regional capacity for addressing maritime trafficking concerns, and an assessment of risk factors which may contribute to the potential for maritime radiological and nuclear trafficking. The final section of the report will seek to identify recuring gaps across regions and potential policy recommendations for those engaged in efforts to mitigate the risk of R/N trafficking via STUVs.

DATA LIMITATIONS AND METHODS

The specific subject matter of the report presents several layers of data limitations. At the broadest level, maritime trafficking/smuggling of all kinds is an inherently clandestine activity, making it intrinsically difficult to know with certainty the volume or scope of trafficking activity. Interdiction data on maritime trafficking can be useful in certain instances, but to the best of the author's knowledge there is no publicly available, comprehensive data on maritime trafficking seizures at a global or regional scale. Where seizure data does exist, it is incomplete and based on voluntary reporting by states, often with significant gaps in coverage across states, varying coverage across different types of illicit products, significant missing data, or existing outside the public domain.

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In addition, the data that does exist on incidents of maritime trafficking is only a reflection of trafficking that has been successfully identified. Because of the increased scrutiny from customs and security measures at ports, much of the resulting seizures occur during screening of containerized cargo at formal ports. STUVs, by comparison, have several advantages (to be discussed in greater detail below) in their efforts to hide their activities in comparison to such containerized maritime trafficking. As such, the level of STUV specific maritime trafficking is extremely difficult to estimate with any degree of certainty. Finally, in addition to the data limitations around maritime trafficking broadly and STUVs specifically, known incidents of maritime R/N smuggling, much less on STUVs specifically, is exceedingly rare, with a very limited number of known cases in the public domain.

Given this confluence of data limitations on the specific subject matter at hand, it is not possible to directly measure the frequency, scope, or patterns behind potential STUV R/N trafficking through event or incident data. Rather, a more indirect approach must be applied, which looks for trends and recent developments in known instances of maritime trafficking more broadly and assesses a variety of factors which are likely to increase the risk of maritime R/N trafficking by STUVs. In this way, the report seeks to assess risks rather than establish known trends for which there is little to no supporting evidence.

In order to execute this strategy, the research relies on several methods. These include:

- Open Source Desk Research- Open source, qualitative research from publicly available sources on the subject from academia, governments, multilateral organizations, civil society research organizations, and media reports was utilized to shed light on the general prevalence of maritime trafficking, vulnerabilities in the maritime system which may facilitate (R/N) smuggling, governance and awareness of potential threats posed by small, unregulated, and traditional vessels, and the general state of maritime domain awareness and maritime enforcement capacity in a given region.

- Interviews- The desk research described above has been supplemented by interviews with stakeholders in a variety of fields of relevance to the research. Interviewees include individuals from: regional maritime law enforcement entities, port and customs officials, and civil society experts on maritime security from the regions in question.

- Risk Assessment- The research utilizes a semi structured risk assessment as a tool for approximating a level of risk regionally. Such an approach is used to make an informed assessment of where the risk of maritime R/N trafficking is most likely.
  Risk factors to considered include:

1 Presence of state or non-state actors potentially seeking nuclear materials.	**2** Presence of legacy stockpiles or natural resources associated with nuclear/ radioactive supply chain.	**3** Presence of existing maritime smuggling networks.	**4** Prevalence of STUVs.
5 Level of maritime domain awareness and maritime enforcement capacity.	**6** Strength of systems for STUV registration and monitoring.	**7** Perceived levels of corruption or lack of capacity in port and customs authorities.	**8** Level of economic security in coastal communities.

CONTEXT AND BACKGROUND

Having laid out the intent, structure, and methods used in the report, it is also important to provide some brief context as to why the issue at hand is of extreme importance to stakeholders across the globe.

THE RISK

R/N trafficking is an inherently low-probability, high consequence threat. As previously mentioned, known instances of R/N smuggling are relatively uncommon. The International Atomic Energy Agency (IAEA) maintains a database on known instances of R/N material discovered to be out of regulatory control which is not publicly available, but from which they provide general descriptive statistics. From this source there has been a total of 3,686 instances of R/N material out of regulatory control between 1993 and 2019[1], an average of 136.5 per year over the 27 years of available data. However, of these incidents, only 290 (7.9%) have been confirmed or deemed likely to have been linked to "trafficking or malicious use,"[2] an average of 10.7 such particularly problematic incidents a year. The same source further details that only "some" of these incidents appear to have included attempts to move the material across national borders and that many of the incidents were characterized as "amateur" attempts[3], both of which would support the assumption that maritime trafficking is potentially involved in only a small subset of such incidents. As such, the threat posed by maritime smuggling of R/N materials by STUVs is likely a quite low probability event.

«...there has been a total of 3,686 instances of R/N material out of regulatory control between 1993 and 2019, an average of 136.5 per year over the 27 years of available data.»

Despite this, the consequences of even one successful incidence of maritime R/N trafficking has the potential to have far reaching and tragic consequences. Successful efforts to use the maritime domain to traffic certain kinds of R/N material and equipment into the hands of either state actors or violent extremist organizations could lead to the proliferation of nuclear weapons or, perhaps more feasibly, the capability to develop a so-called "dirty bomb," either of which could have extremely dangerous consequences. And while the probability of such an event may be quite low, the potential should not be overlooked. More than 30 countries around the world possess weapons-usable nuclear material and more than 100 states possess radiological material.[4] In total there is enough nuclear material around the world to produce tens of thousands of nuclear weapons.[5] And, while the known incidents of potentially nefarious R/N trafficking appear relatively rare, it is well known that there are many violent extremist groups around the world which may seek such destructive capabilities.[6]

1 International Atomic Energy Agency, "IAEA Incident and Trafficking Database (ITDB): 2020 Fact Sheet," Accessed August 22, 2021, https://www.iaea.org/sites/default/files/20/02/itdb-factsheet-2020.pdf.
2 International Atomic Energy Agency, "IAEA Incident and Trafficking Database (ITDB): 2020 Fact Sheet," Accessed August 22, 2021, https://www.iaea.org/sites/default/files/20/02/itdb-factsheet-2020.pdf.
3 International Atomic Energy Agency, "IAEA Incident and Trafficking Database (ITDB): 2020 Fact Sheet," Accessed August 22, 2021, https://www.iaea.org/sites/default/files/20/02/itdb-factsheet-2020.pdf.
4 The Maritime Executive, "Guarding the U.S. Against Nuclear Smuggling Threats," July 8, 2016, https://www.maritime-executive.com/article/guarding-the-us-against-nuclear-smuggling-threats.
5 National Nuclear Security Administration, "Nonproliferation," Accessed August 12, 2021, https://www.energy.gov/nnsa/nonproliferation.
6 Miles A. Pomper and Gabrielle Tarini, "Nuclear Terrorism- Threat or Not?" AIP Conference Proceedings, November 15, 2017, p. 10-11, https://aip.scitation.org/doi/pdf/10.1063/1.5009230.

In short, maritime R/N trafficking would appear an extremely rare risk, but one whose consequences are potentially so grave as to warrant further exploration in order to ensure that policymakers engaged in nonproliferation efforts are equipped with as much information as possible to mitigate the risk.

THE ROLE OF THE MARITIME DOMAIN AND SMALL, TRADITIONAL, AND UNREGULATED VESSELS

Given the risk posed by R/N smuggling more generally, what role might the maritime domain, and STUVs in particular, play in this potential activity? As previously noted, given the relative infrequency of R/N trafficking generally and some of the characteristics of those incidents that are known, it would appear the maritime R/N trafficking is likely to be a somewhat rare occurrence.

However, this does not change the fact that many maritime spaces around the world see prolific and entrenched smuggling and trafficking networks of other products (both licit and illicit). We do not, and will never, know the full scale of illicit maritime trades, but they involve sophisticated and adaptive networks of actors, from transnational organized crime groups to violent non state actors to otherwise law-abiding members of coastal communities looking for means to provide for their basic needs, which move large volumes of diverse goods across vast distances in a clandestine manner. The risk is that those seeking to traffic R/N material could tap into the expertise and ongoing operations of these existing networks in order to facilitate their goals.

Within this ecosystem of maritime trafficking, STUVs play an important and particularly concerning role. The danger of potential STUV involvement in R/N trafficking is the relative lack of tools policymakers have to counteract it. The challenges of STUV trafficking of any illicit products, and the risk they pose in potential maritime R/N trafficking, vary, but can be broadly broken down into three categories.

«The danger of potential STUV involvement in R/N trafficking is the relative lack of tools policymakers have to counteract it.»

First and most simply is the ability of STUVs to "hide in plain sight." In many of the world's maritime regions the vast numbers of relatively anonymous fishing vessels, dhows, recreational vessels, and passenger ferries transit the same waters in the same patterns with great frequency. Without any outward indication of suspicious activity, it would be nearly impossible for authorities to identify the one vessel of thousands that might have illicit cargo of some kind, in a hold, under a tarp, packed away in a refrigerated compartment, or simply in the luggage of a passenger.

Second, STUVs are not tied to modern port infrastructure in the same manner as large cargo vessels. Much of the effort put into place to address the risk of maritime R/N trafficking to this point appears to focus on the technology, equipment, and training necessary to detect R/N material at major port facilities. This is an inherently logical approach, as these efforts can impact the largest volumes of cargo moving through the most controlled environments, both of which increase the effectiveness of the efforts. However, these systems are only effective for vessels and cargo which must move through these chokepoints. STUVs operate under no such constraints. A dhow can utilize any beach with favorable geography to load and unload cargo quickly and disappear. Fishing boats and passenger ferries in much of the world utilize informal or less regulated landing sites that may have very little regulatory or law enforcement presence at all, much less technology to detect R/N material. And vessels of any of the kinds mentioned can simply avoid any scrutiny onshore by dropping illicit cargo at designated GPS locations or attaching them to/depositing them on offshore objects such as buoys and offshore rocks for later retrieval by smaller boats. While the ability of many ports to detect potential R/N trafficking has been strengthened, STUVs can often avoid them altogether, making them ideal for smuggling and trafficking of all varieties.

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CONCEPTUAL LEVELS OF VESSEL MONITORING

Monitoring of STUVs is not a binary question in which a state is either monitoring or not monitoring a vessel. Rather it is important to understand that vessel monitoring is often a question of degrees. In order to better understand the degrees of monitoring available to states, a basic typology may be useful as an organizing principle to provide context for the more detailed discussion of the issue to follow. The below categorization is not official nomenclature, but a conceptual tool for the reader.

Levels of Vessel Monitoring:

1. REGISTRATION

The least comprehensive form of vessel monitoring is simple registration of vessels with a government entity. Registration makes the state aware of a vessel's existence, its ownership, and other characteristics. This system exists in some degree nearly universally. Ministries of Transportation and Maritime Authorities often fill this role, though gaps often exist around the minimum size of vessels required to be registered. These size requirements can vary significantly, and in some instances leave large portions of STUVs outside of any registration regime.

2. PASSIVE MONITORING

Passive monitoring allows authorities to move from knowing of a vessel's existence to understanding its movements. This is a critical step in identifying suspicious behavior such as trafficking. Examples of passive monitoring include AIS and VMS systems whereby a vessel is fitted with a transponder that alerts authorities to its location. While these systems are extremely valuable, they do not provide a complete picture of maritime activity because their coverage is generally limited to larger vessels and can often be simply turned off or spoofed by vessel operators.

3. ACTIVE DETECTION

Active detection denotes systems which allow authorities to remotely detect and track vessels actively seeking to avoid observation. These systems allow for a picture of maritime activity as it is, rather than the information which vessel operators chose to share with authorities. A variety of technologically advanced tools exist which enable this capability, but they are often prohibitively expensive and thus the barrier to their comprehensive use is extremely high.

Finally, STUVs are often subject to lower levels of onshore and remote monitoring in much of the world. Onshore, many states struggle to run effective registry systems for vessels and/or do not require any kind of registration for vessels under a certain length or tonnage. In these instances, the state it operates from may not even know it exists or have incomplete or inaccurate information about it, increasing the anonymity with which it operates. While at sea, many STUVs are virtually invisible to maritime law enforcement. While the Automatic Identification System (AIS) is a widely used platform for remote sensing of maritime traffic, the Safety of Life at Sea Convention (SOLAS) only mandates AIS on vessels of 300 gross tons or more (and all passenger vessels)[7] which is a fairly large cut-off point which would not include most STUVs. SOLAS also instituted the use of mandatory, unique IMO identification numbers, which help confirm identity and track activity. But again, these are only required for passenger vessels over 100 gross tons, cargo vessels over 300 gross tons and are voluntary for fishing vessels over 100 gross tons.[8] Some states may mandate AIS use or alternative remote vessel monitoring systems (VMS) for smaller sizes and other classes of vessels, but this is far from universal and often only enforced on a limited basis.

Other forms of active detection (meaning that a vessel can be identified and tracked without having to opt into the kinds of tracking systems described above) can help overcome this gap. Such tools include synthetic aperture radar, satellite imagery, radio frequencies, "over-the-horizon" radar, and others.[9] These tools can be extremely effective for detecting vessels not part of or seeking to avoid other vessel tracking systems, but they are also technologically advanced and extremely expensive, making their ubiquitous use for the enhancement of maritime domain awareness surrounding STUV trafficking unfeasible for all but the wealthiest of states.

Because of these advantages, STUVs appear to be increasingly used by traffickers around the world to exploit these gaps in monitoring and enforcement. Dhows have been used in the Arabian Sea for trafficking of arms and drugs, Indonesia's vast ferry system is used to transport illegal wildlife as part of a massive illicit wildlife market, and at a global scale the amount of drug trafficking by fishing vessels, for example, is estimated to have increased threefold between 2010 and 2017, with such vessels now estimated to be transporting up to 15% of the world's illegal drug trade by retail value.[10]

Clearly STUVs are particularly appealing to traffickers given the advantages they convey in terms of evading monitoring and detection. As such, the remainder of this report seeks to assess is how and if those who seek and provide illicit R/N material might come to exploit these same gaps in order to facilitate those efforts.

7 International Maritime Organization, "Resolution A.1106(29): Revised Guidelines for the Onboard Operational Use of Shipborne Automatic Identification Systems (AIS)," December 14, 2015, https://wwwcdn.imo.org/localresources/en/OurWork/Safety/Documents/AIS/Resolution%20A.1106(29).pdf

8 International Maritime Organization, "IMO identification number schemes," Accessed November 10, 2021, https://www.imo.org/en/OurWork/MSAS/Pages/IMO-identification-number-scheme.aspx.

9 Ross Davies, "We can see you: introducing Dark Vessel Detection," Ship Technology, April 9, 2020, https://www.ship-technology.com/features/dark-vessel-detection/.

10 Dyhia Belhabib, Philippe Le Billion, David Wrathall, "Narco-Fish: Global fisheries and drug trafficking," Fish and Fisheries, Volume 21, Issue 5, p. 992-1007, June 26, 2020, https://doi.org/10.1111/faf.12483.


BRAZIL

BRAZIL

MARITIME SECURITY AND TRAFFICKING CONTEXT

With a coastline of roughly 7,400 kilometers, several offshore islands and a resulting Exclusive Economic Zone (EEZ) of 3.2 million square kilometers,[11] Brazil benefits from an extensive and largely stable maritime domain. While the safety and security of large offshore hydrocarbon production operations and IUU fishing are of growing significance to Brazil's maritime interests, trafficking is the dominant non-traditional maritime security challenge in Brazil. Trafficking out of and through Brazilian waters takes a variety of forms in terms of the kinds of illicit products moved and the vessels employed to do so.

First, Brazil does appear to see some levels of maritime trafficking in wildlife[12] and arms. Arms appear to be the most significant of the two, with major inbound flows that fuel organized crime. However, while arms trafficking into Brazil is a significant concern, it is also a phenomenon that occurs largely across its land borders.[13] The incidents of maritime arms trafficking into Brazil that have been observed appear to be largely constrained to containerized traffic, with growing volumes of such illicit arms entering through hotspot ports such as Santos and Paranagua. [14]

However, the most prominent form of maritime trafficking in Brazil is drugs, predominantly cocaine, as Brazil has emerged as perhaps the largest single point of disembarkation of transatlantic cocaine trafficking to West Africa and Europe. For example, Brazil now serves as the largest single point of origin for cocaine seizures in the port of Antwerp, the largest point of entry for Europe's cocaine market.[15] Much of this maritime drug trafficking appears to be through containerized cargo, with Brazil's largest port of Santos (near Sao Paulo) Paranagua (also in the southeast) and northeastern ports like Suape, Salvador, and Natal emerging as major dismemberment points for containerized cocaine trafficking.[16] The pace of this form of trafficking appears to be growing rapidly. In Santos for example, seizures of cocaine from containers increased from roughly 1,672 kilos in 2013 to a record 27 tons in 2019,[17] an increase of roughly 16-fold in just seven years.

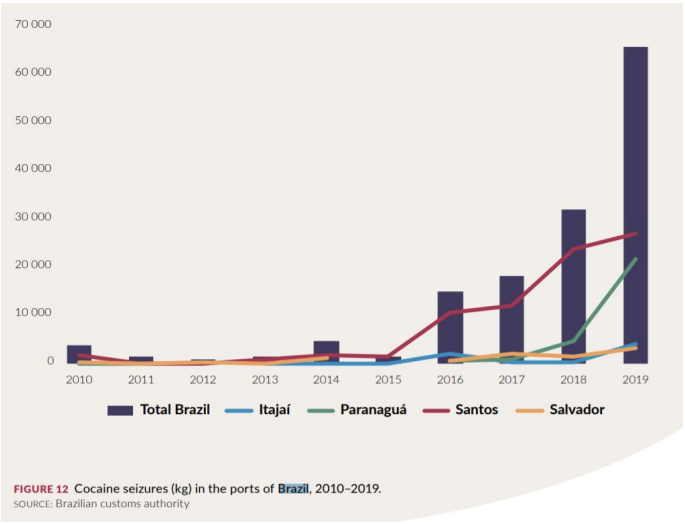

FIGURE 12 Cocaine seizures (kg) in the ports of Brazil, 2010–2019.
SOURCE: Brazilian customs authority

Global Initiative Against Transnational Organized Crime, 2020, p. 41, https://globalinitiative.net/wp-content/uploads/2021/02/The-cocaine-pipeline-to-Europe-GI-TOCInsightCrime.pdf.

«...Brazil has emerged as perhaps the largest single point of disembarkation of transatlantic cocaine trafficking to West Africa and Europe.»

However, these figures for containerized drug traffic likely do not illuminate the entire scope of Brazil's transatlantic drug trafficking activity, as several forms of STUVs (including fishing vessels and sail boats) operating in Brazilian waters also appear to be increasingly involved. Brazilian fishing vessel participation in transatlantic drug trafficking appears as though it may fall into two broad categories. In the first, Brazilian fishing vessels transport shipments directly to known transshipment points for cocaine in West Africa or Europe directly. In

11 Marine Regions, "Brazil," Accessed September 1, 2021, https://www.marineregions.org/eezdetails.php?mrgid=8464&zone=eez.
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15 Gabriel Stargardter, "Brazil's gangs emerge as major cocaine exporters, flooding Europe with white powder," Reuters, March 12, 2020, https://www.reuters.com/article/us-brazil-violence-cocaine-specialreport/brazils-gangs-emerge-as-major-cocaine-exporters-flooding-europe-with-white-powder-idUSKBN20Z1DP.
16 Gabriel Stargardter, "Brazil's gangs emerge as major cocaine exporters, flooding Europe with white powder," Reuters, March 12, 2020,https://www.reuters.com/article/us-brazil-violence-cocaine-specialreport/brazils-gangs-emerge-as-major-cocaine-exporters-flooding-europe-with-white-powder-idUSKBN20Z1DP.
17 Proinde, "Drug Smuggling on Bulk Carriers Out of Brazil on the Rise," April 5, 2021, https://proinde.com.br/circulars/drug-smuggling-on-bulk-carriers-out-of-brazil-on-the-rise/.

«...it appears as though fishing vessels may be playing a very significant but somewhat overlooked role in transatlantic cocaine trafficking from Brazil.»

these instances, fishing vessels originating out of Brazil cross the Atlantic before engaging in transfers of cargo to other vessels waiting offshore for final delivery. Examples of this include the 2016 interdiction of a Brazil-flagged fishing vessel off Cabo Verde as it prepared to transfer 280 kg of cocaine to a U.S.-flagged yacht,[18] likely for final delivery to Europe. More recently, in 2019, another Brazilian fishing vessel was discovered in the high seas off Portugal carrying a cargo of more than a ton of cocaine.[19]

A second, but more difficult to confirm modus operandi involving fishing vessels may entail shorter routes to points within or just outside of the Brazilian EEZ for transshipment to other vessels which then complete the transatlantic route. Observers have noticed in recent years that an increasing number of fishing vessels registered in West Africa have been operating across the Atlantic at the edge of the Brazilian EEZ. This pattern appears rare amongst West African vessels with local ownership, but is increasingly prevalent among vessels registered in West Africa with beneficiary owners in Asia.[20] While much of this activity may be normal fishing, the proximity to one of the world's most prominent disembarkment points for maritime cocaine trafficking does raise concerns as to whether it may also present opportunities for ship to ship transfers at sea, with these West African registered fishing vessels returning to the region with cocaine.

Generally speaking, while much of the maritime cocaine trafficking originating out of Brazil appears to be on containerized cargo vessels, the potential of Brazilian fishing vessels being involved at smaller but still significant scales is a risk that merits continued vigilance. In two instances in July 2021 alone, Brazilian Federal Police in Santa Catarina state interdicted two fishing vessels with a combined cargo of more than 3.6 tons of cocaine.[21] Given that Brazil's largest port of Santos saw 27 tons of cocaine seized in 2019 and the likelihood that many such fishing vessels engaged in trafficking are never detected, it appears as though fishing vessels may be playing a very significant but somewhat overlooked role in transatlantic cocaine trafficking from Brazil.

Another, less prevalent but still noteworthy, type of STUV of potential concern in Brazilian waters is sailboats and recreational vessels more broadly. In 2020, a sailboat from Portugal was discovered off the coast of the northern port city of Recife with 4.3 tons of drugs.[22] However, in contrast to previously described patterns of maritime trafficking, the drug was hashish, and the shipment was being moved into Brazil. In 2019, two Portuguese nationals were arrested for trafficking nearly 2 tons of hashish into the country. Police believe the traffickers transferred the drugs from a larger to a smaller vessel off the Brazilian coast and landed them in the small coastal community of Fortim on the northeast coast.[23] These interdictions are part of what is believed may be an increasing market for cocaine-hashish transactions among traffickers.[24] Earlier, in a February 2021 incident, the navy intercepted another sailboat, again off the coast of Recife, again with apparent ties to Portugal, but this time carrying a cargo of more than two tons cocaine.[25] While evidence of widespread use of recreational vessels in maritime trafficking in Brazil is not apparent, the large number of vessels (80,000 in the country)[26] means that they may represent a potential trafficking risk for a variety of illicit goods either into or out of the country.

ASSESSMENT OF KEY RISK FACTORS

Given this background on the general maritime security and maritime trafficking context in Brazil, what are the key risk factors for R/N trafficking by STUVs and how should Brazil be assessed against these risks?

1. Presence of state or non-state actors potentially seeking nuclear materials

Brazil is plagued by high levels of organized crime but relatively little organized political violence, insurgency, or violent extremism in comparison to many other regions of the world. However, this does not preclude the potential for illicit actors in Brazil to seek out opportunities to exploit its existing maritime trafficking system for potential R/N trafficking. One area of particular concern is the convergence of organized crime actors and terrorist organizations in the tri-border area (TBA) between Brazil, Argentina, and Paraguay.

The TBA has long been associated with trafficking and smuggling of arms, drugs, and counterfeit products, money laundering, and potential terrorism financing, facilitated by the region's porous borders, corruption, and limited customs and law enforcement.[27] The primary actors of concern in the region are organized criminal groups such as the First Capital Command and Red Command, who exploit the permissive

18 Reuters, "Cape Verde seizes 280 kg of cocaine from Brazilian fishing boat," April 18, 2016, https://www.reuters.com/article/us-capeverde-drugs/cape-verde-seizes-280-kg-of-cocaine-from-brazilian-fishing-boat-idUSKCN0XF2QX.
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22 Alessandro Ford, "Hashish: New Player in Brazil Drug Markets," InSight Crime, June 24, 2021, https://insightcrime.org/news/hashish-brazil-drug-markets/.
23 Macau News Agency, "Portuguese detained in Brazil with two tons of hashish await court," January 19, 2019, https://www.macaubusiness.com/portuguese-detained-in-brazil-with-two-tons-of-hashish-await-court/.
24 Alessandro Ford, "Hashish: New Player in Brazil Drug Markets," InSight Crime, June 24, 2021, https://insightcrime.org/news/hashish-brazil-drug-markets/.
25 Brazilian Navy's Social Communication Center, "Brazilian Navy Seizes More than 4 Tons of Hashish," Dialogo, June 24, 2021, https://dialogo-americas.com/articles/brazilian-navy-seizes-more-than-4-tons-of-hashish/#.YY2l9RrMKUl.
26 U.S. Commercial Service, "Pleasure Boat International Resource Guide," 2018, p. 13, http://www.nmma.org/assets/cabinets/Cabinet442/Pleasure%20Boat%20Resource%20Guide%202018_Final2.pdf.
27 Charles Streeper, "Triborder Radioactive Material Trafficking and Threat Environment," Los Alamos National Laboratory, 2008, p. 2, https://osrp.lanl.gov/Documents/LAURS_Documents%20Page/LAUR-08-1485.pdf .

Tri-border area (TBA) between Brazil, Argentina, and Paraguay.

vigilance of Brazil and its regional neighbors.

environment in the region for a variety of criminal enterprises, including trafficking.[28] In addition, due in part to the region's significant Lebanese origin community, it is widely believed that Hezbollah has a significant presence in the region.[29] The colocation of transnational organized crime groups, with their sophisticated maritime trafficking operations, and Hezbollah with its history of terrorism and global financial and money laundering networks, potentially presents acute and overlapping countertrafficking, counterterrorism, and counterproliferation challenges.

What's more, the Brazilian portion of the region is home to significant uranium deposits and mining activity, which has been exploited in the past by criminal organizations using front companies to export the material. For example, in 2004 Brazilian authorities incidentally discovered 600 kg of uranium and thorium while conducting an unrelated operation. This seizure led to the discovery of a trafficking network which had reportedly trafficked more than ten tons of uranium out of the country.[30]

It should be noted that trafficking in the TBA itself occurs overland, and there is no direct evidence of TBA trafficking, R/N or otherwise, utilizing STUVs further down the distribution chain. However, the colocation of R/N material, existing smuggling networks, sophisticated and financially motivated organized criminal actors, and a terrorist organization with global ties, creates an environment that poses significant proliferation risks and requires the continued

«...the colocation of R/N material, existing smuggling networks, sophisticated and financially motivated organized criminal actors, and a terrorist organization with global ties, creates an environment that poses significant proliferation risks and requires the continued vigilance of Brazil and its regional neighbors.»

2. Presence of legacy stockpiles or natural resources associated with nuclear/ radioactive supply chain

Brazil has some of the largest uranium deposits in the world and a large civilian nuclear industry.[31] Brazil is an active member of the IAEA and its associated material control framework[32] and has also created a bilateral mechanism with Argentina called the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials "whose aim is to verify that the nuclear materials in all the nuclear activities of the two countries are not deviated towards nuclear weapons."[33] While some have suggested that the two parallel frameworks may create competing priorities for the safeguarding and regulation of nuclear material, it also highlights the importance the country places on nuclear regulation and security.[34] Nonetheless, the large size of Brazil's nuclear industry and prevalence of nuclear material may create a heightened risk for theft and trafficking of R/N material. The Nuclear Security Index, produced by the Nuclear Threat Initiative, ranks the country 42nd out of the 47 states it examines in its ability to protect its nuclear facilities, and highlights gaps in the prevention of "insider threats," cyber security, and a general deficiency in "security culture" at nuclear facilities as potential risks to its nuclear security.[35] In addition, organized crime groups in the country have proven well organized, opportunistic, and adept at maritime trafficking in other illicit goods, heightening the risk of such potential activity for financial gain.

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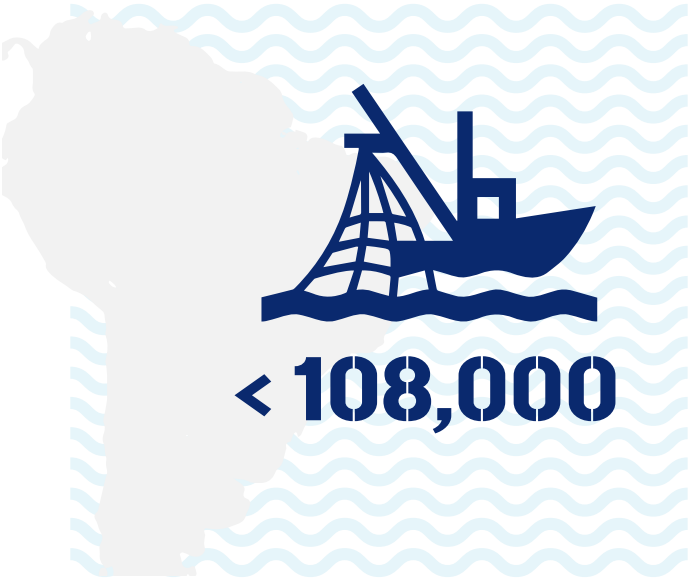
28 InSight Crime, "How Brazil's Borders Became More Diverse, Dangerous," March 8, 2021, https://insightcrime.org/news/how-brazils-borders-became-more-diverse-dangerous/.
29 Emanuele Ottolenghi, "State Sponsors of Terrorism: An Examination of Iran's Global Terrorism Network," Congressional Testimony to the House Subcommittee on Counterterrorism and Intelligence, April 17, 2018, https://docs.house.gov/meetings/HM/HM05/20180417/108155/HHRG-115-HM05-Wstate-OttolenghiE-20180417.pdf.
30 Charles Streeper, "Triborder Radioactive Material Trafficking and Threat Environment," Los Alamos National Laboratory, 2008, p. 2, https://osrp.lanl.gov/Documents/LAURS_Documents%20Page/LAUR-08-1485.pdf.
31 Nuclear Threat Initiative, "Brazil," July 2015, https://www.nti.org/learn/countries/brazil/.
32 Togzhan Kassenova, "Brazil, Argentina, and the Politics of Global Nonproliferation and Nuclear Safeguards," Carnegie Endowment for International Peace, November 29, 2016, https://carnegieendowment.org/2016/11/29/brazil-argentina-and-politics-of-global-nonproliferation-and-nuclear-safeguards-pub-66286.
33 Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials, "About Us," Accessed November 10, 2021, https://www.abacc.org.br/en/the-abacc/about.
34 Togzhan Kassenova, "Brazil, Argentina, and the Politics of Global Nonproliferation and Nuclear Safeguards," Carnegie Endowment for International Peace, November 29, 2016, https://carnegieendowment.org/2016/11/29/brazil-argentina-and-politics-of-global-nonproliferation-and-nuclear-safeguards-pub-66286.
35 NTI Nuclear Security Index, "NTI Index for Brazil," November 11, 2021, https://www.ntiindex.org/country/brazil/.



3. Presence of existing maritime smuggling networks

As previously detailed. Brazil is a hotspot for maritime trafficking in illicit goods, particularly drugs and predominantly cocaine. Should actors seek to traffic R/N material through Brazil's maritime domain, these same networks, particularly those involving STUVs, could be exploited for this purpose.

4. Prevalence of STUVs

As a state with a large maritime domain and large and economically important river system, Brazil has a relatively high prevalence of STUVs. As previously noted, there are roughly 80,000 recreational vessels in the country. In addition, there are estimated to be more than 108,000 fishing vessels in the country.[36] However, because the majority of these vessels are of relatively limited size (under 12 meters) and a significant minority operate in inland waters,[37] this may limit their potential utilization for R/N trafficking at sea. Brazil's fishing vessel distribution is also somewhat geographically bifurcated between relatively small vessels utilized for artisanal and small-scale fishing in the north and northeast and larger industrial vessels in the south and southeast. [38] As such there may be geographic differences in their potential utilization in any maritime R/N trafficking. While the former may be better suited for loading and unloading of larger "mothership' vessels relatively near shore, the latter has a higher potential for transoceanic trafficking.

5. Level of maritime domain awareness and maritime enforcement capacity

The primary actor responsible for ensuring security in Brazil's extensive maritime domain is the Brazilian Navy (initials MB in Portuguese). The country does not have a designated coast guard or equivalent maritime law enforcement agency and the MB assumes many constabulary duties in addition to its national defense missions as a result.[39] In addition, the Brazilian Federal Police are the country's lead entity in counter drug trafficking operations and have an important role to play in maritime security.[40] The MB is a relatively large and well equipped naval force of 69,000 personnel which operates submarines, a helicopter carrier, 11 principal surface combatants, and a moderate amount (44) of the kinds of patrol and coastal vessels of the kind most useful for counter trafficking efforts.[41] In addition, the Brazilian Air Force operates three squadrons of maritime patrol aircraft which can be extremely useful in counter trafficking efforts.[42] It is notable that the potential capabilities of the MB are undermined to a degree by an extremely high percentage of total spending being allocated to personnel cost,[43] leaving limited resources for investment in new capabilities. As mentioned, the Federal Police also contribute resources to efforts to counteract maritime trafficking in Brazil. There is a specialized maritime branch of the Federal Police, but their operations appear largely focused on port safety and security and prosecution, rather than at sea enforcement. [44]

In addition, the MB has recently improved its maritime domain awareness capabilities with the establishment of what it calls the "Blue Amazon Management System." Despite its name, the system is focused on active detection of vessels in Brazil's maritime domain through the use of radar, satellite detection, and a variety of other sensors in order to improve its ability to identify even those vessels which are not transmitting AIS.[45] In addition, it has created an Integrated Maritime Security Center for the collection and analysis of maritime security information, particularly vessel activity.[46] These two efforts, in combination, should significantly improve Brazil's ability to collect and analyze data on STUV trafficking in particular.

In short, Brazil has significant maritime enforcement and maritime domain awareness capabilities with some minor limitations, particularly around the number and availability of the kind of patrol assets which may be most useful for maritime counter trafficking operations.

6. Strength of systems for vessel registration and monitoring

Brazil has a moderate capacity to monitor the activities of STUVs. Brazil has enacted legislation that requires all Brazilian flagged fishing vessels to use its the Vessel Monitoring System (VMS) while operating on the high seas, [47] and has recently taken further steps to increase transparency in its fishing fleet by entering into an agreement with Global Fishing Watch to share fleet location information that can be

36 United Nations Food and Agriculture and Organization, "The Federative Republic of Brazil," 2020, http://www.fao.org/fishery/facp/BRA/en.
37 United Nations Food and Agriculture and Organization, "The Federative Republic of Brazil," 2020, http://www.fao.org/fishery/facp/BRA/en.
38 United Nations Food and Agriculture and Organization, "The Federative Republic of Brazil," 2020, http://www.fao.org/fishery/facp/BRA/en.
39 Admiral Eduardo Bacellar Leal Ferreira, "The Commanders Respond," U.S. Naval Institute, March 2018, https://www.usni.org/magazines/proceedings/2018/march/commanders-respond
40 United States Department of State, Bureau for International Narcotics and Law Enforcement Affairs, "International Narcotics Control Strategy Report," March 2020, p. 108, https://www.state.gov/wp-content/uploads/2020/06/Tab-1-INCSR-Vol.-I-Final-for-Printing-1-29-20-508-4.pdf.
41 International Institute for Strategic Studies, "Chapter Eight: Latin American and the Caribbean," The Military Balance, 2019, p. 401, DOI: 10.1080/04597222.2018.1561032.
42 International Institute for Strategic Studies, "Chapter Eight: Latin American and the Caribbean," The Military Balance, 2019, p. 402, DOI: 10.1080/04597222.2018.1561032.
43 Andrea L. F. Resende de Souza, "Review – Navies and Maritime Policies in the South Atlantic," E-International Relations, June 24, 2020, https://www.e-ir.info/2020/06/24/review-navies-and-maritime-policies-in-the-south-atlantic/.
44 Rebeca Duran, "Branches of the Police in Brazil," The Brazil Business, October 15, 2013, https://thebrazilbusiness.com/article/branches-of-the-police-in-brazil.
45 Marcos Ommati, "Blue Amazon Management System to Help Patrol the Brazilian Coast," Diálogo, March 9, 2020, https://dialogo-americas.com/articles/blue-amazon-management-system-to-help-patrol-the-brazilian-coast/#.YS_9PY5KiUk.
46 Marcos Ommati, "Blue Amazon Management System to Help Patrol the Brazilian Coast," Diálogo, March 9, 2020, https://dialogo-americas.com/articles/blue-amazon-management-system-to-help-patrol-the-brazilian-coast/#.YS_9PY5KiUk.
47 Ganapathiraju Pramod and Juarez Coelho Barroso, "Brazil Country Report," IUU Risk Intelligence, April 2019, p. 6, https://iuuriskintelligence.com/wp-content/uploads/2018/03/Brazil-Country-Report-Global-Fisheries-MCS-Report-2018.pdf.

monitored remotely from anywhere in the world.[48] It has also contracted with a private firm for a system that would allow for the near real time monitoring and tracking of the roughly 140 vessels involved in the development of its offshore hydrocarbon industry (pipelayers, tugs, offshore support vessels etc.) in an effort to insure better monitoring and transparency in that industry.[49]

These are valuable steps that should be commended, but their scope is somewhat limited, covering only fishing vessels and ships associated with the offshore oil industry. This leaves a gap in remote monitoring of other kinds of vessels. As noted in the previous section, Brazil is developing systems for active detection of all vessels in its maritime domain, but questions remain about both the implementation of this capability, as well as the application of on the water and at shore monitoring of the fishing fleet in particular. According to a 2021 report based on information obtained from the Brazilian government, only 9.4% of total fishing vessels registered with the Brazilian government are actively monitored by its VMS system, and only 12% of this smaller number of participating trawling vessels are actively monitored.[50] While the timeframe between the information obtained and the time of reporting is unclear, these numbers would appear to indicate a significant gap in the implementation of the country's remote sensing of its fishing fleet and may be cause for concern. In addition, there may be a lack of capacity in terms of physical enforcement checks both at sea and onshore, as overstretched maritime enforcement agencies are believed to perform only a limited number of at sea checks of fishing vessels and there are a large number of fish landing sites along the Brazilian coast used by small scale fishing vessels "which have little to no monitoring for either IUU or other security violations."[51]

«Brazil's large and influential criminal organizations are known to threaten and bribe officials at the country's largest port, Santos, as a part of their maritime cocaine trafficking.»

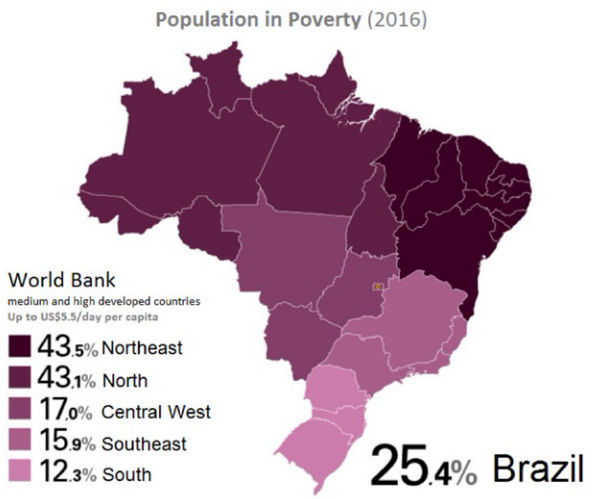
Corruption Perceptions Index https://www.transparency.org/en/cpi/2020/index/nzl

In summary, Brazil has made extremely valuable investments in recent years in its ability to remotely identify and monitor STUVs in its waters, but the best available evidence indicates that these systems may still be approaching full implementation, leaving gaps in STUV specific maritime domain awareness that have the potential to be exploited for maritime trafficking.

7. Perceived levels of corruption or lack of capacity in port and customs authorities

Generally speaking, corruption is a significant concern in Brazil. In Transparency International's 2020 Corruption Perceptions Index, Brazil ranked 94th out of 180 states assessed.[52] What's more, this corruption appears to significantly impact the transparent and effective functioning of the country's port and customs operations. Brazil's large and influential criminal organizations are known to threaten and bribe officials at the country's largest port, Santos, as a part of their maritime cocaine trafficking.[53] This has resulted in multiple port and customs officials being arrested for accepting bribes in order to facilitate drug trafficking on container vessels.[54] While these specific examples occurred at large ports, given the levels of corruption in the country, it is reasonable to assume that there is a significant risk that those using STUVs specifically for maritime trafficking purposes could utilize bribery in a similar manner.

48 Kimberly Vosburgh, "Global Fishing Watch and Brazil sign agreement to increase fisheries transparency," Global Fishing Watch, April 30, 2021, https://globalfishingwatch.org/press-release/global-fishing-watch-and-brazil-sign-agreement-to-increase-fisheries-transparency/.
49 BMT Global, "Tracking vessels around the coast of Brazil," December 20, 2018, https://www.bmt.org/news/2018/tracking-vessels-around-the-coast-of-brazil/.
50 Aldem Bourscheit, "Trawling bycatch increases risk of marine life extinction in Brazil," Mongabay, August 18, 2021, https://news.mongabay.com/2021/08/trawling-bycatch-increases-risk-of-marine-life-extinction-in-brazil/.
51 Ganapathiraju Pramod and Juarez Coelho Barroso, "Brazil Country Report," IUU Risk Intelligence, April 2019, p. 9, https://iuuriskintelligence.com/wp-content/uploads/2018/03/Brazil-Country-Report-Global-Fisheries-MCS-Report-2018.pdf.
52 Transparency International, "Corruption Perceptions Index-Brazil," Accessed August 22, 2021 https://www.transparency.org/en/cpi/2020/index/bra.
53 Gabriel Stargardter, "Brazil's gangs emerge as major cocaine exporters, flooding Europe with white powder," Reuters, March 12, 2020, https://www.reuters.com/article/us-brazil-violence-cocaine-specialreport/brazils-gangs-emerge-as-major-cocaine-exporters-flooding-europe-with-white-powder-idUSKBN20Z1DP.
54 Lloyd Belton, "Report Spotlights Drug Traffic at Santos Port, Brazil's Drug Policies," InSight Crime, July 20, 2016, https://insightcrime.org/news/analysis/report-spotlights-drug-trafficking-at-santos-port-brazil-drug-policies/.



Source: https://news.electroneum.com/brazil-a-huge-business-opportunity-where-crypto-is-on-the-rise-among-a-median-population-of-32

8. Level of economic in coastal communities

An additional factor with the potential to heighten the risk of STUV trafficking is the level of economic security and socioeconomic welfare in coastal communities. When coastal communities lack economic opportunities and livelihoods, they may feel the need to turn to illicit maritime activities such as trafficking, utilizing the STUVs they often already have access to. In Brazil in particular, this is a fairly limited risk. Brazil is an upper middle-income state with a poverty rate (using the global 3.20 USD per day purchasing power adjusted rate) of 9%.[55]

However, this poverty is largely concentrated in the coastal areas of Brazil's North and Northeastern regions.[56] These are areas of the country which have been politically and economically marginalized for decades,[57] and there is a significant risk some in these coastal communities may turn to maritime trafficking for economic opportunity.

55 The World Bank, "Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)," Accessed November 12, https://data.worldbank.org/indicator/SI.POV.LMIC?name_desc=-false.
56 Censo Agroa 2017, "Population in Poverty," Accessed November 12, 2021, https://censos.ibge.gov.br/en/2184-news-agency/news/18835-one-fourth-of-the-population-lives-on-less-than-r-387-a-month.html.
57 Nathalie Beghin, "Notes on Inequality and Poverty in Brazil: Current Situation and Challenges," Oxfam, 2008, https://oxfamilibrary.openrepository.com/bitstream/handle/10546/112516/fp2p-bp-notes-inequality-poverty-brazil-current-140608-en.pdf.

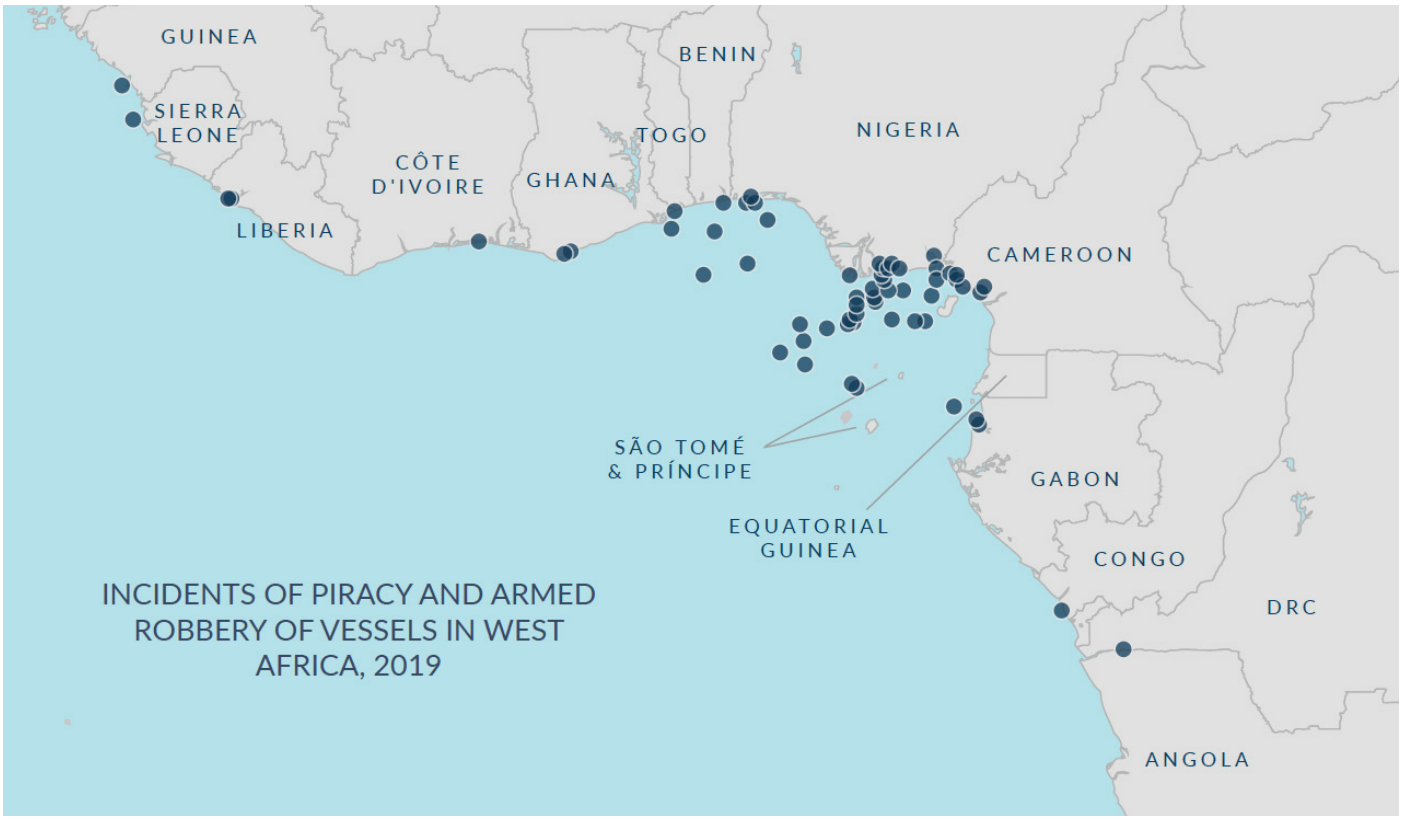

WEST AFRICA

WEST AFRICA

MARITIME SECURITY AND TRAFFICKING CONTEXT

Across the Atlantic, the West African littoral stretching from Cabo Verde to Nigeria is a massive maritime region that includes a dozen coastal states, thousands of kilometers of coastline and a collective EEZ of more than 2.2 million sq km.[58] These waters are also home to a diverse array of maritime security challenges which threaten the safety, security, and prosperity of the region's collective maritime domain. In the face of these challenges, regional states are mobilizing resources at both a national and multilateral level in an attempt to address them, but are often doing so from relatively low baseline capabilities in maritime security and governance.

Of the diverse maritime security threats facing the region, perhaps the most well-known is piracy and armed robbery. West Africa (particularly Nigeria) and adjacent areas of Central Africa are now the most prominent global hotspot for maritime piracy, armed robbery, and kidnap for ransom.[59] Piracy and armed robbery have been a scourge in the region for years now but both national efforts and significant investment from partners outside have failed to significantly mitigate the issue. Piracy in the region likely has significant direct and indirect economic costs to the region (though the exact figure is highly debated) but equally as importantly, it takes an immense human toll on the individuals who are kidnapped, injured, killed, and traumatized by the activity. All of these impacts are incredibly important, but outside the scope of this report. What is important to note about piracy and armed robbery however in the context of potential maritime R/N trafficking is that, because it is such a tragic and attention-grabbing form of maritime crime, it attracts much of the resources and policy attention of both regional states and international partners. This may, in turn, lessen the resources and focus on other maritime security issues, including trafficking.



Lydelle Joubert, "The State of Maritime Piracy 2019: Assessing the Human Cost," Stable Seas, July 10, 2020, p. 9, https://www.stableseas.org/post/state-of-maritime-piracy-2019.

In addition to piracy and armed robbery, another major maritime security challenge in the region is the prevalence of illegal, unreported and unregulated (IUU) fishing. Studies on the severity of IUU fishing vary in time frame, scope, and methodology, but generally speaking, IUU fishing activity has been estimated to represent up to 40%,[60] or even 65%[61] of the total catch in the region. Much of this IUU activity is

58 Marine Regions "Exclusive Economic Zones," Accessed September 8, 2021, https://www.marineregions.org/eezsearch.php.
59 Lydelle Joubert, "The State of Maritime Piracy 2019: Assessing the Human Cost," Stable Seas, July 10, 2020, p. 9, https://www.stableseas.org/post/state-of-maritime-piracy-2019.
60 David J. Agnew, et al. "Estimating the Worldwide Extent of Illegal Fishing," PLoS ONE 4(2), 25 February 2009, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0004570,
61 Alkaly Doumbouya, et al. "Assessing the Effectiveness of Monitoring Control and Surveillance of Illegal Fishing: the Case of West Africa," Frontiers in Marine Science, 7 March 2017, https://www.frontiersin.org/articles/10.3389/fmars.2017.00050/full .

perpetrated by fishing vessels from outside the region that exploit corruption in licensing agencies and weak enforcement to harvest fish via illegal methods and/or beyond legal limits. The prevalence of such IUU fishing undermines the sustainability and future productivity of the region's fisheries, threatens the livelihoods of small scale and artisanal fishers, robs governments of much needed revenues, and may potentially even degrade food security in a region in which seafood products make up 34.1% of animal protein consumption.[62] This activity also highlights the danger of potential trafficking, including R/N trafficking, as it attracts a number of vessels and crews to the region who have already demonstrated a willingness to violate the law for financial gain and are actively attempting to avoid detection.

In addition to these other forms of maritime crime, maritime trafficking itself is also a significant challenge. A number of factors exist which create a facilitating environment for maritime trafficking in the waters of West Africa, including:

Poverty and unemployment in coastalcommunities which can incentivize a turn to participation in maritime trafficking

Generally underdeveloped maritime domain awareness and maritime enforcement capacity in regional states (discussed in greater detail below)

Port monitoring and security at formal ports that leave gaps for traffickers to exploit

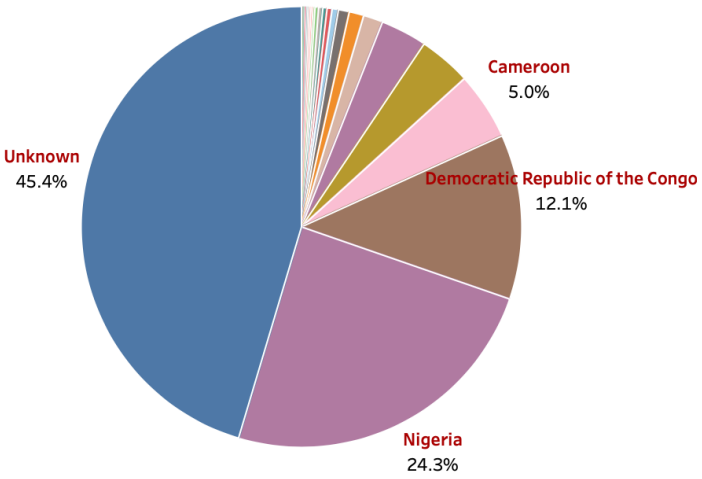
Levels of corruption in both port and customs agencies and broader government which facilitate maritime trafficking activity

All of these factors combine to make West Africa a global hotspot for trafficking in a variety of illicit goods including arms, illicit wildlife products, and drugs.

Of the three groups of illicit products mentioned, maritime trafficking in arms is likely the least prominent. Most arms trafficking in the region appears to occur overland with illicit arms either being diverted from the stockpiles of security services within the region, purchased from the existing black market selling so-called "legacy weapons" from numerous conflicts, or trafficked overland across the Sahel from sources outside the region. That said, some maritime arms trafficking does appear to occur in West Africa via containerized vessels, and from known instances of seizures at port, Nigeria seems a prominent point of entry. [63] However, the use of STUVs as opposed to containerized shipments in maritime arms trafficking appears a rare occurrence in the region. There have been some limited reports of fishing vessels being used to move arms between Nigeria and Cameroon,[64] but overall, STUV involvement in the regional arms trafficking system is likely to be only an extremely minor component of larger arms trafficking in the region.

Another problematic form of trafficking in the region with much clearer links to the maritime domain is the illicit trade in wildlife products including pangolin, ivory, and illicit timber. UNODC data on wildlife trafficking paints a disconcerting picture of the region as a source and point of disembarkation for all three products. Globally, Nigeria is the single largest known country of origin for both ivory and pangolin, while Guinea-Bissau is the largest single known country of origin for highly valued rosewood.[65] Nearly all of this illicit wildlife is then trafficked via the maritime space, largely to feed demand in markets in East Asia. However, this form of maritime trafficking also appears to be highly dependent on containerized cargo shipments facilitated by corruption in customs, environmental, and port agencies,[66] rather than relying on STUVs, of which there is little to no available evidence.

QUANTITIES OF PANGOLINS SEIZURES BY REPORTED COUNTRY OF ORIGIN



UNODC "Weight equivalent of Pangolins and number of Pangolins seizures." https://dataunodc.un.org/content/wildlife

Finally, maritime drug trafficking is perhaps the most relevant form of maritime trafficking in West Africa for the purposes of this report. Several types of drugs present challenges in West Africa but most are of limited relevance to the issue of maritime trafficking, particularly by STUVs. Cannabis use in West Africa is significantly higher than the global average but all available evidence suggests it is largely produced and consumed locally, negating trafficking in significant volumes.[67] The production of synthetic drugs including methamphetamine appears to be growing quickly in West Africa,[68] though there is little tangible evidence that these drugs are being trafficked via the maritime domain. In addition, West Africa is experiencing a recent influx of opioids, most prominently tramadol, which has a rapidly expanding consumer base of the region.[69] Tramadol is largely trafficked into the region via the maritime space, with prominent points of entry

62 Chan, et al, "Prospects and challenges of fish for food security in Africa," Global Food Security, Volume 20, March 2019, Pages 17-25, https://doi.org/10.1016/j.gfs.2018.12.002.
63 Sulaimon Salau,"Why Arms Smuggling Persists at Nigerian Ports, by Experts," The Guardian Nigeria, 20 September 2017, https://guardian.ng/business-services/why-arms-smuggling-persists-at-nigerian-ports-by-experts/
64 Agnes Ebo'o, "Cameroon's customs agency said to be the most corrupt," ENACT Observer, April 17, 2019, https://enactafrica.org/enact-observer/cameroons-customs-agency-said-to-be-the-most-corrupt United Nations Office on Drugs and Crime, "Weight equivalent of Elephant tusks and number of Elephant tusks seizures." Accessed August 19, 2021, https://dataunodc.un.org/content/wildlife.
65 United Nations Office on Drugs and Crime, "Weight equivalent of Elephant tusks and number of Elephant tusks seizures." Accessed August 19, 2021, https://dataunodc.un.org/content/wildlife.
66 Environmental Investigation Agency, "Out of Africa: How West and Central Africa have become the epicentre of ivory and pangolin scale trafficking to Asia," December 2020, https://eia-international.org/wp-content/uploads/Out-of-Africa-FINAL.pdf
67 OECD, "Illicit Financial Flows: The Economy of Illicit Trade in West Africa," 2018, p. 64, https://doi.org/10.1787/9789264268418-en.
68 UNODC, "Global Synthetic Drugs Assessment 2020," November 2020, p. 19, https://www.unodc.org/unodc/en/scientists/2020-global-synthetic-drugs-assessment_Global.html
69 UNODC, "At the Crossroads of Licit and Illicit: Tramadol and Other Pharmaceutical Opioids Trafficking in West Africa," 2021, p. 8, https://www.unodc.org/documents/nigeria/Tramadol_Trafficking_in_West_Africa.pdf.

being Togo, Benin and Nigeria,[70] but it also appears to be trafficked via containerized cargo, as traffickers often rely on fraudulent manifest and licenses for entry into the market,[71] rather than clandestine entry and concealment.

Finally, cocaine is perhaps the most relevant form of maritime drug trafficking as it pertains to STUVs specifically. West Africa is a major transshipment hub for cocaine being trafficked between production centers in Latin America and lucrative markets in Europe. As such cocaine is reportedly the most profitable form of drug trafficking in West Africa.[72] In 2018, cocaine trafficking in West Africa was estimated to be worth 3 billion USD annually.[73] Though exact maritime cocaine trafficking routes are difficult to ascertain, two hubs within the region appear to be or have been hotspots of maritime cocaine trafficking. The first is the states around the Bight of Benin, the second, the so called "Northern Hub," is centered around Sierra Leone, Guinea and particularly Guinea-Bissau, with the latter appearing to be the primary area of concern in recent years.[74] That said traffickers are adaptive and the challenge of maritime cocaine trafficking is not restricted to these states.

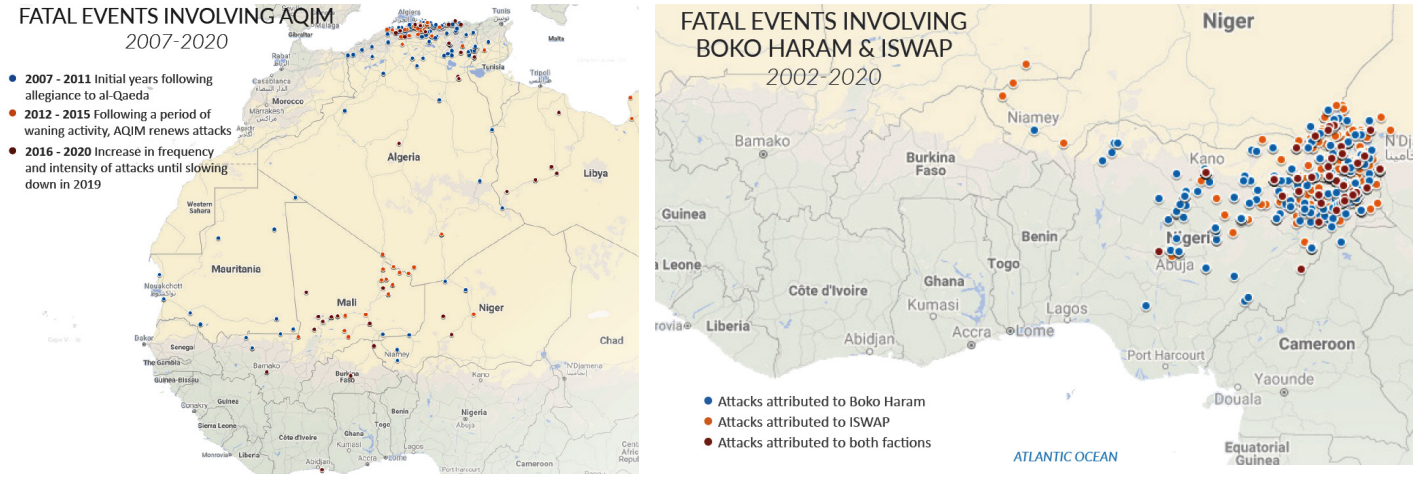
In addition, maritime cocaine trafficking appears to involve the most significant participation of STUVs of any form of trafficking in the region. As mentioned in the prior section, transatlantic drug trafficking has often involved the use of mother ships which transport shipments to offshore locations for loading and offloading by smaller vessels. This would also appear to be a common practice on the West African end of the supply chain. In 2020, the Ivorian Navy interdicted a shipment 411 kg of cocaine in which a Spanish-flagged vessel had been identified lingering in a position 250 km offshore before loading the shipment on to smaller vessels for transportation to the capital, Abidjan.[75] In other instances, shipments are believed to have been dropped by plane off the West African coast to be picked up by West African fishing vessels, or other smaller vessels.[76] As such, both fishing vessels and other smaller motorized vessels in West Africa appear to play a prominent role in the complicated system of transatlantic cocaine trafficking.

ASSESSMENT OF KEY RISK FACTORS

Given this background on the general maritime security and maritime trafficking context in West Africa, what are the key risk factors for R/N trafficking by STUVs and how should the region be assessed against these risks?

1. Presence of state or non-state actors potentially seeking nuclear materials

There are a plethora of violent extremist groups in both West African coastal states and the adjacent Sahel which might seek to acquire R/N material. Militant groups active in the Lake Chad Basin and Mali are the most prominent. These Sahelian groups include (but are by no means limited to) Boko Haram, the Islamic State- West Africa Province, Al Qaeda in the Islamic Maghreb (AQIM), and the Islamic State in the Greater Sahara, in addition to dozens of other subsidiary and independent such groups operating in states across the Sahel.



Stable Seas, "Violence At Sea," 2020, https://www.stableseas.org/post/violence-at-sea-how-terrorists-insurgents-and-other-extremists-exploit-the-maritime-domain

While there has been speculation that some of these groups, for example Boko Haram,[77] may try to acquire R/N material, there is little open-source evidence to suggest serious such attempts have been made. That said, their larger global parent organizations, Al Qaeda and the Islamic State, have shown varying degrees of motivation to acquire such materials. Of the two organizations, Al Qaeda has the clearer track record of such a goal. The group has reportedly long had an interest in developing some kind of nuclear or radiological weapon.[78] Osama bin Laden met Pakistani nuclear scientists to discuss these efforts weeks before the 9/11 attacks[79] and dozens of attempts to acquire

70 UNODC, "At the Crossroads of Licit and Illicit: Tramadol and Other Pharmaceutical Opioids Trafficking in West Africa," 2021, p. 11, https://www.unodc.org/documents/nigeria/Tramadol_Trafficking_in_West_Africa.pdf.
71 UNODC, "At the Crossroads of Licit and Illicit: Tramadol and Other Pharmaceutical Opioids Trafficking in West Africa," 2021, p. 32, https://www.unodc.org/documents/nigeria/Tramadol_Trafficking_in_West_Africa.pdf.
72 OECD, "Illicit Financial Flows: The Economy of Illicit Trade in West Africa," 2018, p. 62, https://doi.org/10.1787/9789264268418-en.
73 OECD, "Illicit Financial Flows: The Economy of Illicit Trade in West Africa," 2018, https://doi.org/10.1787/9789264268418-en.
74 OECD, "Illicit Financial Flows: The Economy of Illicit Trade in West Africa," 2018, p. 63, https://doi.org/10.1787/9789264268418-en.
75 Reuters, "Ivory Coast navy seizes record cocaine haul off coast," February 5, 2020, https://www.reuters.com/article/us-ivorycoast-drugs/ivory-coast-navy-seizes-record-cocaine-haul-off-coast-idUSKBN1ZZ2KA.
76 Antonio L. Mazzitelli, "The New Transatlantic Bonanza: Cocaine on Highway 10," The Western Hemispheric Security Analysis Center, 2011, p. 11, https://core.ac.uk/download/pdf/46946666.pdf.
77 Vanguard, "Insecurity: FG raises alarm over Boko Haram deploying nuclear weapons," December 22, 2019, https://www.vanguardngr.com/2019/12/insecurity-fg-raises-alarm-over-boko-haram-deploying-nuclear-weapons/.
78 Aaron Y. Zelin, "How Al-Qaeda Survived Drones, Uprisings, and the Islamic State: The Nature of the Current Threat," The Washington Institute for Near East Policy, June 2017, p. 14, https://www.washingtoninstitute.org/media/1718.
79 Mathew Bunn, "Twenty Years After 9/11, Terrorists Could Still Go Nuclear," Belfer Center for Science and International Affairs, September 16, 2021, https://www.belfercenter.org/publication/twenty-years-after-911-terrorists-could-still-go-nuclear.

associated material have reportedly been made over decades.[80] IS has not demonstrated the same concerted effort to "go nuclear." An article in its publication, Dabiq, highlighted its potential to purchase a nuclear weapon given the massive financial resources it possessed at the height of its territorial control in the Levant,[81] and the group had access to both Cobalt 60[82] and low enriched uranium[83] while in control of Mosul, but does not appear to have made any attempt to utilize them. Opportunistic pursuit of R/N material by groups in the region, either for their own use or that of their broader global terrorist networks, would appear to present a significant risk.

However, the link between such groups and potential maritime trafficking of R/N material specifically appears less clear. These groups operate in interior regions far removed from the West African coast (one seemingly anomalous deviation from this pattern was a 2016 attack in the coastal community of Grand-Bassam, Côte d'Ivoire, claimed by AQIM[84]). Many groups are heavily involved in smuggling and trafficking, particularly AQIM,[85] but this trafficking activity is trans-Saharan, overland, and open sources do not indicate it has included R/N material.

All of that said, it seems feasible that militant groups in the region could potentially seek to gain access to R/N material by tapping into existing maritime STUV trafficking activity and the financial motivations of the actors involved. Given the number of violent nonstate actors present in the region, their opportunistic motivations to acquire R/N material, and the existing networks of maritime trafficking in the region, there is a fairly high risk that any such actors may seek access to R/N materials through maritime trafficking via West Africa.

2. Presence of legacy stockpiles or natural resources associated with nuclear/ radioactive supply chain

Within the region, several countries such as Ghana, Nigeria, and Niger, have developed civilian nuclear energy industries,[86] though they are extremely small by global standards.[87] In addition, Niger is a major producer of uranium, the sixth largest in the world in 2020.[88] Given levels of crime, instability and conflict in Nigeria in particular, it may represent a heightened risk as a point of origin for material out of regulatory control and potential trafficking. In light of this potential threat, successful efforts have already been made by the international community to extract highly enriched uranium from research facilities in the country.[89]

3. Presence of existing maritime smuggling networks

As noted above, West Africa has a well-established system of maritime smuggling in a variety of illicit goods both into, through, and out of the region. While much of this trafficking appears to occur via containerized vessels, STUVs also play a significant role, particularly in terms of the maritime cocaine trade. As such, the risk of trafficking networks being adapted in order to utilize STUVs for maritime R/N trafficking seems significant.

4. Prevalence of STUVs

As with the other regions, determining the exact number of STUVs across West Africa is not feasible. However, to get sense of the scope of small, traditional, and unregulated vessels in the region it may most useful to look at fishing vessels, as they likely constitute the large majority of such vessels in the region.

In West Africa, fishing vessels broadly break down into three categories: artisanal, semi-industrial and industrial. The first and must numerous category of such vessels is artisanal fishing craft which are small, overwhelmingly undecked, and in West Africa often categorized as "fishing canoes," though they can be significantly larger than that name may imply. The number of such craft varies significantly by state in the region and is not readily available in every state. On the low end of the spectrum, reporting by the UN Food and Agriculture Organization indicates that countries like Liberia and Togo estimate 345[90] and 371[91] such craft respectively. Most states for which information is available report several thousand such artisanal craft in operation. However, there are also a few states, including Benin, Ghana, and Nigeria, on the very high end of the spectrum. While contemporary data for Nigeria is not available, information from 1993 indicates that in that year there were estimated to be more than 77,000 fishing canoes.[92] In Ghana, 14,700 fishing canoes were registered with the government in 2018[93] though there are estimates that the actual number of such craft may be closer to 30,000.[94] Perhaps most surprisingly, Benin, with its relatively small coastline, estimated roughly 50,000 fishing canoes. [95]

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80 Truls Hallberg Tønnessen, "Islamic State and Technology – A Literature Review," Perspectives on Terrorism, Volume 11, Number 6, December 2017, p. 102, https://www.jstor.org/stable/26295959?seq=2#metadata_info_tab_contents.
81 Truls Hallberg Tønnessen, "Islamic State and Technology – A Literature Review," Perspectives on Terrorism, Volume 11, Number 6, December 2017, p. 103, https://www.jstor.org/stable/26295959?seq=2#metadata_info_tab_contents. Antonia Ward, "Is the Threat of Nuclear Terrorism Distracting Attention from More Realistic Threats?" Rand Corporation, July 27, 2018, https://www.rand.org/blog/2018/07/is-the-threat-of-nuclear-terrorism-distracting-attention.html.
82 Antonia Ward, "Is the Threat of Nuclear Terrorism Distracting Attention from More Realistic Threats?" Rand Corporation, July 27, 2018, https://www.rand.org/blog/2018/07/is-the-threat-of-nuclear-terrorism-distracting-attention.html.
83 Wolfgang Rudischhauser, "Could ISIL Go Nuclear," NATO Review, May 26, 2015, https://www.nato.int/docu/review/articles/2015/05/26/could-isil-go-nuclear/index.html.
84 United Nations Security Council, "Security Council Press Statement on Terrorist Attack in Grand Bassam, Côte d'Ivoire," March 14, 2016, https://www.un.org/press/en/2016/sc12279.doc.htm.
85 Zachary Laub and Jonathan Masters, "Al-Qaeda in the Islamic Maghreb," Council on Foreign Relations, March 27, 2015, https://www.cfr.org/backgrounder/al-qaeda-islamic-maghreb.
86 Laura Gil, "Is Africa Ready for Nuclear Energy?" International Atomic Energy Agency, September 3, 2018, https://www.iaea.org/newscenter/news/is-africa-ready-for-nuclear-energy.
87 Nuclear Energy Institute, "Top 15 Nuclear Generating Countries - by Generation," Accessed September 1, 2021, https://www.nei.org/resources/statistics/top-15-nuclear-generating-countries.
88 World Nuclear Association, "World Uranium Mining Production," Accessed September 1, https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/mining-of-uranium/world-uranium-mining-production.aspx.
89 Aaron Mehta, "How the US and China collaborated to get nuclear material out of Nigeria — and away from terrorist groups," Defense News, January 14, 2019, https://www.defensenews.com/news/pentagon-congress/2019/01/14/how-the-us-and-china-collaborated-to-get-nuclear-material-out-of-nigeria-and-away-from-terrorist-groups/.
90 Food and Agriculture Organization of the United Nations, "The Republic of Liberia," September 2019, http://www.fao.org/fishery/facp/LBR/en.
91 Food and Agriculture Organization of the United Nations, "La République Togolaise," August 2019, http://www.fao.org/fishery/facp/TGO/fr.
92 A.V. Amire, "Monitoring, Measurement and Assessment of Fishing Capacity: The Nigerian Experience," Food and Agriculture Organization of the United Nations, Accessed September 20, 2021, http://www.fao.org/3/Y4849E/y4849e0c.htm.
93 Shem Oirere, "New canoe authorization card to control open access policy in Ghana," SeafoodSource, December 23, 2019, https://www.seafoodsource.com/news/supply-trade/new-canoe-authorization-card-to-control-open-access-policy-in-ghana.
94 Food and Agriculture Organization of the United Nations, "The Republic of Ghana," February 2016, http://www.fao.org/fishery/facp/GHA/en.
95 Food and Agriculture Organization of the United Nations, "The Republic of Benin," June 2015, http://www.fao.org/fishery/facp/BEN/en.

In addition to these large numbers of small, undecked, artisanal craft, there are also a smaller number of larger industrial and semi-industrial fishing vessels. However, the number pale in comparison to artisanal craft. In states where such data is available, the number of these larger vessels range from an estimated 20 in Benin to more than 400 in Ghana.[96]

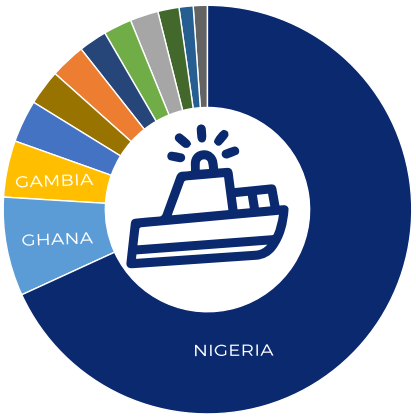
Given these rough estimates and the challenges states face in registering and monitoring vessels of both types (described in a subsequent section), it seems that the sheer number and relative anonymity of STUVs in the region are likely to present a fairly significant risk for all forms of trafficking.

5. Level of maritime domain awareness and maritime enforcement capacity

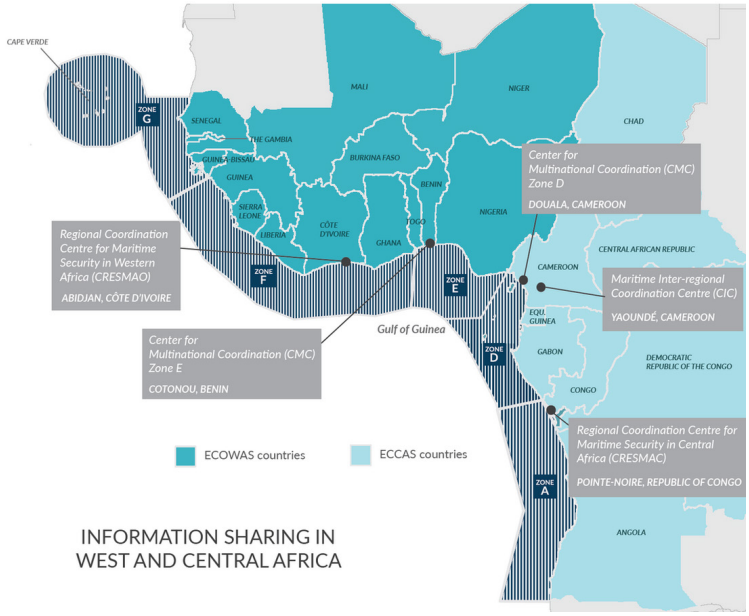
Maritime enforcement capacity and maritime domain awareness in West Africa is variable but generally fairly limited. Many West African states lack the assets necessary to protect their maritime space. Nigeria, with its large navy of 121 patrol and coastal vessels and one frigate[97] is the extreme outlier in terms of the assets available to states for maritime security protection. Even what is perhaps the next most capable state in the region in terms of maritime security, Ghana, has only 14 such vessels.[98] Many states in the region, such as Liberia, Sao Tome & Principe, Sierra Leone, Togo, Cote d'Ivoire, Guinea, and Guinea-Bissau, have four or fewer vessels available for maritime enforcement,[99] and even these are often in a state of disrepair and not fully operational. This means that across much of the West African littoral there is a relative lack of preventative maritime enforcement presence and a limited capacity to respond to incidents of trafficking.

In addition, the individual and collective state of maritime domain awareness in the region is fairly low. With very limited assets for patrol and systems for remote information collection and analysis, many states are likely to have only a very narrow picture of the activities taking place in their waters. The Yaoundé Code of Conduct was established in recent years as a means to improve information sharing and collective response to maritime security challenges, including trafficking,[100] but the operationalization of its implementing arms has been difficult and collective maritime domain awareness in the region remains extremely low.

NUMBER OF COASTAL AND PATROL VESSELS IN WEST AFRICA



Seas Maritime Security Index https://www.stableseas.org/services



Stable Seas, "Stable Seas Gulf of Guinea," 2020, https://www.stableseas.org/post/stable-seas-gulf-of-guinea

Taken together, the level of maritime domain awareness and enforcement capacity in West Africa is exceptionally low in comparison to other areas of the world. Making the waters off West Africa one of the most permissive environments across the world's oceans for potential maritime R/N smuggling by STUVs.

6. Strength of systems for STUV registration and monitoring

Information on systems for STUV registration and monitoring across the states of West Africa is difficult to access universally, but available information paints a picture of a region with highly variable but improving capacity, albeit from relatively low baselines. Some states appear to have extremely limited capacity to monitor STUVs in any systematic way. Benin, for example, reportedly has no VMS system for fishing vessels.[101] Others are taking important steps to address the issue, but the scope of the projects and the effectiveness of their implementation appears to leave significant gaps in STUV monitoring. Senegal, for example, requires VMS for all domestic and foreign fishing vessels, but compliance with the system appears to be inconsistent.[102] Ghana has increased its VMS coverage in recent years, but there are still reportedly hundreds of semi-industrial Ghanaian fishing vessels which are still outside the VMS system.[103] Cabo Verde has also implemented a VMS system for its industrial fishing fleet which has reached a laudable 80% coverage, however the monitoring of the system is reportedly undermined by frequent interruptions to electricity and internet.[104] Guinea seems to have fared slightly better, as its mandatory VMS system for industrial fishing vessels is reportedly well functioning.[105]

96 Food and Agriculture Organization of the United Nations, "Fishery and Aquaculture Country Profiles," Accessed September 20, 2021, http://www.fao.org/fishery/countryprofiles/search/en.
97 International Institute for Strategic Studies, "Chapter Nine: Sub-Saharan Africa," The Military Balance, 2019, p. 483, 10.1080/04597222.2019.1561035.
98 International Institute for Strategic Studies, "Chapter Nine: Sub-Saharan Africa," The Military Balance, 2019, p. 471, 10.1080/04597222.2019.1561035.
99 Stable Seas, "Stable Seas Maritime Security Index Data," Accessed September 2, 2021, Available at: https://docs.google.com/spreadsheets/d/1YIXxv5o8rjn_fI3ebMelcySGqD07_bIB7d80VSlwcDo/edit#gid=0.
100 Stable Seas, "Gauging Maritime Security In West and Central Africa," August 24, 2020, https://www.stableseas.org/post/gauging-maritime-security-in-west-and-central-africa.
101 Ganapathiraju Pramod, "Benin Country Report," IUU Risk Intelligence, May 2019, https://iuuriskintelligence.com/wp-content/uploads/2019/12/Benin-country-Report-Global-Fisheries-MCS-Report-2019.pdf.
102 Ganapathiraju Pramod, Viviane Koutob, and Mantha Gopikrishna "Senegal Country Report," IUU Risk Intelligence, November 2019, https://iuuriskintelligence.com/wp-content/uploads/2019/12/Senegal-country-Report-Global-Fisheries-MCS-Report-2019.pdf.
103 Ganapathiraju Pramod, "Ghana Country Report," IUU Risk Intelligence, April 2018, https://iuuriskintelligence.com/wp-content/uploads/2018/04/Ghana-country-Report-Global-Fisheries-MCS-Report-2018.pdf.
104 Ganapathiraju Pramod, "Ghana Country Report," IUU Risk Intelligence, April 2018, https://iuuriskintelligence.com/wp-content/uploads/2018/04/Ghana-country-Report-Global-Fisheries-MCS-Report-2018.pdf.
105 Ganapathiraju Pramod, "Guinea Country Report," IUU Risk Intelligence, January 2020, https://iuuriskintelligence.com/wp-content/uploads/2020/08/Guinea-Country-Report-Global-Fisheries-MCS-Report-2020.pdf.

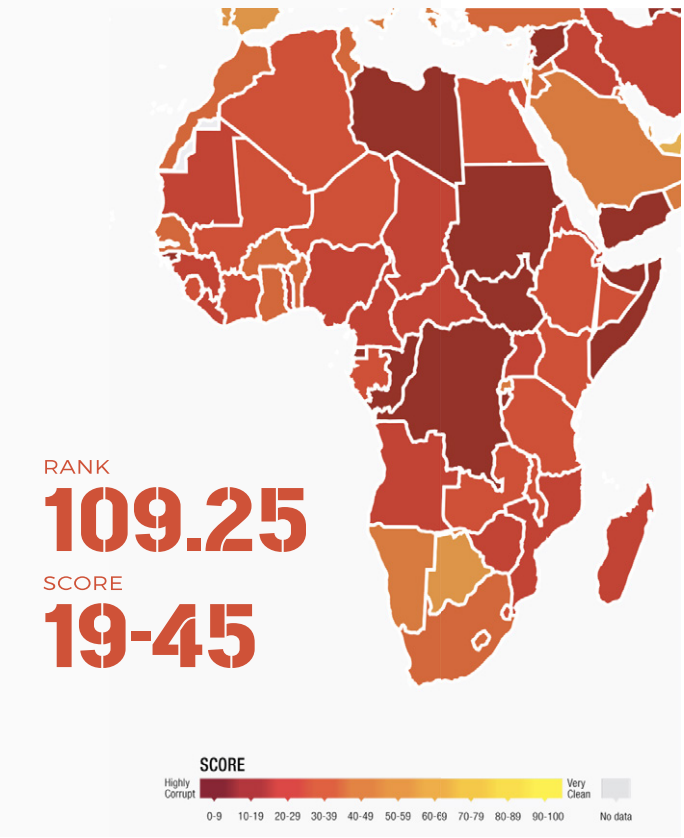
All of these individual efforts should be commended. But these examples also illustrate that implementation of the monitoring systems in place are rife with challenges. It also highlights that the existing efforts in the region appear to be primarily focused on larger fishing vessels, leaving significant gaps for smaller fishing vessels such as the plethora of large, ocean going fishing canoes described above, and, potentially, other types of small vessels operating in coastal waters.

7. Perceived levels of corruption or lack of capacity in port and customs authorities

Corruption in West Africa, generally speaking, is a significant challenge. In 2020 the average rank for West African states in the Corruption Perceptions Index was 109.25 out of 180 states. However, it is also making significant progress in this area, as the region's average rank rose roughly eleven spots from 120.3 in 2010.[106]

What's more, corruption appears to have been a major facilitating factor in allowing maritime trafficking to flourish in West Africa. Examples of this can be drawn from both maritime trafficking of drugs and wildlife in the region. Corruption has been a major factor in West Africa's emergence as a pivotal geography in the world's cocaine trafficking system. Guinea-Bissau is one of the most impacted of West African states, and this was facilitated by a system of corruption and political patronage that came to rely on the profits of cocaine trafficking.[107] It also seems to have been facilitated by those who were actually responsible for trying to address maritime trafficking, as the country's former navy chief was arrested in a sting operation in which he agreed to provide undercover American DEA agents posing as FARC militants with weapons in exchange for cocaine.[108]

«...corruption appears to have been a major facilitating factor in allowing maritime trafficking to flourish in West Africa.»



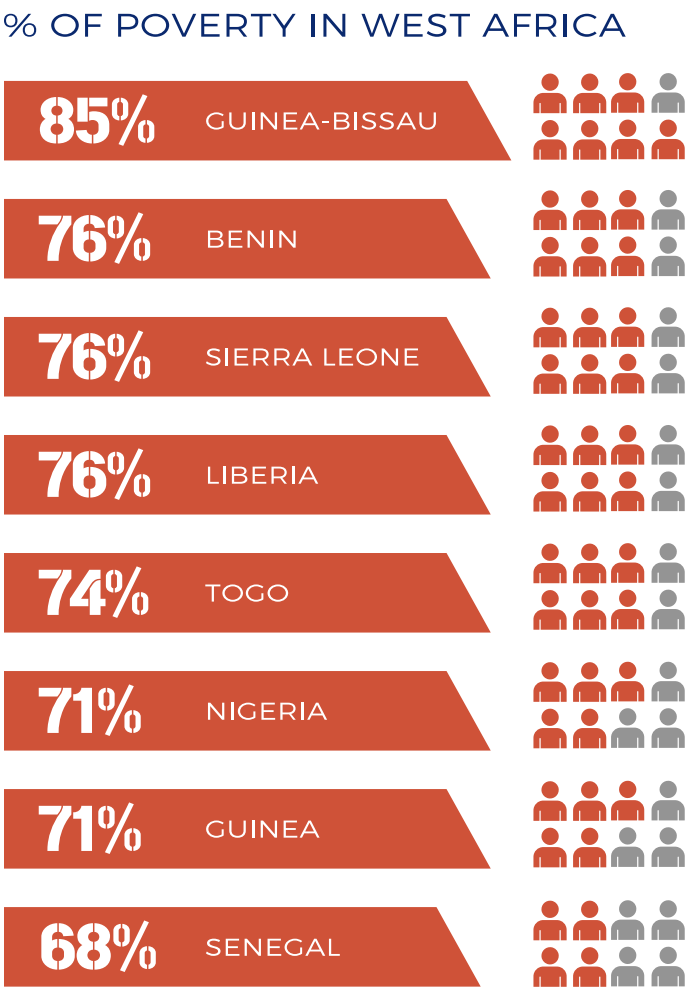
Corruption also appears to be a significant factor in facilitating the region's outbound maritime trafficking of illicit wildlife products. In Ghana, corrupt forestry officials and forged paperwork from shipping agents[109] have facilitated the illegal export of roughly six million rosewood trees despite bans.[110] Research has also shown how bribery of Nigerian port officials in facilities like Port Harcourt and Port Apapa in Lagos has been used by traffickers to allow shipments of ivory and pangolin to bypass screening and evade detection.[111]

Given these high levels of corruption both within port and customs agencies, security forces, and broader government administrations in West Africa, the risk that bribery and corruption could be used as a strategy to facilitate the maritime smuggling of R/N material appears quite high.

106 Transparency International, "Corruptions Perceptions Index," Accessed September 3, 2021, https://www.transparency.org/en/cpi/2020/index/nzl.
107 Mark Shaw and A. Gomes, "BREAKING THE VICIOUS CYCLE: Cocaine politics in Guinea-Bissau," Global Initiative Against Transnational Organized Crime, May 2020, p. 14, https://globalinitiative.net/wp-content/uploads/2020/05/Guinea-Bissau_Policy-Brief_Final2.pdf.
108 Mark Shaw and A. Gomes, "BREAKING THE VICIOUS CYCLE: Cocaine politics in Guinea-Bissau," Global Initiative Against Transnational Organized Crime, May 2020, p. 9, https://globalinitiative.net/wp-content/uploads/2020/05/Guinea-Bissau_Policy-Brief_Final2.pdf.
109 Environmental Investigation Agency, "BAN-BOOZLED: How corruption and collusion fuel illegal rosewood trade in Ghana," 2019, p. 6, https://content.eia-global.org/posts/documents/000/000/906/original/BAN_Boozled_Rosewood_Ghana.pdf?1564513559.
110 BBC News, "Ghana 'exports rosewood timber illegally to China'," July 30, 2019, https://www.bbc.com/news/world-africa-49165636.
111 Environmental Investigation Agency, "Out of Africa: How West and Central Africa have become the epicentre of ivory and pangolin scale trafficking to Asia," December 2020, https://eia-international.org/wp-content/uploads/Out-of-Africa-FINAL.pdf.

8. Level of economic security in coastal communities

Coastal economic security is another important factor driving the risk of maritime trafficking via STUVs in West Africa. Poverty is endemic in many parts of West Africa. Guinea-Bissau (85%), Benin (76%) Sierra Leone (76%), Liberia (76%), Togo (74%), Nigeria (71%), Guinea (71%), and Senegal (68%), all see two thirds or more of their population living on less than 3.20 USD a day.[112] In 2018, Nigeria surpassed India as the state with the single highest number of people living in extreme poverty.[113] In the UN's Human Development Index, all but two states (Cabo Verde and Ghana) fall into the lowest category of socioeconomic welfare.[114] Coastal communities dependent on the artisanal fishing sector has been hard hit by declining fish stocks [115] and illegal, unregulated, and unreported fishing, largely by foreign vessels.[116] Artisanal fishers in Ghana for example have reported up to a 40% drop in income in recent years.[117] Economic insecurity in these coastal communities in particular poses a significant risk factor in the potential for maritime STUV trafficking. As communities' legitimate income is undermined, and with limited other employment opportunities, recruitment of under employed fishers for into maritime trafficking networks becomes an ever-increasing risk.



«As communities' legitimate income is undermined, and with limited other employment opportunities, recruitment of under employed fishers for into maritime trafficking networks becomes an ever-increasing risk.»

112 The World Bank, "Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)," Accessed November 12, 2021, https://data.worldbank.org/indicator/SI.POV.LMIC?most_recent_value_desc=true.
113 Bukola Adebayo, "Nigeria overtakes India in extreme poverty ranking," CNN, June 26, 2018, https://www.cnn.com/2018/06/26/africa/nigeria-overtakes-india-extreme-poverty-intl/index.html.
114 United Nations Development Programme, "Human Development Index-Download Data," Accessed November 10, 2021, http://hdr.undp.org/en/content/download-data.
115 University of British Columbia- Sea Around Us, "Stock status in the waters of Guinea Current," Accessed November 8, 2021,https://www.seaaroundus.org/data/#/lme/28/stock-status.
116 Ifesinachi Okafor-Yarwood, "Illegal, unreported and unregulated fishing, and the complexities of the sustainable development goals (SDGs) for countries in the Gulf of Guinea," Marine Policy, Volume 99, January 2019, p. 414-422, https://doi.org/10.1016/j.marpol.2017.09.016.
117 Andrea Borgarello, "Safety and Sustainability for Small-Scale Fishers in West Africa," The World Bank, May 16, 2016, https://www.worldbank.org/en/news/feature/2016/05/16/safety-and-sustainability-for-small-scale-fishers-in-west-africa.


RED SEA

RED SEA

MARITIME SECURITY AND TRAFFICKING CONTEXT

The Red Sea is a maritime area which has garnered significant international attention in recent years, but largely for reasons beyond those we have discussed in other sections of the report, as it has become a hotspot for maritime terrorism and maritime mixed migration, in addition to trafficking concerns.

The Red Sea is both geographically important and politically complex. The Red Sea is a narrow body of water surrounded by Egypt, Sudan, Eritrea, Yemen, Saudi Arabia, Jordan, and Israel. It has a combined coastline of roughly 5,500 km and more than 1,150 small islands,[118] adding to the complexity of counter trafficking tasks. In addition, it is of extreme centrality to the entire system of international maritime trade and the broader global economy. Bookended by two of the world's most important maritime chokepoints, the Suez Canal and Bab al-Mandab, an estimated 10% of global trade flows through the Red Sea annually.[119] Beyond this purely economic centrality, it is also increasingly an arena of geopolitical competition, as states from both within and outside the region seek to establish presence and advance their interests, all of which appears to absorb much of the attention of regional policy makers, potentially undermining the policy prioritization of nontraditional maritime security challenges such as trafficking.

One of the maritime security issues on the Red Sea which has garnered the attention of policy makers across the globe is the threat of maritime terrorism. Maritime terrorism in the Red Sea poses a variety of threats to both military and civilian vessels including the use of mines, anti-ship missiles, and unmanned attacks by remote controlled boats and aerial vehicles. In October 2019 an Iranian tanker was reportedly damaged by missiles in the Red Sea off Saudi Arabia near Jeddah.[120] Saudi Arabia reportedly intercepted a remotely controlled explosive vessel off Yanbu in April 2021.[121] And, mines off the western coast of Yemen present significant threats to vessel traffic of all kinds. An estimated 137 sea mines have been detected in the Red Sea and Gulf of Aden since the outbreak of the Yemen conflict and Egyptian fishermen were killed in February 2020 when their vessel struck a mine in the southern Red Sea.[122] All of these threats have made the southern Red Sea one of the most dangerous international shipping lanes in the world.

Posing a very different kind of challenge, the Red Sea and adjacent Gulf of Aden have become one of the globe's most significant hotspots for dangerous maritime mixed migration. Conflict and instability in both Yemen and the Horn of Africa have led to high levels of maritime migration in both directions as migrants seek economic opportunities and safety. These maritime migration routes appear to shift fluidly based on developments on the ground. Initially, maritime routes from Djibouti through the southern Red Sea to the west coast of Yemen were prominent. Traffickers on this route appear to have primarily utilized both dhows and fishing vessels.[123] However, the Red Sea route to Yemen appears less prominent in recent years, likely due to increased military activity in western Yemen, subsequently pushing maritime migration routes out into the Gulf of Aden and Arabian Sea.[124]

In addition to this route between the Horn of Africa and the Arabian Peninsula, there also appears to be significant migration across the Red Sea itself, particularly between the Arabian Peninsula and Sudan. Sudan appears to have been a significant point of disembarkation of African migrants being moved to Saudia Arabia on fishing vessels until recent years,[125] though it appears to have declined in prominence at this point, due to increased enforcement in Saudi Arabia.[126] In addition, it also appears that some subset of migrants who cross the Gulf of Aden into Yemen, then undertake a second maritime migration from the western coast of Yemen across the Red Sea to Sudan, [127] with the primary point of dismemberment from Yemen along this route being Mohka. [128]

All of these patterns and routes are multifaceted and continually shifting based on a variety of factors, but it is clear that there is a complex network of maritime migration routes across the broader region. What's more, these routes appear to heavily utilize STUVs in the region

118 Volterra Fietta, "Formation of a new Arab-African council signals the deepening of regional cooperation over waterways," Lexology, April 20, 2020, https://www.lexology.com/library/detail.aspx?g=d698be2f-4444-4843-aecb-3ed070974cef.
119 PeaceLab, "The Art of Crisis Prevention: Maritime Security in the Red Sea & the Gulf of Aden," February 14, 2020, https://peacelab.blog/2020/02/the-art-of-crisis-prevention-maritime-security-in-the-red-sea-the-gulf-of-aden.
120 Scott Neuman, "Iranian Tanker Reportedly Struck By Missiles In Red Sea," NPR, October 11, 2019, https://www.npr.org/2019/10/11/769190659/iranian-tanker-reportedly-struck-by-missiles-in-red-sea.
121 Reuters, "Saudi Arabia says it foiled boat attack off Yanbu," April 27, 2021, https://www.reuters.com/world/middle-east/unconfirmed-reports-vessel-attacked-off-saudi-arabia-dry-ad-2021-04-27/.
122 Maritime Security Review, "3 Egyptian Fishermen Killed By Mine Explosion in Southern Red Sea Near Yemen," February 7, 2020, http://www.marsecreview.com/2020/02/3-egyptian-fishermen-killed-by-mine-explosion-in-southern-red-sea-near-yemen/.
123 Expertise France, "Yemen Country Statement: Addressing Migrant Smuggling and Human Trafficking in East Africa," September 2017, p. 13, https://www.expertisefrance.fr/documents/20182/234347/AMMi+-+Country+Report+-+Yemen.pdf/754f6a54-ac81-4adb-964c-f566e0ff8f4c.
124 The Global Initiative against Transnational Organized Crime, "Integrated Responses to Human Smuggling from the Horn of Africa to Europe," May 2017, p.17, https://globalinitiative.net/wp-content/uploads/2017/05/global-initiative-human-smuggling-from-the-horn-of-africa-may-2017-web.pdf.
125 CSO Maritime Alliance, "Sudanese security says foiled people-smuggling operation on Red Sea," June 15, 2016, https://csomaritimealliance.com/news/sudanese-security-says-foiled-people-smuggling-operation-on-red-sea-3846.
126 Hassan A. Abdel Ati, "Human Smuggling and Trafficking in Eastern Sudan," CHR. Michelsen Institute, September 2017, p. 25, https://www.cmi.no/publications/file/6325-human-smuggling-and-trafficking-in-eastern-sudan.pdf.
127 Expertise France, "Yemen Country Statement: Addressing Migrant Smuggling and Human Trafficking in East Africa," September 2017, p. 10, https://www.expertisefrance.fr/documents/20182/234347/AMMi+-+Country+Report+-+Yemen.pdf/754f6a54-ac81-4adb-964c-f566e0ff8f4c.
128 Deanna Davy, "Unpacking the Myths: Human smuggling from and within the Horn of Africa," Danish Refugee Council, December 2017, p. 9, https://reliefweb.int/sites/reliefweb.int/files/resources/RMMS%20BriefingPaper6%20-%20Unpacking%20the%20Myths.pdf.

including dhows, non-dhow fishing vessels, and small, local cargo vessels,[129] heightening the chance that these networks and vessels could potentially be repurposed for maritime R/N trafficking.

Maritime arms trafficking the Red Sea is another significant concern. While much of the arms trafficking in the larger region appears to take place in the Gulf of Aden, as opposed to the Red Seas itself, recent seizures indicated that it is a significant concern. For example, in 2020 the Yemen Coast Guard interdicted several shipments of ammunition and small arms in the Red Sea on their way to Houthi controlled areas.[130] While much of the arms trafficking in the Red Sea is likely inbound to Yemen to feed the conflict (more on this below), there also appears to be a lucrative secondary market in which arms are trafficked from Yemen through the Red Sea to Sudan[131] and across the Gulf of Aden[132] to markets across the larger Horn of Africa.

Finally, maritime drug trafficking also appears a significant concern in the Red Sea. In the broader region, well known trafficking routes originating in Afghanistan and the Markan Coast move heroin through the Western Indian Ocean via dhows, and while the majority of this traffic appears to travel down the East African littoral, there may also be ancillary branches moving through the Red Sea, particularly to Egypt.[133] Several seizures in recent years indicate that maritime heroin trafficking in the Red Sea itself is a significant challenge. In 2016 an Iranian flagged offshore tug and support vessel was interdicted with 171 kg of heroin in the Red Sea by the Egyptian Navy.[134] In 2017, Egyptian authorities intercepted a consignment of 200 kg of heroin from the engine room of a commercial vessel in the Red Sea port of Safaga.[135] In 2018, a French naval vessel operating as part of Combined Maritime Taskforce 150 in the Red Sea interdicted a suspicious dhow with 260 kg of heroin.[136] And, in 2019, Egyptian authorities detained a small foreign flagged cargo vessel in the Red Sea with more than 2.1 tons of heroin in a concealed portion of the hold. [137]

In addition to heroin, maritime trafficking of captagon also appears increasingly prominent in the Red Sea.[138] Authorities in Saudi Arabia have seized tens of millions of captagon pills in Jeddah which have been hidden in shipments of sheet metal and fruit originating in Lebanon.[139] Across the sea in Port Sudan, millions of captagon tablets have seized over the last decade. [140] However it is important to note that in these cases at least, captagon trafficking appears to be largely reliant on larger cargo vessels, as opposed to STUVs.

That said, a variety of different kinds of STUVs appear to be involved in maritime trafficking in the Red Sea. As has previously been studied in some detail, dhows play a significant role in the movement of clandestine cargoes in the wider region.[141] However, from the information available, dhows do not appear to play as prominent a role in illicit maritime activity in the Red Sea as is observed in the broader region.[142] In fact, a lessening reliance by traffickers on dhows appears to be a wider trend across the broader region, as interdictions indicate that

Non-dhow fishing vessels

Small Cargo Vessel

Tug Boat in Yemen

Skiffs

Offshore support vessels

129 Amit A. Pandya, Rupert Herbert-Burns and Junko Kobayashi, "Maritime Commerce and Security:
The Indian Ocean," The Stimson Center, February 2011, p. 119, https://www.stimson.org/wp-content/files/file-attachments/Section_3_-_Maritime_Commerce_and_Security_The_Indian_Ocean_1.pdf.
130 Ali Mahmood, "Yemen coastguard see uptick in seizures of arms smuggled to Houthis," The National News, July 20, 2020, https://www.thenationalnews.com/world/mena/yemen-coastguard-see-uptick-in-seizures-of-arms-smuggled-to-houthis-1.1052009.
131 Interview with UODC-GMCP staff, Yemen, October 2021.
132 Jay Bahadur, "An Iranian Fingerprint: Tracing Type 56-1 Assault Rifles in Somalia?" Global Initiative Against Transnational Organized Crime, November 2021, https://globalinitiative.net/wp-content/uploads/2021/11/GITOC-An-Iranian-Fingerprint-Tracing-Type-56-1-assault-rifles-in-Somalia.pdf.
133 Charlie Mitchell, "International warships seize 22,000 kilograms of terror financing narcotics in Indian Ocean," The National News, February 23, 2019, https://www.thenationalnews.com/world/international-warships-seize-22-000-kilograms-of-terror-financing-narcotics-in-indian-ocean-1.829129.
134 UNODC, "Current situation with respect to regional and subregional cooperation in countering drug trafficking," August 29, 2017, p. 10, https://undocs.org/pdf?symbol=en/UNODC/HONLAF/27/3/Rev.1.
135 Egypt Today, "Interior Ministry foils attempt to smuggle heroin in Red Sea," December 10, 2017, https://www.egypttoday.com/Article/1/36336/Interior-Ministry-foils-attempt-to-smuggle-heroin-in-Red-Sea.
136 Naval Today, "French frigate seizes $61M of heroin in Red Sea," May 17, 2018, https://www.navaltoday.com/2018/05/17/french-frigate-seizes-61m-of-heroin-in-red-sea/.
137 Al-Masry Al-Youm, "Smuggling of drug shipment on foreign ship thwarted in Red Sea: Interior Ministry," Egypt Independent, April 5, 2019, https://egyptindependent.com/smuggling-of-drug-shipment-on-foreign-ship-thwarted-in-red-sea-interior-ministry/.
138 Global Initiative Against Transnational Organized Crime, "The nexus of conflict and illicit drug
Trafficking: Syria and the wider region," November 2016, p. 11, https://globalinitiative.net/wp-content/uploads/2016/10/The-nexus-of-conflict-and-illicit-drug-trafficking-Syria-and-the-wider-region.pdf.
139 Agence France-Presse, "Lebanon Hails Major Amphetamine Bust In Saudi Arabia," June 27, 2021, https://www.barrons.com/news/lebanon-hails-major-amphetamine-bust-in-saudi-arabia-01624790407.
140 Mohamed Daghar, "Is Sudan a new hub for captagon trafficking?" ENACT, June 24, 2019, https://enactafrica.org/research/trend-reports/is-sudan-a-new-hub-for-captagon-trafficking.
141 M. Umer Khan, "Assessing, Detecting, and Deterring the Threat of Maritime Nuclear and Radiological Smuggling in the Western Indian Ocean Region," Sandia National Laboratories, March 2017, https://www.sandia.gov/cooperative-monitoring-center/_assets/documents/sand2017-2902.pdf
142 Eden Cole and Emmanuel Deisser, "Dhow Trafficking Patterns in the Arabian Gulf, Western Indian Ocean, Gulf of Aden, and Red Sea," UNODC Global Maritime Crime Programme, August 2020.

traffickers are turning to the use of non-dhow fishing vessels in recent years.[143] Rather, in the Red Sea specifically, several other types of vessels are worth highlighting. These include small cargo vessels, tugs and offshore support vessels, and non-dhow fishing vessels,[144] which previous examples have highlighted. In addition, skiffs also appear to be a very commonly utilized type of vessel for trafficking in the Red Sea in particular.[145] Given their size, skiffs may create significant challenges in monitoring and detection. In addition, it has been noted in previous work that traffickers in the Red Sea often use the area's many uninhabited islands and rocks as transshipment and cache points for trafficked goods,[146] a task extremely well suited to relatively small, low draft vessels such as skiffs.

ASSESSMENT OF KEY RISK FACTORS

Given this background on the general maritime security and maritime trafficking context in the Red Sea, what are the key risk factors for R/N trafficking by STUVs and how should the region be assessed against these risks?

1. Presence of state or non-state actors potentially seeking nuclear materials

The Red Sea is rife with actors that may seek to acquire R/N material. Such groups include violent nonstate actors in Sinai and Yemen. Additionally, in a region with nuclear armed states and rapidly rising geopolitical tensions both in the Middle East and Horn of Africa, it is not beyond the realm of possibility that certain state actors may seek such material as well. The primary actors of concern in the region are Islamic State- Sinia Province (IS-SP) in Egypt and the Houthi movement in Yemen.

Of these two, IS- SP is likely of more limited concern regarding the potential for maritime STUV R/N trafficking. No available open-source information appears to directly link IS-SP with attempts to acquire R/N material, however, as with other IS affiliate groups, their place within the larger network may lend itself towards opportunistic efforts to obtain such material. IS-SP is also likely involved in the Sinai peninsula's illicit smuggling and human trafficking networks, though these are largely overland routes, with little indication of a maritime component.[147] However, as Egypt continues to take steps to cut off overland (and underground) smuggling routes used to move everything form daily commodities to weapons between the Sinai and Gaza,[148] actors involved in such operations may look to shift their efforts to the maritime domain.

However, at the other end of the Red Sea, the primary actor of concern for potential maritime STUV R/N smuggling in the region is the Houthi movement in Yemen. It is well established that the Houthis are a central part of the region's maritime arms smuggling ecosystem. The Houthis are recipients of arms smuggled through the maritime domain from Iran and may potentially be involved in follow on maritime trafficking of arms from Yemen to Somalia.[149] These maritime arms trafficking routes are known to utilize dhows in the Gulf of Aden and reports indicate that the Houthis are recruiting local Yemeni fishing vessels for the practice.[150] The Houthis' control of territory along Yemen's Red Seas coast provides them with easy access to exploit the maritime domain for trafficking purposes, including the previously mentioned flow of arms, in addition to profiting from maritime fuel smuggling.[151] As such, the group appears particularly adept at exploiting the maritime domain for trafficking using STUVs in a manner which heightens the risk of potential R/N smuggling.

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2. Presence of legacy stockpiles or natural resources associated with nuclear/ radioactive supply chain

Questions have also been raised about the security of R/N material in the region. In Egypt for example, the Nuclear Security Index ranks the country 45th out of 47 in the security of its nuclear facilities.[152] The index highlights Egypt's lack of adoption of several international agreements on nuclear security, insufficient transparency and reporting around nuclear security arrangements, and a deficiency in measures to counter insider threats at its facilities as significant risks to its nuclear material.[153] Conflict may also undermine nuclear security in the region. In Yemen, in 2010, well before the onset of the conflict, leaked American diplomatic cables warned that Yemen's stock of radioactive material was essentially unguarded, making it an easy target for criminal groups and violent non-state actors.[154] Given the sustained instability and shifting nature of control in Yemen in more recent years this would appear to remain a significant concern.

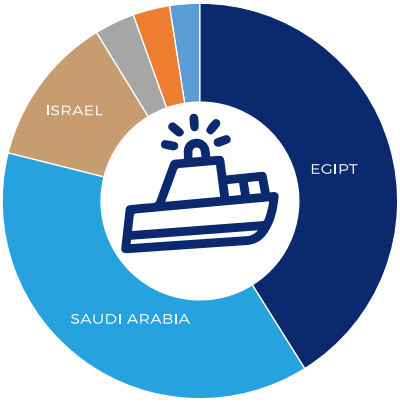
143 Eden Cole and Emmanuel Deisser, "Dhow Trafficking Patterns in the Arabian Gulf, Western Indian Ocean, Gulf of Aden, and Red Sea," UNODC Global Maritime Crime Programme, August 2020, p 16.
144 United States Institute of Peace, "Final Report and Recommendations of the Senior Study Group on Peace and Security in the Red Sea Arena," 2020, p. 40, https://www.usip.org/publications/2020/10/final-report-and-recommendations-senior-study-group-peace-and-security-red-sea.
145 Eden Cole and Emmanuel Deisser, "Dhow Trafficking Patterns in the Arabian Gulf, Western Indian Ocean, Gulf of Aden, and Red Sea," UNODC Global Maritime Crime Programme, August 2020, pg. 20-23.
146 United States Institute of Peace, "Final Report and Recommendations of the Senior Study Group on Peace and Security in the Red Sea Arena," 2020, p. 40, https://www.usip.org/publications/2020/10/final-report-and-recommendations-senior-study-group-peace-and-security-red-sea.
147 Australia National Security, "Islamic State Sinai Province (IS-Sinai)," Accessed November 9, 2021, https://www.nationalsecurity.gov.au/Listedterroristorganisations/Pages/Islamic-state-sinai-province-is-sinai.aspx.
148 P News, "Gaza recovers three dead bodies from smuggling tunnels," September 3, 2021, https://apnews.com/article/middle-east-africa-smuggling-02315a7bded8b986dff-729587de2832a.
149 Jay Bahadur, "An Iranian Fingerprint: Tracing Type 56-1 Assault Rifles in Somalia?" Global Initiative Against Transnational Organized Crime, November 2021, https://globalinitiative.net/wp-content/uploads/2021/11/GITOC-An-Iranian-Fingerprint-Tracing-Type-56-1-assault-rifles-in-Somalia.pdf.
150 Saeed Al-Batati, "Revealed: How Iran smuggles weapons to the Houthis," Arab News, October 1, 2020, https://www.arabnews.com/node/1742621/middle-east.
151 Trevor Johnston, et al., "Could the Houthis Be the Next Hizballah? Iranian Proxy Development in Yemen and the Future of the Houthi Movement," The RAND Corporation, 2020, p. 70, https://www.rand.org/content/dam/rand/pubs/research_reports/RR2500/RR2551/RAND_RR2551.pdf.
152 NTI Nuclear Security Index, "The NTI Index for Egypt," Accessed November 11, 2021, https://www.ntiindex.org/country/egypt/.
153 NTI Nuclear Security Index, "The NTI Index for Egypt," Accessed November 11, 2021, https://www.ntiindex.org/country/egypt/.
154 Karen McVeigh, "WikiLeaks cables: Yemen radioactive stocks 'were easy al-Qaida target'," The Guardian, December 19, 2020, https://www.theguardian.com/world/2010/dec/19/wikileaks-cables-yemen-al-qaida.

3. Presence of existing maritime smuggling networks

As was detailed above, the Red Sea has a complex system of clandestine maritime transportation. Vessels of many types including container cargo vessels, small local cargo vessels, non-dhow fishing vessels, fishing and cargo dhows, tugs, and skiffs have all been utilized to smuggle people, drugs, and arms across the Red Sea. These networks for both trafficking of illicit cargo and smuggling/trafficking of people, could be repurposed with relative ease for potential R/N smuggling, presenting a significant risk.

4. Prevalence of STUVs

NUMBER OF COASTAL AND PATROL VESSELS IN WEST AFRICA



Seas Maritime Security Index https://www.stableseas.org/services

A large and diverse set of vessels utilize the waters of the Red Sea. In addition to the many large container vessels passing through the major shipping lanes, there are also a variety of small fishing vessels, dhows, tugs, small cargo vessels, and skiffs crossing the narrow sea. While it is likely not possible to know the exact number of all such vessels due to a lack of data, it may be helpful to look more specifically at fishing vessels in order to get a sense of the scope of the number of vessels by littoral state.

According to the latest available data from the UN Food and Agriculture Organization, Saudi Arabia has the largest fishing fleet of any Red Seas state with roughly 11,200 fishing vessels. The large majority of this fleet consists of artisanal fishers who operate small vessels in shallow waters.[155] Yemen is estimated to operate the second largest fishing fleet in the region with more than 9,000. The vast majority of these are also artisanal vessels of between six and fifteen meters in lengths with a very small number of industrial size vessels.[156] Egypt also has a sizable fishing fleet of more than 8,000 vessels, with a roughly 60%, 20%, 20% split between motorized commercial, commercial sail, and recreational fishing vessels respectively. It is not known exactly how many of these operate out of the Red Sea as opposed to the Mediterranean, but the Red Sea constitutes 38% of recorded marine catch.[157] Given the fact that the Mediterranean Sea has a higher proportion of industrial vessels while artisanal and recreational vessels are concentrated along the Red Sea coast, thousands of small Egyptian fishing vessels are likely to be operating in the Red Sea. There are also an estimated 1,500 pleasure craft in Egypt,[158] though the number operating in the Red Sea as opposed to the Nile and Mediterranean is unclear. Sudan has an estimated 2,330 small, non-motorized vessels which are utilized in the country's largely artisanal fishing sector in addition to roughly 600 larger motorized vessels in its growing industrial fishing fleet.[159] Other states along the Red Sea have significantly fewer fishing vessels. Eritrea has 210 vessels, with 175 of these of less than 24 meters in length,[160] Jordan's entirely artisanal fishing fleet consists of 220 small vessels,[161] while Israel reports almost no fishing activity from its Red Sea coast.[162]

«...there is a clear bifurcation of capabilities to address maritime security challenges, including maritime trafficking, in the region. »

5. Level of maritime domain awareness and maritime enforcement capacity

Maritime enforcement capacity in the Red Sea is extremely variable. On one side of the spectrum are some of the region's most advanced navies, and on the other are states who struggle significantly to mobilize the resources necessary to effectively project security and governance into their maritime domains. Egypt, Israel, and Saudi Arabia all have robust maritime enforcement capabilities. Egypt's Navy operates six submarines, nine principal surface combatants, 61 coastal and patrol vessels, and a significant maritime aerial patrol capability. Its Coast Guard contributes another 79 patrol vessels for countering nontraditional maritime security challenges such as maritime trafficking.[163] Saudi Arabia also has a very robust capability, though with a significantly smaller patrol vessel availability between its Navy and Border Force (roughly 60 such vessels).[164] However, both are bicoastal states and for each, their respective Red Sea coasts have likely been a second priority given Egypt's interests in the Mediterranean and Saudi Arabia's rival across the Persian Gulf. That said, both are showing increased attention to Red Sea maritime security by increasing the maritime capabilities stationed on its shores[165] and leading a variety of collective efforts focused on enhancing regional maritime security.[166]

Other maritime forces in the region lay decidedly on the other side of the spectrum. Jordan has a relatively small navy of roughly 500 personnel and seven patrol vessels, but this is for the protection of a very small maritime domain.[167] Eritrea has spent much of its recent history engaged in active conflicts on land and has largely neglected its maritime forces with only 12 patrol vessels.[168] Sudan has faced a similar dilemma, with long running internal security challenges that have left little of its security resources and policy prioritization

155 Food and Agriculture Organization of the United Nations, "The Kingdom of Saudi Arabia," February 2017, http://www.fao.org/fishery/facp/SAU/en.
156 Food and Agriculture Organization of the United Nations, "The Republic of Yemen," February 2002, http://www.fao.org/fi/oldsite/FCP/en/YEM/profile.htm.
157 Food and Agriculture Organization of the United Nations, "The Arab Republic of Egypt," 2010, http://www.fao.org/fishery/facp/EGY/en.
158 U.S. Commercial Service, "Pleasure Boat International Resource Guide," 2018, p. 33, http://www.nmma.org/assets/cabinets/Cabinet442/Pleasure%20Boat%20Resource%20Guide%202018_Final2.pdf.
159 Food and Agriculture Organization of the United Nations, "The Republic of the Sudan," 2019, http://www.fao.org/fishery/facp/SDN/en.
160 Food and Agriculture Organization of the United Nations, "The State of Eritrea," April 2021, http://www.fao.org/fishery/facp/ERI/en.
161 Food and Agriculture Organization of the United Nations, "The Hashemite Kingdom of Jordan," August 2019, https://www.fao.org/fishery/facp/JOR/en.
162 Food and Agriculture Organization of the United Nations, "The State of Israel," 2018, http://www.fao.org/fishery/facp/ISR/en .
163 International Institute for Strategic Studies, "Chapter Seven: Middle East and North Africa," The Military Balance, 2019, p. 337, DOI: 10.1080/04597222.2018.1561033.
164 International Institute for Strategic Studies, "Chapter Seven: Middle East and North Africa," The Military Balance, 2019, p. 365, DOI: 10.1080/04597222.2018.1561033.
165 Ahmed Eleiba, "Egypt's Naval Operations Expanding Southwards," Tesfa News, January 15, 2017, https://tesfanews.net/egypt-navy-operations-expanding-south/.
166 Desirée Custers, "Red Sea Multilateralism: Power Politics or Unlocked Potential," The Stimson Center, April 7, 2021, https://www.stimson.org/2021/red-sea-multilateralism-power-politics-or-unlocked-potential/.
167 International Institute for Strategic Studies, "Chapter Seven: Middle East and North Africa," The Military Balance, 2019, p. 350, DOI: 10.1080/04597222.2018.1561033.
168 International Institute for Strategic Studies, "Chapter Seven: Middle East and North Africa," The Military Balance, 2019, p. 467, DOI: 10.1080/04597222.2018.1561033.

available for the protection of its extensive maritime space, resulting in a very small navy with only 11 patrol vessels. Yemen, who's navy and coast guard were in relative disrepair even before the onset of the current conflict, [169] is just now reestablishing a functioning coast guard with the assistance of the UNODC Global Maritime Crime Programme. [170]

In summary there is a clear bifurcation of capabilities to address maritime security challenges, including maritime trafficking, in the region. At the northern end of the Red Sea, the relatively high-capacity states of Egypt, Israel, Jordan, and Saudia Arabia enjoy a maritime domain that is, while not free of conflict and nontraditional maritime security threats, relatively stable. While at the southern end of the sea, significantly weaker capacity states must deal which a much more unstable and challenging maritime domain ripe with maritime terrorism, maritime mixed migration, and trafficking. This imbalance challenges the ability of the entire region to address its shared maritime security interests.

6. Strength of systems for STUV registration and monitoring

«...there may be a need for greater clarity about which vessels meet registration requirements and/or greater resources may be necessary for the full implementation of existing legislation on registration. »

Registration and monitoring systems for STUVs in the Red Sea vary significantly across states. Registration requirements of some kind are universal, but the types of vessels which require registration and the degree to which these systems are effectively implemented appears to differ somewhat significantly. In Egypt, all vessels must be registered with the exception nonmotorized fishing vessels, recreation vessels under ten tons, and vessels restricted to operation within ports.[171] Very similarly, in Saudi Arabia, a recently passed, 2018 maritime law (which replaces legislation dating back to 1931 based on Ottoman law) requires all vessels to be registered with similar exemptions for vessels under 24 meters in length, fishing vessels under 30 tons, recreational vessels under 10 tons, vessels of "primitive construction," and vessels restricted to port operations.[172] And while it would be expected that higher capacity states such as Egypt and Saudia Arabia would have such registration regimes, even more resource constrained states in the region make similar efforts. For example, the Yemen Coast Guard maintains a vessel registry that includes over 1,000 vessels.[173] Sudan also has legislation mandating vessels registration, though it appears there are challenges which arise form a lack of specificity as to what vessels meet such registration requirements and how they should be implemented.[174] All of these efforts are laudable but in some cases there may be a need for greater clarity about which vessels meet registration requirements and/or greater resources may be necessary for the full implementation of existing legislation on registration. In addition, even in states where requirements around vessels registration are quite clear, they are far from universal. Many of the vessel types described above which do not explicitly require registration in Egypt and Saudi Arabia, for example, could very easily be exploited for coastal trafficking activities.

In addition, while significant recent progress has been made, there appears to be significant gaps in the actual monitoring of STUVs at sea. For example, mandatory use of VMS for fishing vessels appears rare in those states for which information is available. Eritrea passed legislation in 2014 which mandated the establishment of a Fisheries Monitoring Centre and VMS with remote satellite tracking of fishing vessels,[175] but the degree to which such a relatively advanced system has been implemented in the intervening years is unclear. Egypt, despite its robust maritime enforcement capabilities, appears to conduct only limited monitoring of fishing vessels at sea, with only two fishing vessels reportedly using its VMS system and fairly limited monitoring of fish landing sites.[176] In Saudi Arabia, VMS is not required for the domestic fishing fleet,[177] but there appears to be efforts being made to increase remote monitoring of STUVs. For example, some recreational craft in the country are reportedly being equipped with AIS, the Coast Guard monitors fishing ports,[178] and, in 2016, the country reportedly purchased a large number of AIS transponders as part of a drive to facilitate monitoring of its domestic vessels,[179] though the types of vessels targeted by these efforts and the degree of implementation to date in unclear.

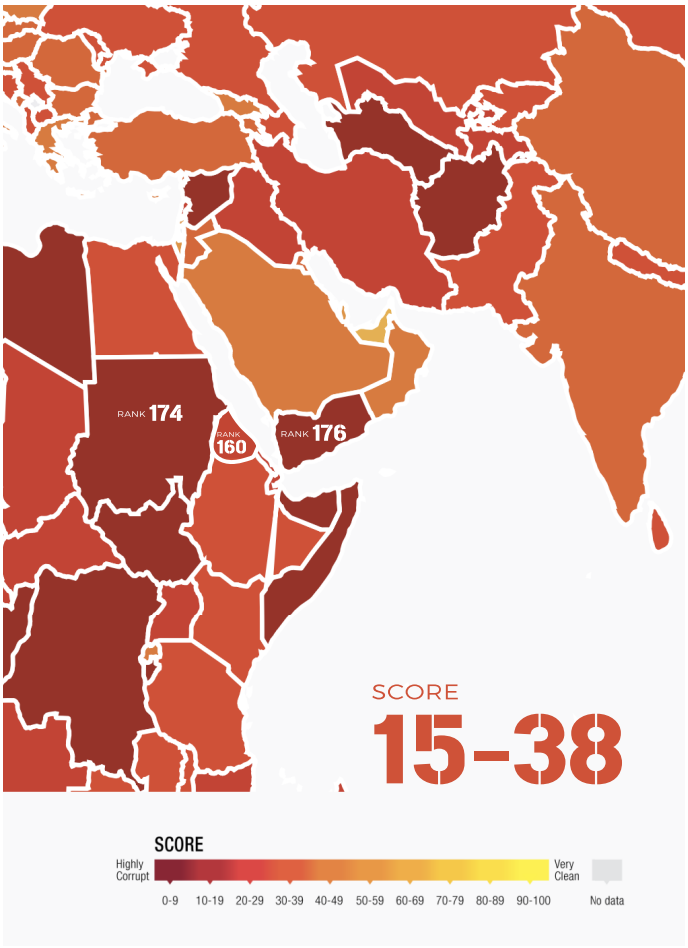
«...while significant recent progress has been made, there appears to be significant gaps in the actual monitoring of STUVs at sea. »

In summary, states in the Red Sea region are making progress in their capacity to register and monitor vessels under their jurisdiction, albeit, in many cases from a relatively low baseline. Despite this progress however, significant gaps exist in registration and monitoring systems, particularly for STUVs, which may significantly increase the potential risk of their utilization in any attempts to traffic R/N material through the maritime domain.

169 Eleonora Ardemagni, "Rebuilding Yemen's Maritime Forces Hobbled by Internal and External Rivalries," The Arab Gulf States Institute in Washington, August 6, 2020, https://agsiw.org/rebuilding-yemens-maritime-forces-hobbled-by-internal-and-external-rivalries/.
170 United Nations Development Programme, "Maritime Governance to Promote Security and Safety in Yemen," Accessed November 11, 2021, https://www.ye.undp.org/content/yemen/en/home/projects/Maritime.html.
171 Youssry Saleh, "Vessels Registration in Egypt," HG Legal Resources, Accessed November 10, 2021, https://www.hg.org/legal-articles/vessels-registration-in-egypt-37735.
172 Robert Lawrence, Khurram Ali, and Ahmed Alhudaithi, "Saudi Arabia Officially Introduces First Bespoke Maritime Law," Mondaq, July 10, 2019, https://www.mondaq.com/saudi-arabia/marine-shipping/823524/saudi-arabia-officially-introduces-first-bespoke-maritime-law.
173 Interview with UODC-GMCP staff, Yemen, October 2021.
174 Wahya Almansurry, "THE SHIP REGISTRATION ACT OF THE RUPUBLIC OF THE SUDAN, 2014," IMO International Maritime Law Institute, 2014, p. 14, https://imli.org/wp-content/uploads/2020/11/Wahya-Almansurry-sudan-Draft-2014.pdf.
175 Government of Eritrea, "PROCLAMATION NO 176/2014: THE FISHERIES PROCLAMATION," Gazette of Eritrean Law, Volume 22, Number 2, October 2014, https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/103959/126618/F-221982642/ERI103959.pdf.
176 Ganapathiraju Pramod, "Egypt Country Report," IUU Risk Intelligence, April 2018, https://iuuriskintelligence.com/wp-content/uploads/2018/03/Egypt-country-Report-Global-Fisheries-MCS-Report-2018.pdf.
177 Ganapathiraju Pramod, "Saudi Arabia Country Report," IUU Risk Intelligence, April 2018, p.3, https://iuuriskintelligence.com/wp-content/uploads/2018/03/Saudi-Arabia-country-Report-Global-Fisheries-MCS-Report-2018.pdf.
178 Ganapathiraju Pramod, "Saudi Arabia Country Report," IUU Risk Intelligence, April 2018, p.4, https://iuuriskintelligence.com/wp-content/uploads/2018/03/Saudi-Arabia-country-Report-Global-Fisheries-MCS-Report-2018.pdf.
179 SRT Marine Systems, "VESSEL TRACKING ORDER RECEIVED FOR SAUDI ARABIA," October 14, 2016, https://srt-marine.com/vessel-tracking-order-received-saudi-arabia/.

7. Perceived levels of corruption or lack of capacity in port and customs authorities

As with the discussion above of maritime enforcement capacity, corruption in the Red Sea is extremely divergent across geographic lines. Along the northeast coast, Israel, Saudi Arabia, and Jordan, rank 35th, 52nd and 60th respectively in Transparency International's 2020 Corruption Perceptions Index, all in the top third. While at the southern end of the sea Eritrea (160th), Sudan (174th), and Yemen (176th) all rank in the bottom 20 of the 180 states measured. While reporting on specific instances of corruption in relevant government entities is limited, it is highly likely that corruption plays a facilitating role in the illicit maritime transportation of goods and people in the southern Red Sea, creating the potential that such corruption could potentially similarly facilitate maritime R/N trafficking in certain contexts.



Source

8. Level of economic and physical security in coastal communities

As with many of the risk factors of potential R/N trafficking via STUVs in the Red Sea, coastal economic welfare in the region varies significantly. GDP per capita adjusted for purchasing power in Saudi Arabia (48,948 USD) is nearly 30 times that in Eritrea (1,682 USD), just across the water.[180] In Yemen 51% of the population lives on less that 3.20 USD a day. The corresponding figure in Israel is 1%.[181] There are significant coastal populations in Sudan, Eritrea, and Yemen in particular, with extremely limited economic opportunities. In addition, fishing, one of the economic activities many such communities had relied on, has been consistently undermined in recent decades. Overfishing[182] and marine pollution[183], appear to have contributed to a significant decline in the region's fisheries production. From a peak in 1999, Red Sea fisheries production has been on a steady decline and by 2018 production had dropped from this peak by more than 45%.[184] In real terms, the catch of the artisanal fishing sector in the Red Sea dropped from 112,000 tons to 80,000 tons over the same period.[185] In the coastal communities (primarily along the southern coast of the Red Sea) most impacted by economic insecurity and compounded by declining fisheries, the risk of a turn to maritime trafficking using STUVs out of economic necessity is very high.

«In the coastal communities (primarily along the southern coast of the Red Sea) most impacted by economic insecurity and compounded by declining fisheries, the risk of a turn to maritime trafficking using STUVs out of economic necessity is very high.»

180 The World Bank, "GDP per capita, PPP (current international $)," Accessed November 11, 2021, https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?most_recent_value_desc=true.
181 The World Bank, "Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)," Accessed November 11, 2021, https://data.worldbank.org/indicator/SI.POV.LMIC?most_recent_value_desc=true.
182 Claire Shellem et al., "Red Sea fish market assessments indicate high species diversity and potential overexploitation," Fisheries Research, Volume 239, July 2021, https://doi.org/10.1016/j.fishres.2021.105922.
183 Ibrahim Naffee, "Red Sea shore loses up to 70% of its fish stock to pollution," Arab News, August 27, 2013, https://www.arabnews.com/news/461752.
184 University of British Columbia- Sea Around Us, "Catches by Reporting status in the waters of Red Sea," Accessed November 8, 2021, https://www.seaaroundus.org/data/#/lme/33?chart=catch-chart&dimension=reporting-status&measure=tonnage&limit=10.
185 University of British Columbia- Sea Around Us, "Catches by Reporting status in the waters of Red Sea," Accessed November 8, 2021, https://www.seaaroundus.org/data/#/lme/33?chart=catch-chart&dimension=sector&measure=tonnage&limit=10.


INDONESIA

INDONESIA

MARITIME SECURITY AND TRAFFICKING CONTEXT

Indonesia's maritime security context is characterized by complexity. It has a vast and varied maritime domain and an equally complex set of maritime security challenges to contend with. Its vast archipelagic geography spans roughly 5,000 kilometers from east to west and includes more than 14,000 islands and the second longest coastline in the world,[186] generating an EEZ of more than 6 million square km.[187] This expansive maritime geography presents both opportunities and significant challenges for those working to ensure its security. In addition to maritime trafficking, three other maritime security challenges: IUU fishing, maritime terrorism, and piracy and armed robbery, are significant concerns that shape the country's maritime security strategy.

Perhaps the most pressing of these on a day-to-day basis is IUU fishing. Both foreign and domestic fisheries crime is a massive challenge for Indonesia and one that is estimated to cost it roughly $4 billion annually.[188] Domestic IUU fishing largely takes the form of harvest via illegal methods (poison, explosives, etc.), in protected areas, or of protected species. Foreign IUU fishing takes the form of foreign fishing vessels operating in Indonesia's EEZ without authorization and is primarily perpetrated by Vietnamese, Malaysian, Filipino, and Chinese vessels along the northern fringe of the Indonesian EEZ.[189] IUU fishing is a significant threat in a country in which 7 million people count on the fishing industry for employment[190] and the majority of animal protein consumed comes from seafood.[191] It also represents a huge strain on Indonesia's overstretched maritime enforcement authorities as they play a time consuming game of cat and mouse with IUU fishing vessels.

Quite different from fisheries enforcement, Indonesia must also contend with the use of the maritime space by violent nonstate actors (described in greater detail below). Indonesia and it neighbors have long had to contend with violent campaigns by separatist and extremists, and given the geography of the country, these onshore security issues take on maritime dimensions as well. Many Southeast Asian violent nonstate actors have become extremely adept at exploiting the maritime domain to finance their operations, facilitate logistic support, and occasionally carry out attacks on targets at sea.[192] Given the stakes of allowing such actors to exploit the maritime space unchecked, it is a risk which must be continually monitored.

Perhaps the most attention-grabbing maritime security challenge faced by Indonesia however is piracy and armed robbery, of which Indonesia is the epicenter in Asia. In 2020 the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) recorded 97 piracy and armed robbery incidents in Asia. 56 of these occurred in Indonesian waters.[193] This takes the form of both robbery at anchorage, as well as the targeting of vessels underway through the Indonesian portion of the Straits of Malacca and Singapore. The later of these is particularly problematic in its potential to threaten the safety and security of one of the world's most critical maritime chokepoints and thus requires significant resources and policy prioritization to address.

Finally, maritime trafficking is also a significant challenge in Indonesia given is vast and sometimes porous maritime borders. The primary products trafficked through Indonesia's maritime domain appear to be synthetic drugs and illicit wildlife products. In terms of synthetic drugs, Indonesia sits directly along the maritime routes which traffickers use to move synthetic drugs from production centers in mainland Southeast Asia to consumers in Oceania and East Asia. As such, Indonesia has seen a dramatic acceleration of synthetic drug trafficking in

MARITIME SECURITY THREATS IN INDONESIA

186 Lyle J. Morris and Giacomo Persi Paoli, A Preliminary Assessment of Indonesia's Maritime Security Threats, RAND Corporation, 2018, https://www.rand.org/content/dam/rand/pubs/research_reports/RR2400/RR2469/RAND_RR2469.pdf.
187 Marine Regions, "Indonesia EEZ," Accessed July 3, 2021, https://www.marineregions.org/eezdetails.php?mrgid=8492&zone=eez.
188 Aaron Orlowski, "Indonesia's explosive IUU policy is working, new report says," SeafoodSource, May 21, 2018, https://www.seafoodsource.com/features/indonesias-explosive-iuu-policy-is-working-new-report-says.
189 Information Fusion Centre, "IFC Products," https://www.ifc.org.sg/ifc2web/app_pages/User/common/SharingPublications.cshtml.
190 California Environmental Associates, Trends in Marine Resources and Fisheries Management in Indonesia: A 2018 Review, 2018, p. 12, https://www.ceaconsulting.com/wp-content/uploads/Indonesia-Report-2018-11.9.18-compressed.pdf.
191 Marine Stewardship Council, "Fish for Good- Indonesia," https://www.msc.org/what-we-are-doing/pathway-to-sustainability/fishforgood/indonesia.
192 Jay Benson, "Violent Non-State Actors in the Maritime Space: Implications for the Philippines," Philippine Strategic Forum, February 2, 2021, https://www.stratforumph.com/post/violent-non-state-actors-in-the-maritime-space-implications-for-the-philippines.
193 ReCAAP, "List of Incidents for 2020," https://www.recaap.org/resources/ck/files/Number%20of%20Incidents/List%20of%20Incidents%20for%202020%20(caa%2018%20Dec%2020).pdf.

recent years. In the six years between 2014 and 2019 Indonesia saw the amount of synthetic drugs seized increase from 1,125 kg to 17,900 kg,[194] much of this is moved through the country on fishing vessels and other types of STUVs.[195] In 2018 for example, a fishing vessel was used to traffic 1.6 tons of methamphetamine to the island of Batam, just across the strait from Singapore. [196]

In addition, given its biodiversity and maritime geography, Indonesia has become a hotspot for maritime trafficking of illicit wildlife products. In 2019 Indonesia's Ministry of Environment and Forestry estimated that the illegal wildlife trade in the country was valued at nearly $1 billion annually.[197] STUVs are used extensively in this process, with illicit wildlife including reptiles, birds, and turtles discovered routinely on passenger ferries,[198] fishing vessels,[199] small traditional cargo vessels, barges, and tugs,[200] and at the country's multitude of small, minimally monitored small ports and informal landings.

All for these diverse maritime security challenges, spread across a vast and crowded maritime domain present an incredibly complex maritime security challenges for Indonesia, and create a facilitating environment for other forms of clandestine maritime activity, potentially including R/N smuggling.

ASSESSMENT OF KEY RISK FACTORS

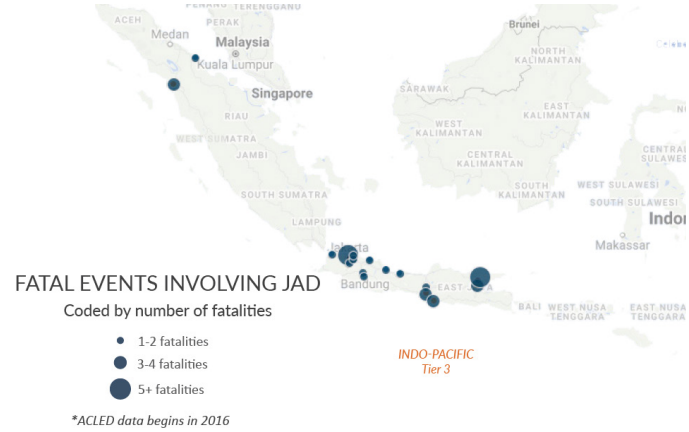
Given this background on the general maritime security and maritime trafficking context in Indonesia's waters, what are the key risk factors for R/N trafficking by STUVs and how should Indonesia be assessed against these risks?

1. Presence of state or nonstate actors potentially seeking nuclear materials

Indonesia has a host of violent nonstate actors with a variety of motivations and modes of operating within its territory and in bordering regions of adjacent states. Some of the more prominent of these include violent extremist groups such as Jemaah Islamiyah (JI), Jemaah Ansharut Daulah (JAD), and Mujahideen Indonesia Timur (MIT), as well as a growing separatist challenge in Papua from armed separatist groups.

Source

Source



Source

194 United Nations Office on Drugs and Crime, Synthetic Drugs in East and Southeast Asia, 2020, p. 48, https://www.unodc.org/documents/southeastasiaandpacific/Publications/2020/Synthetic_Drugs_in_East_and_Southeast_Asia_2020.pdf.
195 Information Fusion Centre, "IFC Products," https://www.ifc.org.sg/ifc2web/app_pages/User/common/SharingPublications.cshtml.
196 Reuters, "Indonesia seizes record 1.6 tonnes of crystal methamphetamine," February 20, 2018, https://www.reuters.com/article/us-indonesia-drugs/indonesia-seizes-record-1-6-tonnes-of-crystal-methamphetamine-idUSKCN1G41NW.
197 Christine Knaus, "Wildlife Trafficking in Indonesia," Public Policy Indonesia, January 30, 2020, https://publicpolicyindonesia.wordpress.com/2020/01/30/wildlife-trafficking-in-indonesia/.
198 BBC World News, "Parrots found stuffed in plastic bottles in Indonesia," November 20, 2020, https://www.bbc.com/news/world-asia-55016513#:~:text=Dozens%20of%20smuggled%20parrots%20stuffed,from%20inside%20a%20large%20box.
199 Coconuts Bali, "7 arrested for alleged endangered green turtles smuggling attempt," July 13, 2020, https://coconuts.co/bali/news/7-arrested-for-alleged-endangered-green-turtles-smuggling-attempt/.
200 Tempo, "Indonesian Navy Surabaya Seizes a Ship with Teak Wood in it," June 7, 2016, https://nasional.tempo.co/read/777598/tni-al-surabaya-tangkap-kapal-bermuatan-kayu-jati.

Looking at the three religious extremist groups, it is important to note that the groups differ significantly. JI is older, more established, has a broader base of ideological and financial support in Indonesia, and has long held ties to the Al Qaeda network. MIT and JAD on the other hand are newer, smaller, and IS linked. Despite their differences, all three may have motivations to obtain nuclear or radiological material. For example, studies on JI recruitment activities show that the group included nuclear scientists on a list of professions it sought to recruit individuals from.[201] JAD appears to have made even more significant efforts. In 2017, Indonesian authorities arrested five JAD members who had planned to detonate a radioactive "dirty bomb." The group had planned to transform Thorium 232 into Uranium 233 and combine this with a homemade explosive.[202] While the plan was scientifically unfeasible, they had planned to target either the presidential palace or police headquarters. The group drew their inspiration from a bomb making manual titled "Nuclear for Dummy," posted online by a JAD

Routes taken by foreign fighters traveling to Mindanao in the Philippines from Malaysia and Indonesia. Image: GoogleEarth/The Defense Post

leader, which called for Indonesian extremists to learn and utilize nuclear science.[203] Given these active attempts to utilize R/N material for terrorist purposes, the motivation for maritime R/N trafficking would appear high.

What's more, these groups are also highly adept at exploiting the maritime domain for smuggling and trafficking purposes. Much of this activity takes place in the maritime tri-border area of the Sulu and Celebes seas. The region has been a center of the movement of goods and people between Indonesia, Malaysia, and the Philippines for centuries. Violent nonstate actors in all three states have exploited these existing smuggling and trafficking routes to move supplies and fighters through the maritime domain. In Indonesia in particular, the island of Sulawesi, is an important center of jihadist activity,[204] as well as being the primary Indonesian jumping off point for these maritime smuggling and trafficking routes. The city of Manado, in North Sulawesi province has been identified as the primary Indonesian terminus of smuggling and trafficking routes that moves through the northern Indonesian Sangihe and Talaud islands groups to Mindanao in the southern Philippines.[205] All three groups previously mentioned appear to actively exploit these routes for the movement of arms and supplies to and from the southern Philippines,[206] which has its own active ecosystem of violent extremist groups.

These extremist groups have demonstrated a desire to target civilians, an interest in acquiring R/N material, and an ability to exploit maritime trafficking by STUVs in the region, and therefore present a significantly high risk of potentially pursuing maritime R/N trafficking.

Finally, in addition to violent religious extremist groups, Indonesia has also seen increasing activity by armed Papuan separatist groups in recent years. Several groups, who sometimes act in concert but are often in competition with each other,[207] have been conducting a low intensity insurgency against Indonesian rule in Papua for decades. These groups do not appear to have any clear motivation for R/N trafficking specifically and there is no evidence to suggest they have ever been involved in such activity. There is however some link to the maritime trafficking of arms though the Celebes Sea from the Philippines to West Papua, which have made their way to separatist

201 Sidney Jones, "The Re-Emergence of Jemaah Islamiyah," Institute for Policy Analysis of Conflict, April 27, 2017, p. 27, https://www.academia.edu/32722412/THE_RE-EMERGENCE_OF_JEMAAH_ISLAMIYAH.
202 Tom Allard and Agustinus Beo Da Costa, "Exclusive: Indonesian militants planned 'dirty bomb' attack – sources," Reuters, August 25, 2017, https://www.reuters.com/article/us-indonesia-security/exclusive-indonesian-militants-planned-dirty-bomb-attack-sources-idUSKCN1B51FW.
203 Tom Allard and Agustinus Beo Da Costa, "Exclusive: Indonesian militants planned 'dirty bomb' attack – sources," Reuters, August 25, 2017, https://www.reuters.com/article/us-indonesia-security/exclusive-indonesian-militants-planned-dirty-bomb-attack-sources-idUSKCN1B51FW.
204 Aljazeera, "Indonesia police kill ISIL-linked leader in Sulawesi shoot-out," September 19, 2021, https://www.aljazeera.com/news/2021/9/19/indonesia-police-kill-is-linked-leader-in-sulawesi-shootout.
205 Zam Yusa, "Malaysia and Indonesia foreign fighter transit routes to Philippines identified," The Defense Post, November 20, 2018, https://www.thedefensepost.com/2018/11/20/malaysia-indonesia-philippines-foreign-fighters-transit-routes/.
206 Zam Yusa, "Malaysia and Indonesia foreign fighter transit routes to Philippines identified," The Defense Post, November 20, 2018, https://www.thedefensepost.com/2018/11/20/malaysia-indonesia-philippines-foreign-fighters-transit-routes/.
207 Jordan Fennell and Tracey Shelton, "West Papua rebel groups join forces in bid for independence from Indonesia: separatist group," Australian Broadcasting Corporation, July 2, 2019, https://www.abc.net.au/news/2019-07-03/three-armed-separatist-groups-unite-in-west-papua/11273382.

groups.[208] That said, the link to maritime arms trafficking is likely indirect as the groups primarily operate in the highlands away from coastal areas. Given the confluence of these factors the risk of such groups' participation in maritime R/N trafficking would appear quite low.

2. Presence of legacy stockpiles or natural resources associated with nuclear/ radioactive supply chain

Indonesia has long considered the potential of nuclear energy as a potential way forward for its substantial electrification needs and has undertaken the development of experimental reactors.[209] Indonesia has also adopted many of the international community's treaties on nuclear security including Convention on the Physical Protection of Nuclear Materials and The International Convention for the Suppression of Acts of Nuclear Terrorism.[210] However, Indonesia's ability to monitor and control R/N material may present risks as research organizations have described its export control system as "nascent" and called into question its ability to maintain control over R/N material.[211] The country is taking steps to address these concerns, having, for example, installed seven Radiation Portal Monitors at its major ports with the assistance of the IAEA.[212] However, the country may still represent a potentially heightened risk for material out of regulatory control.

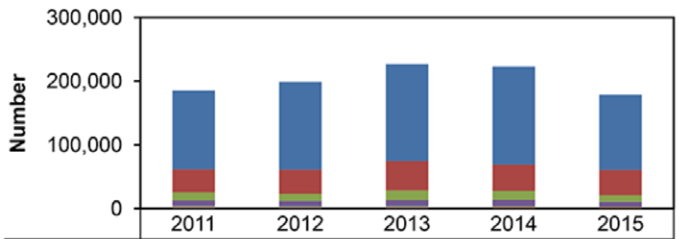
3. Presence of existing maritime smuggling networks

Per the description above, Indonesia has an array of existing maritime smuggling networks that crisscross the archipelago. Traffickers use a wide variety of vessel types including traditional cargo vessels, barges, tugs, speedboats, fishing vessels, and passenger ferries to move illicit product across, into and out of Indonesia. All of these networks could potentially represent avenues for those seeking to traffic R/N material through the maritime space.

4. Prevalence of STUVs

There are a plethora of STUVs in Indonesia. The country's maritime geography makes the use of vessels for a variety of purposes a practical necessity. As such, STUVs, of a variety of types, are ubiquitous throughout the country. These include small fishing vessels, traditional cargo vessels, barges, passenger ferries (both formal and informal), and other craft. While it is unfeasible to definitively determine the exact number of STUVs in Indonesia, it is possible to draw upon some know figures to shed light on the scale and profile of these vessels. The most prominent type of STUV in Indonesia are small fishing vessels. In 2015, there were estimated to be more then 560,000 fishing vessels in Indonesia, down slightly from well over 600,000 in previous years.[213] This fishing fleet is overwhelmingly made up of small and/or traditional vessels. As opposed to large, inboard motors, an estimated 43% of Indonesia fishing vessels use outboard motors, while another 25% of the vessels are nonmotorized altogether.[214] 98.5% of Indonesian fishing vessels with inboard motors are less than 30 tons, while 88.3% are less than 10 tons, and 66.1% of vessels are smaller than 5 tons.[215] This paints a picture of a fishing fleet which is overwhelmingly quite small and traditional in nature.

Figure 8. Number of fishing boats in marine capture fisheries in Indonesia in 2011-2015 by size
Source: KKP, 2016b



	2011	2012	2013	2014	2015
< 5 GT	123,748	137,587	151,939	153,493	117,848
5-10 GT	35,877	37,694	46,358	41,374	39,429
10-20 GT	13,201	11,583	15,208	14,301	10,515
20-30 GT	8,022	7,611	8,782	9,578	7,680
30-50 GT	914	917	1,074	1,029	825
50-100 GT	1,801	1,641	1,727	1,766	1,435
100-200 GT	1,204	1,167	1,127	840	571
> 200 GT	354	338	358	176	9
Total	185,121	198,538	226,573	222,557	178,312

Source KKP, 2016 B

In addition to fishing vessels, there are also several other categories of vessels that might qualify as STUVs. One such category are small, traditional wooden cargo vessels. Such vessels are still relied upon heavily in many areas of Indonesia for the movement of cargo within the archipelago.[216] Smaller ports from which these traditional cargo vessels operate, for example Sunda Kelapa port in Jakarta, scatter the country and continue to play an unimportant role in the system of domestic cargo movement.[217] Likewise, maritime passenger vessels, both formal and informal ferries, are extremely numerous and important to the transportation system in Indonesia. In 2019 the state-run ferry service moved more than seven million passengers and 767,582 tons of cargo, though many more people and goods move across Indonesia via private ferries and cargo vessels to ports, terminals, and informal landings across the archipelago.

The sheer number of STUVs in Indonesia presents a significant monitoring challenge. The fact that many of these vessels utilize small, informal ferry terminals, ports, and landing sites further adds to their potential to contribute to the risk of STUV trafficking, including of R/N material.

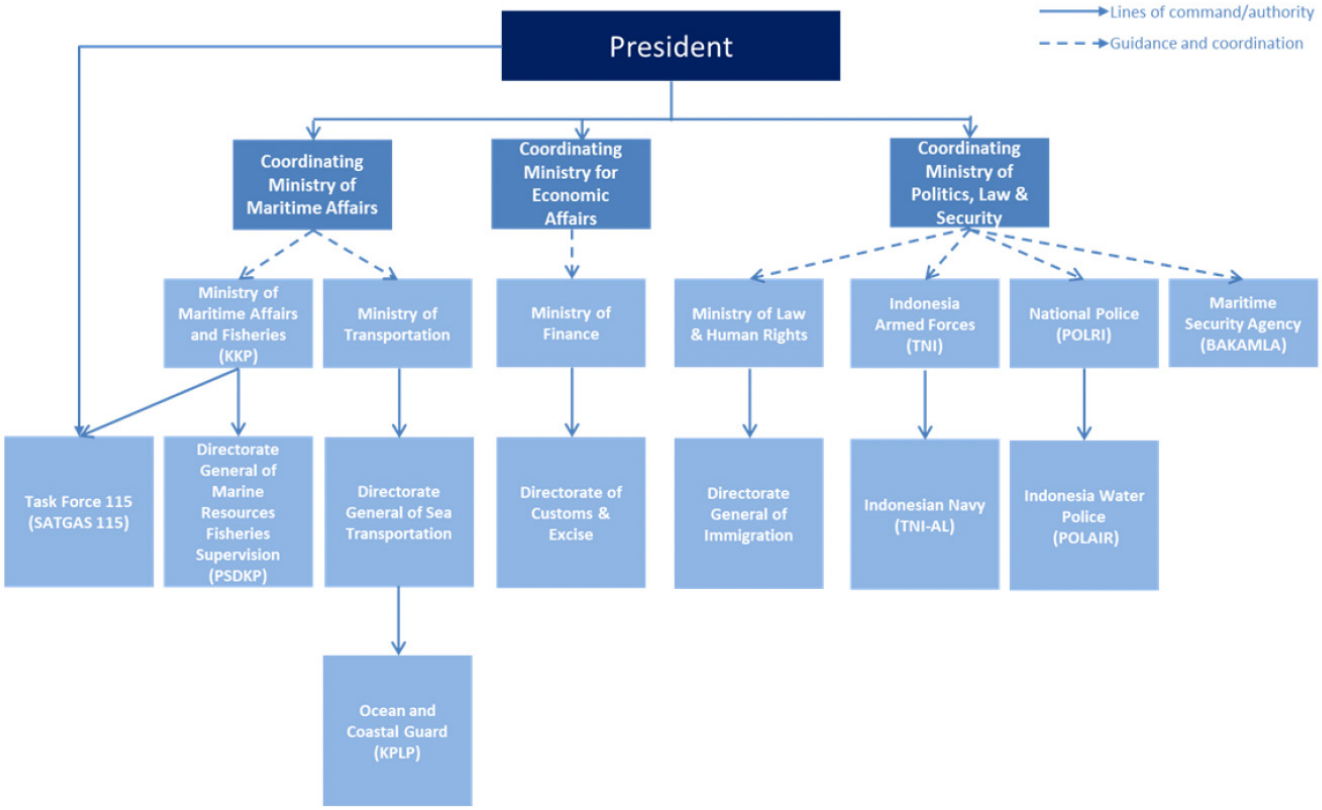
208 Melyana R Pugu, "Illegal Small-Arms Trade, Armed Violence, and Human Security at the land Border in Papua, Indonesia," Border Security Report, July 31, 2020, https://border-security-report.com/illegal-small-arms-trade-armed-violence-and-human-security-at-the-land-border-in-papua-indonesia/.
209 World Nuclear Association, "Nuclear Power in Indonesia," January, 2021, https://world-nuclear.org/information-library/country-profiles/countries-g-n/indonesia.aspx.
210 NTI Nuclear Security Index, "The NTI Index for Indonesia," Accessed November 11, 2021, https://www.ntiindex.org/country/indonesia/.
211 Nuclear Threat Initiative, "Indonesia," Accessed August 3, 2021, https://www.nti.org/learn/countries/indonesia/.
212 Nuclear Threat Initiative, "Indonesia," Accessed August 3, 2021, https://www.nti.org/learn/countries/indonesia/.
213 Ifan Ariansyach, "Fisheries Country Profile: Indonesia," Southeast Asian Fisheries Development Center, 2018, http://www.seafdec.org/fisheries-country-profile-indonesia/.
214 Ifan Ariansyach, "Fisheries Country Profile: Indonesia," Southeast Asian Fisheries Development Center, 2018, http://www.seafdec.org/fisheries-country-profile-indonesia/.
215 Ifan Ariansyach, "Fisheries Country Profile: Indonesia," Southeast Asian Fisheries Development Center, 2018, http://www.seafdec.org/fisheries-country-profile-indonesia/.
216 Shafiah Muhibat et al. "Maritime Safety in Indonesia: Mapping the Challenges and Opportunities," Centre for Strategic and International Studies, 2020, https://www.csis.or.id/uploads/attachments/post/2020/01/17/CSIS_Maritime_Safety_Report.pdf.
217 The World Bank, "The Tale of Two Ports in Indonesia," May 26, 2015, https://www.worldbank.org/en/news/feature/2015/05/26/the-tale-of-two-ports-in-indonesia.

5. Level of maritime domain awareness and maritime enforcement capacity

Indonesia has a moderate capacity for enforcing maritime security and governance. The Indonesian Navy (TNI-AL) operates roughly 13 frigates and 116 coastal and patrol vessels.[218] Its various maritime law enforcement entities operate an estimated three dozen more such patrol vessels. However, while this combined total may seem high, many believe it is still inadequate to effectively respond across Indonesia's massive maritime domain, much less provide preventative presence. Experts have estimated that in order to provide an even basic level of coverage, Indonesia would need to operate 300 such patrol vessels at any given time, therefore requiring many more than that 300 number to provide sustained presence.[219]

Furthermore, and perhaps of more importance when dealing with an issue as complex as potential maritime R/N trafficking by STUVs, Indonesia's maritime enforcement entities are presented with significant challenges in interagency coordination and information sharing. As the diagram above demonstrates, there are a plethora of government entities with sometimes overlapping mandates and missions related to maritime security in Indonesia. There are two separate, but seemingly similar in mandate, coast guard agencies, a separate search and rescue agency, and a fisheries enforcement agency in addition to an interagency fisheries enforcement task force. This overlap can create confusion, hamper interagency communication and information sharing, and lead to duplication of effort with scare resources, all of which have the potential to significantly undermine the efficiency and effectiveness of Indonesia's maritime law enforcement system.

In sum, Indonesia's maritime enforcement capacity is significantly hampered by both a relative scarcity of resources and the complexity of its own administrative structure. Indonesia's maritime enforcement agencies overcome these challenges reasonably well, but these hurdles still significantly heightened the potential risk of maritime R/N trafficking.



Source: RAND analysis.

6. Strength of systems for vessel registration and monitoring

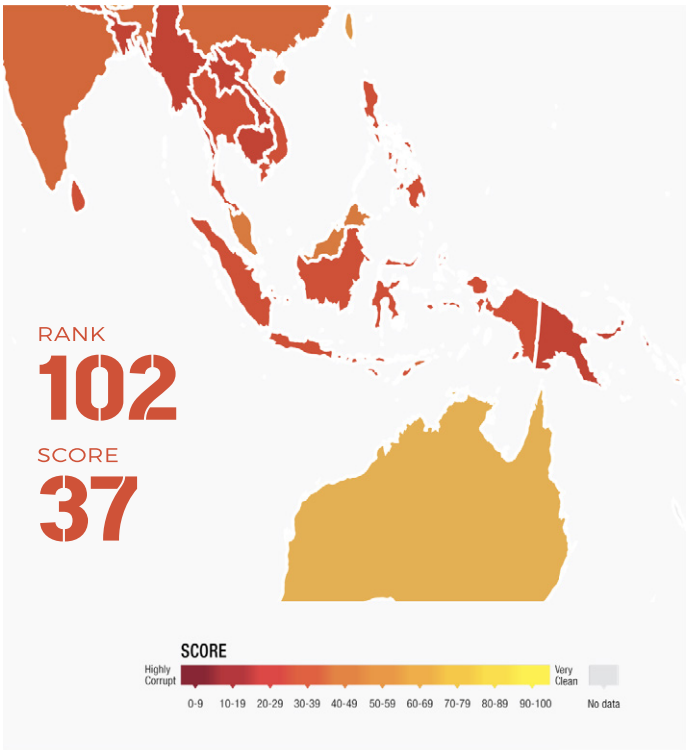
The previously described prevalence of STUVs in Indonesia presents a variety of registration and monitoring challenges. All vessels in Indonesia over seven tons must be registered.[220] While this minimum tonnage is comparatively low, and thus comprehensive, by the standard of many states, it must also be looked at in comparison to the relative size and prevalence of vessels in the country. As was noted above, the majority of Indonesia's small scale fishing vessels fall below this bar[221] and as a result, there are a very large number of small, unregistered vessels in the country.

In terms monitoring vessels at sea, Indonesia has taken significant recent steps towards this capacity, but again gaps remain. In addition

218 International Institute for Strategic Studies, "Chapter Six: Asia," The Military Balance, 2019, p. 274, DOI: 10.1080/04597222.2018.1561032.
219 Peter Chalk, "Indonesia's maritime strategy: what's been achieved?" Australian Strategic Policy Institute, September 5, 2017, https://www.aspistrategist.org.au/indonesias-maritime-strategy-whats-achieved/.
220 Dyah Soewito and Stephen Igor Warokka, "Indonesian Shipping Law: Updates and Developments," Indonesia Law Blog, October 18, 2018, https://www.ssek.com/blog/indonesian-shipping-law-updates-and-developments.
221 Ifan Ariansyach, "Fisheries Country Profile: Indonesia," Southeast Asian Fisheries Development Center, 2018, http://www.seafdec.org/fisheries-country-profile-indonesia/.

(Source Basten Gokkon, "Indonesia's decision to share vessel tracking data 'ill-advised,' some say," Monga Bay, August 21, 2017, https://news.mongabay.com/2017/08/indonesias-decision-to-share-vessel-tracking-data-ill-advised-some-say/.)

to those vessels meeting the tonnage requirements for AIS, in 2008 Indonesia implemented a VMS system for fishing vessels, requiring the system on all vessels over 30 tons.[222] This additional VMS system allows for the remote tracking of an additional roughly 5,000 vessels in its domestic fleet.[223] In 2017, Indonesia took the step of making all of its VMS data publicly available, in partnership with the organization Global Fishing Watch.[224] This is an unprecedented and extremely commendable step towards transparency which catalyzed several other states to follow suit. However, despite the progress, the VMS system represents, it also highlights just how far from comprehensive remote monitoring most states around the globe are. While the 30-ton requirement for VMS in Indonesia allows for the tracking of thousands of additional vessels, 98.5 % of Indonesian fishing vessels with inboard motors do not meet this minimum tonnage requirement and thus are not part of the system.



7. Perceived levels of corruption or lack of capacity in port and customs authorities

Corruption in Indonesia is a significant problem. The country is ranked 102nd out of 180 states in Transparency International's Corruption Perceptions Index.[225] Indonesia's ports have also been recognized as a hotspot for corruption.[226] Patterns of corruption in Indonesian ports, such as the payment of bribes for the clearance of licit goods is well established.[227] Corruption in Indonesian ports has also been linked to maritime trafficking in goods such as illegal

222 Basten Gokkon, "Indonesia's decision to share vessel tracking data 'ill-advised,' some say," Monga Bay, August 21, 2017, https://news.mongabay.com/2017/08/indonesias-decision-to-share-vessel-tracking-data-ill-advised-some-say/.
223 Basten Gokkon, "Indonesia's decision to share vessel tracking data 'ill-advised,' some say," Monga Bay, August 21, 2017, https://news.mongabay.com/2017/08/indonesias-decision-to-share-vessel-tracking-data-ill-advised-some-say/.
224 Kimbra Cutlip, "Indonesia VMS Joint Statement," Global Fishing Watch, June 2017, https://globalfishingwatch.org/news-views/republic-of-indonesia-vms-joint-statement/.
225 Transparency International, "Corruption Perceptions Index- Indonesia," Accessed October 28, 2021, https://www.transparency.org/en/cpi/2020/index/idn.
226 Basel Institute on Governance, "Maritime Anti-Corruption Network Indonesia," May 13, 2020, https://baselgovernance.org/b20-collective-action-hub/initiatives-database/maritime-anti-corruption-network-indonesia.
227 Fergus Jensen, Henning Gloystein, "UPDATE 1-Indonesia port graft investigation disrupting coal shipments," Reuters, March 22, 2017, https://www.reuters.com/article/indonesia-coal-shipping-idINL3N1GZ3HT.

timber.[228] As such, there is a risk that corruption could serve as a significant facilitating factor in any efforts to traffic R/N materiel through Indonesia's maritime domain.

8. Level of economic security in coastal communities

«In the two decades between 1999 and 2019 the country's per capita GDP nearly tripled.»

Generally speaking, economic security has improved markedly in Indonesia in recent years. In the two decades between 1999 and 2019 the country's per capita GDP nearly tripled.[229] However, these gains are not irreversible. Indonesia's economy has been hit hard by Covid-19 and in January 2021, the World Bank actually dropped its classification of Indonesia from an upper-middle income to a lower-middle income economy.[230] What's more, the impressive socioeconomic gains of recent decades are far from equally distributed. The economic and demographic centers of gravity are located in the east of the country, on the islands of Java and Sumatra. These islands account for 75% of the country's population and 80% of its economic activity.[231] Other, more distant, sparsely populated islands in the archipelago, particularly in the eastern portion of the country, have not reaped the same benefits of economic development and public service provision. Areas such as Papua, Sulawesi, Nusa Tenggara, and Maluku experience significantly higher poverty rates, higher rates of infant mortality, and less access to electricity.[232] This economic marginalization has the potential to significantly contribute to the risk that members of such remote, loosely governed, and economically struggling communities in these parts of the country may turn to maritime trafficking as an alternative means to make ends meet.[233]

228 United Nations Office on Drugs and Crime, "Illegal logging in Indonesia: the link between forest crime and corruption," June 1, 2010, https://www.unodc.org/unodc/en/frontpage/2010/June/illegal-logging-in-indonesia-the-link-between-forest-crime-and-corruption.html.
229 he World Bank, "GDP per capita, PPP (current international $) – Indonesia," Accessed November 11, 2021, https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?locations=ID&most_recent_value_desc=true. The World Bank, "The World Bank in Indonesia," October 29, 2021,
230 The World Bank, "The World Bank in Indonesia," October 29, 2021, https://www.worldbank.org/en/country/indonesia/overview#1.
231 Alexandra Amling, "Stable Seas: Sulu and Celebes Seas," Stable Seas, February 2019, p. 25, https://www.stableseas.org/post/stable-seas-sulu-and-celebes-seas.
232 Lutfi Hanafi, "Looking at Indonesia's Inequality through Four Simple Maps," Barking Gov, August 26, 2017, https://medium.com/barkinggov/looking-at-indonesias-inequality-through-four-simple-maps-116644feb8d9.
233 Jay Benson, "The Forgotten Key to Maritime Security in the Sulu-Celebes Seas," The Diplomat, March 21, 2019, https://thediplomat.com/2019/03/the-forgotten-key-to-maritime-security-in-the-sulu-celebes-seas/.

RECURRING GAPS AND POLICY PRIORITIZATION

RECURRING RISK FACTORS AND POTENTIAL POLICY PRIORITIZATION

Given the description of these four important maritime regions, what commonalities can be drawn between them? The maritime security dynamics at play in each are incredibly diverse. But despite that diversity, what are the common risk factors seen across the regions analyzed and what can be done to address those issues?

While the nature of specific risk factors across the different regions examined varies significantly, several areas emerge as recurring gaps which may warrant further examination, additional resources, and future capacity building efforts going forward. Such areas identified include:

STRENGTHENING STUV SPECIFIC MONITORING AND REGISTRATION

Efforts to register and monitor all vessels which present a trafficking risk within any given state appear lacking. Baseline estimates available of the numbers of all vessel types are either nonexistent or vary considerably. The mandatory AIS requirement for vessels over 300 tons leaves a massive number of vessels outside of this particular monitoring regime. It appears that many states are taking steps to increase registration and monitoring of larger fishing vessels outside of AIS requirements, but this still leaves significant gaps. Small scale, artisanal, and recreational fishing vessels, informal passenger vessels, very small cargo vessels, tugs and barges, speedboats, skiffs, and recreational craft all appear to have the continued ability to operate with varied degrees of anonymity should they desire to do so. This is a gap which is not restricted to the lowest capacity states but is also seen in examples from the study such as Brazil and Egypt.

However, this is also an incredibly difficult issue to overcome. The sheer number of all vessels in each of these regions is massive and efforts to implement a truly universal registration and monitoring system may require more policy prioritization and resources than is feasible. As such, efforts to extend STUV registration and monitoring systems needs to be targeted towards those vessel types which are deemed to pose the greatest risk of trafficking and other forms of maritime crime. And these efforts do not all need to be resource and technology-intensive. Even relatively low-tech efforts such as the registration and mandatory application of visible registration numbers could allow maritime law enforcement, upon encountering a vessel at sea, visible indication that a vessel may be attempting to operate outside the law if such markings are absent or visibly tampered with. Ghana, for example, has recently launched a mandatory registration drive for its large artisanal fishing canoe fleet that includes application of unique serial numbers and barcoded id cards for canoe operators.[234] Even basic steps such as this can provide a degree of transparency and accountability in the operations of STUV vessels.

«Small scale, artisanal, and recreational fishing vessels, informal passenger vessels, very small cargo vessels, tugs and barges, speedboats, skiffs, and recreational craft all appear to have the continued ability to operate with varied degrees of anonymity should they desire to do so. »

Beyond registration, relatively few states around the world have anything approaching a complete picture of STUV activity while out at sea. As previously described, coverage of remote tracking systems such as AIS and national VMS systems is extremely limited beyond the largest vessels, and nearly nonexistent for STUVs across many parts of the globe. Steps to increase the ability of at-risk states to actively detect and remotely monitor vessels in the maritime domain would greatly increase the ability of authorities to detect potential trafficking by STUVs. However, such efforts present two significant challenges. First, such remote detection and the data it produces in its raw form is not a panacea. In order to be turned into actionable intelligence, various types of data need to be fused together and analyzed. Without the systems and training to recognize patterns associated with potential suspicious activity, the ability to simply collect additional vessel data in the maritime domain is of limited utility. As such, any capacity building efforts which provide remote detection and tracking capabilities will need to be accompanied by systems and training which allow for it to be put to effective use. In addition, as previously noted, such capabilities are extremely expensive and cost prohibitive for many states. In light of this, rather than attempting to develop such capabilities in every state of concern, increased information and intelligence sharing between the U.S., and other states with such capabilities, and states with more limited maritime domain awareness may be a more cost-effective manner for combatting STUV trafficking in the immediate future.

COUNTER TRAFFICKING SPECIFIC CAPABILITIES

All states face resource constraints and difficult choices when determining the mix of assets needed to protect their maritime domain. Choices must be made that mean that enhanced capability in one area often means less resources to counter another challenge. These are unenviable decisions. One gap that, results from these tradeoffs and appears prevalent in the regions studied is that many states seem to lack the assets which are best suited to address nontraditional maritime security challenges such as trafficking in adequate numbers. This is often referred to as a "high-low mix" between "high end" platforms focused on naval warfighting and national defense such as submarines, destroyers and aircraft carriers and "low end" platforms such as patrol vessels and maritime patrol aircraft which can be more efficiently used for countering maritime crime such as trafficking. For many states in this study, such as in West Africa and the southern Red Sea, resource constraints mean these "high end" capabilities are beyond reach. But even more capable states often focus largely on "high end" platforms which severely limits the resources available for more numerous and cost effective "low end" platforms. Each state must allocate resources in accordance with its own interests and the need for national defense at sea should not be brushed aside, but if states are going to effectively counter nontraditional maritime security challenges such as trafficking by STUVs the scope of the threat posed by these nontraditional security issues may need to be further communicated and resources realigned according.

234 S. Apetogbor, "Canoes Authorization Cards and Control of new entrants of canoes," The USAID/Ghana Sustainable Fisheries Management Project, 2015, https://www.crc.uri.edu/download/GH2014_POL107_CRC_FIN508.pdf.

NUCLEAR AND RADIOLOGICAL AWARENESS AND DETECTION

Given the scope of diverse maritime security challenges naval and maritime law enforcement personnel face on a daily basis and the relative rarity of maritime R/N trafficking, there may also be a gap in awareness around the issue and the capabilities to detect it.

In terms of awareness, this could be somewhat easily addressed via capacity building. Trainings with naval and maritime law enforcement that help these officers understand the scope of the issue, previous known instances of maritime R/N trafficking, and potential warning signs to keep in mind, could significantly improve awareness of and knowledge about the issue.

Actual R/N detection capabilities are somewhat more difficult to build given resource constraints and the ability to STUVs to bypass port security. However, one potentially advantageous means to counter the threat of STUV R/N trafficking is the proliferation of personal radiological detection devices among maritime law enforcement, naval, and port personnel across the globe. The U.S. Coast Guard, at sea and onshore, have been widely equipped with such devices for several years.[235] These Human Portable Tripwire devices alert the user to the presence, location, and certain characteristics of any radiation detected.[236]

«Actual R/N detection capabilities are somewhat more difficult to build given resource constraints and the ability to STUVs to bypass port security. »

The primary benefits of such devices in the context of countering STUV R/N trafficking are their portability, passive detection, and cost effectiveness. If widely deployed among maritime law enforcement and naval personnel they can effectively turn any boarding into a screening for potential R/N trafficking. This could serve as a significant force multiplier in efforts to combat STUV R/N trafficking. Incorporating passive radiological screening of this kind into all maritime law enforcement operations could be particularly effective in countering STUV trafficking, which can largely avoid port-based R/N screening. In addition, these capabilities are relatively cost effective, in comparison to port-based detection and the broader costs of maritime law enforcement. The initial contract for such devices in the U.S. reportedly cost just over 17 million USD.[237] This is a somewhat modest expense in the realm of maritime and naval operations, even for relatively resource constrained states. Indonesia for example, has recently entered into an agreement to purchase up to eight new frigates at a cost of 450 million USD a piece.[238] With funding assistance for procurement and training from the U.S. and other capacity building partners, such devices could become ubiquitous in even those relatively low capacity states most at risk of STUV R/N trafficking, presenting a significant improvement in detection capacity in a relatively cost effective manner.

SYSTEMIC MARITIME HUMAN INTELLIGENCE

Discussions of maritime security solutions often focus on resource intensive and high-tech solutions. These tools are extremely valuable, but for many states their application is unrealistic or unsustainable. In addition, all the maritime domain awareness technology possible may not be enough to deter and detect determined criminal actors at sea. As such, one relatively low-cost policy option that may warrant further attention is the utilization of human intelligence at sea. One of the factors that facilitates bad actors' ability to operate with a degree of anonymity at sea is the sheer amount of activity. Coastal waters in particular, through which any trafficking activity must pass to reach its final destination, are not empty spaces. These waters are full of vessels and the shores populated by coastal communities which have a deep understanding of the normal "pattern of life" in their local waters. They often know when an unfamiliar vessel appears to be acting suspiciously at sea and along the coast.

Due to the limitations of technological solutions, tapping into this local knowledge as a source of actionable intelligence in counter trafficking operations is critical. Interviews with multiple stakeholders across the regions examined in the report highlighted the importance of human intelligence in efforts to combat STUV trafficking in particular. In order to facilitate this goal, maritime enforcement must cultivate relationships with coastal communities that are built on trust and provide clear channels of communication for reporting any potentially suspicious activity. Efforts along these lines have been undertaken in places like Malaysia and Indonesia, where mobile phone applications have been developed which allow civilians at sea and in coastal communities to easily communicate concerns to maritime law enforcement.[239] The broader application of such tools may have outsized impacts in mobilizing the eyes and ears of those with the most intimate knowledge of the maritime spaces where they work and live to contribute to efforts to counter maritime trafficking activity.

ENHANCED INFORMAL PORT MONITORING

As was previously described, much of the effort and resources which have gone into counter trafficking efforts broadly and counter R/N trafficking specifically has been focused on large, formal ports. These ports are increasingly secure and well-regulated spaces. However, one of the primary benefits of STUVs for trafficking purposes is their ability to bypass these points of increased scrutiny. STUVs of various types may utilize small local ports, fish landing sites, informal ferry terminals, or any section of shoreline with suitable geography to load and offload illicit cargo. Monitoring every stretch of coast is obviously unfeasible, but the permissiveness of the environment traffickers operate in could be diminished with increased monitoring and regulation of small and informal ports and landing sites. Forcing traffickers

235 U.S. Department of Homeland Security, "Written testimony of USCG Assistant Commandant for Response Policy Rear Admiral Peter Brown for a House Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation hearing titled 'Prevention of and Response to the Arrival of a Dirty Bomb at a U.S. Port'," October 27, 2019, https://www.dhs.gov/news/2015/10/27/written-testimony-uscg-house-transportation-and-infrastructure-subcommittee-coast.
236 U.S. Department of Homeland Security, "Equipping Frontline Personnel with New, Portable Radiological & Nuclear Threat Detection Capabilities," November 5, 2015, https://www.dhs.gov/blog/2015/11/05/equipping-frontline-personnel-new-portable-radiological-nuclear-threat-detection.
237 CBRNE Central, "DHS Awards 17.2M Contract For Human Portable Tripwire Program," November 7, 2017, https://cbrnecentral.com/flir-awarded-17-2m-dhs-contract-radiation-detectors/10845/.
238 Sebastian Strangio, "Japan Could Deliver 8 Cutting-Edge Frigates to Indonesia," The Diplomat, April 8, 2021, https://thediplomat.com/2021/04/japan-could-deliver-8-cutting-edge-frigates-to-indonesia/.
239 Jay Benson, "Human Intelligence: The Missing Piece to Comprehensive Maritime Domain Awareness," Center for International Maritime Security, April 28, 2020, https://cimsec.org/human-intelligence-the-missing-piece-to-comprehensive-maritime-domain-awareness/.

to confront even basic levels of monitoring when utilizing such sites and/or compelling a greater reliance on completely undeveloped sections of coast which can be more easily identified as potentially suspicious activity could make their task significantly more challenging.

STRENGTHENED COASTAL ECONOMIC WELFARE

«...trafficking is also often facilitated by the participation of otherwise law-abiding individuals who turn to participation in maritime crime as a last resort strategy to meet their basic needs.»

Finally, and most broadly, policy makers should keep in mind the root causes of maritime crime when considering the potential risks of maritime R/N trafficking. Maritime trafficking often involves a variety of actors with significantly divergent motivations. Central to our conception of trafficking are those committed illicit actors such as transnational criminal networks and violent nonstate actors whose motivations (be they financial or ideological) to participate in trafficking activity are deep seated. However, trafficking is also often facilitated by the participation of otherwise law-abiding individuals who turn to participation in maritime crime as a last resort strategy to meet their basic needs. When coastal communities suffer from limited economic opportunities, poor public service provision, and weak rule of law, they are often forced to utilize their background in maritime sectors such as fishing or operation of coastal vessels for the benefit of traffickers. This is not to say that such peripheral actors in trafficking networks are without agency in their decisions or that improved socioeconomic wellbeing in coastal communities would eliminate maritime trafficking. Rather, such improvements would alter the individual level risk-benefit calculation of those who may become involved, lessen the pool of potential collaborators traffickers can utilize, and potentially make civilians in coastal communities more willing to share information of interest. As such, the socioeconomic drivers of maritime trafficking, and maritime crime more broadly, should be an important consideration of policy makers attempting to craft strategies for countering such activity.

CONCLUSION

CONCLUSION

There are significant challenges facing actors who seek to reduce the risk of R/N trafficking via STUVs. These vessels operate with relative anonymity and many of the states of greatest concern have very limited capabilities for understanding their movements and any potential R/N trafficking. Countless such vessels operate across the globe, blending into the frenetic activity of coastal waters and avoiding the scrutiny of formal ports. While progress has been made in some areas in recent years, states around the world are still very far from having a complete picture of their activities and their potential for R/N trafficking. There are however several areas where sustained policy attention and investment could yield significant progress in countering potential R/N trafficking by such vessels. Several such areas identified in the course of this research include:

- **STUV Monitoring-** Improved monitoring of STUVs would provide maritime law enforcement with a more complete understanding of the pattern of activity in their waters. A broader application of remote detection systems like AIS and VMS would be a significant step. However, to understand the movements of vessels which truly do not wish to be seen, the further proliferation of active detection using tools such long range radar, synthetic aperture radar, satellite imagery, radio frequencies, will be necessary.

- **Human Intelligence-** In addition to more technology-focused solutions, the more systematic use of human intelligence would be extremely beneficial in countering potential R/N trafficking by STUVs. Civilians at sea and in coastal communities know the normal pattern of life in their local waters and often know when STUV activity may be suspicious. Systems for collecting and utilizing such information could be significantly expanded.

- **Informal Port Monitoring-** Since STUVs bypass screening and security measures at large formal ports, increased security measures at the sites utilized by such vessels would be beneficial. R/N screening at every ferry landing, local commercial port, fish landing site is logistically and financially unfeasible, but even more general security presence at the multitude of such sites could help deter their utilization for R/N trafficking. In addition, given the challenge of R/N screening at informal ports, the increased utilization of personal radiological detection devices by naval and maritime law enforcement personnel could serve to effectively turn any boarding of an STUV into an at sea screening for potential R/N trafficking, increasing the chance of detection in a relatively cost effective manner.

- **Coastal Economic Security-** While the core actors potentially involved in maritime R/N trafficking have more entrenched motivations, many of the members of coastal communities which are directly involved in or help facilitate STUV trafficking do so out of basic financial need. It is important to keep in mind that economic insecurity in coastal communities is often at the root of all forms of maritime trafficking and steps to improve the economic security of these communities should be a component of any comprehensive strategy to address it.

Given the risks posed by potential R/N trafficking, further capacity building in the areas described above appear well warranted. STUVs pose a unique challenge in the context of R/N smuggling. Because of the massive number and geographic dispersion of such vessels, more targeted, R/N specific detection strategies may be difficult to implement at scale. As such, addressing potential R/N trafficking by STUVs specifically, likely requires sustained capacity building in general maritime law enforcement capabilities.

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