ARTICLE
Spatial Analysis of Maritime Piracy in the Gulf of Guinea

Okpuvwie Ejuvweyere Jonathan[*]

Department of Geographic Information Science, African Regional Institute for Geospatial Information Science and Technology, Ile-Ife, Osun State, Nigeria

ARTICLE INFO	ABSTRACT

Humans rely on the sea for food and mineral resources; hence it is vital to their economic survival. Nations all throughout the world rely on the water for trade and commerce. This article looks at the present condition of marine security in the Gulf of Guinea. The Gulf of Guinea has a total shoreline of about 5,000 nautical miles and several natural harbours with dangerous weather. It has a significant crude oil reservoir, as well as fish and other natural resources. These traits provide huge prospects for marine trade and transportation, but the Gulf of Guinea is also riddled with maritime crimes of all types, including piracy and smuggling. Maritime piracy has presented a threat to coastal states' stability and economic viability all across the world, not only in Africa. The study examines sea piracy in general, the Geographic Information System, and the impact of maritime piracy on the world socioeconomic development using secondary data. It then goes on to provide a number of recommendations aimed at addressing the problems caused by maritime piracy in the Gulf of Guinea in order to improve maritime security.

1. Introduction

Piracy in the waterways around the Horn of Africa, India, the South China Sea, and the Strait of Malacca, as well as the Singaporean Strait, the Arabian Sea, Indonesia, the Caribbean, and the Gulf of Guinea, is a global security threat. Maritime pirates like to operate in areas with extensive coastlines, high economic activity, little state naval forces, and ineffective regional security coordination systems. Other aspects of maritime security, such as maritime terrorism, arms and narcotics trafficking, illegal fishing and dumping, and human smuggling, are made easier by these characteristics [1].

The sea is used for trade and commerce by nations all over the world; yet, man's relentless desire of money and economic survival has resulted in tremendous instability. Maritime piracy has jeopardized the stability and socioeconomic productivity of the majority of African coastal states [2]. Piracy on the high seas is a serious human security problem that has cost seafarers a lot of money. It

Corresponding Author:
Okpuvwie Ejuvweyere Jonathan,
Department of Geographic Information Science, African Regional Institute for Geospatial Information Science and Technology, Ile-Ife, Osun State, Nigeria;
Email: okpuvwie37@yahoo.com

poses a serious danger to global shipping and international trade throughout the world [3]. Maritime piracy, according to Webster, is the act of attacking and plundering ships at sea. Maritime piracy occurs outside of nations' territorial waters; however, when it occurs within a nation's internal waterways, it is referred to as sea robbery and is subject to that country's laws. According to [4]. maritime piracy is perhaps the most feared and dangerous crime at sea because pirates are designated as Hostis Humanis Generis, or enemies of the human race. Maritime security issues in the Gulf of Guinea have weakened the governments of most coastal states and the Gulf of Guinea [5].

The [6] report on maritime piracy shows an increase in piracy and armed robbery on the world's waters in the first nine months of 2020, with a 40% increase in kidnappings reported in the Gulf of Guinea. According to the International Maritime Bureau, sea pirates equipped with weapons and knives abduct larger groups of seafarers at increasing distances off the coast of West Africa. The study looks at maritime piracy in general, maritime piracy in the Gulf of Guinea, the use of geospatial technologies in the fight against maritime piracy, the effects of maritime piracy on global and local economies, and the concerted efforts made by both local and international authorities/agencies to combat maritime piracy in the Gulf of Guinea.

2. Study Area

This study focuses on the Gulf of Guinea. From Senegal to Angola, the Gulf of Guinea is a West African maritime area. The Gulf of Guinea has a total coastline of around 5,000 nautical miles and a number of harbours that are vulnerable to storms. It has a large crude oil deposit as well as other resources, which open up a plethora of opportunities for maritime trade, resource exploitation, shipping, and development [7]. The Gulf of Guinea is made up of Angola, Benin, Cameroun, Equatorial Guinea, Gabon, Ghana, Guinea, Ivory Coast, Liberia, Nigeria, Sierra Leone, Sao Tome and Principe, and Togo. The Gulf of Guinea serves as a link between central and southern Africa and the rest of the world, making its sea basin an important resource for fisheries and other commercial activities. The region has become a vital hub in global and regional energy trade.

On a daily basis, about 1,500 fishing vessels, transport ships, and tankers cross the waters of the Gulf of Guinea, according to [8]. The Gulf of Guinea is home to some of the world's wealthiest and least-exploited natural resource deposits. In the first quarter of 2018, the Gulf alone accounted for more than 40% of all maritime piracy events worldwide. In addition, the region accounted for 43% of all reported piracy events, including both fired upon and hijacked. A pirate-captured fishing trawler was used as a mother vessel to facilitate additional marine attacks in the Gulf of Guinea on February 8, 2021 [9]. In the Gulf of Guinea, the Niger Delta region of Nigeria is the epicenter of marine crime. Huge hydrocarbon deposits in the Niger Delta region have increased socioeconomic tensions, social justice movements, and even development and pollution in the region as a whole. Meanwhile, crude oil exploration in the Niger Delta region has earned, benefited, and enriched the central government, local elites, the privileged few, and oil multinationals over the years [8].

Due to the large quantity of crude oil and other aquatic resources in the Gulf of Guinea, the Gulf of Guinea region has become a magnet for all forms of maritime crimes, which thrive with minimal retaliation from the Gulf's surrounding countries. Figure 1 shows the study area and the countries.
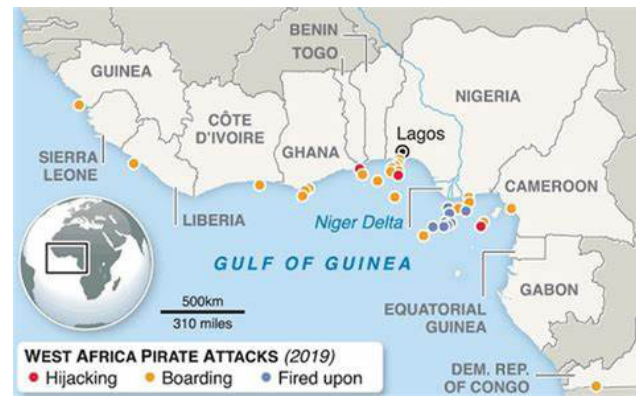

Figure 1. Map of Study Area (Gulf of Guinea)
Source: Google maps (https://www.bing.com/images/search?q=map+of+the+gulf+of+guinea&id)

3. Materials and Methods Synopsis

The research was based entirely on secondary data gathered from both public and unpublished sources. Because the study largely used the descriptive technique, materials were also acquired from the internet and official documents of both local and international maritime organizations and agencies to increase the quality of the work.

3.1 Research of Literature

The AFRIGIST and Obafemi Awolowo University Campus libraries were used to conduct the literature search. Using the www.google.com search engine, some literature was also discovered on the internet.

3.2 Descriptions of Documents

The study primarily employs a descriptive technique

to get useful information about maritime piracy from the numerous papers collected in order to improve the quality of the paper.

4. Results

4.1 Overview of Maritime Piracy

The IMB defined sea piracy as "the act of boarding any vessel with intent to commit theft or any other crime, and with an intent or capacity to use force in furtherance of that act". Maritime piracy is a worldwide phenomenon that has had a negative impact on the security of most coastal nations. Maritime piracy is prevalent in three primary geographical areas across the world. Maritime piracy in Southeast Asia (particularly the Strait of Malacca and South China), the Horn of Africa (coast of Somalia), and the Gulf of Guinea (West Africa) are among these places [10]. The rise of pirate attacks off the Horn of Africa can be traced back to Somalia's persistent insecurity, lack of central administration, and absence of rule of law. Many modern Somali pirate groups appear to be driven by profit, and piracy in the region has proven to be a worthwhile, fulfilling, and successful business [1].

According to the United Nations Convention of 1982 on the Law of the Sea (UNCLOS) (Article 101), maritime piracy consists of: "(a) Any illegal acts of violence, detention, or any act of attack committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed: (i) On the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft; (ii). Against a ship, aircraft, persons or property in a place outside the jurisdiction of any State; (b) Any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft; (c) Any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b) of this article."

Acts of maritime piracy have been shown to be commonly carried out by those who are enduring socioeconomic deprivation, with such persons attempting to discover alternative, innovative, but destructive ways to improve their economic fortunes by disrupting the status quo [11]. The continuous attacks on ships at sea by maritime pirates in the Gulf of Aden drew the attention of the international community, triggering a multinational alliance and a counter-offensive against maritime piracy in that region [2]. The alliance permitted governments and the international community to conduct military operations against marine pirates in the Gulf of Aden, led by the United States, with the help of the United Nations Security Council. While the international coalition has made substantial progress in reducing maritime piracy in the Gulf of Aden, maritime pirates in the Gulf of Guinea continue to meet less opposition from littoral states [2].

The underlying causes of maritime piracy and armed robbery in Africa can be traced to dry ground rather than at sea. This is because maritime piracy is usually carried out or sponsored by disgruntled, oppressed, and impoverished communities who've been deprived from their own country's economic development. Some residents of these communities who believe they have been deceived want to change the status quo, believing that fewer fishing opportunities lead to increased piracy [8]. Unemployment and poverty appear to be further factors in maritime piracy in the Gulf of Guinea. In the Gulf of Guinea, weak law enforcement, corruption, environmental damage, cultural acceptability, incompetent government, and easy access to arms and ammunition all contribute to the ongoing incidence of maritime piracy. These forces have the potential to sabotage regional integration, trade, and international security and stability.

4.2 Maritime Piracy in the Gulf of Guinea

Maritime piracy has been in the Gulf of Guinea for many years, but it was not a serious issue until lately, when the frequency of piracy attacks surged dramatically [6]. The Gulf of Guinea is regarded the world's most dangerous shipping passage due to the highest frequency of piracy events [7]. In the Gulf of Guinea, oil theft and illegal bunkering are widespread crimes, with Nigeria losing between 40,000 and 100,000 barrels of crude oil each day due to theft [12]. According to the IMB, piracy operations have made Sub-Saharan Africa's waterways the world's most dangerous and terrifying. In addition, according to the IMB report of 2019, sixty-two (62) seafarers were caught in the Gulf of Guinea, out of the seventy-five (75) seafarers taken prisoner onboard various vessels or kidnapped for ransom around the world. In the first half of 2019, the IMB pirate reporting centre recorded 78 occurrences of armed robbery and piracy against ships, compared to 107 events in the same period of 2018.

Hijacking, drug smuggling, crude oil theft, pipeline vandalism, human trafficking, and illicit, unregulated, and unreported fishing are all threats in the Gulf of Guinea [5]. Maritime piracy and armed robbery are well-established criminal enterprises in the Gulf of Guinea, and they are a growing source of concern for international communities and the maritime industry. According to IMB, a total of 55 piracy attacks were reported in West Africa in 2016. 36 of these events occurred in Nigeria alone, according to these statistics. Nigeria's seas, according to the IMB, are now the world's second most dangerous, scary, and feared after

Somalia's [13].

Maritime pirates in the Gulf of Guinea are notorious for their ferocity, as they are less concerned with the safety of their victims [10]. On May 25, 2020, pirates kidnapped a Bulgarian captain and his crew from the Portuguese-flagged cargo ship Tommi Ritscher off the coast of Cotonou, Benin, while on January 23, 2021, pirates attacked the Liberian-flagged container ship "V/S Mozart" in the Gulf of Guinea, killing one crew member and kidnapping 15 others. The ship arrived in Port-Gentil, Gabon, at 11:00 TRT, with three crew members remaining [14]. With large numbers of merchant ships regularly drifting in these waters, pirates frequently assault anchorages and approaches to the ports of Tema (Ghana), Abidjan (Côte d'Ivoire), Bonny and Lagos (Nigeria), Cotonou (Benin), and Lomé (Togo) [7]. Togo and Nigeria accounted for more than 70% of pirate and hostage-taking attacks in West Africa between 2012 and 2014. Figure 2 shows the severity level of maritime piracy attacks in the Gulf of Guinea. It is obvious from Figure 2 that the hotspots of maritime piracy in the Gulf of Guinea include Nigeria, Benin, Togo, Guinea and Cameroon. Certainly, the pirates operating in the Gulf of Guinea have become more organized, bold and sophisticated in their efforts to unleash threats and mayhem in the region. Maritime crimes in the Gulf of Guinea are increasing at a rate not matched by the response capacities of the littoral states. It is important to note that the pervasiveness of maritime security threats across the Gulf of Guinea illustrates the need for a holistic approach to maritime security response in the region [15].

4.3 Application of Geospatial Technologies in the Fight Against Maritime Piracy

Geospatial technologies are cutting-edge technologies that center around the acquisition, collection, storage, and analysis of spatially referenced data in order to solve geographic problems. Geographic Information System (GIS), Global Positioning System (GPS), Remote Sensing (RS), cloud GIS, and big data GIS are examples of these technologies. There is always a location for every crime committed on land or at sea, and the importance of GIS, GPS, and RS in successful geolocation of such a crime scene cannot be overstated. In order to intercept and apprehend targeted offenders such as maritime pirates, GIS can be utilized to track sea pirate hotspots, arms and suspect movement, and intelligence collection [16]. GIS can be used to visualize and study the spatial distribution of modern pirate attacks. It's a spatially referenced data management system that can integrate, store, modify, analyze, distribute, and display data.

We can use GIS data to figure out where and who is involved in piracy attacks. Geographic Information System is a computer system that captures, records, stores, analyzes, and manipulates data about features on the
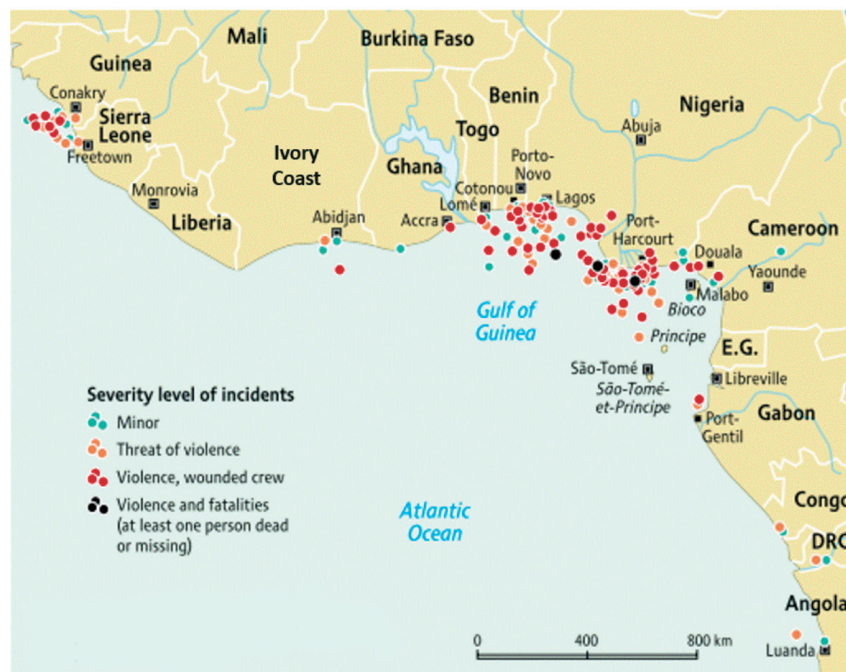

Figure 2. Severity Level of Maritime Piracy Attacks in the Gulf of Guinea (2006 – 2013).

Source: UNITAR/UNOSAT, GSIS, IMO, 2014.

surface of the earth. At sea, the introduction of automatic identification systems and its fishing counterparts, vessel monitoring systems, has made it possible to track vessels to a larger extent than previously possible. However, some sailors at sea turn off the system on a regular basis to either avoid pirate attacks or to take advantage of the opportunity to commit more crimes at sea. GPS and RS are used in GIS. RS entails data collection without physical touch with a target item. It involves airborne sensor systems that use propagated signals from aircraft, drones, satellites, or all to identify and classify items on the ground.

Maritime pirates operating in the Gulf of Guinea can be easily monitored and tracked using these technologies, as satellite photos can display critical information about pirates' illicit operations at sea. With the use of satellites, GPS could potentially be utilized to gather coordinate points of any pirate assaults. In an ArcGIS context, the collected coordinate points are interfaced with the GIS system for analysis and interpretation. The effectiveness and speed of GIS analysis will improve crime-fighting capability. To collect maritime data, sophisticated drones and marine aircraft might be deployed, which would then be linked to a GIS system for further analysis and interpretation, resulting in greater security. In the Gulf of Guinea, the deployment of integrated marine surveillance systems, which allow data to be shared among several agencies and, ultimately, nations, may be encouraged in order to provide actionable intelligence for greater security.

4.4 Effects of Maritime Piracy

Because of the tremendous threat it poses to global security and wealth, maritime piracy is a major source of concern for the international community [17]. Maritime piracy has mostly affected West Africa's oil and gas and shipping industries. The illegal operations of pirates have a significant influence on the fishing sector. Pirates can impersonate local fishermen to target important vessels and commit crimes, as well as attack legitimate fishermen to steal their catch, fuel, and personal belongings. The cost of maritime piracy in the Gulf of Guinea due to stolen cargo, security, and insurance is estimated to be around $2 billion, according to published estimates [18].

Piracy on the high seas has a variety of negative consequences, including not only deaths and ransom payments, but also damage to the region's reputation and the global economy [19]. Piracy on the high seas affects international trade because it creates concerns about commodities arriving on time. It also jeopardizes the lives of global mariners and obstructs the supply of important humanitarian aid to troubled locations around the world, particularly the Horn of Africa. Every year, a large number of seafarers are abducted, with some being wounded, deformed, or killed as a result. Damage to ships and cargoes, delays in cargo delivery, increased maritime insurance premiums, the costs of protecting commercial ships against attack, and the cost of using naval forces for anti-piracy operations and manouvers are all possible consequences of maritime piracy [1].

The cost of piracy to the maritime industry is estimated to be between $1 billion and $16 billion per year. The global economic impact of Somali piracy was estimated to be between $7 and $12 billion in 2010. As a result, Somalia's second-largest money-laundering business could be maritime piracy [17].

Piracy on the high seas has cost coastal governments in the Gulf of Guinea anything between $565 million to $2 billion [20]. According to the United Nations Office on Drugs and Crime, the total economic cost of piracy, abduction, and armed robbery at sea spent by all stakeholders involved in countering these crimes, including Nigeria, was US$2.3 billion between 2015 and 2017. Maritime piracy is predicted to cost more than 750 million pounds in West Africa in 2017, making it a global threat [8].

5. Discussion

5.1 Global Piracy Attacks

Table 1 shows the types of violence used against ship personnel in global piracy assaults from 2011 to 2016. According to the data, 397 attacks occurred in 2011, compared to 58 incidents in 2016. Given the importance of the sea to the global economy and sustainability, this decrease can be attributed to continued naval cooperation among countries throughout the world, as well as several international organizations' efforts to limit the frequency of piracy assaults.

Table 1. Global Piracy Attacks on the Types of Violence Committed Against Ship's Crew for the Period 2011-2016

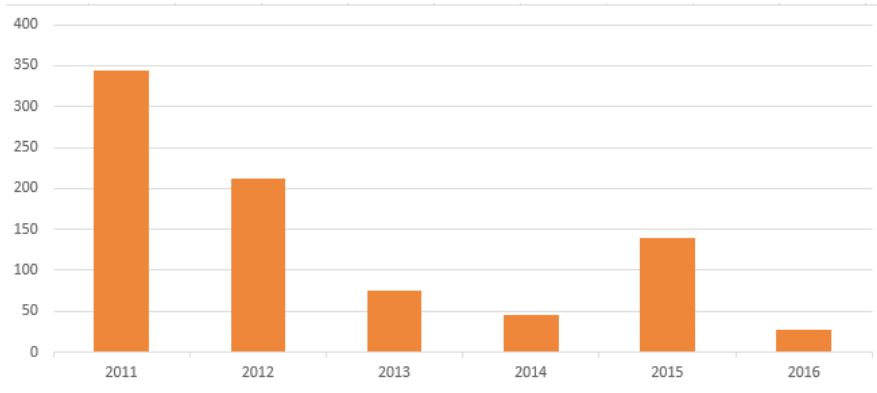| Types of violence	2011	2012	2013	2014	2015	2016
Hostage	344	212	75	46	140	28
Kidnapped	6	3	14	2	5	26
Threatened	4	4	3	3	1	1
Assaulted	2	1	-	-	13	1
Injured	34	9	3	1	3	2
Killed	7	4	1	-	1	-
Total	397	233	96	52	163	58

Source: ICC-IMB Report (2016)

Figure 3. Global Hostage Taking from 2011-2016

Source: Author's Analysis (2021)

In 2019, 119 piracy attacks occurred in the Gulf of Guinea; however, in 2020, the number of attacks increased to 132. In the Gulf of Guinea, 80 of the 85 seafarers kidnapped and held for ransom were captured in 14 incidents documented along the borders of Nigeria, Benin, Gabon, Equatorial Guinea, and Ghana [6]. In the first nine months of 2020, seafarers reported 134 incidents of assault, injury, and threats, with 85 crew members kidnapped and 31 held captive onboard their ships. 112 vessels were boarded and six were shot at in the Gulf of Guinea, with 12 reporting attempted attacks and two fishing vessels being hijacked [6].

In the Gulf of Guinea, the number of piracy attacks grew to 132 in 2020, up from 119 in 2019. In 14 distinct occurrences along the Nigerian, Benin, Gabonese, Equatorial Guinean, and Ghanaian borders, 80 of the 85 seafarers kidnapped and held for ransom in the Gulf of Guinea were apprehended. In the first nine months of 2020, seafarers reported 134 assaults, injuries, and threats, with 85 crew members kidnapped and 31 held captive on board their ships. 112 ships were boarded and six were shot at in the Gulf of Guinea, with 12 ships reporting attempted attacks and two fishing boats being hijacked. Eight pirates armed with machine guns hijacked a product tanker 196 nautical miles southwest of Bayelsa state, Nigeria, holding all 19 crew members captive, taking the ship's documents and valuables, and fled with 13 kidnapped crew members, according to the International Maritime Bureau. On March 11, 2021, pirates kidnapped 15 crew members from a Maltese-flagged Chemical Tanker 212 miles south of Cotonou, Benin [9]. The Gulf of Guinea has long been a pirate hotspot and a center for African maritime crime.

5.2 Types of Violence Against Ships at Sea

Maritime pirates operating in the Gulf of Guinea are infamous for assaulting their victims in various ways. On January 2, 2020, three seafarers were abducted and four security guards were killed on a dredger off the coast of Nigeria's Forcados Terminal. Kidnapping (113.9 percent) and hostage taking (41.5 percent) are the most common methods used by maritime pirates in the Gulf of Guinea to force their hostages to surrender at sea.
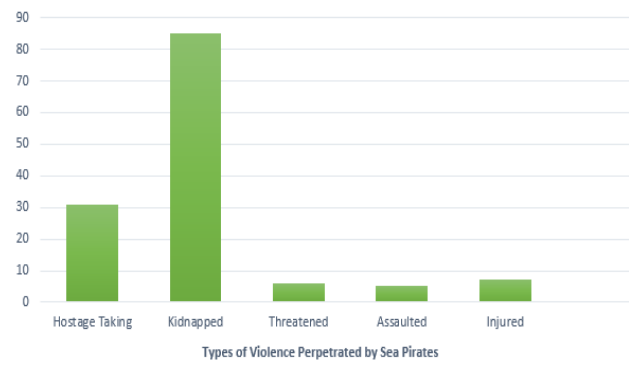

Figure 4. Types of Violence Perpetrated at Sea by Sea Pirates

Source: Author's Analysis (2020)

Table 2. Global Piracy Attacks on the Types of Violence Committed Against Ship's Crew for the Period 2011-2016

Serial Number	Types of Violence	Total
1.	Assaulted	**5**
2.	Hostage Taking	**31**
3.	Injured	**7**
4.	Kidnapped	**85**
5.	Threatened	6

Source: International Chamber of Commerce -IMB Report (2020)

5.3 Types of Vessels Attacked by Pirates at Sea

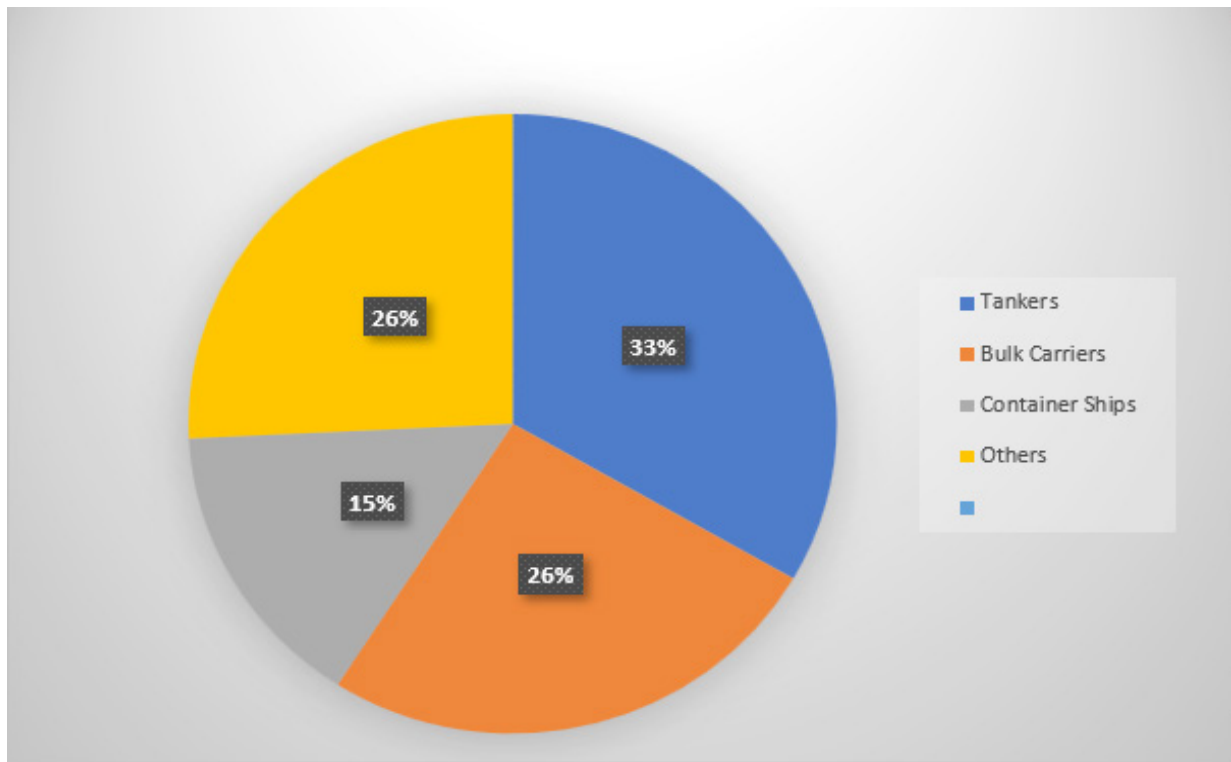Maritime pirates in the Gulf of Guinea attack a range

Figure 5. Preferred Types of Vessels Attacked by Sea Pirates Between January-September 2020

Source: International Chamber of Commerce-IBM Report (2020)

of targets with the primary purpose of stealing valuable commodities such as money and products from their victims. Figure 5 depicts the various types of vessels targeted by maritime pirates in the Gulf of Guinea. Figure 5 also reveals that 132 vessels were attacked by maritime pirates in the Gulf of Guinea between January and September 2020, with tankers and bulk ships being the most regularly targeted. Piracy incidents in the Gulf of Guinea have revealed that crude oil and oil product-laden ships are the favoured targets. Along the Ghana-Angola and Nigeria-Côte d'Ivoire axes, such attacks have been reported [7].

5.4 Spatial Locations of Actual and Attempted Piracy Attacks in the Gulf of Guinea

Table 3 shows the spatial distribution of actual and attempted piracy attacks in the Gulf of Guinea from 2011 to 2016. There was a total of 72 piracy attacks throughout the time period under review, with Nigeria having the highest number of 49 (35.3 percent) attacks. Ivory Coast, which has had nine attacks, is closely following Nigeria (6.5 percent). The table indicates Nigeria as the hotspot littoral nation for maritime piracy attacks in the Gulf of Guinea over the time period under consideration.

Table 3. Spatial Locations of Actual and Attempted Piracy Attacks in the Gulf of Guinea for January - March 2011 – 2016

Countries	2011	2012	2013	2014	2015	2016
Angola	-	-	-	1	-	-
Benin	1	1	-	-	-	-
Cameroon	-	-	-	1	-	-
D.R. Congo	-	1	-	-	-	2
Gabon	-	-	-	1	-	-
Ghana	-	2	-	-	2	-
Guinea	1	-	-	-	-	-
Ivory Coast	1	3	3	-	1	1
Liberia	-	-	-	1	-	-
Nigeria	5	10	11	6	7	10
Total	8	17	14	10	10	13

Source: International Chamber of Commerce -IMB Report

6. Efforts to Combat Maritime Piracy in the Gulf of Guinea

Piracy on the high seas is a transnational crime that necessitates more than national response. In January 2009,

a multilateral Contact Group on Piracy off the Coast of Somalia was formed to coordinate anti-piracy efforts. The US, NATO, the European Union, regional, and other naval forces were actively recruited to conduct aggressive patrols in Somalia's waterways in conjunction with a US-led Task Force. Maritime piracy in the Gulf of Aden, which includes Somalia's waterways, has decreased in recent years [1]. International action maritime security is addressed primarily through the 1982 United Nations (UN) Convention on the Law of the Sea. Article 105 provides that any state can exercise jurisdiction over acts of maritime piracy.

At the local, regional, and global levels, governments in the Gulf of Guinea have made a number of attempts. The Gulf of Guinea's navies have been working together to conduct aggressive patrols in order to combat the rise of maritime piracy in the region, as regional collaboration is critical in the battle against maritime crime. The Yaoundé Code of Conduct was signed in 2013 by the 25 members of the Economic Community of Central African States (ECCAS), the Economic Community of West African States (ECOWAS), and the Gulf of Guinea Commission [8]. The signatories to this code of conduct pledged to work together to combat transnational organized marine crime, such as maritime piracy, maritime terrorism, and illicit fishing. The Central Africa Regional Maritime Security Centre, formed by ECCAS in 2009, and the West Africa Regional Maritime Security Centre, established by ECOWAS in 2014, are in charge of this cooperation.

Improvements in operational collaboration between the Nigerian Navy (NN) and the Nigerian Maritime Administration and Safety Agency (NIMASA) resulted in a significant decrease in piracy attacks in the Lagos harbor area in 2010 [7]. Nigeria has established a forum with the Inter-Regional Coordination Centre in Yaounde to coordinate regional and international efforts to combat maritime piracy in the Gulf of Guinea. This partnership aimed to increase shared knowledge and de-conflict actions in the Gulf of Guinea [21]. According to [7], NIMASA launched a Satellite Surveillance Centre in 2014 in partnership with the NN and the Nigerian Air Force (SSC). All vessels in Nigerian seas are tracked by the SSC, which can also identify each vessel's International Maritime Organization number. According to him, this project complements the current array of sensors built along Nigeria's coastline as part of the Regional Maritime Awareness Capability and Falcon Eye program, which is funded by the United States and the United Kingdom.

The Nigerian Suppression of Piracy and Other Maritime Offenses Act of 2019 was another approach taken by the Nigerian government to prevent and suppress maritime piracy, armed robbery, and other unlawful activities against ships, aircraft, and other marine vessels. Ten pirates were sentenced to 12 years in prison by the Lagos Division of the Federal High Court of Nigeria on May 14, 2020, for kidnapping and hijacking a Chinese fishing vessel, the FV Hai Lu Feng II. In addition to their prison sentences, the convicts will pay $600 each for the three counts [22]. This Act also gives effect to the 1982 UNCLOS and the Convention for the Suppression of Unlawful Acts Against the Safety of Navigation, 1988 (SUA). In 2016, the African Union adopted the African Charter on Maritime Security and Safety and Development in Africa (Lomé Charter), to safeguard the continent's maritime space and its 18,950 miles of coastline from criminal activity.

Similarly, on August 1, 2021, the Nigerian Navy deployed eight ships and two helicopters to the Gulf of Guinea for a special maritime exercise codenamed Operation Beni Kekere 2021 in an effort to bring more sanity to the region. Anti-piracy efforts, oil facility protection, and search and rescue operations are also part of the maritime exercise. According to the naval high command, the purpose of this deployment was to deny marine pirates and other criminals the freedom to operate in the Gulf of Guinea [23]. In addition to the Nigerian Navy's ongoing and aggressive patrols in the Gulf of Guinea in collaboration with other warships in the region, all of these steps were conducted by several nations in the Gulf of Guinea. A significant reduction in maritime insecurity in the Gulf of Guinea, according to [15], will necessitate the development of a sustainable blue economy, improvements in the well-being of coastal communities, and commitment and collaboration across agencies and governments among the Gulf of Guinea's littoral states.

7. Conclusions

Maritime piracy is a threat to the stability and socioeconomic sustainability of coastal states all throughout the world, not only in Africa. The Gulf of Guinea is rich in crude oil deposits and other natural resources, but it is also plagued by piracy and other forms of marine crime. The Gulf of Guinea alone accounted for more than 40% of all maritime pirate incidents worldwide in the first quarter of 2018. The region has been accountable for 43% of all documented pirate events, including both fired upon and hijacked. Rather than at sea, the core causes of maritime piracy and armed robbery in Africa can be traced to dry ground. This is because maritime piracy is usually carried out by or sponsored by marginalized communities that have not participated in

their own country's economic development. Other causes of maritime piracy in the Gulf of Guinea appear to include unemployment, poverty, insufficient law enforcement, and corruption.

There is always a location for every crime committed, and the importance of geospatial technologies in effective localization of such a crime cannot be overstated. The spatial distribution of modern pirate occurrences can be shown and analyzed using GIS. GPS and RS are used in GIS. Maritime pirates operating in the Gulf of Guinea can be easily detected and traced using these tools. Maritime piracy has a wide range of consequences, including not only injuries and ransom payments, but also damage to the region's reputation and the worldwide economy. Maritime piracy may result in ship and cargo damage, higher maritime insurance rates and higher expenditures for using naval forces in anti-piracy operations.

The Gulf of Guinea according to the IMB, is the world's piracy hotspots as it is seen as the epicenter of marine criminality in Africa for the year 2021. The most preferred choice of violence adopted by the sea pirates according to the paper include kidnapping and hostage taking. These marine crimes in the Gulf indicate a preference for ships laden with crude oil and oil products including tankers and bulk carriers. Furthermore, Nigeria, Ivory Coast, Guinea and Cameroon are the hotspots littoral nations of maritime piracy attacks within the Gulf of Guinea.

Piracy on the high seas is a transnational crime that demands more than national measures to stop. NATO, the European Union, the United States, regional naval forces, and others have expressed interest in assisting in the battle against maritime piracy in the Gulf of Guinea. The Gulf of Guinea's navies have been working together to conduct rigorous patrols in order to combat the increase of maritime piracy in the region. It is hoped that these initiatives would deliver favorable results, allowing the Guinea of Guinea to return to being a safer and more secure commercial corridor for local, regional, and worldwide trade.

8. Recommendations

Based on the findings from the study, the paper recommends that:

(1) Governments of all littoral states in the Gulf of Guinea should strengthen their collaborative efforts to stem the rising incidents of maritime piracy in the Gulf of Guinea. Governments should always keep their words and promises and pursue vigorously all agreed treaties and memorandum of understanding as regards security in the Gulf of Guinea.

(2) All littoral states in the Gulf of Guinea should strengthen their navies and coast guards and provide adequate platforms for aggressive individual or joint patrols. Maritime surveillance should be prioritized and budgetary allocations for navies and coast guards should be increased to enable them to function more effectively.

(3) Governments of all littoral states in the Gulf of Guinea should work to re-engineer and re-invent effective governance, as well as solve the socio-political concerns that cause people to be dissatisfied, frustrated and marginalized. Unemployment, weak governance, poverty and other factors that might promote criminality and maritime piracy should all be addressed.

(4) Governments of all littoral states in the Gulf of Guinea should domesticate all international laws and treaties supporting the repression of maritime piracy and other forms of criminalities in the Gulf of Guinea.

(5) All littoral states in the Gulf of Guinea should have the political will to ensure that arrested maritime pirates and other criminals, as well as their accomplices, are diligently prosecuted.

(6) The governments of all littoral states in the Gulf of Guinea should encourage the training of their naval and coast guard personnel in modern methods of conducting maritime warfare using geospatial technologies.

References

[1] Lauren, P. Blanchard, C. O'Rourke, R., Mason, C. and King, R. (2009). ''Piracy Off the Horn of Africa''. Congressional Research Service Report for Congress, Naval History and Heritage Command, USA.

[2] Abu, M. (2017). ''Combating Piracy in the Gulf of Guinea: Taking a Page from the Gulf of Aden International Anti-Piracy Operation''. A Thesis presented to the Faculty of the U.S. Army Command and General Staff College.

[3] Desai, R. and Shambaugh, G. (2021). ''Measuring the global impact of destructive and illegal fishing on maritime piracy: A spatial analysis''.*PLoS ONE* 16(2): e0246835. https://doi.org/10.1371/journal.pone.0246835.

[4] Staff, M. (2018). ''Getting to The Root of Maritime Piracy''.

[5] Lamptey, S. (2021). ''Sea Piracy on the Gulf of Guinea: Impacts on the Artisanal Fisheries Sector of Tema Fishing Area (Sub-City in Accra)'': A Dissertation Submitted to the Department of Human Geography, Lund University (Graduate School).

[6] International Maritime Bureau Report on Piracy for 2020.

[7] Osinowo, A. (2015). ''Combating Piracy in the Gulf of Guinea''. Africa Center for Strategic Studies. Africa Security Brief No 30.

[8] Pichon, E. (2020). ''Piracy in the Gulf of Guinea'': EU and international action. European Parliamentary Research Service.

[9] International Maritime Bureau Report on Piracy for 2021.

[10] Abdel-Fattah, M. (2017). ''Piracy in the Gulf of Guinea Causes, Efforts and Solutions''. Arab Academy for Science, Technology & Maritime Transport.

[11] Xiaowen, F. Adolf, N. and Yui-Yip, L. (2010). "The Impacts of Maritime Piracy on Global Economic Development: The Case of Somalia Maritime Policy & Management": *The Flagship Journal of International Shipping and Port Research*, 37:7, 677-697.
DOI: 10.1080/03088839.2010.524736.

[12] "European Union Strategy on the Gulf of Guinea," press release from the Council of the European Union, March 17, 2014.

[13] Uadiale, M. (2012). "The Security Implication of Sea Piracy and Maritime Insecurity in Contemporary Africa Economy''. *International Journal of Economic Development Research and Investmen.t* Vol 3, No. 3.

[14] Reuters. (2020)."Kidnapped captain of Portugal-flagged ship freed-Bulgaria".

[15] Ofori, F. (2021). "Libya's Unrest Fueling Piracy in Gulf of Guinea''. A Key Note Address Delivered During the Inauguration of a Five-Day Maritime Security Training for Key Maritime Law Enforcement Agencies in Victoria Island, Lagos, Nigeria.

[16] Umar, S. (2015). 'The Role of Geographic Information System (GIS) in Effective Control of Terrorism in Nigeria''. *International Journal of Economics, Commerce and Management* Vol. iii, issue 4.

[17] Bruno, S. and Giacomo, M. (2016). ''The Pirates' Curse: Economic Impacts of the Maritime Piracy''. *Studies in Conflict and Terrorism*. Volume 39, Issue 10.
DOI: 10.1080/1057610X.2016.1144918.

[18] Baldauf, S. (2012). "Next Pirate Hot Spot: The Gulf of Guinea". *The Christian Science Monitor*.

[19] Gries, T. and Redlin, M. (2014). Maritime Piracy: Socio-Economic, Political, and Institutional Determinants. Sematic Scholars.

[20] Jens-Vestergaard, M., Conor, S. and Kellie, B. (2014). ''The State of Maritime Piracy (Colorado: Oceans Beyond Piracy, 2014'', 55. Report of the United Nations Assessment Mission on Piracy in the Gulf of Guinea (7 to 24 November 2011) (UN doc. S/2012/45, January 2012), 11.

[21] Nigeria Punch Newspaper, 27 April 2021).

[22] Society of Master Mariners' Bangladesh-*Maritime Professionals knowledge sharing*, Friday 30 July, 2021.

[23] Nigeria, Nation Newspaper of 01 August 2021. Navy Deploys Eight Ships, Helicopters for Special Operation at Gulf of Guinea.