WMD TERRORISM AND THE AL QAEDA NETWORK: AN ANALYSIS OF AQIM AND AL SHABAAB

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Globalization has had a large impact on the growth of nuclear facilities. With the advent of dual-use technology, many programs can be created on the basis of "peaceful nuclear research". This concept presents an incredible amount of dangers pertaining to the facilitation of nuclear terrorism and nuclear trafficking due to a potential increase in the ease in which this material may be accessed. In 2008, Director of National Intelligence, McConnell, told the Senate select Committee on Intelligence that the safety of the United States was threatened by the "ongoing efforts of nation-states and terrorists to develop or acquire dangerous weapons and delivery systems."[1] There is reason to believe that research is needed in North Africa to assess the current flourish of Al Qaeda affiliates proceeding the Arab Spring uprising and increasing instability in an environment of rapid change. Al Qaeda has shown interest in obtaining a weapon of mass destruction and illicit materials. Despite the chances of a terrorist organization obtaining a nuclear weapon is low; the repercussions could be very great. The growing interest in nuclear energy programs in this region increases the chances for terrorist groups to obtain illicit materials. The region of North Africa has been undergoing an immense amount of changes that have been exacerbated by the growth of terrorist groups. As Al Qaeda in the Islamic Maghreb and Al-Shabaab continue to grow, they may present a threat of nuclear terrorism to opposition in the area. The Middle East and North Africa presents a "next generation" of proliferation challenges for the U.S.[2]

It is of great importance that the potential for illicit materials trafficking in regions of high instability with groups that are interested in obtaining them be studied. It is vital to assess how strong that intention is being pursued today, and whether or not they are closer to obtaining nuclear materials due to the amount of conflict, continued civil unrest and growth of technology in their region. Current arms and drug trafficking routes may be used for the trafficking of nuclear materials. Identifying these trends in trafficking is of great importance as well.

The facilitation of spatial analysis will assist in demonstrating areas of particular interest in which trends of violence are occurring. These areas can then be viewed as having a certain degree of probability in which illicit trafficking may be occurring. The events for each year will be plotted against the locations of nuclear research reactors, nuclear research facilities, reactor engineering centers, and chemical facilities. The number of locations is limited to the information that could be found through open source research. There are other facilities and arsenals that may not be included in this assessment due to the lack of coordinate information. The probability of violence surrounding such locations can allow for a better picture of those events that may be occurring that have yet to be reported or discovered. As most nuclear trafficking is a clandestine activity, it is subjective and cannot be measured.

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[1]J. Michael McConnell, Annual Threat Assessment of the Director of National Intelligece for the Senate Select Committee on Intelligence, February 5, 2008, accessed November 21, 2013, http://www.intelligence.senate.gov/080205/mcconnell.pdf

[2] Shaheen, Jeanne. "Next Generation Cooperation Threat Reduction Act of 2013." Statement for the Record, May 21, 2013. from Institute for Science and International Security. Homeland Security Digital Library. https://0-www.hsdl.org.lib.utep.edu/?view&did=738009

Literature Review

Al Qaeda Interest in WMD

Al Qaeda's interest in using WMD against the United States began well before September 11, 2001. In 1998, Osama bin Ladin expressed that acquiring and using such weapons were an integral part of his jihad. Over the decades that followed he ordered his top leaders to purchase or develop nuclear and biochemical WMD.[3] There has also been documentation supporting this goal found in their possession. In January 2002, the Associated Press reported that U.S. military officials in Afghanistan discovered diagrams of nuclear weapons in an Al Qaeda safe house.[4] One of the documents discovered describes a nuclear weapon labeled the "Superbomb." Although the way this weapon was described it would be unable to function properly, it does demonstrate that they possessed some sort of knowledge in initiating a nuclear explosion.[5] Additional evidence of interest in acquiring nuclear material is the information provided by an Al Qaeda defector by the name of Jamal Ahmad al-Fadl. He claimed that he played a role in a $1.5 million purchase of uranium from Khartoum, Sudan. The material was provided in a 2 ft. to 3 ft. cylinder with the words "South Africa" engraved in it.[6] In addition to the attempts to obtain nuclear material, there were also incidents involving the smuggling of radioactive sources. In 2002, a Chicago criminal who had connections to Al Qaeda, by the name of Jose Padilla, described their interest in creating a "dirty-bomb." He was ordered to obtain nuclear waste to be used in a conventional bomb to contaminate an area when detonated. [7] These are just a few of the incidents involving the attempts by the Al Qaeda network to obtain dangerous materials for the purpose of weaponization. These incidents lead to the belief that this remains a goal of the network as a whole and that if given the opportunity, it will be one that is acted upon.

Al Qaeda's interest in obtaining WMD's as well as chemical, biological, radiological, and nuclear (CBRN) materials, has slowly been increasing over the past ten years. This interest along with the lethality of current incidents, the possibility of some type of incident involving CBRN materials or weapons becomes more probable in being used to support their end goals. The possession of such materials could be used to manipulate opposing governments into cooperating with such groups through political compromises. A major factor influencing nuclear terrorism would be the ease with which they would have access to illicit materials, insiders, and facilities. The threat of a CBRN terrorist attack would most likely have a larger psychological

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[3] Rolf Mowatt-Larssen, "Al Qaeda's Pursuit of Weapons of Mass Destruction." Foreign Policy, January 25, 2010, accessed September 10, 2013, http://www.foreignpolicy.com/articles/2010/01/25/al_qaedas_pursuit_of_weapons_of_mass_destruction

[4] John J. Lumpkin, "Diagrams Show Interest in Nuke Plants," Associated Press, January 30, 2002, accessed September 10, 2013, http://www.mrt.com/import/article_5345552b-a052-5324-956f-56da861e6a34.html?TNNoMobile

[5] Mike Boettcher and Ingrid Arnesen, "Al Qaeda documents outline serious weapons program," CNN, January 24, 2002, accessed September 10, 2013, http://edition.cnn.com/2002/US/01/24/inv.al.qaeda.documents/index.html?_s=PM:US

[6] Kimberly McCloud and Matthew Osborne, "WMD Terrorism and Usama Bin Laden," CNS Report, November 20, 2001, accessed September 10, 2013, http://cns.miis.edu/pubs/reports/binladen.htm

[7] Lyudmila Zaitseva and Kevin Hand, "Nuclear Smuggling Chains: Suppliers, Intermediaries, and End-Users," *American Behavioral Scientist* 822, no. 46 (2003): 822-844, accessed September 13, 2013, DOI: 10.1177/0002764202239177

impact as opposed to physical impact and could force a government into negotiations with the terrorist group. Given that the Al Qaeda network's anti-western sentiment is particularly focused on the U.S. and their heightened interest in the use of CBRN material creates a cause for concern. They are currently the most advanced terrorist network with the needed organizational skills, geographic reach, and financial resources needed to pursue nuclear terrorism. The Al Qaeda network will continue to be a developing threat as it continues to disseminate its beliefs unto other groups, growing potential affiliates and furthering its reach across new regions. Identifying the groups with potential capabilities of conducting illicit materials trafficking and/or carrying out acts of nuclear terrorism is an important task for counterterrorism efforts to effectively disrupt future operational efforts and deny access to such material. North Africa has seen incredible amounts of civil unrest and government instability within the past few years alone. This region will continue to undergo massive amounts of change led by inexperienced leaders. The prevalent Al Qaeda affiliates in this region must be monitored and sustained to prevent any nuclear threats they may pose in the future. [8]

Al-Qaeda Today

Due to the string of recent conflicts in North Africa, it is imperative that the current threat of Al Qaeda be assessed in this region. Over the past few years, Al Qaeda has grown more diffuse and decentralized. The core group, led by senior leadership and located in Pakistan, has been the focus of U.S. strategy over the past few years and remains the head of the network despite continued decentralization. The Bush Administration increased pressure on this group and did little to combat the affiliated groups that were outside of the Afghanistan-Pakistan area.[9] As a result the threat of such affiliate groups continued to grow, catapulted in just the past few years by the Arab Spring uprisings. Regimes across North Africa and the Middle East have weakened, creating an ample opportunity for Al Qaeda affiliates and allies to secure their positions. The environment of North Africa and Somalia provided ideological alignment, under governed territory, and high levels of insecurity, perfect for the chance to reestablish itself and become a safe haven for these groups.[10]

AQIM and Al-Shabaab have been chosen for analysis of this paper because they are the most active and fastest growing Al-Qaeda affiliates in the region. The leaders of both of these groups have sworn their loyalty to the Al Qaeda leaders in Pakistan, thus becoming an affiliate. The main focus of both groups is concentrated on activities in their current locations, and not of that of the U.S. homeland.[11] They do however remain a threat to U.S. interests overseas. More than 20 diplomatic posts across the Middle East and North Africa were closed on August 4, 2013.[12] Between 1998 and 2011, Al Qaeda and affiliates in Yemen, Iraq, North Africa, and Somalia have conducted nearly 1,000 attacks, killed over 8,000 people, and wounded over

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[8] Charles D. Ferguson and William C. Potter, *The Four Faces of Nuclear Terrorism* (Monterey, CA: The Center for Nonproliferation Studies, Monterey Institute of International Studies, 2004), 18, 21, 25, 29.

[9] Katherine Zimmerman. "The Al Qaeda Network: A new framework for defining the enemy," America Enterprise Institute's Critical Threats Project. September 2013, accessed October 3, 2013, http://www.criticalthreats.org/al-qaeda/zimmerman-al-qaeda-network-new-framework-defining-enemy-september-10-2013, 1,4,7.

[10] Seth G. Jones, "Re-Examining the Al Qa'ida Threat to the United States," RAND Office of External Affairs, July 2013, http://www.rand.org/content/dam/rand/pubs/testimonies/CT300/CT396-1/RAND_CT396-1.pdf , 1, 10.

[11] Ibid, 6-7.

[12] Zimmerman, "The Al Qaeda Network," 1.

12,000 others. About 98% of these attacks were part of an insurgency where operatives tried to overthrow a local government or secede from it.[13]

Understanding how these groups operate, and what they contribute to the goals of the Al Qaeda network as a whole will better enable the U.S. to counter potential threats and develop a strategy in detecting the trafficking of nuclear materials.[14] A long term approach to Al Qaeda may need to be taken, with an assessment of those affiliates that pose a threat to the homeland, and allied support for those countries who are encountering significant threats from such affiliates. Under the leadership of Ayman al-Zawahiri, a major goal of his leadership is to establish a pan-Islamic caliphate across North Africa, the Middle East, and Asia. He has sought to replace regimes within these areas by implementing violent jihad, which has been largely seen in the area.[15] This goal is facilitated with means of trafficking that include but are not limited to arms, narcotics, and human trafficking. Assessing the trends in the regions in which this activity occurs can help gain insight into areas of potential illicit materials trafficking.

Instability in North Africa

The level of instability in North Africa is heightened by the number of operational research reactors, the possibility of nuclear terrorism, and the trafficking of illicit materials. According to Senator Jeanne Shaheen, the countries in the Middle East and North Africa present a large proliferation challenge to the U.S. due to the ongoing political instability and "deeply-rooted violent extremism." Nearly one-third of the states in this region possess some type of CBRN capability, and many are suspected of having related research programs. This region is particularly challenging due to the violent nature of its climate, along with its complex ethnic differences, and inexperienced and unstable governments recently brought into power. [16] The recent confirmation of Syria's chemical weapons stockpile and the discovery of Iran's nuclear program, its development and ongoing negotiations, are examples demonstrating the proliferation issues that are known to be occurring. These materials and expertise may trickle down to the Al Qaeda network, whose direct ties to the Iranian and Syrian regimes amplify the threat of potential trafficking of illicit materials. There may be additional clandestine activities and programs that have yet to be discovered, such as the A.Q. Khan nuclear trade network that was not discovered until 2004. [17]

There is also the possibility of terrorists obtaining uranium or plutonium for use in an improvised nuclear device (IND).[18] The geographical location of North Africa and the nuclear research reactors and facilities located in this region presents this opportunity to the inhabiting terrorist groups. According to the International Atomic Energy Agency (IAEA), Algeria, Egypt, Libya, Morocco, Nigeria, Ghana, Democratic Republic of Congo, and South Africa all currently

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[13] Global Terrorism Database at the University of Maryland's National Consortium for the Study of Terrorism and Responses to Terrorism (START), Accessed on September 8, 2013, http://www.start.umd.edu/gtd/

[14] Zimmerman, "The Al Qaeda Network," 1.
[15] Jones, "Re-Examining the Al Qa'ida Threat to the United States," 2-4.
[16] Jeanne Shaheen, "Next Generation Cooperation Threat Reduction Act of 2013," Statement for the Record, May 21, 2013. from Institute for Science and International Security. Homeland Security Digital Library. https://0-www.hsdl.org.lib.utep.edu/?view&did=738009

[17] "Middle East and North Africa 1540 Reporting," 2013, Nuclear Threat Initiative. Accessed September 12, 2013, http://www.nti.org/analysis/reports/middle-east-and-north-africa-1540-reporting/
[18] Ferguson and Potter, *The Four Faces of Nuclear Terrorism,* 1.

possess operational nuclear research reactors. The nuclear material would be implemented as an alternative energy source to be developed into nuclear power plants to generate electricity. The countries of Algeria, Egypt, Libya, Morocco, Kenya, Nigeria, and Tunisia, are all considering the possibility of nuclear energy and are currently receiving research assistance from the IAEA. [19]

Many of these research reactors are located in highly populated cities. Most of them contain a much smaller amount of radioactive materials than nuclear power stations, hence lower security measures. Research reactors in the U.S. have lower security measures for this reason. It can be inferred that security at a majority of these sites in North Africa is rather limited, and may present an attractive target to terrorist groups.[20] The fissile materials contained at these sites are low enough that it is too small to be used to produce an explosive device. However, two or three thefts of such a material could yield enough to potentially create an IND.[21] The material contained in the nuclear power plants that may be built in this area in the future : enriched uranium, low-level radioactive waste, and spent nuclear fuel all present the potential to be used in an IND.[22] The concern over the development of future nuclear power plants in this region presents a large step that could very well lead the world closer to the potential for nuclear terrorism.

Africa also contains another source where illicit materials can be obtained. Most of Africa is rich in uranium ore deposits; Algeria, Mali, Mauritania, Morocco, Niger, Nigeria, and Somalia all possess these deposits. Uranium mining is a frequent event that is taking place in 33 African states. With the development of nuclear energy programs and mining uranium, it is important that African states begin to prioritize nuclear security. This task may be fairly difficult given the various security challenges that are faced. Most of Africa faces more pressing challenges that include; the proliferation of small arms and light weapons, the alleviation of poverty, the provision of basic goods and services, educational facilities and healthcare. Africa also faces the dilemma of a scarcity of food, unequal land distribution, and perceived corrupt practices of those in power. Implementing the proper security measures required to divert non-state actors from obtaining nuclear materials will be challenging for these states whose main issues focus on the survivability of its inhabitants. Following the proper security measures seems unlikely. [23]

Nuclear Terrorism

According to information in the Center for Nonproliferation Studies' WMD Terrorism Database, the number of terrorist incidents involving some type of CBRN has been growing in the past decade, even if the scale of each event remains low. While the probability of a large terrorist attack involving the use of this scale of materials is low, the chances of it occurring is

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[19] Amelia Broodryk and Noel Stott. "Securing Africa's Nuclear Resources." Institute for Security Studies. 2011. Accessed October 10, 2013, http://www.issafrica.org/iss-today/securing-africas-nuclear-resources 6-7.

[20] Ferguson and Potter, *The Four Faces of Nuclear Terrorism,* 10.

[21] William J. Broad, "Research Reactors a Safety Challenge," The New York Times, April 12, 2010, accessed October 13, 2013, http://www.nytimes.com/2010/04/13/science/13nuke.html?pagewanted=all&_r=0

[22] "Nuclear Power Plants," The U.S. Environmental Protection Agency, accessed October 22, 2013, http://www.epa.gov/radtown/nuclear-plant.html

[23] Amelia Broodryk and Noel Stott. "Securing Africa's Nuclear Resources," 6, 10, 15, 24.

becoming more likely due to the gaining popularity of peaceful nuclear programs facilitating their access to these materials. Terrorist acts with smaller consequences have a greater likelihood of occurring because they are easier to carry out. They are more likely to create an IND or RDD than attempt to create a nuclear weapon due to the lack of technological expertise and financial resources. However, if they were able to obtain highly enriched uranium, they would be able to create a devastating explosion using an IND. [24]

According to Ferguson and Potter, there are four "faces" of nuclear terrorism. The environment in North Africa brings about the growing possibility that all but one may occur. These "faces" explain how a terrorist group may exploit military and civilian nuclear assets. The first expresses the theft and detonation of an intact nuclear weapon. Next, the theft and or purchase of fissile material may lead to the fabrication and detonation of an improvised nuclear device IND. Third, attacks against and sabotage of nuclear facilities, in particular nuclear power plants causing the release of large amounts of radioactivity. This point would be unlikely to occur in this region because these facilities are located in their homeland. If the targeted facility was located in the area of an adversary, this third point would carry a greater likelihood of occurring. The last point is the unauthorized acquisition of radioactive materials contributing to the fabrication and detonation of a radiological dispersion device (RDD) or dirty bomb.[25] Expanding nuclear technology in this area of unrest will pose an increased challenge to current non-proliferation efforts. Security in this area is then faced with threats that involve attacks on nuclear facilities and the diversion of nuclear material through trafficking or smuggling to state and non-state actors, and the increase in illicit trafficking cases.[26]

Nuclear Smuggling

To assist in the identification of potential nuclear smuggling routes, those used for the transport of goods, narcotics, arms, and people could be reasonably assessed. Such smuggling routes could provide transportation and opportunities for them to sustain themselves. It is difficult to detect and bring an end to nuclear trafficking because it is often difficult to tell that it is occurring. It often remains unknown until an incident is caught. The assessment of routes used for trafficking of other materials by AQIM and Al Shabaab could potentially shed light on possible nuclear trafficking routes. Nuclear trafficking routes may already exist due to the A.Q. Khan network, or they may have formed new routes after the network was discovered. North Africa presents a fertile environment for trafficking due to its porous borders, underdeveloped law enforcement institutions, and lack of export control and border security.[27] According to the IAEA's Illicit Trafficking Database ITDB, from January 1993 to December 2009, a total of 1773 global incidents have been reported by participating states and non-participating states. There were 500 incidents reported involving the theft of loss of nuclear or radioactive material.[28] These events are continually occurring, and these are only the events that are known. It is a matter of

[24] Ferguson and Potter, *The Four Faces of Nuclear Terrorism*, 5, 8, 18.
[25] Ibid, 3.
[26] Broodryk and Stott. "Securing Africa's Nuclear Resources," 11-12.
[27] "Middle East and North Africa 1540 Reporting," 2013, Nuclear Threat Initiative.
[28] International Atomic Energy Agency (IAEA), 'The IAEA Illicit Traffi cking Database', 31 Dec. 2004, accessed September 26, 2013, http://www-ns.iaea.org/security/itdb.asp.

time before nuclear smuggling begins throughout North Africa if it has not already done so. Both AQIM and Al Shabaab have engaged in the transport of contraband in order to sustain and better facilitate their goals.

AQIM Trafficking

The recent interventions and regime changes that have occurred in North Africa have facilitated AQIM's trafficking network. AQIM benefited from the collapse of Muammar Qaddafi's regime in Libya, and they now possess the arms and munitions that were moved out of this country. Libya has become a key area for trafficking, conflicts over the control of these routes is becoming more frequent. The uprising that took place in Mali in 2012 also provided AQIM the opportunity to establish relationships with groups in that region. The French intervention in January 2013 in northern Mali further facilitated this growth by degrading military capabilities and pushing AQIM into new territories, creating new safe havens for them to network in. Despite the French intervention, this mission has given way to AQIM growing into areas in Libya and providing them with potentially new trafficking networks in this region.[29] AQIM's network has begun to reach into southern Tunisia, where arms trafficking and criminal networks connecting to Central Africa are known to exist. This region in Tunisia is becoming notoriously known for smuggling and drug trafficking, it is a key trafficking point connecting to the rest of the region. AQIM has been using this area as a safe haven in plotting attacks on eastern Algeria. The main goal of AQIM has been shown to be the overthrow of regimes in North Africa, particularly Algeria, and replacing them with an Islamic regime. Their main foreign enemy is France, and not the U.S., despite their anti-Western sentiment.[30] Their well-integrated trafficking routes provide an outlet for the trafficking of nuclear materials.

Al Shabaab Trafficking

Al Shabaab was responsible for the recent terrorist attack at a shopping mall in Nairobi, Kenya. There were at least 67 fatalities, the victims were targeted based on their ideological beliefs, and those who were of Christian faith were murdered. [31] Al Shabaab is becoming one of the most feared militant groups in the Al Qaeda network. Their main focus is to overthrow the Somali government and they support Al Qaeda's ideology of re-establishing a caliphate. The area that they currently maintain a stronghold in is East Africa. They currently do not appear to be plotting against the U.S. but they do present a potential threat in the future. However, their senior leadership has shown interest in targeting U.S. and other foreign targets in East Africa. An even more troubling concept is that many Americans have been recruited to join Al Shabaab's efforts. Furthermore, Al Shabaab is heavily involved in piracy off the coast of Somalia. Much of the cargo in ships that are attacked are then trafficked through the rest of Africa. In 2008, global

[29] Zimmerman, "The Al Qaeda Network," 16-18.
Anouar Boukhars, "Al-Qaeda's Resurgence in North Africa?" FRIDE: A European think tank for global action. Norwegian Ministry of Foreign Affairs. August 2013. No. 120, 1, 10, 12.
[30] Jones, "Re-Examining the Al Qa'ida Threat to the United States," 2.
[31] Katherine Zimmerman, "Al Qaeda's African Surge Threatens the U.S." September 25, 2013. AEI Critical Threats. Accessed November 9, 2013. http://www.criticalthreats.org/somalia/zimmerman-al-qaedas-african-surge-threatens-us-september-25-2013

piracy increased 11% with piracy up by 200 percent in East Africa. [32] This group takes full advantage of its position off the coast of Somalia. It is from this location that the group trafficks arms, ammunition, goods, and other items. This group is a major participant of an international ivory smuggling network and makes a majority of its money from these trading activities; up to 40% of their financial backing comes from these sales. Given their location, present smuggling activities, and anti-Western sentiment, they could potentially participate in nuclear trafficking or nuclear terrorism in the future. [33]

Theoretical Framework

The hypothesis of my study is that terrorist incidents involving AQIM and Al Shabaab have increased within the past five years in areas containing nuclear and chemical materials. My study seeks to identify trends in areas that may facilitate and potentially be used to conduct nuclear trafficking. If there is an increase in such incidents, this could be a potential indicator that these Al Qaeda affiliates may be closer to obtaining illicit materials to create INDs or RDDs. Therefore, they may present a heightened security threat to U.S. interests and allies abroad, and may possess the potential to conduct acts of nuclear terrorism.

Research Design

To implement my analysis, I will be conducting my assessment using a geospatial information model. I will use ArcGIS software to illustrate the location of armed conflict terrorist incidents conducted by AQIM and Al Shabaab on a projected map of North Africa. This layer will illustrate the number of incidents as points scattered across the map in accordance to the longitude and latitude coordinates indicated in the dataset. The second layer of data includes the locations of research reactors and chemical facilities located in the region. The amount of terrorist incidents will be assessed according to their proximity to each plotted facility. A multiple ring buffer zone has been created around each facility. Each ring represents an indicated distance ranging from 1 km to 50 km. The first analysis compares the amount of AQIM incidents in 2007 to AQIM incidents in 2012. I will assess whether there are more incidents occurring in 2012 than in the past, as well as the amount of incidents located within the buffer zones of each nuclear facility. The second analysis will be conducted in the same method, but will assess the comparison between Al Shabaab incidents that occurred in 2008 with those incidents that occurred in 2012. This analysis begins in 2008 due to the lack of data for 2007.

The data I will be using to test my hypothesis is from the Armed Conflict Location and Events Dataset (ACLED). This data contains information on the dates, locations, type of event, groups involved, fatalities, and changes in territorial control.[34] This data was divided based on countries, I collected information for the following: Algeria, Egypt, Morocco, Libya, Mali, Mauritania, Somalia, Kenya, and Uganda. I researched each dataset for incidents containing AQIM and/or Al Shabaab. The above countries were the only datasets containing this

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[32] Stephanie Hanson, "Combating Maritime Piracy," Council on Foreign Relations, April 13, 2009, accessed, November 15, 2013, http://shipmun.pbworks.com/f/Combating%20Maritime%20Piracy.pdf

[33] Seth G. Jones, "The Terrorist Threat from Al Shabaab," RAND Office of External Affairs. October 2013. http://www.rand.org/pubs/testimonies/CT400.html 1-2.

[34] Armed Conflict Location and Event Dataset, International Peace Research Institute, accessed November 2, 2013, http://www.acleddata.com/

information. Countries such as Tunisia, and Niger did not contain any data for these two groups. I then extracted AQIM and Al Shabaab incident data from each dataset to be uploaded into the ArcGIS software. This data was then layered over a geographic world map. To create additional layers of information for the terrorist incidents, I implemented the "Selection by Attributes" tool to separate the data into different layers based on year in order to measure growth.

The data obtained for the locations of the nuclear research reactors and chemical facilities was gathered from the IAEA Research Reactor Database. This database provides technical specifications and information on research reactors and facilities located around the world.[35] I also gathered data from the Nuclear Threat Initiative's Interactive Facilities Map displayed with Google Maps. This interactive mapping system displays known biological, chemical, and nuclear facilities.[36] After obtaining this data, I gathered longitude and latitude coordinates through Google Earth. The facilities included in this project were those whose information was available through open source materials. Also included were reactors and chemical facilities that have been shut down and are being dismantled. Exhibit 1 illustrates the facilities included in this study. Each facility contains a multiple ring buffer zone. This buffer zone was created using the ArcMap Toolbox application of the software, the facility data was used as my input. Five rings were created representing 1 km, 2 km, 5 km, 10 km, and 50 km. The rings are displayed surrounding each facility to illustrate the distance between the facility and the plotted terrorist incidents.

Analysis

When conducting the analysis, there were several countries that did not contain any reported terrorist incidents for the years that were assessed. The first analysis compares the amount of AQIM incidents in 2007 to AQIM incidents in 2012. Only three countries contained terrorist incident data for AQIM in 2007; Algeria, Mali, Mauritania. The countries containing incident data in 2012 were Algeria, Mali, Mauritania, Egypt, and Libya. The maps located in the Exhibit section of this paper illustrate the plotted data for the total AQIM incidents occurring from 2007 through 2012 (Exhibit 2), followed by AQIM incidents in 2007 (Exhibit 3), and AQIM incidents in 2012 (Exhibit 4).

There are a greater amount of incidents that have occurred in 2007 than in 2012. This may be due to a number of factors. AQIM may now be directing other terrorist groups to conduct attacks for them. There may be an increasing number of groups that they have allied themselves with to assist in carrying out their goals. The maps also show that incidents surrounding nuclear facilities and research reactors were only occurring in Algeria. This area is of particular importance due to its proximity to sea ports, where trafficking of materials have the potential of being facilitated. There is a greater amount of incidents surrounding these reactors in 2007 than there are in 2012. In the assessment of incidents occurring within the buffer zones surrounding the facilities, Exhibit 4, indicates that the Nuclear Research Center, located near the borders of Niger and Mali, has one terrorist incident within 50 km at the city of Tamanransett. The specific incident involved the arrest of an AQIM operative by security services, there were no fatalities.

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[35] IAEA Research Reactor Database, International Atomic Energy Agency, accessed September 20, 2013, http://nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx?rf=1

[36] NTI interactive facility map, Nuclear Threat Initiative, accessed September 20, 2013, http://www.nti.org/gmap/?country=egypt&layers=biological,chemical,missile,nuclear

The next portion of analysis will consider the AQIM terrorist incidents occurring within the buffer zone of the NUR research reactor in Draria, Algeria. The AQIM 2007 terrorist incidents occurring within a buffer zone is illustrated in Exhibit 5, and Exhibit 6 demonstrates the same area of Algeria without the buffer zone layer. This map demonstrates five AQIM terrorist incidents occurring in 2007 within the buffer zone at the NUR research reactor in Draria. There are four incidents that have occurred within 50 km of the site and one incident occurring within 10 km of the site. The incidents occurring within 50 km of the site involved the following incidents. One involved the bombing of the prime minister's office and a police station, 30 fatalities were recorded. The next incident involved a terrorist attack with four fatalities, the third incident involves another terrorist incident with three fatalities, and the fourth incident involved one fatality. The incident occurring within 10 km of the site involved violence against civilians and had zero fatalities.

The following analysis of the AQIM terrorist incidents in 2012 involves the same research reactor in Draria, Algeria. There were not any additional AQIM terrorist incidents occurring at other facilities in North Africa. Exhibit 7 illustrates three AQIM terrorist incidents occurring within 50 km of the NUR research reactor site and one within 10 km of the site. The incidents occurring within 50 km of the site involve a terrorist incident with three fatalities, another incident with two fatalities, and another operation involving two fatalities. The incident occurring within 10 km of the site involved another conflict, with no fatalities reported.

The second analysis compares the amount of Al Shabaab incidents from 2008 to 2012. Exhibit 8 illustrates the amount of terrorist incidents occurring in Somalia and along the border with Kenya. When assessing the amount of Al Shabaab incidents contained in the ACLED database, the only countries containing incidents on this group was Somalia, Kenya, and Uganda. Since the group is a fairly recent affiliate of the Al Qaeda network, the amount of data was low. There were no terrorist incidents conducted by Al Shabaab within any of the plotted facilities. According to Exhibit 9, there was a large rise in the amount of incidents in 2012. Incidents have begun to spread outside of Somalia.

There are a few limitations to this study. The data in the ACLED terrorist incident dataset may have been gathered on a limited set of criteria. There may be more incidents that have occurred in these regions than what is currently displayed in the model. The data selected to be included may not be representative of all terrorist events occurring in this region. The events included may also not have been properly validated with other sources to confirm which terrorist group conducted the act. There is not the same amount of information available for each incident; some contain more information detailing attacks than others. There also exists a lack of incidents recorded involving Al-Shabaab and AQIM in the Democratic Republic of Congo, Ghana, Nigeria, and Ethiopia. According to the ACLED database, there were no terrorist incidents conducted by these groups. There exists the inherent limitation that not all incidents can be measured or recorded. It is difficult to assess clandestine activity, and many incidents may go unreported. Another limitation may be the location of the facilities plotted on the map. Their longitude and latitude coordinates may be slightly off from the exact location of the site. The map represents an estimate of such locations. There were also several locations recorded for one city, this may prevent different incidents from being accurately portrayed on the map.

Conclusion

In assessing the AQIM terrorist incidents in the region, it can be concluded that incidents surrounding facilities and research reactors were only found to be in Algeria. There were a greater amount of incidents surrounding reactors in 2007 than in 2012. Most of the incidents occurring within 50 km of a research reactor occurred at the Nur research reactor site. For the incidents occurring in 2007 and 2012, there have been a total of 12 incidents occurring within 50 km of this site, and two incidents occurring within 10 km of the site. The terrorist incidents occurring for Al Shabaab in 2008 and 2012 demonstrate significant growth of this group. They seem to be spreading in numbers, and are more capable of carrying out activity. There were no Al Shabaab terrorist incidents within 50 km of a research reactor or facility. However, while the data presented an increase in terrorist activity for Al Shabaab along the East African coast, but not around nuclear reactors or facilities, there was a decrease in terrorist activity by AQIM (Exhibit 10). This group may not have a large interest in trafficking illicit material. I can assess with moderate confidence that this group has a smaller potential of trafficking nuclear material than Al Shabaab.

This study reveals that AQIM and Al Shabaab do not present a significant threat of nuclear terrorism to the U.S. homeland, or a significant threat for carrying out the potential of trafficking nuclear material. Neither group presents a threat of obtaining nuclear material from facilities in this region. I can assess with medium confidence that AQIM and Al Shabaab present a threat to U.S. interests in North Africa due to the past incidents and current motivations. Al Shabaab presents a greater threat to U.S. interests abroad than AQIM. They are unlikely to attack a nuclear reactor or facility because the cities in this region are made up of a combination of allied groups and adversary groups. They would not risk conducting an act of nuclear terrorism that may hurt their allied groups because these sympathizers are a type of support system that provides financial support. Nuclear trafficking is more probable than nuclear terrorism because trafficking in general is a way of life in this area. A majority of the countries in Africa live in extreme poverty. Participation in trafficking provides a source of income. The areas that have been revealed to be likely nuclear trafficking routes are those areas along the coast. This region contains the majority of plotted terrorist incidents in North Africa amongst both groups. Maritime security must be amplified to diminish the likelihood of nuclear material smuggling through cargo ships. The potential for nuclear trafficking in this region will continue to grow within the next 10 to 15 years due to the advent of dual-use technology and the rising popularity in nuclear peace programs. The closer this region becomes to implementing nuclear power plants to produce electricity, the greater the threat of nuclear trafficking.

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Exhibits

Exhibit 1- Locations of nuclear research reactors and facilities

Country	City	Facility
Algeria	Draria	NUR research reactor
Algeria	Birine	Nuclear Research Center
Algeria	Ain Oussera	Es-Salam research reactor
Algeria	Tamanrasset	Nuclear Research Center
Morocco	Maamora	Research center with research reactor: TRIGA
Egypt	Inshas	ETRR-2 research reactor
Egypt	Nasr City	National Center for Radiation Research & Technology
Egypt	Inshas	Fuel Element Fabrication Plant: Reactor Engineering Center
Egypt	Inshas	Hydrometallurgy Pilot Plant
Egypt	Inshas	Tandem Electrostatic Accelerator
Egypt	Inshas	Nuclear Chemistry Building inside The National Research Center
Libya	Tajoura	10 Mw research reactor
Libya	Rabata	Pharma 150 Rabata chemical facility
Libya	Sebha	Pharma 200 Sebha chemical facility
Libya	Tarhunah	Pharma 300 Tarhunah chemical facility
Ghana	Haatso	GHARR-1 research reactor
Nigeria	Zaria	NIRR-0001 research reactor
South Africa	Pretoria	SAFARI-1 research reactor

Exhibit 2- AQIM Total Incidents 2007-2012

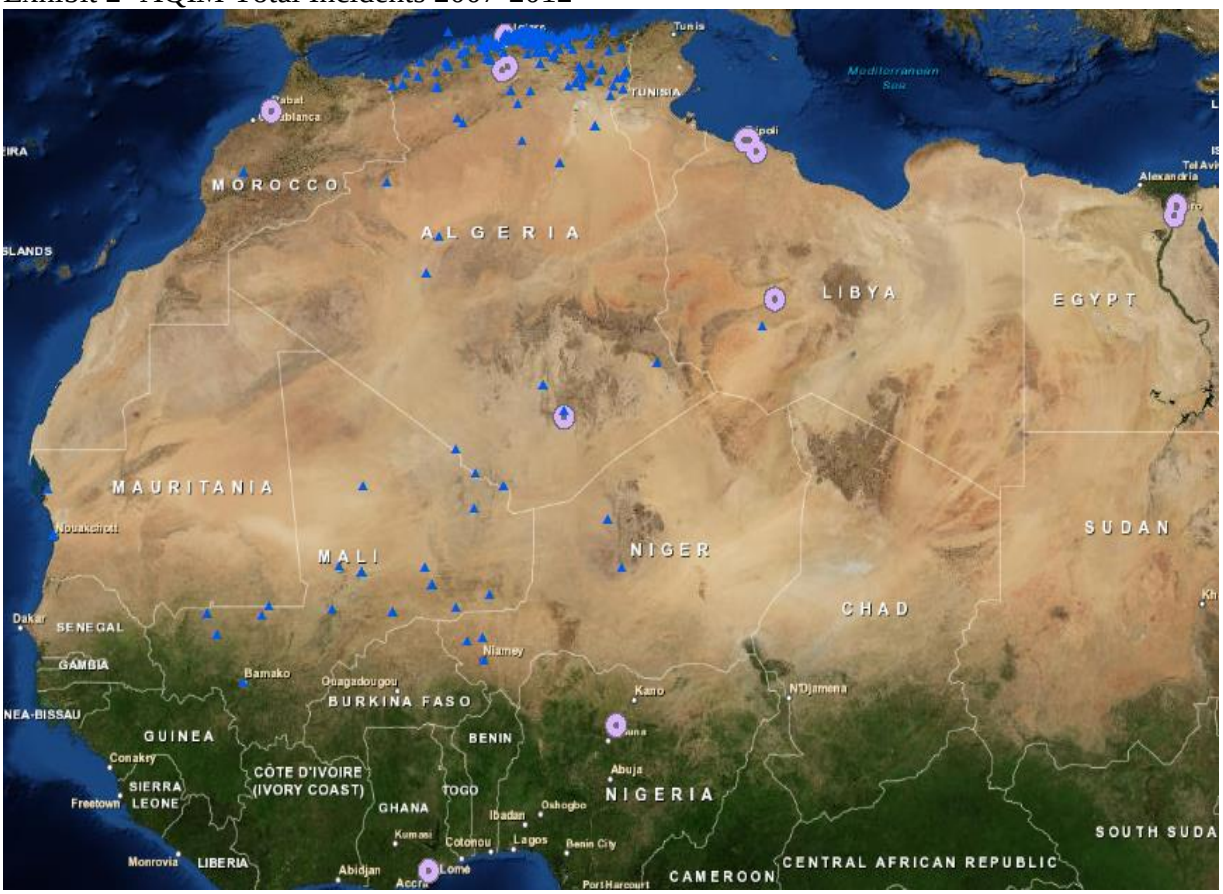


Exhibit 3- AQIM Incidents 2007

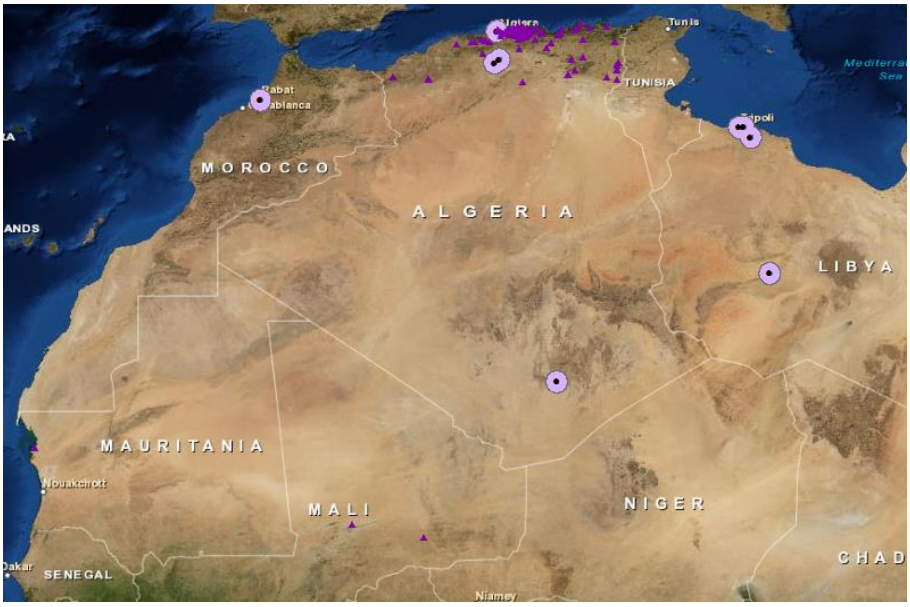
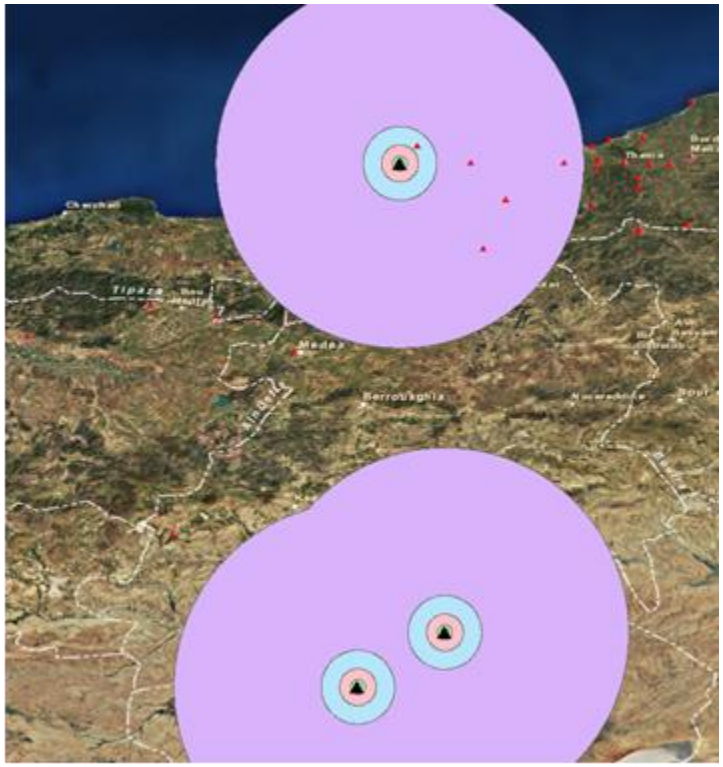


Exhibit 4- AQIM Incidents 2012

Exhibit 5- AQIM2007 Incident Buffer Zone



Buffer
distance
1 km
2 km
5 km
10 km
50 km

TI_Algeria_AQIM 2012

Reactor_Facilities

Exhibit 6- AQIM 2007 Reactor Incidents

Exhibit 7- AQIM 2012 Incident Buffer Zone

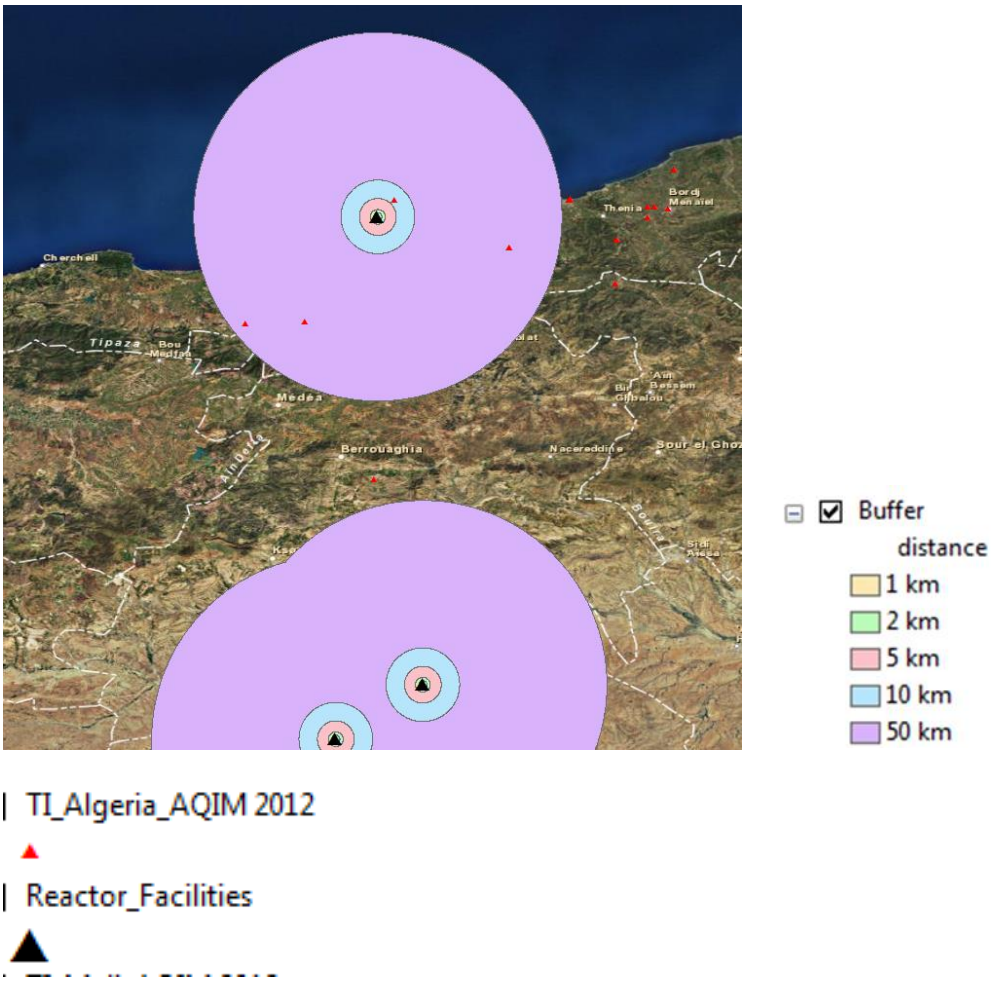


Exhibit 8- Al Shabaab 2008 Incidents

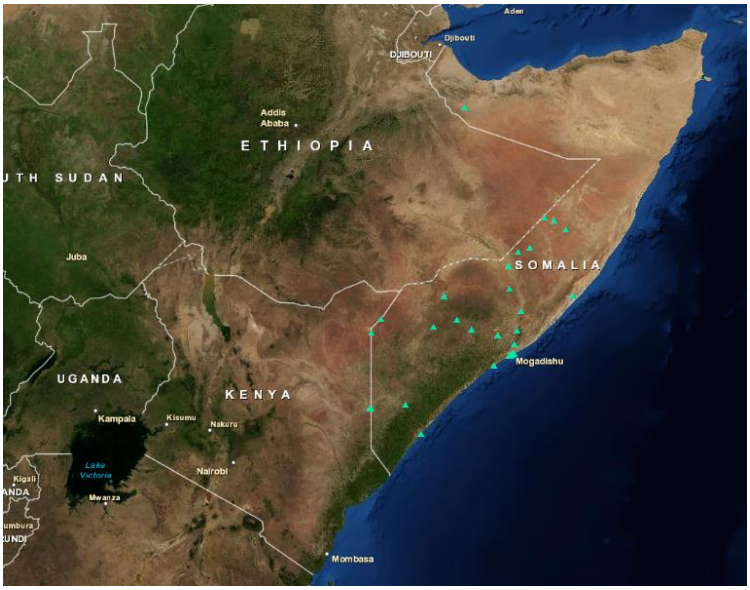


Exhibit 9-Al Shabaab 2012 Incidents

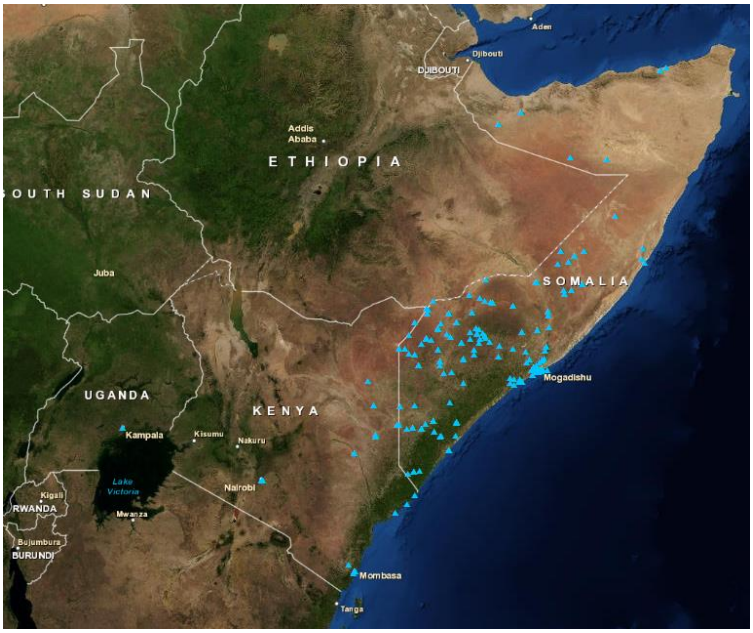
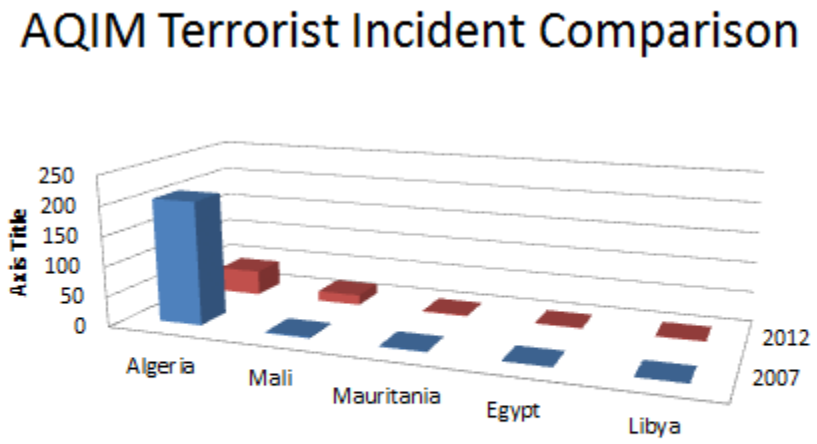


Exhibit 10



	Algeria	Mali	Mauritania	Egypt	Libya
2007	206	2	1	0	0
2012	42	17	2	1	1