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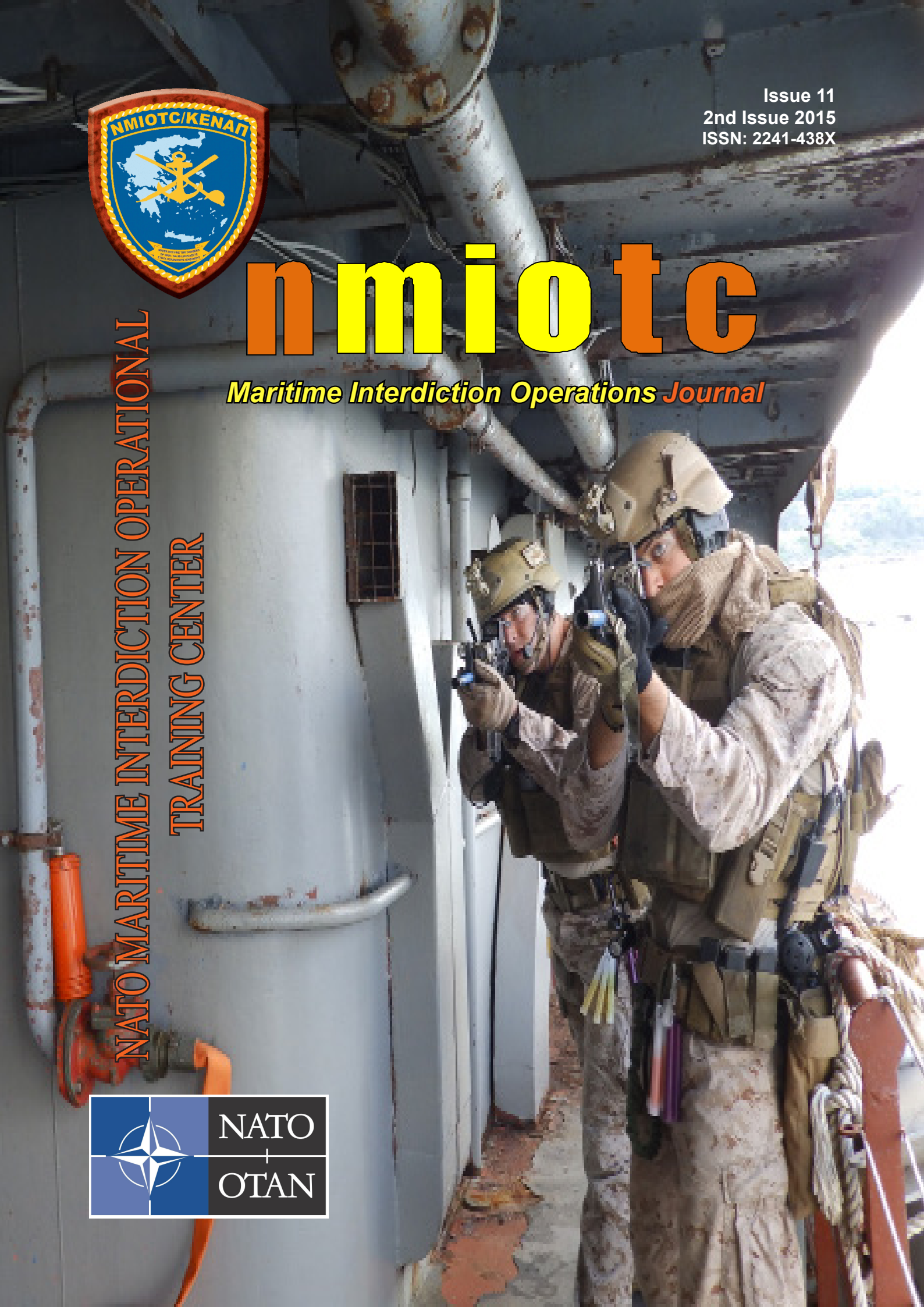

NATO
Maritime Interdiction Operational
Training Center

7th Annual Conference

CHALLENGES TO MARITIME SECURITY DERIVED FROM TRASNATIONAL ORGANISED CRIME AT SEA

07-09 JUNE 2016

CONTENTS

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MARITIME INTERDICTION OPERATIONS *JOURNAL*

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NMIOTC Commandant's Editorial

As we part from the year 2015 it's time to start an account of the year's outcomes, and take time to ponder on the past 12 months. The year 2015 was marked by a plethora of security challenges worldwide. Destabilization of Syria and ISIS marching on Middle East further complicate the situation of an already turbulent area and show that helping this area secure its own future is a hard bet. A little bit northern, the Ukrainian Crisis remains another tricky puzzle to solve. On the other hand the climatic change and the global energy market transformation pose a significant point of consideration affecting both the global way of thinking and the daily quality of living around the globe. Referring to the tactics used from those posing a threat to international stability we notice that more than ever before, hybrid threats are used and cyber threats and IEDs are characteristic examples of low- cost high-efficiency tactical methods, with strategic level effects.

Further from the security effects produced on the area there are side effects affecting the broader region. A stunning example of such collateral damage can be seen in the migration flows from the Middle East and North Africa to Europe which has already caused serious problems on border security terrorism, proliferation of weapons of mass destruction and illicit trafficking at sea.

NATO Maritime Interdiction Operational Training Centre is fully aware of all these challenges and is constantly transforming to cope with current and evolving threats to maritime security. Therefore we have intensified our efforts on 2015 with noteworthy results. Firstly, we continued providing affordable and efficient training necessary to enhance maritime security, with more than 1290 trainees from 60 countries, 38 naval units and 37 special forces teams trained within 2015. Secondly, in order to envision and develop future and emerging solutions to maritime security threats through transformation, the centre hosted 17 seminars, conferences and workshops attended by 560 participants and participated to several concept development and experimentation activities.

On the same track the centre already announced its 7th Annual Conference, which will take place in our premises, in Souda Bay Crete, Greece, from the 7th to the 9th of June 2016, with the theme "Challenges to Maritime Security Derived from Transnational Organized Crime at Sea".

As a result of the aforementioned efforts new courses are being developed on "Protection of critical infrastructure ashore-

offshore" and "Use of non lethal capabilities in MIO" and we are launching our new courses on "Illicit Trafficking at Sea", "Vessel Protection Detachment (VPD)" and "C-IED Considerations in MIO".
In keeping with all this, and in order to evolve and enhance our training products and promote our transformation capabilities we signed partnership agreements with University of Plymouth, Arab Institute of Security Studies and World Maritime University of IMO. The partnerships were formally sealed with the signing of dedicated Memorandum of Understanding among NMIOTC and the aforementioned Universities and institute. Following the inauguration of the academic collaboration of the NMIOTC with Plymouth University and the Dartmouth Centre for Sea Power and Strategy, NMIOTC will be stakeholder to the new suite of blended MA degrees in Applied Strategy, introduced by Plymouth University, including MA in Applied Strategy and Maritime Security.
As Maritime Interdiction Operations are a critical enabler for all Maritime Security Operations tasks, NMIOTC remains an excellent example of low-cost high-efficiency Education and Training Facility providing the alliance and its partners with an added value in three different ways: increasing the effectiveness of NATO-led multinational forces (through interoperability and their ability to work together), assisting partner countries in their reform efforts, and helping bring peace and stability to crisis hit areas through Defense Capacity Building. With the arrival of 2016 most of the security challenges of the past remain open and hot, and NMIOTC stands ready and eager to support the Alliance in the best possible ways.

Anastasios Tserkezoglou
Commodore GRC (N)
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Hybrid Threat

The new evolving challenge to International Security & Stability

by Corrado Campana
Captain ITA N

In the 20th century, military forces, law enforcement organizations and intelligence agencies worldwide were highly specialized and responded to challenges within their respective field of concern. With an oversimplification, it could be said that the militaries of the world dealt with insurgency –on different scales which could vary from local to regional or international–, law enforcement institutions dealt with their respective country's organized crime problem, and the global intelligence community dealt with international terrorism. Each entity used approaches and methods that were consistent with the challenge they were facing and within their scope and depth of expertise and resources.

The world has changed dramatically in the first 15 years of the 21st century and the pace of this change seems to be accelerating. Technological innovation, dramatic shifts in the degree of ideological perspective, economic crises, and ancient disputes involving what military historians called "wars of blood and faith" are combining with modern conflict trends within the collective phenomena formerly referred to as organized crime, insurgency, and terrorism. This paradigm shift in the construct of conflict itself is rapidly making the old approaches less effective or useless or, even worse, in some cases, a potential strategic advantage for the counterpart projecting a new, insidious and not easily defined or identified threat: a "hybrid" threat. According to a widely accepted definition, Hybrid threats "are those posed by adversaries, with the ability to simultaneously employ conventional and non-conventional means adaptively in pursuit of their objectives". This is a very broad term, encompassing a wide variety of existing adverse circumstances and actions, such as terrorism, migration, piracy, corruption, ethnic conflict etc.

It is particularly important to note that hybrid threats are not exclusively an instrument of asymmetric or non-state actors, but can be applied by state and non-state actors alike. The main benefit deriving from their use by a state actor is that they are in most cases non-attributable, and therefore can be applied in situations where more overt and explicit actions are ruled out for a number of reasons. As former NATO Secretary General Anders Fogh Rasmussen said in 2011 "The paradox, (…), is that the global order enjoys more stakeholders than ever before yet it has very few guarantors".

The hybrid threat confronts us collectively beyond national borders and across oceans, it flourishes in the seams between states and in the soft and grey areas of bad or weak governance, and it imposes professionals in the military, intelligence, and law enforcement fields, but also diplomats and statesmen, to create new doctrines, strategies and tactics to cope with this rapidly evolving and developing transnational threat.

The contemporary and evolving Hybrid Threat is a completely different phenomenon and presents immediate obstacles to the unilateral approaches that had application within the old paradigm.

It still retains highly visible elements of its triad and strategically confuses the modern observer by publicly demonstrating one nature (e.g. transnational drug trafficking) while actually pursuing another goal or intent (e.g. insurgency).

The Hybrid Threat is highly dynamic and adaptive, technologically aware and proficient, opportunistic, ruthless, and open to innovation. It is increasingly transnational and it doesn't recognize international boundaries, but selectively ignores them or actively uses them as a buffer against traditional approaches and countermeasures by military and security forces.

In this complex scenario, finance has become for the Hybrid Threat an integral component of its dynamic. It receives financing from national, multinational and transnational sources that may be completely legitimate, or even altruistic, in their country of origin, but are later diverted, skimmed, or outright stolen. Funds also arrive from illegitimate sources such as drug trafficking, kidnapping, extortion, piracy, and human trafficking, and these organized criminal sources of funding may have direct, indirect, or peripheral connections to the insurgency itself and each venue of criminal funding may not be connected to another except at the Hybrid end user. The volume of this financing is extremely large, and enables the Hybrid Threat to be armed with the most modern small arms and weapon systems, easily outgunning the law enforcement institutions of any country.

The Hybrid Threat sees terror as a highly useful course to advance both its criminal enterprises and insurgency, especially when insurgency would serve a complimentary purpose. Indeed, terror is a condition of fear and instability that most insurgencies seek to create, in particular in countries with limited resources, where the diversion of military resources to counterinsurgency operations means fewer assets to target other fierce and highly profitable criminal activities like drug trafficking.

The evolving Hybrid Threat consistently demonstrates its resistance to unilateral approaches that worked against its individual components in the old paradigm, and presents a new conflict model that requires a significant change from the conventional approaches.

The Hybrid Threat represents a unique challenge to the whole international Community and to Western nations in particular. Every single presentation of it around the world constitutes a direct threat to the national security of Western countries in general, and to collective Western strategic interests worldwide.

Highly resistant to unilateral efforts, the Hybrid Threat responds to any countermeasure with tactics, techniques, and procedures capable of defying traditional and conventional approaches that were useful in the last century. Each element of the Hybrid Threat serves the purpose of enhancing the collective survivability of it and makes it highly persistent, acting as a force multiplier.

No law enforcement exertion will effectively counter it, no military intervention will destroy it, only a highly cohesive and focused approach can manage to provide prompt and substantial results.

Captain Corrado Campana

Attended the Italian Naval Academy from 1987 until 1991, when he was commissioned as Ensign. He has achieved the qualification in Naval Artillery and Missile Systems and the specialization in Naval Weapons Direction. He served onboard several Italian Navy ships such as the frigates Libeccio and Maestrale and the destroyers Ardito and Luigi Durand de la Penne, and was appointed as Commanding Officer of the auxiliary ship Ponza and of the frigate Granatiere. He served in international staffs such as the Force HQ of the Multinational Force and Observers (M.F.O.) in El-Gorah (Sinai, Egypt) as Naval Advisor, and the EU Naval Force OHQ in Northwood (UK) as ACOS CJ3 Operations within the anti-piracy Operation ATALANTA. He served in national staffs such as the Command in Chief of the Italian Fleet as Head of the Artillery and Missile Systems Section, the Command of Italian Maritime Forces in Taranto as ACOS N3 Operations and at the Italian Joint Operations HQ in Rome, as Head of Maritime Operations Section (J3). He attended the Italian Joint War College and the Course in International Humanitarian Law at the Centre for Defence High Studies in Rome and also served as Tutor for the attendees. Captain Campana has achieved the Degree in Maritime and Naval Science at the University of Pisa, the Degree in Political Science at the University of Trieste, and the Master in International and Military-strategic Studies at the L.U.I.S.S. University "Guido Carli" in Rome. Since the 1st August 2013 he is appointed at the NATO Maritime Interdiction Operational Training Centre in Souda Bay, Crete, Greece as Director of the Training Support and Transformation Directorate.

MARITIME TERRORISM

The Threat to the National Security of the Middle East

by Sayed Choneim
General (Retired), Egyptian Army

Abstract
"Arab Spring" revolutions in the ME countries were exploited badly leading to the emergence of several terrorist groups in Tunisia, Algeria, Egypt, Libya, Yemen, Syria, Iraq and Somalia.
This lets terrorism overlook the Red Sea, the Mediterranean Sea, the Arabian Gulf, the Gulf of Aqaba, and the Suez Canal. This may foreshadow the possibility of close terrorist cooperation, and an imminent danger from the sea, threatening the whole region including the nations of southern Europe.
Terrorist groups are planning to spread throughout the region including Arab and European countries, recruiting their youth after washing their brains, using their bodies as mobile bombs, to kill themselves and their people seeking the heaven that is promised by the terrorist leaders.
Terrorism will continue, and not stop, spreading like cancer attacking new targets. It will not end unless all nations coordinate their efforts, as one body unifies its cells efforts to destroy it.

MARITIME SECURITY

1. Introduction

Chaos leads to more chaos, taking us to the worst end. We have to stop for a while thinking together how to fight and eliminate terrorist chaos. It's the true result of the creative chaos which was created and planned very badly in the Middle East. Many assessments have talked about the origins and evolution of maritime terrorism, bypassing the estimates of its future plans and actions in the Middle East. Therefore, I want to share my vision of maritime terrorism as a threat to the national security of the Middle East.

2. Creative chaos leads to more chaos

Many threats targeting our national security come from the sea, such as smuggling, illegal immigration and human trafficking, piracy and others. So, what about terrorists attacking our countries from the seaside? To get a realistic strategic appreciation of the situation in the Middle East, we have to go through the political circumstances of the region during the last four years. Revolutions calling for noble objectives were launched in Arab countries, and named collectively by the American Department of State and Western countries as the "Arab Spring". The situation was prepared to be exploited very badly by countries and groups which were far from nobility. Let's review the situation.

In Tunisia, there was an interim parliament of the Muslim Brotherhood, in the time of the emergence of "Oqba Ben Nafi" and "Ansar Al-Sharia" terrorist groups, with the advent of the "Soldiers of the Caliphate" terrorist group in Algeria. Tunisia, after a second successful presidential election, and Algeria are currently suffering from terrorism.

In Egypt, two regimes have been overthrown in less than three years, as the result of bad governance hidden by the name of religion (Muslim Brotherhood). The current government is seeking political and economic stability, whilst confronting the terrorism of those such as "Muslim Brotherhood" and "Ansar Bayt Al-Maqdis". These terrorist groups have tried and are still trying to overthrow the Egyptian state, which is considered the backbone of the Middle East and is going to be its 5th regional power.

In Libya, the catastrophic failure of the Muslim Brotherhood and the emergence of the "Council of Shura Youth of Islam" and "Fajr Libya" terrorist groups must be set beside the outbreak of extended civil war.

Then there is the new Yemen, divided and weak. The persistent and struggling people had launched an immature revolution, thereby giving an opportunity for the emergence of the Muslim Brotherhood on the surface, followed by an armed intervention of Houthi's terrorist movement which has led to a civil war, "adding insult to injury."

Lastly but not least, there is the bloody conflict in Syria between the Syrian governmental forces and the Syrian and non-Syrian opposition forces, with the emergence of numerous terrorist elements so ensuring an endless civil war. The most important of these terror organisations is Islamic State in Iraq and Syria –"ISIS-Daash".

Most of these groups have announced their support for the leader of the "ISIS" organization, which has declared an Islamic caliphate in Iraq, an Iraq which should be strong but failed as state after being divided ethnically and religiously.

Despite the current government's efforts in Somalia for justice and security in their country, there is a coalition between the Somali terrorist movement of "Young Mujahideen" and "ISIS", especially since many of them joined ISIS fighters in Iraq, assuring the killing of their most important leader so-called "Abu Ayyub Al-Somali" in June 2014 in "Baquba".

Notice that all countries of the Arab Spring which have been affected by the spread of terrorist groups overlook

MARITIME SECURITY

the Red Sea, the Mediterranean Sea, the Arabian Gulf, the Gulf of Aqaba, Suez Canal and all straits.

3. The Most Likely Maritime Terrorism Course of Action in the Middle East

Don't you think that this may foreshadow the possibility of close terrorist cooperation, and an imminent danger from the sea, expanding the terrorism circle in the region?

After achieving their first goal of failing the state of Egypt, the maritime terrorist elements are expected to start achieving their short term goals in Middle East, seeking to start their attacks on the Straits of "Bab El-Mandeb and Tiran" and on the Suez Canal. Such attacks would aim for marine control at the main entrances to the Red Sea and to control the main exit to the Mediterranean Sea, easing the pressure on "ISIS" in Iraq and Syria.

Then as a mid-term goal they might try to transfer their attacks across the Red Sea and the Horn of Africa to threaten the Strait of Hormuz and the coasts of Gulf States.

The long-term goals are likely to be to continue transferring their attacks across Red Sea and Horn of Africa to expand their strikes on the coasts of southern countries of Asia. They might also reach across the Mediterranean Sea to threaten the Strait of Gibraltar. These would expand their control and confirm their dominance of the region, threating the coasts of southern European countries.

Using all possible methods and means –hijacked fishing boats, yachts, and tourist ships to launch raids by assault boats or frogmen, for example– they might target seaports, villages, coastal units, marine petroleum stations and other installations.

The European Union as a regional organization should coordinate with the Arab League as counterpart regional organizations; and NATO as a regional allied force should coordinate with the Arab Defence Force as counterpart allied forces. We must try to avoid any sub-regional or individual efforts in the region that can only limit a truly effective international response.

4. Recommendations

We must be aware that our countries should not look only to our land borders, but also consider our maritime borders (regional and economic waters).

Hostile activities and the cooperation of terrorist groups form a serious security and economic threat to the countries in and around the region, which necessitates all the countries of the region to work hand in hand to seek radical solutions to eliminate these threats.

The European Union as a regional organization should coordinate with the Arab League as counterpart regional organizations; and NATO as a regional allied force should coordinate with the Arab Defence Force as counterpart allied forces. We must try to avoid any sub-regional or individual efforts in the region that can only limit a truly effective international response.

5. Conclusion

Maritime terrorism is becoming the most dangerous threat to the Middle East.

It is spreading quickly and widely, recruiting our youth to destroy our future. There is therefore, no doubt that we have to fight it together before it comes to a point when it becomes too strong to defeat. Working together cannot be only country beside other country; it must become the collective effort of regions and organizations.

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Gen (Ret) Sayed Ghoneim

Is National Security Advisor at UAE and Administration Advisor to Al Khaja Holding (Ismail Al Khaja & Sons Group).

He served in various positions of Egyptian armed forces including Director of Planning & Operations/Strategic Department Level and Chief of Staff/ UN Mission In Nepal, Kathmandu and Senior National Representative of Egypt to the United States Central command (US, Florida).

Protection Measures for Merchant Ships:

Piracy and Armed Robbery are a Maritime Energy Security concern

by F. de Rosa[1], H. Davies[2]
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Abstract
Piracy and armed robbery have re-emerged in the last decades as a global security threat, which poses a risk not only for the seafarers' safety, but also for our eco-nomic well-being, as maritime transport is a key factor that underpins international trade and global energy supplies.
It has been recognized by the international community that adequate and cost effective solutions are needed to protect merchant ships and energy supply lines.
Protection Measures for Merchant Ships (PROMERC), is an European Union's Seventh Framework Programme project, which aims at reducing the vulnerability of EU merchant fleets and maritime supply lines to piracy and armed robbery, providing a layered approach to planning, routeing and threat reduction. The concept is to provide integrated tools which will enable informed decisions and an improved choice of counter measures.

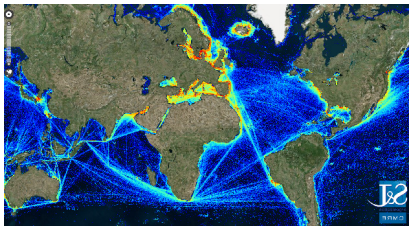

Fig. 1. Main Marine transport routes

1. Introduction

Largely as a consequence of failed states and social instability, piracy and armed robbery have re-emerged in the last decades as a global security threat, which poses a risk not only to ship's crew and passengers safety, but also to our economic well-being, as maritime transport is a key factor that underpins international trade and global energy supplies. In fact, energy markets rely on safe Sea Lines of Communication, as about the 63% of the global oil production is transport by sea (based on data of 2013).

Piracy, armed robbery and sea-based terrorists threaten the flow of energy. In fact, the High Risk Areas (Horn of Africa and Indian Ocean, West Africa, South China Sea and Strait of Malacca, Caribbean region) are characterized by some of the major energy supply routes and chokepoints *(fig.1)*. An example of this are: the Strait of Hormuz and the Strait of Malacca, which alone accounted in 2013 for the passage of 27.2 million barrels per day. Vessels travelling in these regions become attractive targets, both to terrorist and non-terrorist attacks.

Piracy as defined by the UN Convention of the Life at Sea (UNCLOS) is any illegal act against ships or the people and property onboard the ship, committed for private ends on the high seas. Armed robbery has been defined in the IMO Code of Practice for the Investigation of the Crimes of Piracy and Armed Robbery against Ships as any illegal act against ships or the people and property onboard the ship, committed for private ends within a State's internal waters, archipelagic waters and territorial sea. Those definitions imply that the fight against piracy and armed robbery has not only major economic implications, but also political, ethical and social ramification.

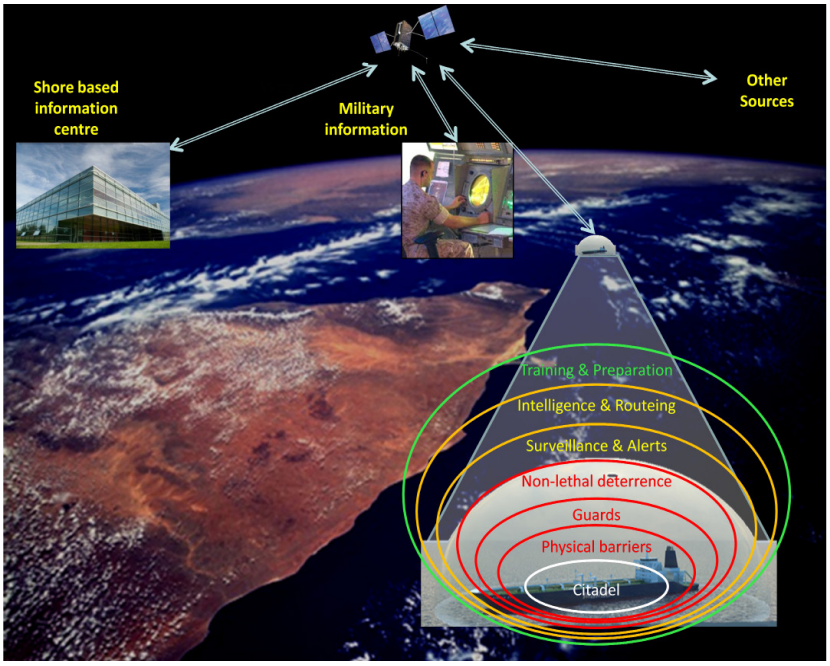

Fig. 3: PROMERC approach

2. Non-military protection measures for merchant ships

It has been recognized by the international community that the long term solution to piracy and armed robbery requires building more stable states and tackling poverty. This is a long and complex process with many political issues and implications. In the short term, cost effective solutions to protect merchant ships, their crew and maritime supply lines are needed. Military Operations (e.g. NATO Operation Ocean Shield, European Naval Force Somalia - Operation Atalanta, U.S. Naval Forces Central Command Combined Task Force 151) have been effective, but the available resources cannot guarantee military intervention over the millions of square kilometers of sea of the High Risk Areas. Moreover, within the territorial waters the mandate of the international task forces does not allow intervention as the coastal state authorities are responsible for security related matters. Therefore, non-military self-protection measures are considered of primary importance.

3. PROMERC Project

Protection Measures for Merchant Ships (PROMERC), is an ongoing European Commission's Seventh Framework Programme funded project, which aims at reducing the vulnerabil-

PROMERC
Protection Measures for Merchant Ships

Fig. 2: PROMERC logo

MARITIME SECURITY

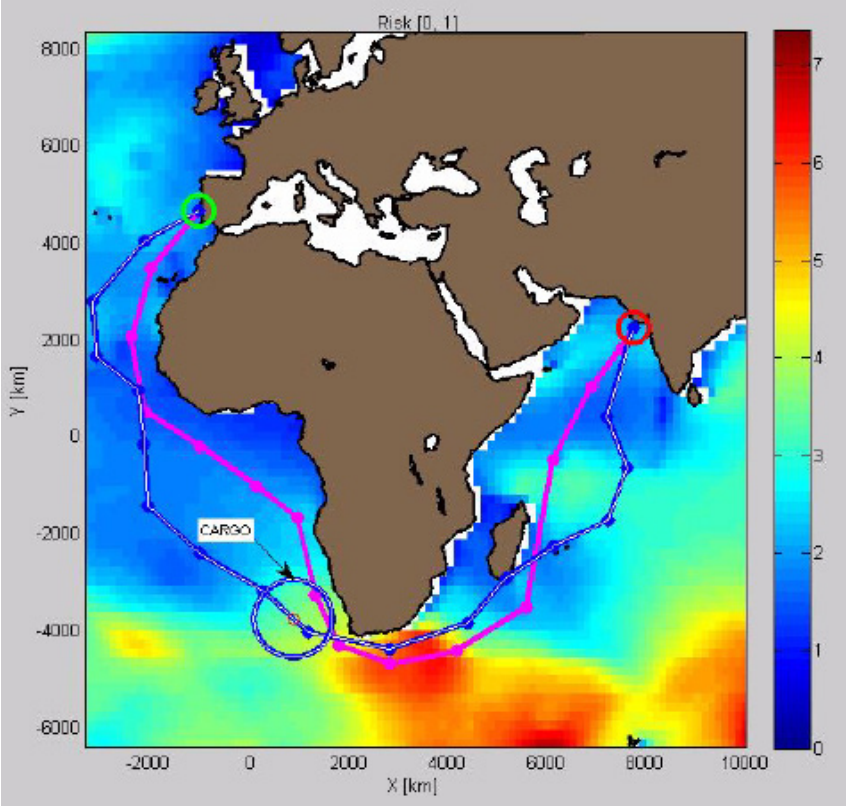

Fig. 4: Route Optimizer

ity of European Union (EU) merchant fleets and maritime supply lines to piracy and armed robbery, therefore reducing the overall risk and associated economic and human costs.

There are a large number of non-military defensive options available to shipping companies, but there is scant information about their effectiveness and the cost-benefit of their use, especially when deployed in combination. Given the wide range of protection options with little understanding of their effectiveness, shipping companies could spend large sums without achieving significant risk reduction. To enable informed decisions, PROMERC has adopted a holistic approach *(fig. 3)* when analyzing the available protection options, encompassing not only an evaluation of the utility of technology, but also considering the influence of less easily quantifiable aspects, such as political –economic-ethic-social-legal– environmental factors, training and Standard Operational Procedures.

The use of digital information has become increasingly common place in the maritime environment since the introduction of electronic charts some 60 years ago. In particular, Naval Command and Control systems have used digital data to characterise the battlespace to increase situation awareness and to drive Tactical Decision Aids.

However, beyond the development of electronic charts for navigation the adoption of digital information to support commercial maritime activities has been relatively limited to date. PROMERC seeks to leverage military doctrine (layered defence) and tools to assist situation awareness to mitigate the risk presented by piracy.

The timing may be expeditious for the exploitation of digital data, but a barrier to adoption has recently been overcome with the mandatory carriage of electronic chart display and information systems (ECDIS). The development of a new, more versatile standard – S-100 standard by the International Hydrographic Office (IHO), to replace S-57 standard for encoding electronic navigational charts (ENCs) for use in ECDIS will align ENCs with the ISO 19100 series of geographic information standards. This will make ENCs interoperable with other ISO/TC211 standards and profiles such as NATO DIGEST and should facilitate the pro-

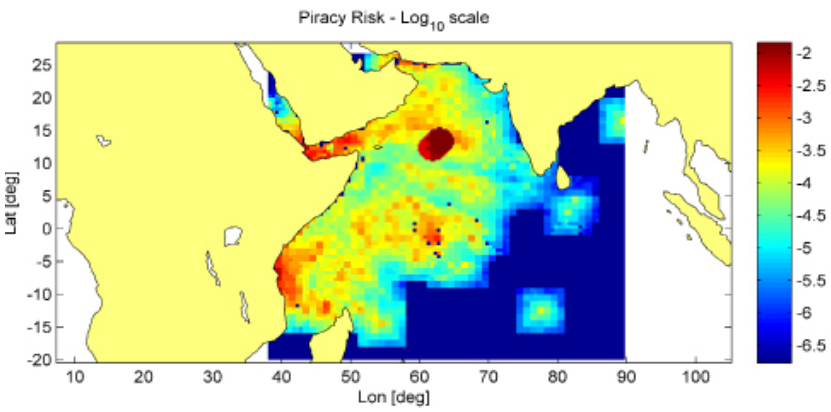

Fig. 5: Risk map

vision of digital information to shipping.

4. PROMERC results

PROMERC has developed a Counter-Measures Manual and the consortium is currently working on the integration of the components of an automated voyage planning support tool (Route Optimizer) and an automated on-board Tactical Decision Aid (TDA). Furthermore, PROMERC will provide recommendations on further improvement of counterpiracy measures.

The Counter-Measures Manual provides a practical guide for shipping companies to assess the vulnerability of their ships to piracy and the possible piracy counter-measures, their effectiveness, cost benefits and their political, economic, ethical, social, legal and environmental implications. Both a hard copy and an online version have been developed. The Counter-Measures Manual is based on a user-configurable database. This will allow shipping company to better express their attitude towards single counter-measures, tailoring the manual to their needs, in order to make an informed decision. The same database will be used as input to the Route Optimizer *(fig. 4)* and the on-board TDA.

Once a vessel and Counter Measures have been selected for a particular voyage, the Route Optimizer provides shore based decision makers with a tool to assist in planning the vessel's route. The route optimiser takes into consideration ship's characteristics, available piracy counter-measures and historical and near real time information (e.g. METOC conditions and piracy threat), balancing between risk mitigation and additional costs associated to rerouting.

The tool creates dynamic risk maps *(fig. 5)* for the duration of the voyage and then uses an advanced evolutionary algorithm to create a route which minimises risk. Once he is content the voyage manager can send these to the ship.

The optimised route, risk maps, the databases and models provided to the ship will be integrated with shipborne data in an onboard TDA tool *(fig. 6)*, that will work both as a stand-alone tool or supported by a land based information centre.

This decision support tool will at any time, based upon real time threat assessment, calculate the risk level for the initially determined route, provide situation sensitive best practice guidance and raise a warning whenever a threat level threshold is passed. The Route Optimizer and on-board TDA prototypes are currently being developed and will be tested and evaluated by end-users during normal shipping operations in early 2016.

Besides the innovative PROMERC tangible results, the research conducted has highlighted some interesting elements.

The most comprehensive source of piracy events data that has been analyzed is the IMO database. Due to the fact that a piracy events database only records piracy events, this leads to an inability to properly calculate the occurrence rates. In fact, while success rates may be biased within the dataset, due to under –or over– reporting of events, the occurrence rates are defined as the number of events divided by the overall shipping population, which is difficult to obtain reliably. Moreover, a number of important information is collected in narrative form, which can lead to difficulties in the analysis and inconsistencies. In order to improve on future data collection and analysis it would be useful to provide more standardized report forms, including for example a list of all known counter-measures. Moreover, other useful information should be included or better defined, such as the attacker behavior, environmental data, time of attack, number of attacking vessels and mother-ships.

At the beginning of the project Political, Economic, Ethi-cal, Social, Legal and Environmental (PEESLE) factors were assumed to have mainly a negative impact in the overall counter-measure utility. During the analysis it became clear that they could have a positive impact on many of the counter-measures identified, for example the use of armed guards leads to a reduction of insurance costs.

Through the strong involvement of

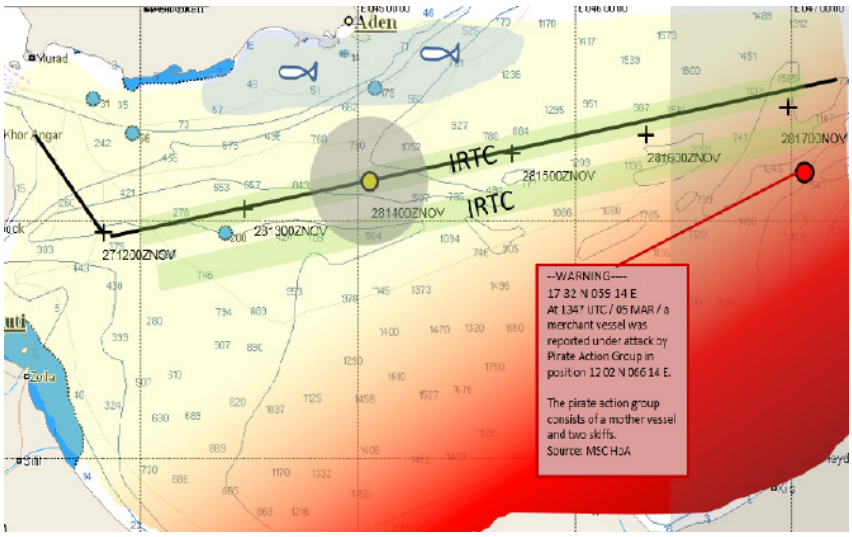

Fig. 6: On-board Tactical Decision Aid

end-users into the PROMERC project (Moller-Maersk and Oldendorff) it became clear that crew safety plays a vital role in the security policies of shipping companies. Therefore, they show a strong preference for the adoption of Standard Operational Procedures and low technology, that can be operated without exposing the crew members to the attackers, and which do not require intensive and costly training nor should lead to a sensible escalation of force.

5. Conclusions

Due to the strategic importance of the Sea Lines of Communication, a significant level of resources has been spent in the effort to protect those vital assets from terrorist and non-terrorist attacks, with the primary aim of ensuring the security and economic well-being of our nations. Piracy and armed robbery are issues that have always existed, in fact they are endemic in some areas of the world, but in the last decade they have re-emerged as a strategic maritime threat. Cost effective solutions to protect merchant ships and our energy supply chain are needed and non-military self-protection measures have to be considered solutions of primary importance, to complement the military operations and legal instruments.

4. Acknowledgements

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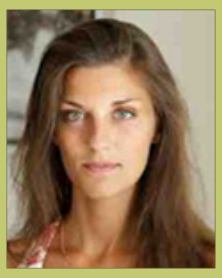
Francesca de Rosa



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CONTEMPORARY STATUS OF MARITIME ZONES IN SOUTHEASTERN MEDITERRANEAN SEA IN THE LIGHT OF ENERGY ANTAGONISM

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Introduction

Both the continental land of Southeastern Europe and its surrounding sea masses —in particular the broader area of the Eastern Mediterranean region— constitute a subset of Eurasia of a great geopolitical importance. The geo-economic importance of the Mediterranean Sea, as a whole, is further enhanced by the fact that this is the common place of three continents: Europe, Asia and Africa. It should be noted that both the Mediterranean and the Persian Gulf are geopolitically placed among the same broader periphery, while Turkey and Egypt (Suez) can be treated as land and sea bridges at the same time between Europe and the Middle East/Southwest Asia[1]. Besides the geostrategic dimension of the Eastern Med, the wider region has additionally acquired an upgraded role in energy geopolitics due to the recently discovered deposits of energy resources deep in its sea-bed.

1. See G.P. Vlahou and E. Nikolaidi, *Maritime Economic Geography,* J & J Hellas, Piraeus, 2002, pp. 63-67

LEGAL ISSUES

The energy geopolitical importance of Southeastern Med

According to the data of a United States Geological Service (USGS) study, in the bed of the Levantine Basin, (which is environed by Cyprus, Israel, the strip of Gaza, Lebanon and Syria) there are great deposits of natural gas and petroleum. Companies which serve American-Israeli and Norwegian interests have already been granted the permission to research the sea area between Cyprus and Israel and they have announced their discovery of large natural gas deposits. Political events and decisions in the wider region are decisively influenced by the discoveries of new energy resources of carbohydrates in the sea bed between Cyprus and Israel, as well as in the area of the triangle formulated by the Greek islands of Crete and Castellorizo and the Republic of Cyprus[2].

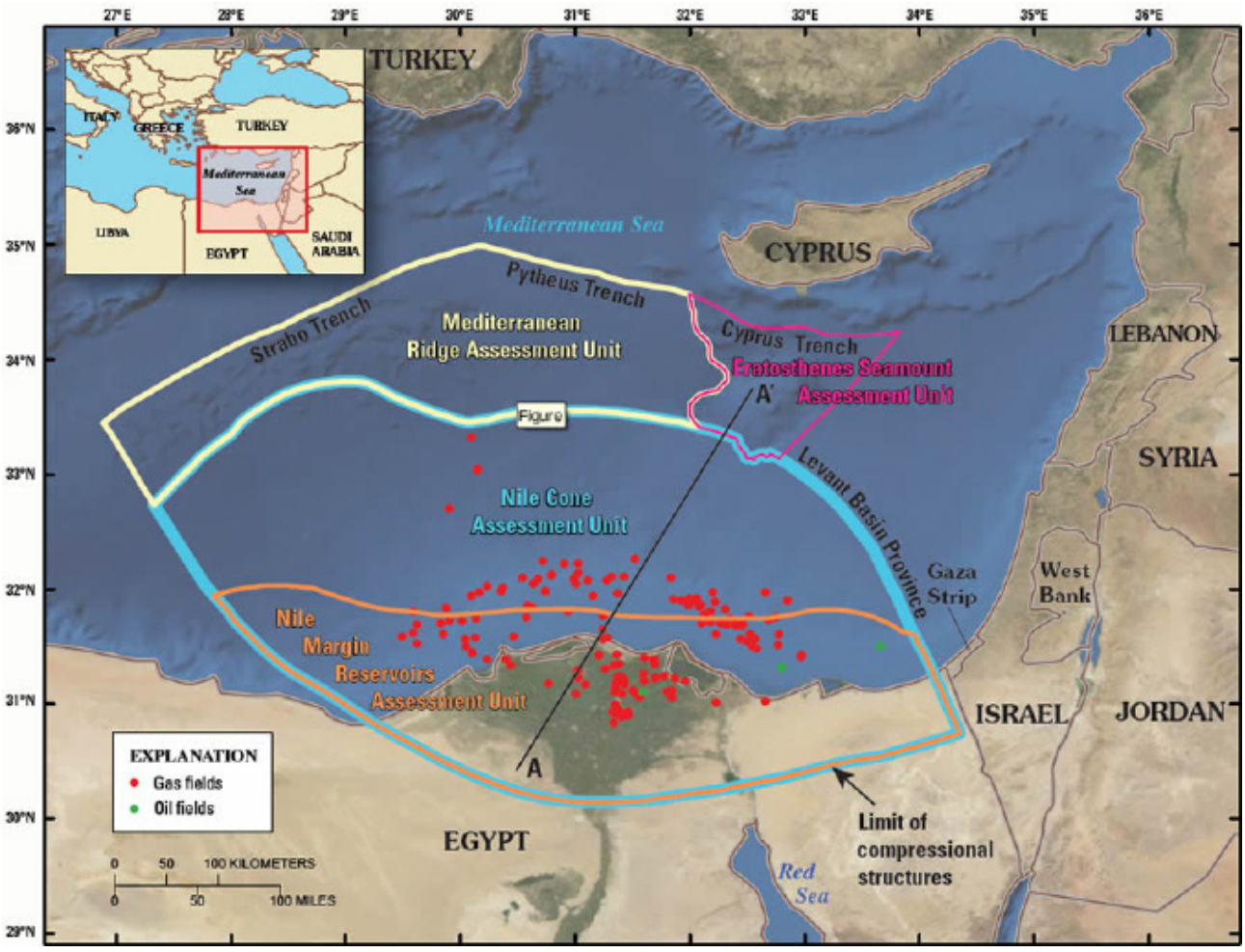

Fig. 1. Assessment of undiscovered oil and gas resources in the Southeastern Mediterranean basin

The greatest deposits of natural gas seem to exist in the common boundaries of the Exclusive Economic Zones (EEZs) between Cyprus and Israel promising an alternative more stable corridor for the energy sufficiency of the EU in the latter's effort to reduce the dependency from Moscow. However, not all the EEZs between the neighboring states have yet been determined (except for the zones between Cyprus and Israel, Cyprus and

2. Needless to mention, these discoveries create new tensions both in the Greek-Turkish relations, have the potential to intensify the Arabic-Israeli conflict and further complicate the Cypriot and the Kurdish issues.

Egypt, Cyprus and Lebanon), even though intensive consultations among the interested parts have commenced for the delimitation of these zones. It should be noted that there are major disputes regarding the issues of the territorial waters and the EEZs (e.g. between Lebanon and Israel, or Israel and the Palestinians in Gaza). Additionally, the existence of a significant amount of natural gas deposits is possible not only in the areas between Cyprus and Israel and between Cyprus and Egypt, but also in the sea area in the west of Cyprus, which is, between the islands of Cyprus and Crete (see *fig. 1)*.

In more detail, the discovered oil and natural gas deposits of the Eastern Med and the widespread belief that the surrounding area is very rich in energy resources, have caused since 2008 frictions among the key-players, which combined with the recent uprisings against the authoritarian regimes in the Middle East and North Africa, delineate the creation of a confrontational situation of pulsated intensity over time. That situation, results both in the deterioration of the internal security of the involved countries and in the emergence of new threats and risks for the specific region and its periphery since:

- firstly, it threats the stability of the Arab world as a whole,
- secondly, it affects negatively the cooperative relationship between the countries involved in the uprisings,
- thirdly, it creates conditions for new massive flows of migrants and refugees to the countries of Europe,
- fourthly, it jeopardizes the energy security of the western world,
- finally, it increases the price of energy resources, so that the same recovery of the global economy is at stake.

Cyprus, taking the advantage of the aforementioned geopolitical circumstances, came in 2010 in collaboration with Israel by achieving an agreement on a common exploitation of the adjacent energy deposits 'Leviathan' and 'Venus' (which lie within Block 12 of Cypriot surveys), of the 'Levantine' basin, considering them a unified area of common interest for the two states (see *fig*. 2). At the same time, Cyprus legitimated internationally this cooperation by signing an agreement on the delimitation of the EEZ with Israel[3].

In the aftermath of the abovementioned agreement, there is a diffusive belief that Israel has seriously considered Greece and Cyprus as a transfer node towards Europe of the gas (the so called 'East Med Pipeline') that will be found in its EEZ (see *Fig. 3)*. That may stand true both because Israel has estimated that the construction of relevant infrastructures could possibly receive financing from Europe and because the alternative route (via Turkey) seems for the moment not to be feasible, on the grounds that Tel-Aviv regards (correctly according to what has been recorded so far) its relatively recent crisis in its relationships with Ankara as not something temporary[4]. On the other hand, of course, the option of transferring the Cypriot-Israeli gas to the West via pipeline linked to the Arab Gas Pipeline[5] and through the projection to Turkey seems difficult for the time being because of the increased pipeline security issues due

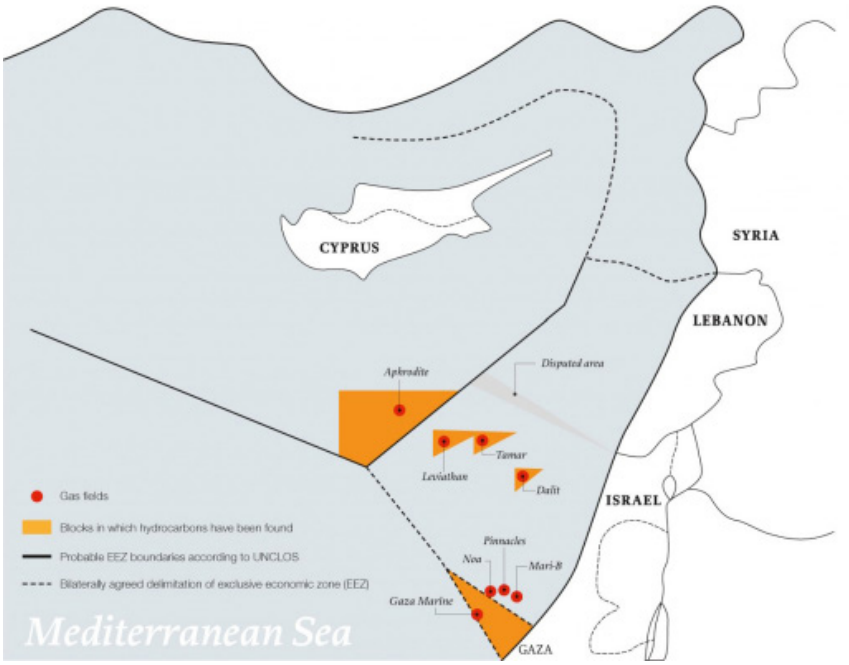

Fig. 2. The Cypriot and Israeli energy deposits in Southeastern Med

3. See G. Chrysochou and D. Dalaklis, 'The Declaration of a Cypriot Exclusive Economic Zone (EEZ) and the Law of the Sea (in Greek)', *Nausivios Chora-A Journal of Naval Sciences and Technology,* Volume 4/2012 (ISSN: 1791-4469), Hellenic Naval Academy, Piraeus, December 2012, pp. 245-263.
4. *Ibid.*
5. Which connects Egypt, Israel, Syria and Lebanon.

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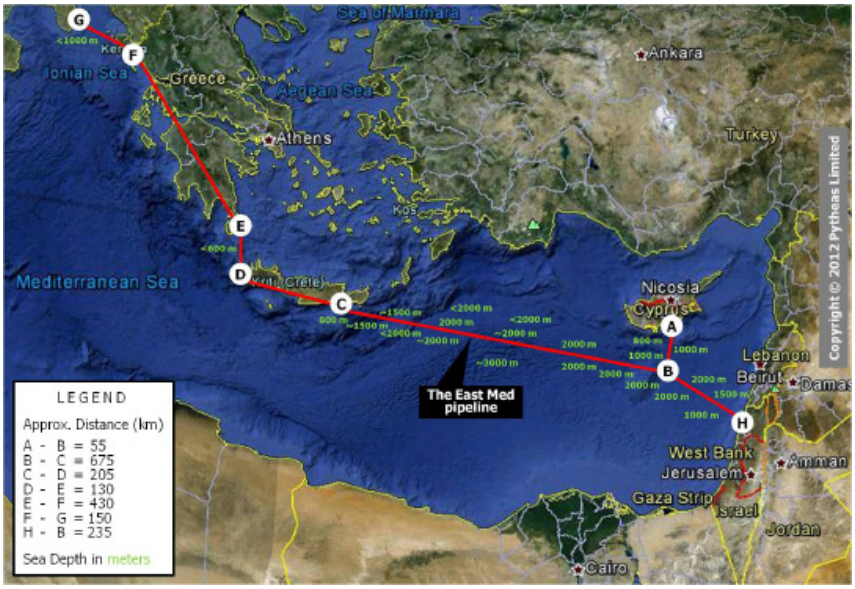

Fig. 3. The 'East Med Pipeline via Greece'

to the volatility in the specific region. Needless to mention, that the option of the cheapest solution, namely the construction of a pipeline from Cyprus to Turkey and then to Western and Central Europe is politically forbidden, at least for the near future, because of the 'Cyprus Question'[6].

The perspective of the above project was confirmed by the President of the European Commission during the proceedings of the Council of 22 May 2013, in the general context of determining the future energy priorities of the EU. The energy dependence of the EU by countries belonging to the Arab-Muslim world, which are in a highly sensitive political and geostrategic transition, but also by countries like Russia, which demonstrate a high level of geostrategic competition against the dipole 'Great Britain-USA', forces the Western world, and particularly the EU, to pay attention to the promising hydrocarbon reserves of Cyprus Republic, Israel and Greece. Of course, Israel has not yet finally decided how to exploit its own deposits, thus what quantities will export to Europe and how will do this –either by Liquefied Natural Gas (LNG) or via pipeline (see *fig. 4)*[7]. The type and depth of strategic relationship that Israel will develop with Cyprus, Greece as well as the EU will largely depend on this decision.

However, it is important to note that there are many interested parts meeting in the region, apart from Cyprus, Greece, Turkey and Israel. Except the classical geopolitical pair of USA and Russia, the factor of the EU should also be taken under serious consideration. In addition, the Southeastern Med energy deposits implicate, except the aforementioned countries, Lebanon but also Egypt, Syria, NATO, China, UK as well as Asian, Middle Eastern and African natural gas producing countries. They also implicate

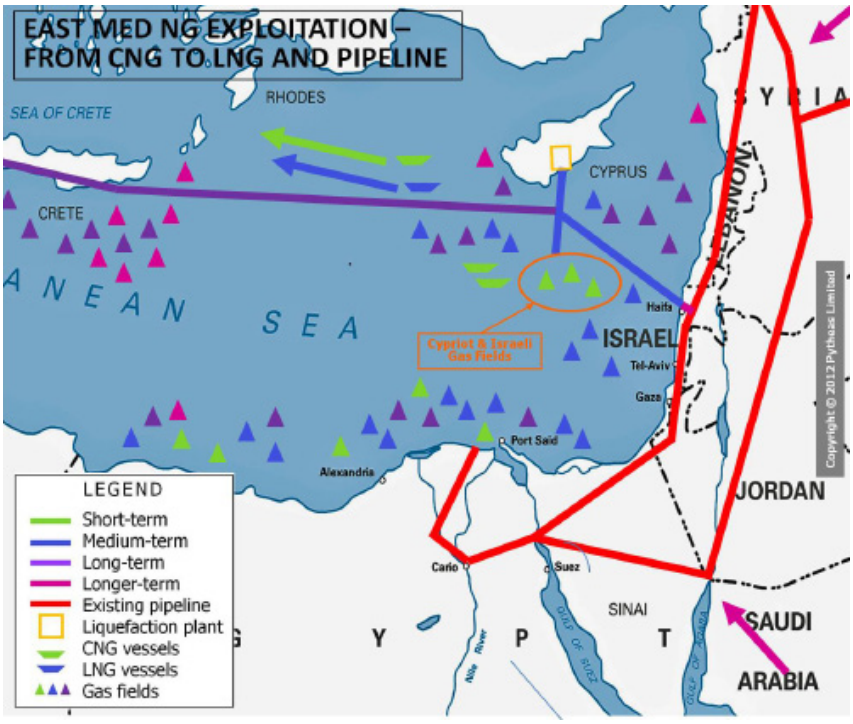

Fig. 4. The suggestions of transferring the Southeastern Med natural gas to the West

6. See Southeastern Mediterranean Hydrocarbons: A new energy corridor for the EU', 25-4-2012, available at http://www.defencegreece.com/index.php/2012/04/southeastern-mediterranean-hydrocarbons-a-new-energy-corridor-for-the-eu/, (Accessed; 02 February 2013)
7. See Th. Dokos, 'Important strategic approach' (in Greek), *Filelefttheros tis Kyriakis,* p. 10, Nicosia, 12

the world's most important energy companies, both for their aspirations for a piece of the action but also for the imposed threat of the hydrocarbons deposits to their planned projects.
Nevertheless, as mentioned above, it is too early to speak with absolute optimism for a further development of the other energy deposits of the wider region, since a series of interstate agreements concerning the delimitation of the relevant maritime economic zones is required, while at the same time a series of long-term conflicting issues like the so-called Cyprus Question, the Aegean Dispute and the Middle-East Issue, render the possibility of a comprehensive settlement of the maritime zones rather low[8].

The maritime zones status of Eastern Med and the delimitation issues

With regard to the Eastern Med, the fact that many states are not signatories to the United Nations Convention on the Law Of the Sea (UNCLOS) (Turkey, Israel, etc), combined with the number of maritime delimitations which are required to be settled between countries with contradictory interests and historic rivalries in the wider area, leaves no big room for plotting commonly accepted applicable rules for delimitation purposes. Nevertheless, the Continental Shelf and EEZ boundaries delimitations that have taken place in Eastern Med through agreements and unilateral declarations are the following ones:

- In 1968, Italy and Federal Yugoslavia, delimited by agreement between them their Continental Shelf, and after the collapse of the latter, Croatia announced in 2000 that considers this delimitation boundary to be valid for the EEZ as well, yet in some sections[9].
- In 1977, Greece and Italy delimited by agreement their Continental Shelves, based on the principle of equidistance/median line.
- France proceeded to unilateral declaration of its EEZ in the Mediterranean in November 2013[10]. However, the designated area overlaps a part of the EEZ delimitation area between Spain and Italy. This fact causes friction between France and Spain, with the latter state considering that France encroaches part of its EEZ. Furthermore, Spain has declared an EEZ up to the isobaths' limit of 50m in the Gulf of Gabès[11].
- Additional unilateral proclamations of EEZ have been issued as well by Syria and Morocco, while Libya asserts a fishing zone of 62nm[12].
- Between Egypt and Cyprus in 2003, there's been an EEZ delimitation agreement on the basis of median line principle[13]. This bilateral agreement between Cyprus and Egypt entered into force on 7 March 2004[14]. A fact of particular importance was that the approach taken in determining the westernmost point of the median line between Cyprus and Egypt. On the advice of Greece, citing reasons of avoiding tension with Turkey, the set point of EEZ between Cyprus

8. For an extensive analysis of the current geostrategic issues of South-eastern Med Basin see G. Chrysochou, *How the discoveries of energy deposits in Easter Med the geostrategic issues of the region. Implications for Greece, Cyprus and Turkey. How will the Cyprus Question be affected?* (in Greek), Thesis, Hellenic Naval Staff and Command College, July 2011.
9. Croatia even named this area as an 'Area of Ecological Protection'. However, other adjacent states of the Adriatic Sea which have emerged from the ex-Yugoslavia, namely Montenegro, Slovenia and Bosnia-Herzegovina, assert their participation in the delimitation procedure. However, there's been no result yet, because the last two countries either haven't got any front on the Adriatic Sea or the front they've got is very limited, rendering pending so far a possible settlement of the delimitation boundary. Moreover, there hasn't been yet an official confirmation of the delimitation agreement between Croatia and Montenegro. Finally, in 2005, Slovenia unilaterally defined the coordinates of a specific but temporary as stated area in the Adriatic region, while naming that region as an 'Area of Ecological Protection', until the settlement of the Continental Shelf between her and Croatia.
10. Until 2013 France had only declared an EEZ for its western coastal side in the Atlantic Ocean.
11. See United Nations Division for Ocean Affairs, Table of claims to maritime jurisdiction 17 July 2011, available at www.un.org/Depts/los/table_summary_of_claims.pdf.
12. *Ibid.*
13. See *Agreement between the Republic of Cyprus and the Arab Republic of Egypt on the Delimitation of the Exclusive Economic Zone,* 17 February 2003. *That agreement contains the provision that 'The delimitation of the exclusive economic zone between the two Parties is effected by the median line of which every point is equidistant from the nearest point on the baseline of the two Parties'.* See Article 1(a). The demarcation is drawn very carefully so as not to create interference with Greece in the southeastern region of Kastellorizo Island. However, Turkey has made to UN a note verbale with regard to that particular delimitation, stating that it should have been involved in because it affects its national interests
14. See A. Strati, 'Exclusive Economic Zone', in Ch. Dipla and Ch. Rozakis collective work, *The Law of the Sea and its Application in Greece* (in Greek), Sideris, Athens, 2004, pp. 145-209..

and Egypt was shifted about 15 to 20 kilometers east of its actual location, so as to keep a potential Greek-Turkish issue of awarding or not a delimitation effect to the Greek island of Kastellorizo temporarily neutral and out of the context of the actual agreement.[15,16]

- A similar agreement with Egypt was reached between Cyprus and Lebanon in 2007, following a decision by Cyprus to undertake in 2007 the initiation of the first licensing round for hydrocarbon exploration activities and the resulting pursuit of reaching EEZ's agreements with other neighboring countries. The delimitation has been done by agreement on the basis of equidistance/median line on the same content and procedure followed in the respective agreement between Cyprus and Egypt. However, the prolonged instability that prevailed in Lebanon's political scene together with border disputes with Israel, were the main reasons why the ratification of the agreement by the Parliament of Lebanon has not been possible to date[17]. The border dispute between Lebanon and Israel concerns an area of 850 square kilometers[19].

Finally, on 17 December 2010, the sign of the EEZs' delimitation agreement between the Republic of Cyprus and Israel was taken place, based on the delimitation method mentioned above in the already existing agreements with Egypt and Lebanon. This agreement was ratified by the relevant law of the House of Representatives of Cyprus on February 2011[19].

Referring to the possibility of delimitation of the EEZs between Greece and Cyprus, there hasn't been any agreement so far, despite the insistence by the side of Cyprus Republic. However, the length of the maritime border between the two countries is estimated at 27nm approximately[20].

In addition to the abovementioned agreements of maritime delimitation as well as unilateral declarations of EEZs in the Mediterranean region, there are also two maritime delimitation decisions by the ICJ for the cases of Continental Shelves of Tunisia-Libya and Libya-Malta[21]. In addition, lately, there has been a growing desire on behalf of the Greek side to start negotiations with the Libyan side in order to reach agreement on maritime delimitation[22]. However, according to the Libyan side, these issues will need to be addressed within a framework which will include third countries with common maritime borders, namely Turkey and Egypt[23].

15. See S. Kassinis, 'The EEZ of Cyprus Republic: From Theory to Practice', in V. Kikilias, EEZ: *From Strategic Movement to Economic Solution (in Greek),* Kastaniotis, Athens, 2012, p. 72.
16. Greece supports that the delimitation of the respective zones must be done on the basis of equidistance/median line, asserting full-effect to the southeastern Greek islands of the Aegean, including Kastellorizo island, while Turkey seems arguably to support that there reduced effect to those particular islands due to its assertion for the handling of the relevant area as an area of special legal status that justifies the use of equity principles. For an analytical examination of the maritime delimitation issues between Turkey and Greece in the context of international jurisprudence see in detail G. Chrysochou and P. Siousiouras, 'Maritime Delimitations in the Context of Recent Jurisprudence and the Greek-Turkish Issues', *The A38 Journal of International Law,* Vol 2, Edition 2 (July-Sept 2013, (ISSN: 2277-9361), 2(2)A38JIL(2013)112 and P. Siousiouras and G. Chrysochou, 'The Aegean Dispute in the Context of Contemporary Judicial Decisions on Maritime Delimitation', *Laws Journal,* Vol 3, no.1 (2014), Basel, Switzerland, ISSN 2075-471X, pp. 12-49.
17. *Ibid,* pp.77-78.
18. However, in the margin of an official visit to Cyprus in 2012, the President of the Parliament of Lebanon expressed the intention of the Lebanese Government to sign the agreement immediately after the border settlement with Israel. See Press General Secretariat of Cyprus Republic, *Cyprus Today,* 07 Mar 2012, p.3.
19. Israel, being a non-contracting party to UNCLOS, and, therefore, not contractually bound by its provisions –except those which constitute rules of customary international law, and only if they do not conflict with the rules of Israeli domestic law– should have adopted relevant domestic law as a basic condition for the initiation of official negotiations and then concluding an EEZ delimitation agreement with another country. That kind of law was adopted in mid-2010. See S. Kassinis, *op. cit.,* pp.81-82.
20. See A. Strati, *Greek Maritime Zones and Delimitation with Neighboring States* (in Greek), Law Library, Athens, 2012, p. 150.
21. See *Continental Shelf (Tunisia/Libyan Arab Jamahiriya),* Judgment, ICJ Reports, 1982 and *Continental Shelf (Libyan Arab Jamahiriya/Malta),* Judgment, ICJ Reports, 1985. Libya has not ratified yet the UNCLOS, remaining over time committed to the principles of equity/relevant circumstances for the delimitation of maritime zones. In the cases of the delimitation of Continental Shelf boundary with Tunisia in 1982 and Malta in 1985, Libya claimed respectively that the islands have no effect at all in the determination of delimitation line and that the Continental Shelf boundary should not be determined under the principle of equidistance/median line sought by Malta. Moreover, in the latter case Libya asserted as relevant circumstances to be taken into account by the Court, the geomorphologic criteria and the principle of proportionality between the length of the coastline of each state and the respective allocated Continental Shelf areas.
22. Consequently, there have been some contacts at the level of competent experts from the two countries, but also at the level of Foreign Ministers during a meeting held in Tripoli on 21 December 2012. The outcome of that meeting was the agreement between the two sides on a roadmap for issues relating to maritime zones.
23. See Official Webpage of Hellenic Ministry of Foreign Affairs, available at www.mfa.gr, *Statements between the Greek Minister of Foreign Affairs D. Avramopoulos and the Minister of International Cooperation of Libya M. Abdelaziz,* (accessed: 21 Dec 2012).

Over and above, it should be made clear that the non- declaration of EEZ by any coastal state in the region is not a factor that reduces its full sovereign rights in the seabed and subsoil, which are fully guaranteed by the legal regime of the Continental Shelf. Given that the EEZ is —if the coastal State wishes— the possible extension of its sovereign rights at the overlying bottom water column, aiming to control fishery and energy production, in accordance with Article 56 of UNCLOS, the sovereign rights over the Continental Shelf exist for a coastal state ab initio and ipso facto, regardless of any express proclamation[24].

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Conclusive remarks

In summary, the analysis taken place in this article, examined the new geopolitical aspect of the Mediterranean Sea, and, particularly what is currently happening in its Eastern basin. The main focus-point was the geopolitical implications of the recent discoveries of significant energy reserves in this region. The discovered hydrocarbon reserves of the Southeastern Med can and should play an important role in supplying the EU with natural gas in the long run. Therefore, the neighboring states of Eastern Med, especially Cyprus, Israel, Greece and Turkey, should seek to maximize their role as alternative suppliers of the European Union. This prospect, with the expected future outcome of providing the first non-Russian gas of the so-called southern European energy corridor, imposes considerable benefits, particularly in relation to potential European funding for a pipeline construction (Eastern Med Pipeline), which will transfer to Central and Western Europe large amounts of natural gas, as well as other relevant projects. For the time being the main issue at stake is that the energy resources near Cyprus can be exploited for the energy security of EU. Other important protagonists of the international arena are also part of the complex equation, with NATO and EU standing out. Therefore, the first conclusion to be drawn here is that geopolitical confrontations and changes in the region will continue in the near future.

Nevertheless, linked to the geopolitical dimension there is one more essential parameter; that of International Law of the Sea. UNCLOS provides the necessary framework to define the limits of maritime boundaries between adjacent states, since it is the core document of international conventional law, which regulates issues related to the establishment and delimitation of EEZs. For the moment the question of delimitation of maritime zone boundaries in Southeastern Med remains a point of friction for many of the states involved in. The abovementioned analysis highlighted, inter alia, the decisions made from the Republic of Cyprus and their conformity with international law provisions. Now, it is the turn of the Greek government to take decisive action upon the question of the EEZ in full conformity with international law and in trusting cooperation with its neighboring states, since there are many interested parts meeting in the region, as well as other important protagonists of the international arena with NATO and EU standing out.

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23. See Article 77, UNCLOS, 1982.

The Eastern and Central Mediterranean Era of Oil and Gas

Importance for the European Energy Security

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Abstract

Europe is currently facing a deficit of 240 bcm (billion cubic meters) of natural gas/year. It is anticipated that by 2020, it will carry an additional deficit of 200 bcm of natural gas/year. At the same time, a deficit of over 1.8 billion barrels of oil/year is predicted. Both deficits are attributed to the high depletion rate of the oil and gas fields in the North Sea.

Producing nations such as Russia, the North African States and USA will not be able to meet the European natural gas and oil energy deficit.

- Russia has 31.3 tcm (trillion cubic meters) of natural gas reserves, out of which only 10.4 tcm are availa-ble for export. Of the available export, 5 tcm are already committed to Western Europe and Turkey and 2 tcm to China. It is highly unlikely that Russia will commit her remaining reserves of 3.4 tcm to Europe.
- The North African States of Algiers, Libya and Egypt have already reduced their annual natural gas con-tribution to Europe from 90 bcm/year to 45 bcm/year. Therefore, it is obvious that they cannot support Europe in meeting its forthcoming deficit.
- USA, on the other hand, has 9.3 tcm of natural gas reserves, an annual production rate of 0.68 bcm/year but an annual consumption rate of 0.75 tcm/year. As a result, they import natural gas from Canada. Obviously, USA cannot assist Europe. At their current consumption rate, the US reserves will last only for 12 years.

However, Europe's incremental energy deficit of 200 bcm/year can be met from the new and "about to be verified" oil and gas fields located offshore of Egypt, Israel, Cyprus, Lebanon and Greece (Ionian Sea and offshore of southern Crete), whose reserves are over 16.3 tcm, out of which at least 11 tcm are exportable.

Furthermore, if exploration and exploitation of hydrocarbon fields is expedited, the above mentioned countries can, within the next 10 years, supply Europe with at least 1.4 million barrels/day from their anticipated reserves of 14 billion barrels, thus counterbalancing to some extent the depletion from the North Sea oil fields.

It is within this context that Greece will play an important role in supplying and safeguarding the transportation/delivery of natural gas and oil either by pipelines, CNG/LNG ships or tankers to European ports.

This implies a secure maritime environment.

Keywords
Oil; gas; Eastern Mediterranean; European Energy Security.

Introduction

Beyond 2020, the European Union will face a natural gas deficit of 440 bcm/year, *Fig.1,* and over 2 billion barrels of oil, *Fig. 2,* due to the rapid depletion of oil and gas fields in the North Sea. The present paper indicates how these shortcomings can be resolved by relying on the hydrocarbon resources which are located in the Eastern and Central Medi terranean Sea.

Confronting the European natural gas deficit

The current natural gas deficit of the European Union of 240 bcm/year is satisfied by importing 136 bcm/year from Russia, 30 bcm/year from Algeria, 24 bcm/year in the form of LNG from Qatar and the remaining in the form of LNG, from Nigeria and Trinidad-Tobago, *fig.3.*

The additional deficit of 200bcm/year which is forthcoming beyond 2020 cannot be satisfied neither from Russia, nor from the North Africa, nor from USA as some European parliamentarians believe.

The reasons are the following:

1. Based upon the data provided by BP Statistical Review of World Energy, 2014, Russia's natural gas reserves stand at 33 tcm. The annual production stands at 630 bcm/year and the exports at 231 bcm/year. The remaining, roughly 2/3 of the production is consumed internally. Hence, the available amount for export is 11 tcm out of which 6.9 tcm is already committed for the next 30 years, while an additional 2 tcm are allocated for China leaving only 2.1 tcm of natural gas for other customers. Since Europe beyond 2020 will need 200bcm/year or 6 tcm for the next 30 years it is apparent that Russia cannot be considered as the nation to meet Europe's natural gas demands. In addition, the European Union does not want to obtain any more natural gas from Russia because they do not want to be totally dependent on Russia's natural gas supplies. Practically and politically, Russia cannot fill the European natural gas vacuum of 200 bcm/year for the next 30 years.
2. Based upon the data provided by BP Statistical Review of World Energy, 2014, Egypt and Libya have stopped supplying the European Union with natural gas while Algeria has reduced the export of natural to Europe from 70 bcm/year to 30 bcm/year. Obviously, the North African States cannot commit 200

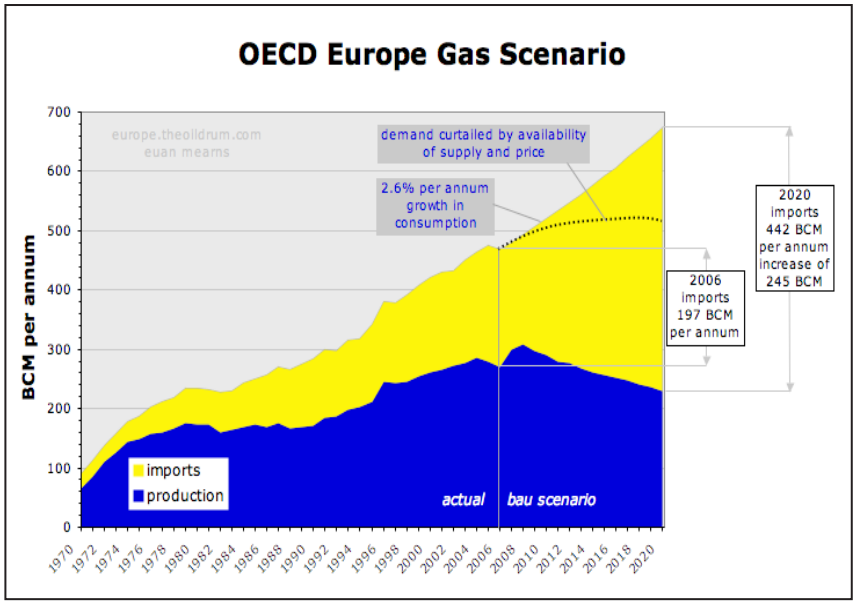

Fig.1: OECD Europe gas Scenario. http://europe.theoildrum.com/node/4361

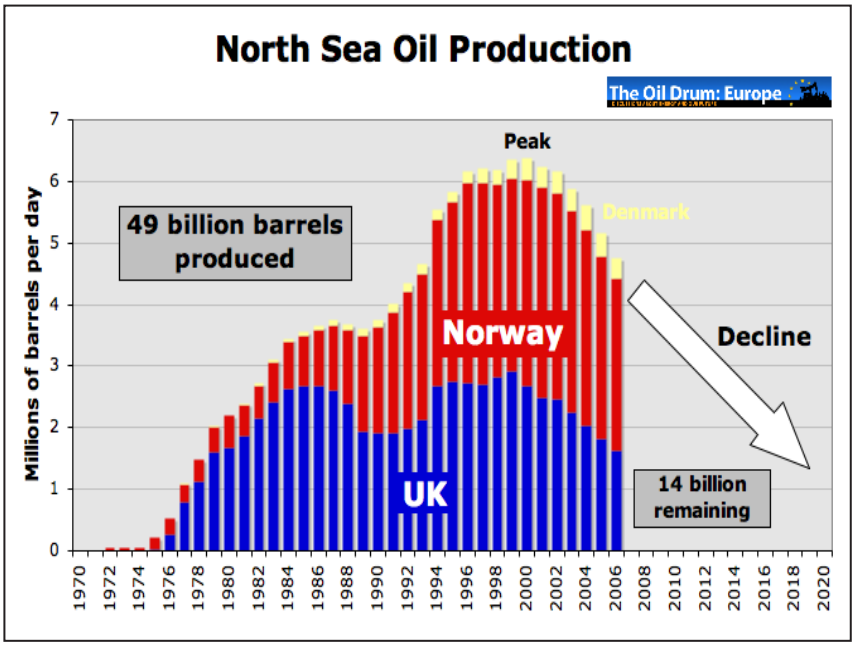

Fig.2: North Sea Petroleum declining production. By Euan Mearns, 2009, The Oil Drum Europe.

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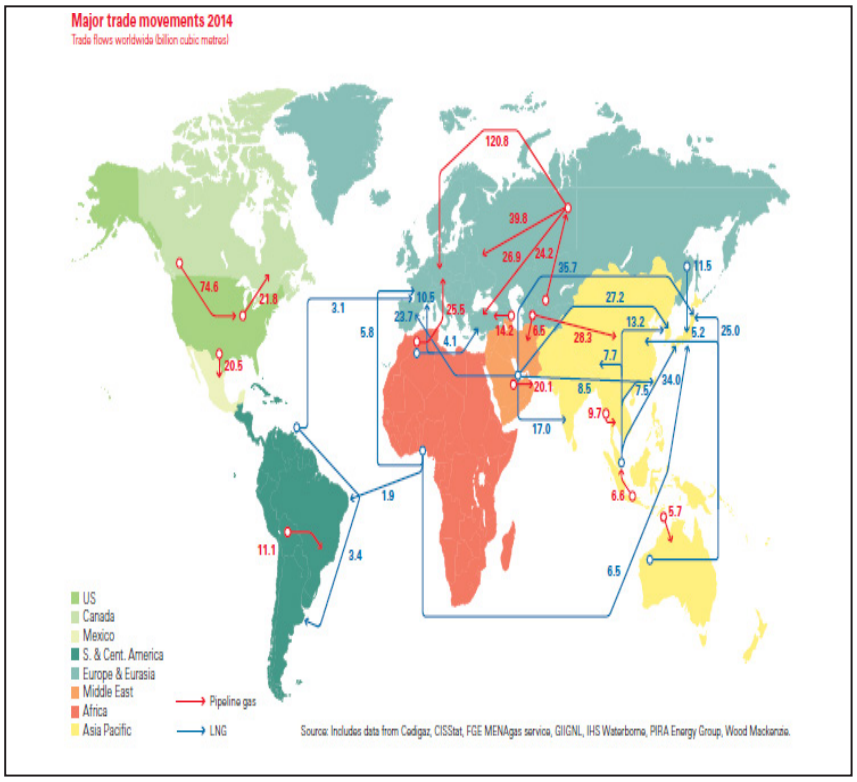

Fig. 3: Gas shipments by pipelines and LNG. BP statistical Review of World Energy 2014.

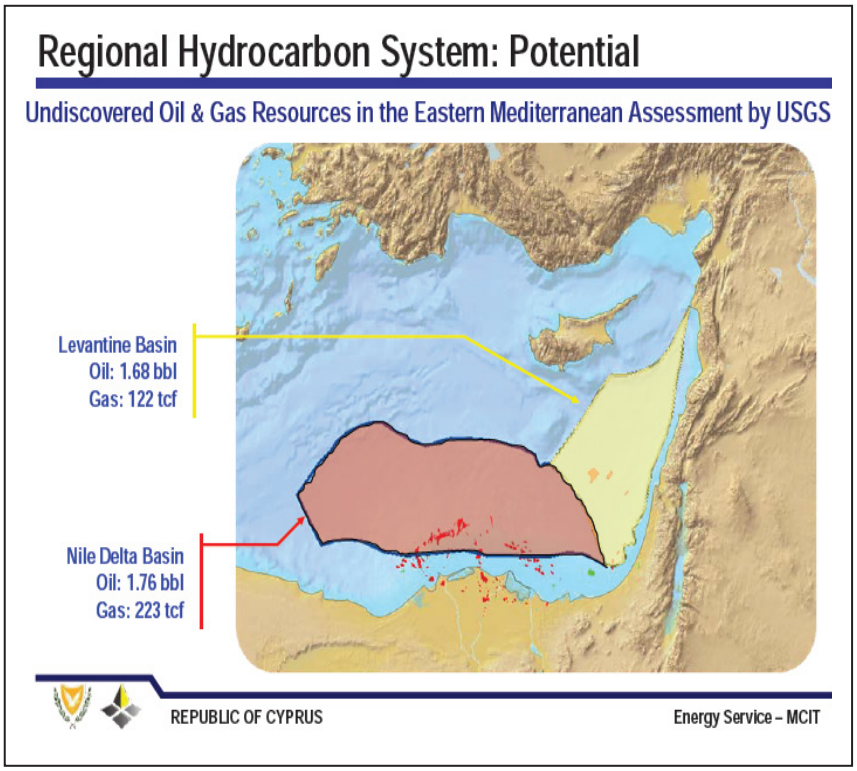

Fig. 4: Hydrocarbon potential of Nile Delta basin and Levantine Basin, USGS Technical Reports 2010-3014 and 2010-3027.

bcm/year of natural gas to Europe.

3. Based upon the data provided by BP Statistical Review of World Energy, 2014 USA has 9.3 tcm natural gas deposits. The annual production stands at 680 bcm/year while the consumption at 730 bcm/year. Obviously, a nation that imports natural gas can not export its resources to Europe even if shale gas reserves of 14 tcm prove to be correct and economically exploitable[1].

Based upon 2 USGS Technical Reports, Fact Sheets 2010-3027[2] and 2010-3014[3] the technically recoverable natural gas deposits from the Nile Cone and the Levantine basin, excluding the natural gas deposits of offshore Cyprus, offshore Crete and the Ionian Sea, stands at 345 tcf (trillion cubic feet) or 9.8 tcm which is more than what USA has 330 tcf. In addition, these 2 basins should have 3.4 billion barrels of oil and 9 billion barrels of gas liquids, *Fig.4.* These data show the immense importance of the Eastern Mediterranean as an energy supplier for the European Union.

Table 1: indicates the natural gas resources of all Eastern and Central Mediterranean Countries with different probabilities. This table indicates that with a probability of 50%, the natural gas reserves in the Eastern and Central Mediterranean are 16.3 tcm. These reserves classify the Eastern and Central Mediterranean basin as the second worldwide natural gas basin. The first one is the Western Siberian basin with 643 trillion cubic feet (18.2 trillion m^3) of natural gas. The third worldwide natural gas basin is the

1. BP. 2014. World Energy Resources, p. 45.
2. United States Geological Survey (USGS) 2010. Undiscovered oil and gas of the Nile Delta Basin, Eastern Mediterranean. Fact Sheet 2010-3027. Feb. 2010.
3. United States Geological Survey (USGS) 2010. Assessment of undiscovered oil and gas resources of the Levant Basin Province, Eastern Mediterranean. Fact Sheet 2010-3014, March 2010.

Rub Al Khalil basin in Algeria with 425 trillion cubic feet (12.1 trillion m^3), the fourth is the Greater Gawar Uplift in Saudi Arabia with 227 trillion cubic feet (6.4 trillion m3) and fifth the Zagros Foki Belt with 212 trillion cubic feet (6.0 trillion m^3). *Fig. 5* indicates the natural gas wealth of the Eastern and Central Mediterranean in respect to what is encountered in North America and the Western Siberian basin.

Table 2: Indicates the amount of gas discovered by Noble Company which is also ascertained by EIA, 2013[4] and MIT, 2013[5]. These proven reserves allow the proposed by DEPA, the National Greek Gas Company, to carry 15 bcm/year of natural gas to the European Union for 25 years, *Fig. 6.* This is an identical amount which TANAP/TAP natural gas pipeline will carry from Shah Deniz gas field of Azerbaijan, *Fig. 7.*

The already discovered natural gas in Eastern Mediterranean, 1.2 tcm, is more than the natural gas reserves of Azerbaijan, 0.9 tcm, BP Statistical Review of World Energy 2014[6].

Table 1 shows that Israel has proven reserves of natural gas 900 bcm out of which 40% can be exported, while Cyprus has proven reserves of 200 bcm and highly probable, at least 1,800 bcm while Greece has at least 3,500 bcm in offshore southern Crete and in the Ionian Sea we might have at least another 500 bcm. Therefore, assuming that Greece and Cyprus expedite their exploration and exploitation program the following amount of natural gas can be exported beyond 2025 for the next 30 years, *Fig. 8:*

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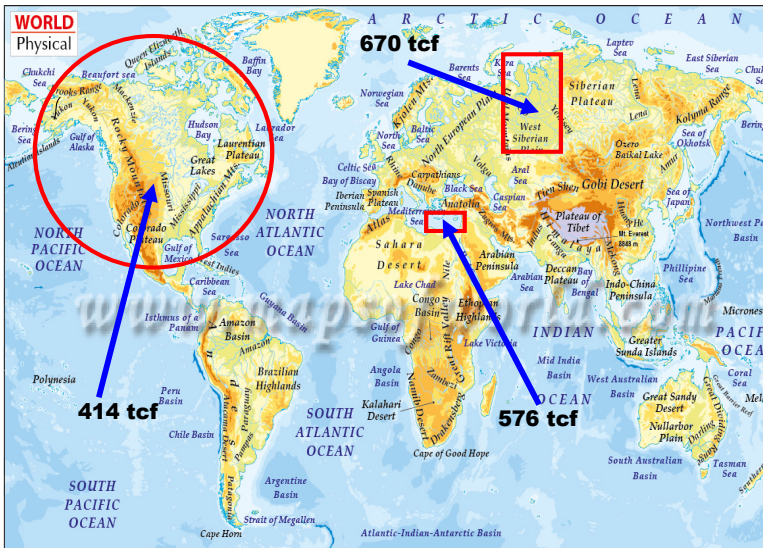

Fig. 5: Proven reserves of natural gas in Northern Amer-ica and Western Siberia basin and 50%probable natural gas reserves in Eastern Mediterranean basin.

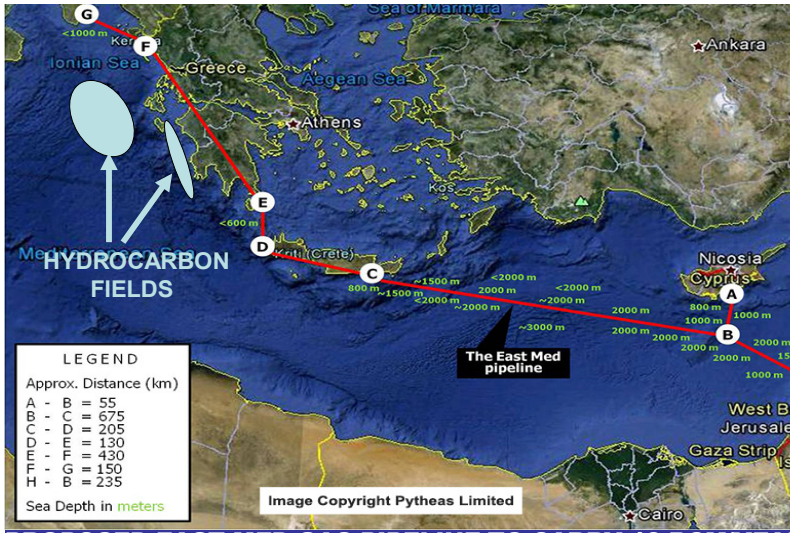

Fig. 6: Proposed East Med natural gas pipeline to carry 10-15 bcm/year from Israel and Cyprus to Europe. Beyond 2020 the European Union will need 200 bcm/year.

4. EIA (Energy Information Administration), 2013. Overview of oil and gas in the Eastern Mediterranean region, pp. 1-29.
5. MIT Energy Institute, 2013. Interim report for the study: Monetization Pathways for Cyprus. Economics for Project Development Options pp. 1-92.
6. BP. 2014. World Energy Resources, p. 45.

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Table 1.
Expected (Possible) Conventional Natural Gas Reserves In Eastern and Central Mediterranean in Trillion Cubic Meters (tcm)

EEZ OF COUNTRIES	RESERVES 95% PROBABIL	RESERVES 50% PROBABIL	RESERVES 5% PROBABIL	ACCURACY
EGYPT	3.4[1]	5,8[1]	12.1[1]	20%
ISRAEL	0.9	1.5[2]	3.5[2]	30%
CYPRUS	1.2	2.0[2]	4.5[2]	30%
LEBAN & SYRIA	0.9	2.0[1]	5.0[1]	40%
GREECE	1,9	4.5[1]	8.8[3]	50%
TOTAL EAST & CENTR. MEDIT.	8.3	16.3	33.5	50%*

1. USGS Technical Reports 2010-3014 and 2010-3027.
2. USGS Technical Reports + Data from the Cypriot Hydrocarbon Public Company (KPETYK).
3. Bruneton et al., 2011, Foscolos, et. al., 2013, PGS 2011.

* Inaccurate estimates due to sparse data. Reserves, however, have been extrapolated based on geological similarities (converging plates, mud flow volcanoes and accretionary prism complexes) of southern offshore Crete, Greece with the highly prolific hydrocarbon areas of the Barbados Ridge, West Timor, Indonesia and the Andaman-Nicobar islands, Myanmar.

Conversion Factors: 1 Barrel of Oil Equivalent (boe) = 155,373 Cubic Meters (m^3) = 5,467 Cubic Feet (cf)

Fig. 7: TANAP/TAP natural gas pipeline to carry 15 bcm/year. From Shah Deniz, Azerbaijan to European Union.

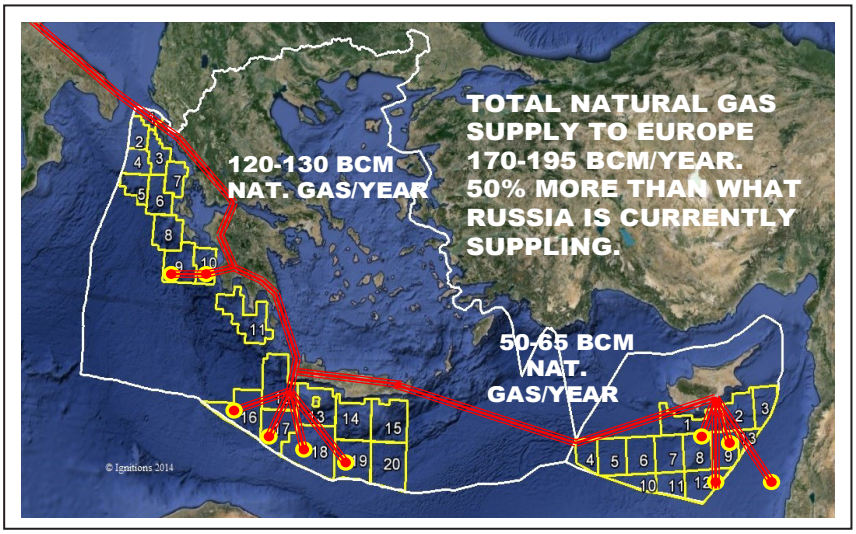

Fig. 8: Potential of annual natural gas supply from Eastern Mediterranean (Israel & Cyprus) 50-65 bcm/year and Greece 120-130 bcm/year.

Table 2.
Reserves and Exportable amounts of natural gas reserves from Israel and Cyprus, Noble Energy, Inc.1.

GAS FIELDS	RESOURCES (TCF)	% EXPORT	EXPORT= VOLUMES (TCF)
TAMAR	10.0	50	2.0*
DALIT	0.5	75**	0.4
LEVIATHAN	18.9	50	9.5
DOLPHIN	0.1	75**	0.1
TANIN	1.2	75	0.9
KARISH	1.8	75	1.4
TAMAR SW	0.7	75**	0.5
APHRODITE	9.0[2]	100	9.0
TOTAL	42.2		23,8

1. www.sigmalive.com/files/download.pdf
2. Aphrodite gas field has 5 tcf of natural gas while the satellite field in block 12 has at least an additional 4.05 tcf of natural gas bringing the total to 9 tcf. Data from Noble Energy Inc.

* 50% of uncontracted volumes.

** Up to 100% at discretion of MEWR (Ministry of Envi-ronment and Water Resources).

→ Israel exportable amount 360 bcm or 12 bcm/year.
→ Cyprus exportable amount 1,800 bcm or 60 bcm/.year.
→ Greece exportable amount 3,500 bcm or 116 bcm/year.
→ Total exportable amount from Eastern Mediterranean and offshore Crete and the Ionian Sea 5,660 bcm or 188 bcm/year.

The remaining 12 bcm/year will be supplied from Azerbaijan in order to reach the needed the 200 bcm/year of natural gas. As a result the total European natural gas deficit of 440 bcm/year beyond 2020 will be met, provided that Russia can keep her commitment, as follows:

→ 188 bcm/year (42.7%) from Eastern Mediterranean (Israel, Cyprus and Greece).
→ 120 bcm/year (27.3%) from Russia.
→ 36 bcm/year (8.2%) from Algeria.
→ 84 bcm/year (19.1%) as LNG from Qatar, Nigeria, Trinidad-Tobago and other nations.
→ 12 bcm/year (2.7%) from Azerbaijan.

Total 440 bcm/year

Hence, a complete coverage of the European natural gas deficit. Natural

gas can be exported to Europe either by pipelines, *Fig. 9*, or by CNG and/or LNG, *Fig.10* & *11*.
This development will undermine Russia's natural gas dominance of the European market with all its ramifications for Russia's economy.

Confronting the European oil deficit

Table 3 indicates that the proven and highly probable oil reserves of Israel, Cyprus and Greece amount to14.5 billion barrels. Based on a rule of thumb the daily production is 1/10,000 of the reserves which means that Eastern and Central Mediterranean can supply the European Union with, at least 1,450,000 barrels/day. This amount can increase to 2,500,000 barrels/day if EEZ between Egypt, Greece and Cyprus is materialized. The latter will allow the exploitation of the Herodotus basin which is estimated to have 12.5 billion barrels of oil. Two fifths of Herodotus basin belongs to Egypt, two fifths belongs to Greece and one fifth to Cyprus.

General Discussion

To exploit all this hydrocarbon wealth, a large number of active offshore platforms are needed. By comparing the size of the area in the Gulf of Mexico, USA, some 600,000 km^2, the amount of hydrocarbons reserves, 17 billion barrels of oil and less than 2 tcm of natural gas and the number of active offshore platforms needed, 3,858. *Fig. 9,* with the EEZ of Cyprus and Greece, roughly 600,000 km^2 which has 15 billion barrels of oil and 3.1 tcm, **Table 2,** 95% probability, then it is reasonable to anticipate the same number of active platforms to be deployed in Eastern and Central Mediterranean Sea.

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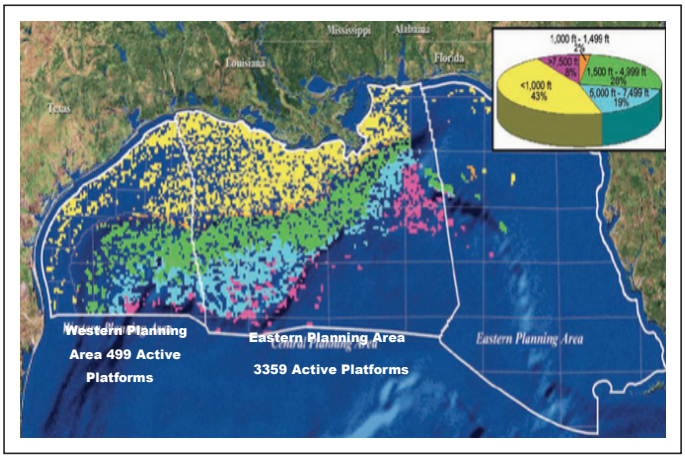

Fig. 9: 3,858 offshore active platforms in the Gulf of Mexico. Producing 1.5 million barrels of oil/ day and 46 bcf (billion cubic feet)/day natural gas.

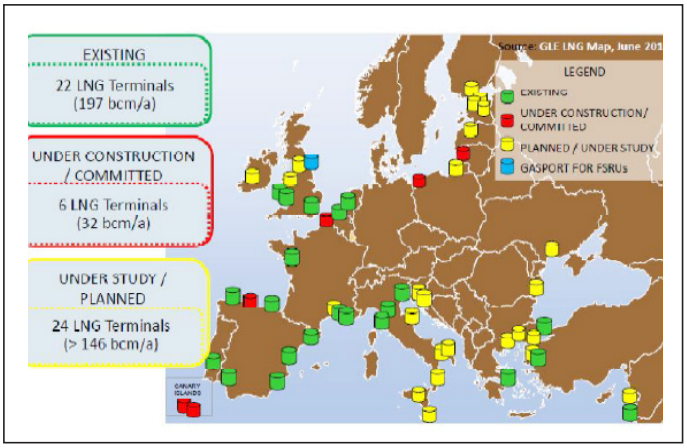

Fig. 10: LNG stations in Europe

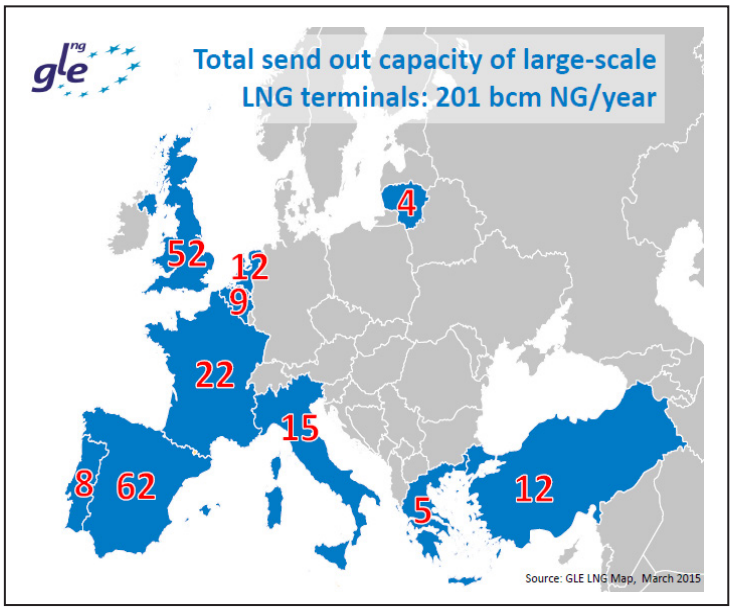

Fig. 11: Total LNG in bcm/year to be delivered www.sigmaline.com/files/download/pdf

TECHNOLOGICAL ISSUES

Table 3.

Proven, Highly probable and Probable Conventional Southern Crete and the Ionian Sea Oil Reserves (Bbo) in Eastern Mediterranean and Offshore.

EEZ OF COUNTRIES	PROVEN RESERVES	HIGHLY PROBABLE	50% PROBABLE
EGYPT	4.0[1]	1.8[3]	5.5[5]
ISRAEL	2.0[2]		
CYPRUS	1.5[2]		1.5[5]
LEBANON		1.0[3]	
GREECE		11.0[4]	5.5[5]
TOTAL	7.5	13.8	12.5[5]

1. BP Statistical Review of World Energy 2014.
2. Data from Noble Energy Inc.
3. USGS Technical Reports of 2010.
4. Statements by the ex Prime minister Samaras and minister of Energy and Climatic Change Yiannis Maniatis.
5. Total estimate of Herodotus basin by BEICIP/FRANLAB based upon TGS-NOPEC geophysical data and Krois et. al., 2009.

Conclusions

1. Europe is currently facing a deficit of 240 bcm of natural gas/year. It is anticipated that by 2020, it will carry an additional deficit of 200 bcm of natural gas/year. At the same time, a deficit of over 1.8 billion barrels of oil/year is predicted. Both deficits are attributed to the high depletion rate of the oil and gas fields in the North Sea.
2. Neither Russia, nor North Africa or even USA can help the European Union to meet this additional natural gas energy deficit of 200 bcm/year. The same applies to the oil deficit.
3. Geological, geophysical and geochemical data indicate the existence of very large hydrocarbon concentrations in the Eastern Mediterranean Basin (Lebanon, Israel, Palestine, Egypt and Cyprus) along with offshore southern Crete and the Ionian Sea. If exploration and exploitation of the hydrocarbon fields is expedited, Israel, Cyprus and Greece can supply the European Union with at least 188 bcm/year, thus covering the additional European Union gas deficit which is forthcoming after 2020. Moreover, some of the European Union oil deficit can be also covered by producing 1,400,000 barrels/day. This amount can be augmented to 2,500,000 barrels/day if Herodotus Basin is exploited by Egypt, Greece and Cyprus.
4. The production of oil and gas from Eastern and Central Mediterranean needs a safe marine environment.

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UNDERSTANDING RISK IN THE MARITIME ENERGY SECURITY DOMAIN

by Alexandra Hall
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*** Any views or opinions expressed in this paper are solely those of the author and do not represent those of RAND Europe**

The Concept of Risk

The concept of risk is paramount to an understanding of human agency[1]. It is contingent on the belief that we have a choice of behavioural options and can act in advance to prevent harm. As such it presupposes the ability to act strategically by linking decisions with outcomes[2]. Our understanding of risk tends to be borne of experience –we draw connections between historical and existing attributes and future actions or decisions. In his study on risk, the German sociologist Niklas Luhmann postulated that 'human behaviour can only be understood if we know and explore what options actors considered before making their choice'[3]. And, he goes on to suggest, the hypothetical futures considered are often more important for understanding social responses to specific phenomena than actual responses.

There are countless definitions and ways of conceptualising risk and there is no definition suitable for all contexts. Broadly speaking, it is the potential for

1. Aven T, Risk Management and Governance, Concepts, Guidelines and Applications.
2. Dawes, R. M. (1988): Rational Choice in an Uncertain World.
3. Luhman, N (1990), *Technology, Environment and Risk: A Systems Perspective,* Industrial Crisis Quarterly

something adverse to happen[4]. The term 'risk' denotes the possibility that an undesirable state of reality may occur as a result of natural events or human actions[5]. There is the potential for this undesirable outcome to be lessened or averted altogether by either modifying the events or actions or taking steps to mitigate the impact of their occurrence. All concepts of risk distinguish between possible and chosen action and considering risk can help individuals or organisations to select the option that promises at least marginal benefit compared to all other available options[6].

Risk has a number of key features: it is interdisciplinary in nature, found in many of the sciences but transcending them all; it implies uncertainty; it can be distributed over time, space and populations; it is context-specific (in different situations, a risk may be perceived as heightened or reduced); it can be measured in different ways; finally, it is not static but evolves. As events develop, the risk changes.

Risk in the maritime energy sphere

Many developed countries depend heavily on imported oil, gas and other energy commodities from overseas and this reliance continues to increase[7]. The collection and storage of these resources relies on a interdependent network of inland, coastal and port infrastructure and off-shore moorings and facilities. Transporting these commodities involves a complex global supply chain which follows trade routes across international waters which are outside the jurisdiction of any one government.

Evidently there are risks associated with the collection, storage and transportation of maritime energy supplies and much risk-based work has been done in this sphere. However, initially a large proportion of this work focused on safety rather than security. Early work concentrated on assessing the safety of individual vessels or marine structures, for example, vessels transporting liquefied natural gas and offshore oil and gas platforms[8]. However, there has been a move towards assessment of security risks, as it has become evident that the energy supply chain is also vulnerable to deliberate attack. Coastal infrastructure and port facilities provide access by both land and sea. Energy tankers themselves are easily visible, slow-moving, often follow wellknown routes and have to pass through chokepoints where their manoeuvrability is reduced.

Over the past few decades, international incidents have demonstrated that maritime targets are viewed as both attractive and feasible by both pirate and terrorist actors[9]. Certainly, there is precedent for attacks with piracy-oriented attacks occurring in various locations including off the Horn of Africa, the Gulf of Guinea and in the Malacca Straits. Similarly, while terrorist attacks on maritime targets are less common than piracy, historical cases nevertheless illustrate that both means and motivation exist. Examples include the 2000 attack on

4. Davis, P, Lessons from RAND's Work on Planning Under Uncertainty for National Security, 2012.
5. Kates, R. W., C. Hohenemser, J. X. Kasperson (Eds.) (1985), Perilous progress: Managing the hazards of technology.
6. See A. Strati, *Greek Maritime Zones and Delimitation with Neighboring States* (in Greek), Law Library, Athens, 2012, p. 150.
7. Renn O, Risk Governance: Coping with Uncertainty in a complex world', Earthscan, London, 2008.
8. Examples include the 2006 International Association of Oil and Gas Producers' 'Guidelines for managing marine risks associated with Flotation, Production, Storage and Off-take Vessels' and the 2002 American Bureau of Shipping Technical Paper presenting *A Quantitative Risk Assessment Model for Oil Tankers.*
9. Previous RAND research identified 15 high-profile deliberate attacks on energy commodity tankers between 1970 and 2013. There have been a substantial number of lower-profile and unreported attacks.

the USS Cole[10] and the 2002 suicide bombing of the M/V Limburg oil tanker. More recently, in 2010 a branch of Al Qaeda in the Arabian Peninsula took responsibility for an improvised explosive device (IED) attack on the M/V Maritime Star in the Strait of Hormuz. Many initiatives have been introduced to try and mitigate against these threats[11]. The risk still remains, however to understand the risk allows policy-makers and practitioners to ensure that appropriate and effective mitigations are in place to help reduce the likelihood of the risk coming to fruition. No risk can be eliminated altogether but there may be scope for more targeted or effective mitigations, especially as would-be attackers' modus operandi evolves.

Different techniques for thinking about risk

Although there are multiple complex (often quantitative or technology-led) methods of considering risk, there are also various approaches that can be employed with limited –or in some cases, no specific– risk expertise. Such approaches may be used by practitioners in numerous functional domains albeit that different techniques will have greater or less relevance in different situations. They include:

- Risk assessment which usually involves an analysis of threat, vulnerability and impact to inform decisions on which of any available courses of action/mitigation are likely to deliver maximum benefit. These mitigation strategies can then be filtered according to their acceptability, affordability and implementability;
- Different futures techniques such as Delphi, visioning or road-mapping which can help identify future threats or test the likely outcome of different approaches or mitigations. Such techniques are useful where the threat is yet to develop and the timeframe may not be known;
- Historical analysis: a form of analysis which draws on the lessons learned from history and which considers precedent to determine whether and how risks materialised and how successful different mitigation strategies proved;
- The use of different planning techniques:
  - Assessment-based planning: this is of particular utility in situations where the source of the threat is known and where the threat is projected to manifest itself in the short to mid-term;
  - Portfolio planning: this method helps planners and practitioners think about how capabilities can be optimally configured to meet concurrent risks. Such methods are highly dependent on the ability of participants to judge how resources may be used in an optimal way in order to be sufficiently flexible to adapt to concurrent risks;
  - Task-based planning: this method is particularly useful where uncertainty is so great that planning focuses on the ability to complete a specified task. As such, it focuses on any prerequisites of the specific task to be accomplished (e.g. the mounting of a maritime interdiction operation) to allow any threat to the ability to conduct this task to be mitigated;
- Finally, stakeholder engagement, across different communities of interest (although not a method, per

10. For further information, see http://asiastudies.org/file/publication/ashik/article%20for%20web.pdf
11. Examples include the International Maritime Organisation (IMO) International Ship and Port Facility Security (ISPS) Code, an amendment to the Safety of Life at Sea (SOLAS) Convention (1974/1988) on minimum security arrangements for ships, ports and government agencies. The ISPS Code came into force in 2004.

se) can enhance overall awareness of risk and mitigation at the practitioner level and can cultivate mutual understanding and trust between different interested parties (including vessel operators, port authorities, national security authorities, etc). Such engagement can also be used as a communication mechanism –with appropriate security provisions– where a new threat is emerging or novel mitigations have been developed.

The sorts of insights that can be gained from thinking about risk can help policymakers and practitioners 'govern' risk and take steps to prevent a risk coming to fruition or reduce its impact. Renn's five principal elements of risk governance are broadly applicable in many different contexts:

Risk assessment and risk governance

1) Pre-assessment. Activities conducted in the pre-assessment phase have close synergies with horizon scanning and futures analysis techniques. This phase concerns the setting of the context and parameters, and the identification of trends and indicators. It may involve: conceptualising or framing relevant risk topics; scanning for new hazards and identifying early warning and monitoring mechanisms; developing methods for screening hazards and risks (as a means of prioritising efforts); and drawing out the assumptions upon which risk assessment should be based.

2) Appraisal. This activity is concerned with placing a value on the implications –both direct and indirect– if the outcome in question should come to fruition. This is likely to involve: the identification of the hazard(s); an assessment of vulnerability; and an estimate of the likelihood and severity of a risk's impact based on the characteristics of the vulnerability. The level of detail that can be included in the risk appraisal will depend on the degree of uncertainty attached to the threat, vulnerability and likelihood of occurrence. In some cases, there may be a high degree of uncertainty, especially where there are a large number of variables (as is often the case in the maritime energy security environment) or where causal relationships and inter-dependencies are difficult to determine. Whatever the level of detail included, the risk appraisal will generally examine the likely impact on individuals, groups and the environment should a risk come to fruition as well as broader socio-economic implications.

3) Evaluation/Characterisation. This activity is concerned with viewing the risk estimate in context. It involves drawing a distinction between what is tolerable and intolerable in the specific circumstances under consideration. Where there is ambiguity in the evidence, the risk evaluation may take this into account (the evidence on the severity or likelihood of the risk may not be clear cut) and different values or norms may also need to be considered.

4) Management. Risk management activity involves considering options for managing, reducing or removing risk. Options might include buying time, obtaining information, planning for the worse –than expected–, adopting a flexible approach to insure against multiple possible eventualities or taking pre-emptive action. Risk management spans: the generation of risk handling/mitigation options; the assessment of the likely impacts of the identified options; the identification of possible trade-offs between mitigation options; the implementation of selected mitigations; and the monitoring of the effectiveness of mitigation implementation. Risk management can be complicated by competing agendas (e.g. where two actors have a strong interest in conflicting mitigations) and by interdependencies (e.g. where mitigations are dependent upon effective implementation by more than one actor).

5) Communication. This concerns awareness raising across relevant communities and the establishment of appropriate behaviours. Communication about risk is likely to take different formats but is intended as a means of; educating and enlightening those who are potentially affected by a risk or who could have a role in risk mitigation; encouraging behavioural change including, potentially, by providing risk management training; developing confidence in those institutions with a responsibility for assessing and managing risk; and permitting involvement by interested parties in risk related decision making.

It is possible to apply these principles in varying degrees of detail. While a deep and thorough risk assessment may be most appropriate for instances when outputs are to be used for detailed planning, useful insights may still be derived from a 'light touch' risk assessment where the outputs are more concerned with 'gauging' options

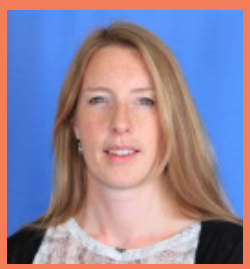
or considering the suitability/fitness for purpose of existing approaches.

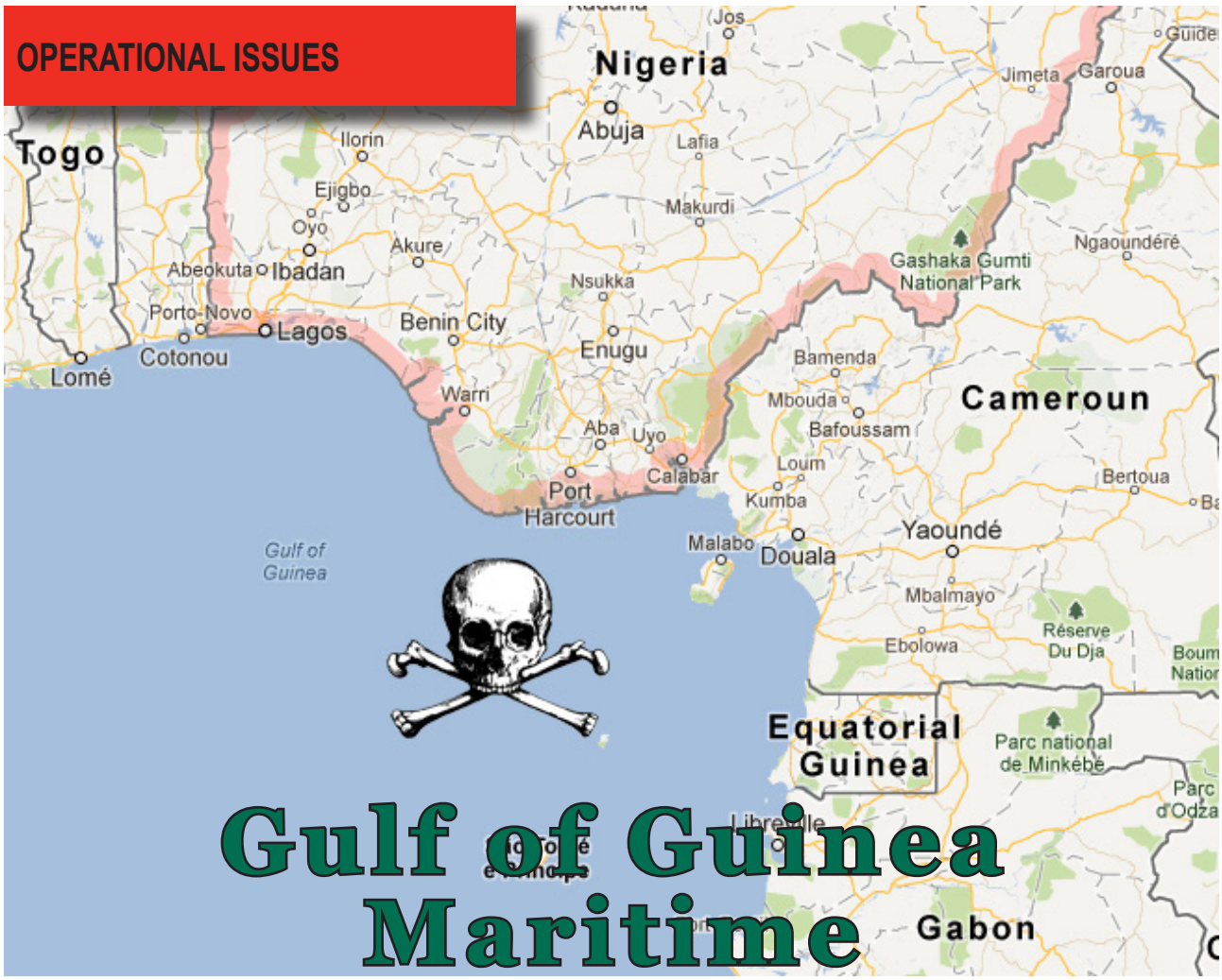
Conclusion

Risk will continue to exist in the maritime energy security domain. However, there are techniques that can be employed to assist in managing and responding to this risk. The use of risk assessment techniques can generate important insights that may inform decisions regarding the best courses of action in a given situation. Risk cannot be eliminated absolutely but even the application of simple risk assessment techniques can produce an understanding of risk that can, in turn, substantially reduce the potential for undesirable outcomes.

Alexandra Hall

Is a research leader on Defence and security issues at RAND Europe. Her professional experience spans a diverse range of Defence and security subjects including: military concepts and doctrine; the contemporary and future operating environment; international relations and geopolitical risk; insurgency, counter-insurgency and terrorism; the civil-military interface; and European Defence and security. She also specialises in scenario development to underpin capability planning and strategic-level training exercises. Prior to joining RAND Europe she worked for an independent UK Defence consultancy, working principally for the UK MoD, European Defence Agency and NATO on projects relating to geopolitics, capability planning and strategic-level analysis. Her academic background is in International Relations and European studies.





Gulf of Guinea Maritime Criminality Analysis with *Geographic Informations Systems*

by Miguel Bessa Pacheco
CINAV, PORT N

Abstract

Over the past few years, the Gulf of Guinea has been increasing its world share of oil production. At the same time, armed robbery and piracy attacks have become a permanent threat to the maritime agents in the region. Oil theft, crew kidnapping for ransom and robbery of crew and ship valuables are the most common outcomes of successful attacks.

To better understand the phenomena, a political, economic, social and environmental analysis of the region was performed, and a geographic information system was developed to provide a deeper analysis and understanding of the correlation between geographical and scope factors of this criminal activity, considering the period from January 2012 to May 2015. The system integrates the land and maritime boundaries, population, religion, oil/gas platforms, oil/gas fields, reported attacks on ships and spatial analysis results.

Several factors are pointed out as major contributors to today's maritime criminality in the Gulf of Guinea. The geographic information system analytical outputs provide a view of the geographical concentration, trends and perceive a slow decreasing of this threat until 2014 and a slow growing tendency in 2015.

1. Introduction

The Gulf of Guinea (GoG) is a maritime natural resources rich environment, both live and mineral. Its strategic value is growing proportionally to its oil and gas production, and fishing is also not to be neglected. Over the last few years, the shipping and fishing activities have been under piracy (outbound the territorial sea) and armed robbery assaults (inbound the territorial sea limits). To deal with these illicit activities several national, international and multinational strategies have been designed. To better understand the maritime criminality problem of the GoG, and decide on the best lines of action to take, a geospatial analysis of the area and its maritime criminality was performed using a COTS geographic information system (ArcGIS). The piracy and armed robbery assault data was acquired from the monthly IMO reports on acts of piracy and armed robbery against ships, from January 2012 until December 2014 and from the US Navy Office of Naval Intelligence worldwide threat to shipping reports from January to May 2015.

2. The Golf of Guinea

The GoG comprises a geographic area that goes from Cape Verde and Senegal in the north along the West African coast down to Angola in the south. For the purpose of this paper only the littoral countries were considered: Cape Verde, Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroons, Equatorial Guinea, S. Tomé & Príncipe, Gabon, Republic of the Congo, Democratic Republic of Congo and Angola. These countries are members of several organizations that have been discussing the security of the GoG, namely the African Union, the Economic Community of Central African States (ECCAS), the Economic Community of Western African States (ECOWAS) and the Gulf of Guinea Commission (GGC).

The GoG area shipping (Halpern & Walbridge, 2008) follows two major routes. One goes down to the Cape of Good Hope and around Africa (outbound) and the other follows the coast of the GoG countries and dissipates as it reaches Nigeria *(fig. 1)*. The GoG maritime routes to Europe and the USA are of great value for there are no choke-points between their coasts, and sailing distances are shorter than the ones to the Middle East great oil producing countries. These factors are major in transportation costs and security attractiveness.

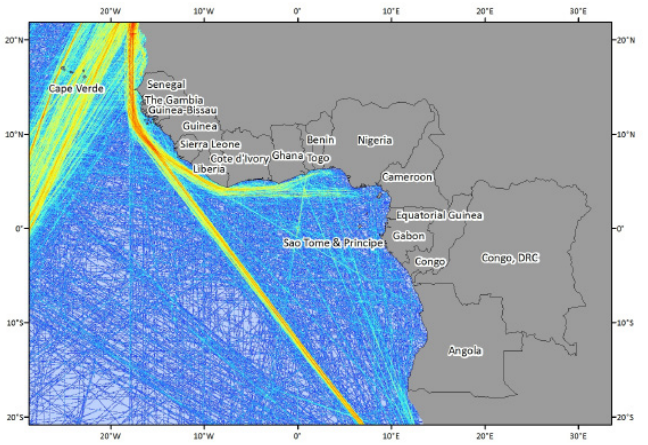


Fig. 1:. GoG shipping, 2005

The maritime illicit activities are to be dealt differently according to littoral countries sovereignty and jurisdiction areas. All GoG countries have signed the United Nations Convention on the Law of the Sea (UNCLOS). Although UNCLOS sets a maximum width of the territorial sea to 12 nautical miles from the base lines, Togo still claims a width of 30 NM and Benin a width of 200 NM *(fig. 2)*. This fact has implications in the classification of maritime illicit activities such as piracy or armed robbery assaults, and in the way an event can be dealt with by local authorities and the international community.

The Exclusive Economic Zone (EEZ) of the GoG litoral countries sums up 3.3 million km^2, first ranking Cape Verde, Angola and Equatorial Guinea. The territorial seas add about 208 thousand km^2 and the continental shelf claims, so far presented to the United Nations, represent an area of about 1.1 million km^2.

In 2014 the GoG littoral countries sum up about 287 million people *(fig. 3)*, representing about one third of the African's continent. Nigeria is at the same time the most populated and the country with the highest population density (CIESIN & CIAT, 2005).

In 2014, the gross domestic product (GDP) was highest in Nigeria (1058 million $), followed by Angola (175,5) and Ghana (109,4) *(fig. 4)*.

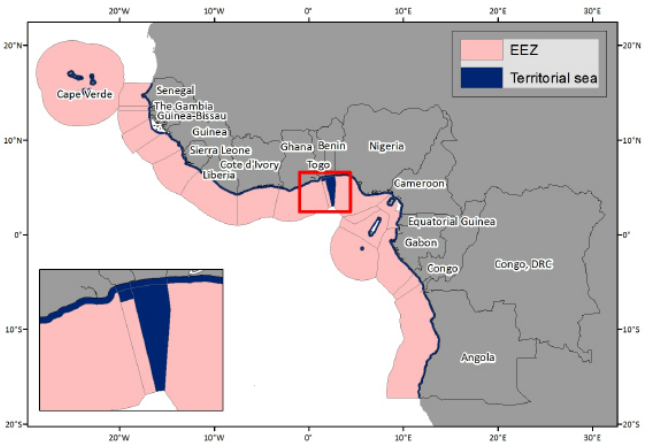


Fig. 2. GoG maritime boundaries

OPERATIONAL ISSUES

Equatorial Guinea ($32.600) and Gabon ($21.600) had the highest GDP per capita, between 2,5 and 4 times higher than Angola ($8.200), the third in rank *(fig. 5)*.

In 2013 Africa produced 10.1% of world's oil and 6.0% of gas (British Petroleum, 2014). Africa's proven reserves of oil and gas represent 7.7% and 7.6% of the world's, most of them located in the GoG area. In 2013 Nigeria produced a daily average of 2322 thousand barrels of oil and Angola reached 1801 *(fig. 6)*. These figures and the fact that there are no major international conflicts between GoG countries have led several analysts to flag a growing strategic role of the GoG in the energy market. Also, the grade of GoG oil is very good. Crude oil is evaluated according to its sweetness (sulphur content) and weight (API gravity degree). The best value for money from crude oil distillation is achieved from sweet and light oil. GoG oil is sweet and light.

For oil and gas production, in 2009, there were 801 fixed platforms off the GoG countries (Saldanha Bay IDZ, 2012, p. 15), and it is expected that this number is higher today. Pipelines and floating units are used to store and transport crude and gas from the platforms to terminals and to shore. In 2014, thirty seven (37) of the world's 151 oil floating production storage and offloading units were operating in the GoG. To dig new wells, the offshore oil and gas industries use rigs. In 2014, the GoG rig fleet was of about 100 vessels and platforms, which had a utilization rate of 65%. Altogether it is a very significant and expensive infrastructure.

Some authors refer that, in the GoG countries, only political and economical national leaders have been benefiting from the oil and gas industries (Fidelis Allen, 2012), implying that the revenues have not been applied to the common social, economic and environmental policies. According to the Resource Governance Index (Revenue Watch Institute, 2013), Nigeria (40th), Angola (41st) and Republic Democratic of Congo (44th) have "weak" natural resources revenues governance scores while Cameroons (47th) and Equatorial Guinea (56th) are considered to be "failing" in their revenues governance. Only Ghana (15th) and Liberia (16th) have a classification of "partial satisfactory" *(fig. 7)*. No GoG country is classified in the "satisfactory" rank of natural resources revenues governance.

International, regional and local criminal activities are intrinsically related with the incapacity of states to make and/or enforce their laws. This was clear when Somalia government collapsed and maritime piracy went off the roof. The fragile states index is published annually and it ranks the world countries regarding their collapse probability (Fund for Peace, 2014). This index takes into account, among other indicators, the demographic pressure, group grievance, uneven development, poverty and economic decline, human rights and security apparatus. The political reality in the GoG is generally evaluated as fragile due to regime challenge or instability, generalized poverty and high levels of criminality. In the GoG countries there are five that figure within the 20th most fragile states in the world. Democratic Republic of Congo is the 4th most fragile, being included in a set of countries in very high alert. Guinea, Ivory Coast and Guinea-Bissau are in the high alert list and Nigeria, in the 17th place, is in the simple alert list *(fig. 8)*.

Among the GoG countries, Angola is the one with the most uneven development, followed by Equatorial Guinea and Nigeria. Guinea, Guinea-Bissau and Sierra Leone are the ones with more poverty. Democratic Republic of Congo, Equatorial Guinea and Nigeria are the worst evaluated considering human rights.

Despite its richness in natural resources, the GoG area is experiencing maritime safety and security problems that might affect future investments in the oil and gas industries. Security in the GoG is a major problem, namely due to ship robbery, kidnapping or host taking and oil theft.

The number of piracy and armed robbery attacks in the GoG, from 2012 until May 2015, reached a total of 172 *(fig. 9)*, in many of which hostages were taken. In 2013, the GoG piracy and armed robbery assaults estimation of primary economic costs to stakeholders were between $565 million and $681 million (Oceans Beyond Piracy, 2014, p. 55). These numbers still differ significantly from the 2013 Somali piracy economic costs that were estimated between $3.000 million and $3.200 million (ibidem, p. 7).

The shipping industry is not completely innocent in the GoG criminality schemes. Some crews also participate in irregular activities selling some unaccounted oil for private benefit, or transferring stolen oil from the black to the clean oil market. For this reason, some attacks are not reported to authorities and the official maritime related crime numbers are considered conservative.

The GoG is an area of open waters in the Atlantic, and attacks to ships are mainly made inside or near the countries' territorial seas, when they are anchored or slow moving. In Somalia, attacked ships and their whole crew are taken for ransom and can be held hostage for very long periods of time, sometimes years. In the GoG, criminals select high value crew members (i.e. the captain and the head of engineering) and take them to land for ransom. Ships are not held for more than a few days, just enough to transfer the oil into a ship enrolled in the

black market or to a store site ashore. Attackers in the GoG are more violent than in the Indian Ocean. They also are very well armed and have some capability to directly fight law enforcement authorities.

When analyzing the maritime illicit activities in the GoG there are two major enablers: the limited authority capabilities of coastal states and the resources governance. The first includes limited cooperation between states, limited maritime situational awareness and limited navies and coast guards capabilities. The latter includes all the factors that affect fragile states, corruption and low natural resources revenue transparency.

The problems that arise from the maritime illicit activities can be grouped in five different areas: illegal, unreported and unregulated fishing that damages local economies and contribute to the degradation of natural resources sustainability; environment degradation by toxic waste dumping; trafficking & smuggling of drugs, arms and people; damaging of the oil & gas infrastructures for oil theft, specially pipelines (which is also a source of major inland and near shore oil spills); and shipping that is affected by robbery, crew kidnapping for ransom, oil theft and oil smuggling that is sold to the oil black market.

Data mining and analyzing the GoG piracy and armed robbery assault database one can verify that attacks are more frequent from February to September *(fig. 10)*.

Considering the maritime areas where the 172 attacks occurred, 88 took place inside the countries' territorial or interior waters (33 in 2012, 23 in 2013, 23 in 2014 and 9 in 2015) and 84 outside. Of all these attacks, 65 were attempts that for some reason had no consequences on ships, their crew or cargo *(fig. 11)*.

The worst types of attacks are the ones that include kidnapping, injuries or the death of crew members, hijacking a ship and stealing its cargo. Other minor consequences include stealing ship and crew valuables, temporary taking of hostages and the destruction of material, normally the ship's communication systems. One attack may include more than one type of consequences. The majority of successful attacks is focused in stealing ship valuables (46) and crew valuables (32). Ship hijacking occurred 18 times and 8 attacks resulted in the death of crew members *(fig. 12)*, 7 of which occurred in Nigerian waters.

The number of attacks to ships that had major consequences has fallen down in the period between 2012 and 2014 (18, 12, 9), but by May 2015 the number of these occurrences was already 7, reflecting a tendency to increase.

Of all GoG maritime attacks to ships, about 46% (79) occurred in the Nigerian EEZ, territorial sea or interior waters. Most of these attacks occurred in the Lagos anchorage site or between the two major oil and gas exploring areas off the Bayelsa state *(fig. 13)*.

In order to better understand the geographic tendencies of the attacks, a spatial density analysis was performed for each year and also the whole period from 2012 until May 2015.

Figure 14 shows the density analysis of the attacks in 2012. The highest concentration is in the Togo anchorage off Lomé, followed by the Nigerian waters offshore Bayelsa and the Ivory Coast anchorage of Abidjan, the Nigerian anchorage of Lagos and the Congolese anchorage of Point Noir.

In 2013 the highest density of attacks occurred on the waters off the Nigerian Bayelsa state, followed by the Togo anchorage of Lomé and the Nigerian anchorage of Lagos *(fig. 15)*. The figures at Abidjan and Point Noir anchorage sites didn't change much from the previous year.

In 2014 two areas presented very high concentration of attacks: the Point Noir anchorage site and the waters off the Nigerian state of Bayelsa *(fig. 16)*. The Lagos anchorage site presents a lower, but still noticeable, value.

In 2015 (January to May) the higher concentration of attacks took place at the Lagos anchorage site and the waters off the Akwa Ibom Nigerian state, near the border with the Cameroon, where there is a very large number of oil and gas industry infrastructures *(fig. 17)*.

Considering the period from 2012 to May 2015, the density of attacks analysis shows that the hotspots of the GoG piracy and armed robbery assaults are four anchorage sites (Abidjan, Lomé, Lagos and Point Noir) and the waters off the Nigerian state of Bayelsa *(fig. 18)*.

One of the major concerns related to oil theft is that at some point in time the Islamic group Boko Haram, which terrorizes the north of Nigeria, could be able to get control of some parcels of land in the south and finance its activities with oil. This would lead to a different scale of insecurity in the region and the establishment of links with other terrorist organizations. Figure 19 shows the Boko Haram attacks in the period between 2009 and 2013, as well as the piracy attacks off Nigeria in the period 2012-2015. In the background one can also see the dominant religion in the different areas of the GoG (Muslims, Christians and Tribalists). The map shows a very big geospatial gap between the locations where the two different types of attacks occur. Also it is visible that, at this time, Boko Haram has a particular focus on Nigerian states of Muslim religion and that the Christian states represent a geospatial break in its territorial activities.

OPERATIONAL ISSUES

3. Conclusions

The strategic value of the GoG is growing due to its richness in natural resources, especially oil and gas. For the last few years, the shipping activity in the GoG has been targeted by piracy and armed robbery assaults.

There were 172 reports of piracy and armed robbery attacks in the GoG in the period from 2012 until May 2015. About 38% of these attacks didn't result in any damages to ships, their crew or cargo. The number of attacks has decreased between 2012 and 2014. In 2015 it is noticeable an increasing tendency, especially in attacks that resulted in ship hijacking, crew kidnapping or cargo stolen. Crew members died in eight attacks, seven of which occurred in Nigerian waters. The number of piracy attacks (outbound the territorial seas) and armed robbery assaults (inbound the territorial seas) is very similar (84/88).

The spatial distribution and density analysis of the attacks show that the anchorage sites of Abidjan, Lomé, Lagos and Point Noir and the waters off the Nigerian state of Bayelsa are the hotspots for the GoG maritime criminality.

The illicit maritime activity in the GoG has the main objectives to steal the cargo from tankers, to sell it in the oil black market, and to kidnap high valued crew members for ransom.

The geospatial gap between Boko Haram attacks and maritime attacks is very big. This gap suggests that, for the time being, there is no connection between the two phenomena.

The use of a geographic information system for the GoG maritime criminality analysis was very useful to discover both temporal and spatial patterns and tendencies of the attacks.

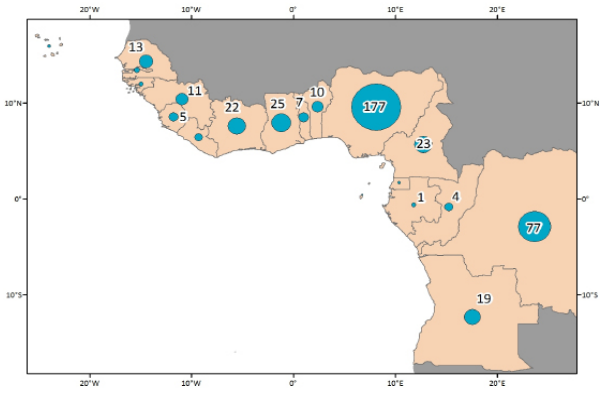


Fig. 3: Population (millions)

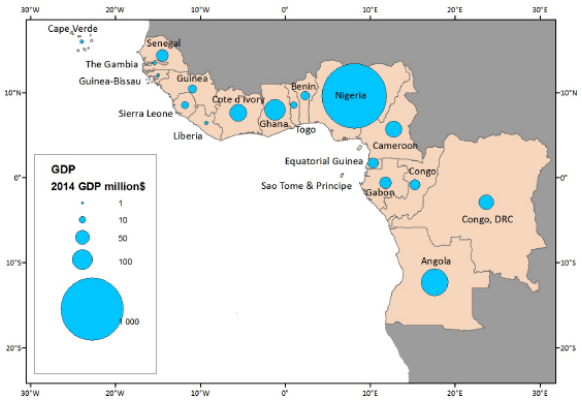


Fig. 4: GDP, 2014

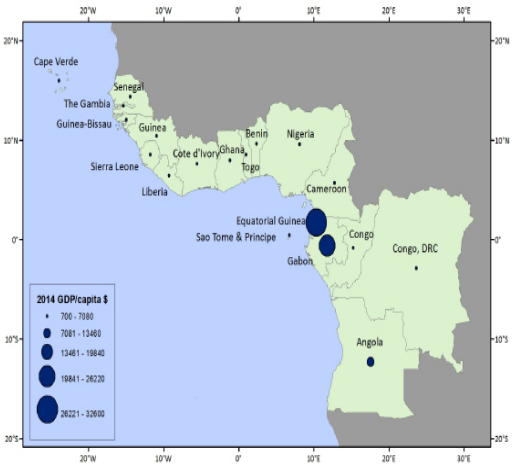


Fig. 5. GDP per capita, 2014

OPERATIONAL ISSUES

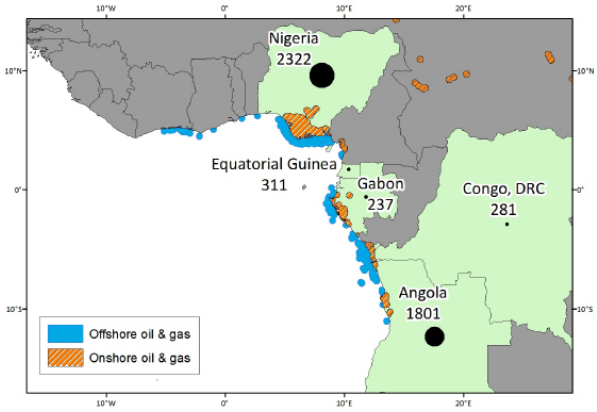


Fig. 6. Oil fields & production, 2013

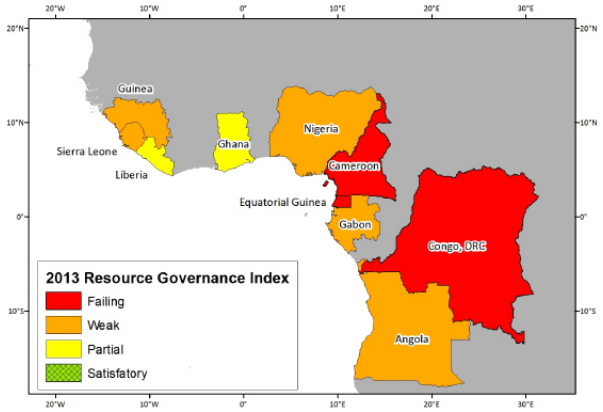


Fig. 7. Resource Governance Index

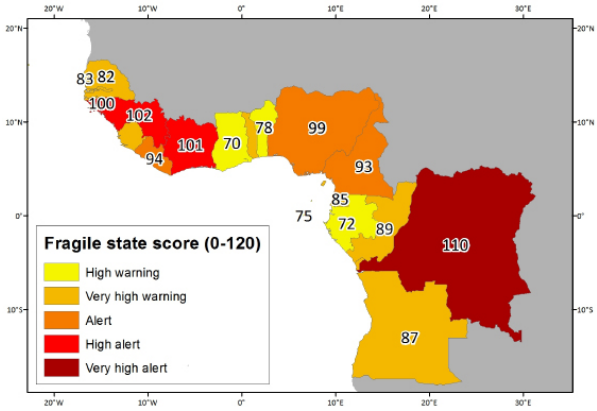


Fig. 8. Fragile states index

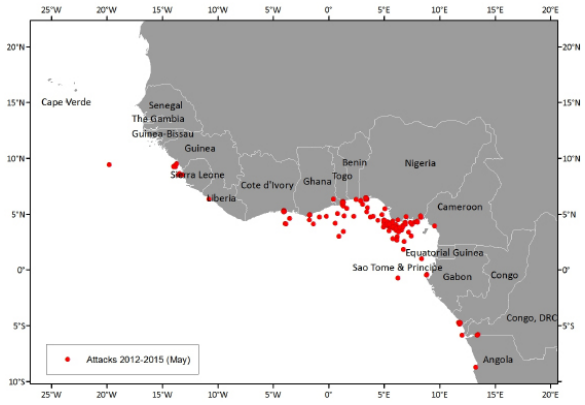


Fig. 9. Piracy and assaults 2012-2015 (May)

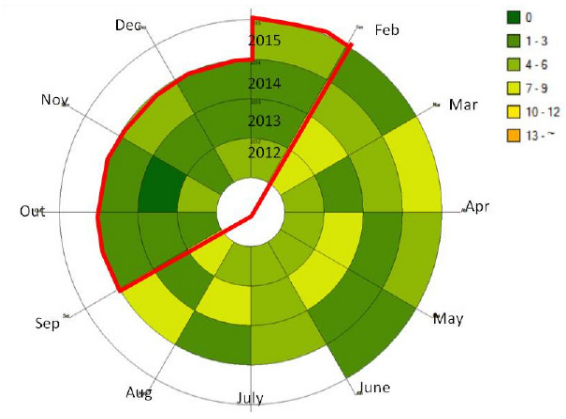


Fig. 10. Attacks "years by months"

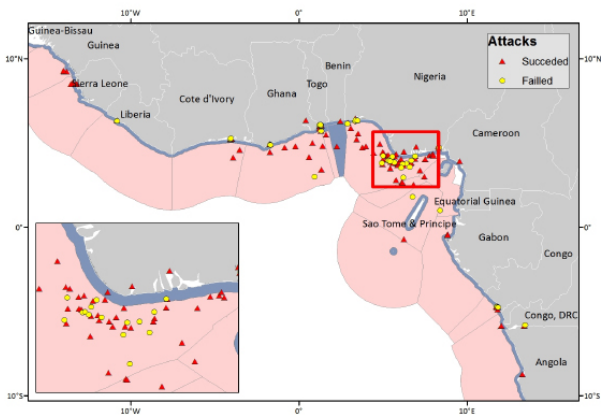


Fig. 11. Success of attacks

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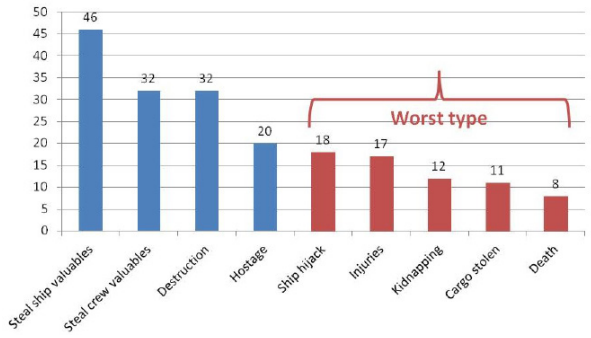

Fig. 12. Attacks outcome

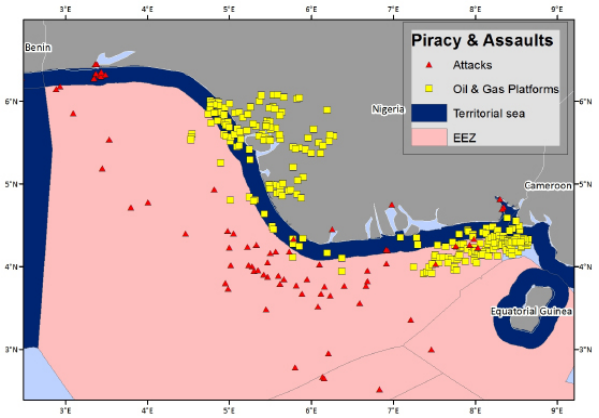

Fig. 13. Attacks in Nigerian waters

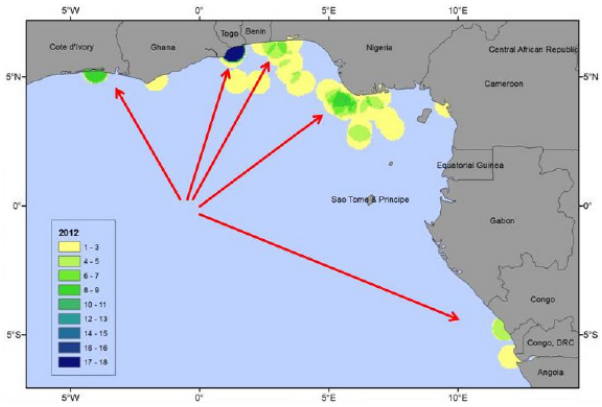

Fig. 14. Density of attacks in 2012

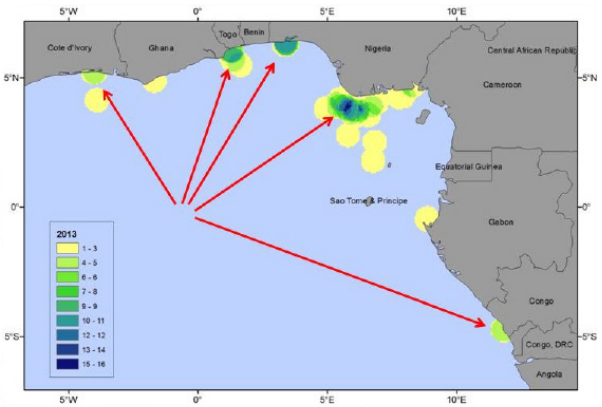

Fig. 15. Density of attacks in 2013

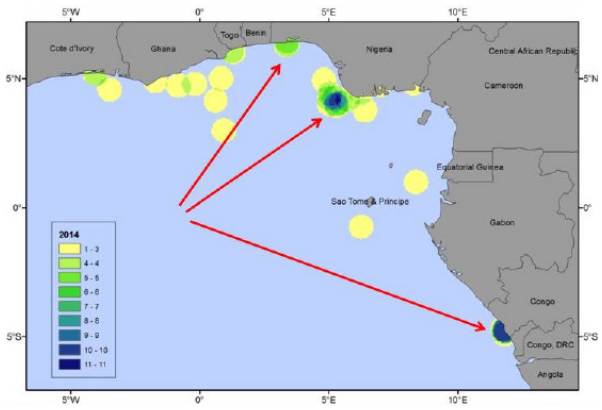

Fig. 16. Density of attacks in 2014

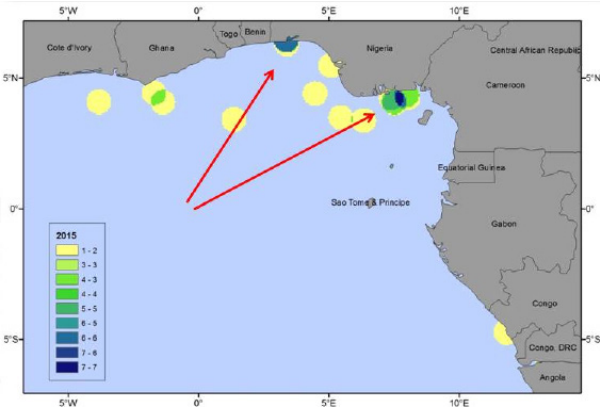

Fig. 17. Density of attacks in 2015

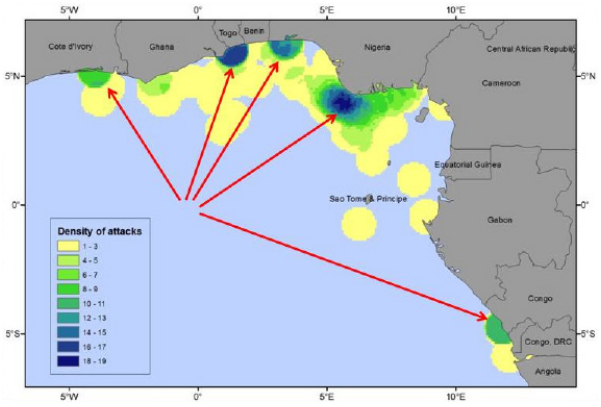

Fig. 18. Density of attacks 2012-2015

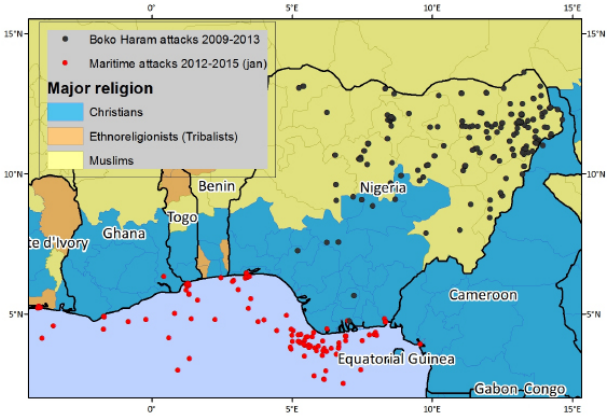

Fig. 19. Terrorism & piracy

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Commander Portuguese Navy holds a Bsc in Naval Military Sciences, a MEng in Surveying Engineering, a MSc in GIS, a diploma in Hydrography and a diploma in Hydrographic Engineering. At sea he served in a Frigate and was the commanding officer of a patrol boat and of an oceanic survey ship. At shore he served at the Portuguese Hydrographic Institute, at the Naval School and at the Naval Staff. He is a member of the Portuguese Naval Research Centre, of Academia de Marinha, of the Portuguese Chamber of Engineers and of the Geography Society of Lisbon. Presently he serves as Action Officer at the European Union Military Staff.

HIGH VISIBILITY EVENTS

Visit of the Chief of the Helenic National Defence General Staff, Admiral Evangelos Apostolakis

Visit of the Chairman of the Armed Forces of Jordan escorded by the Vice Chief of the Helenic National Defence General Staff, Lt General Georgios Paraschopoulos GRC (AF) & Policy Branch of the Hellenic National Defence General Staff, Rear Admiral Ioannis Pavlopoulos GRC (N)

Visit of the UNIFIL MTF Commander, Rear Admiral Flavio Macedo Brazil BRA (N),
escorded by his Military Assistant, Lt Commander Matheus de Athaides Firmino BRA (N)

Visit of the NATO SNMG2 Comander, Rear Admiral Jorg Klein DEU (N), escorded by his Chief of Staff, Captain Gennaro Carola ITA (N)
& the two Commanding Officers of SNMG2 Naval Units, Commander Steffen Lange DEU (N) & Commander Ozgurk TUR (N)

HIGH VISIBILITY EVENTS

Visit of the Director of Political-Military & Policy Affairs Bureau of the Israeli MoD Mr Amos Gilad, escorded by the Vice Chief of the Hellenic National Defence General Staff, Lt General Georgios Paraschopoulos GRC (AF)

Visit of the Commanding Officer of Suez Naval Base, Rear Admiral Eyhar Sobhy Mohamed EGY (N)

Visit of the Chief of Staff of the Egyptian Armed Forces, Major General Mahmoud Hegazy, escorded by the Chief of National Defence General Staff, Admiral Evangelos Apostolakis GRC (N)

Visit of the Chief of the Vice Commandant of US Coast Guard, Vise Admiral Charles D. Michel

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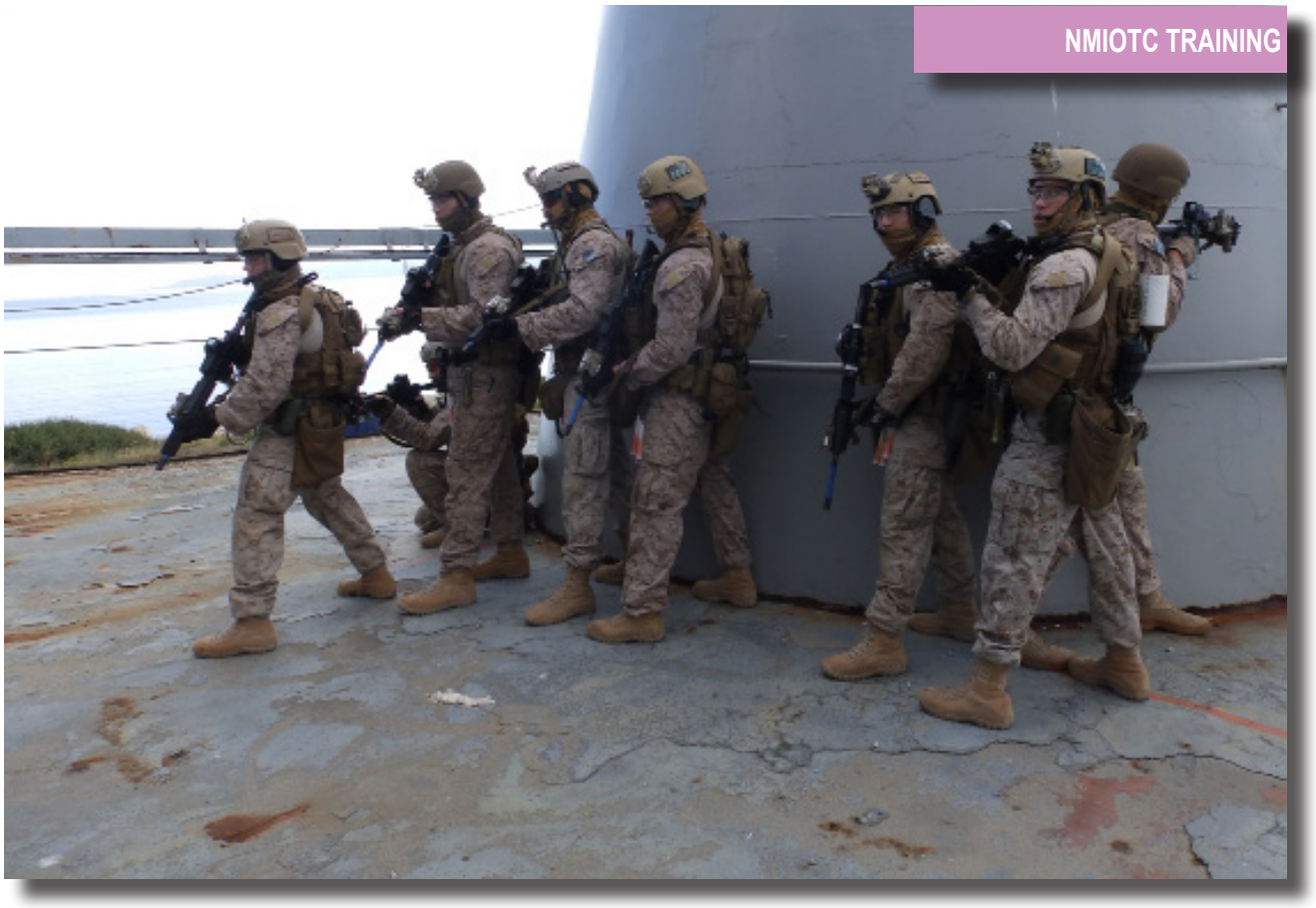

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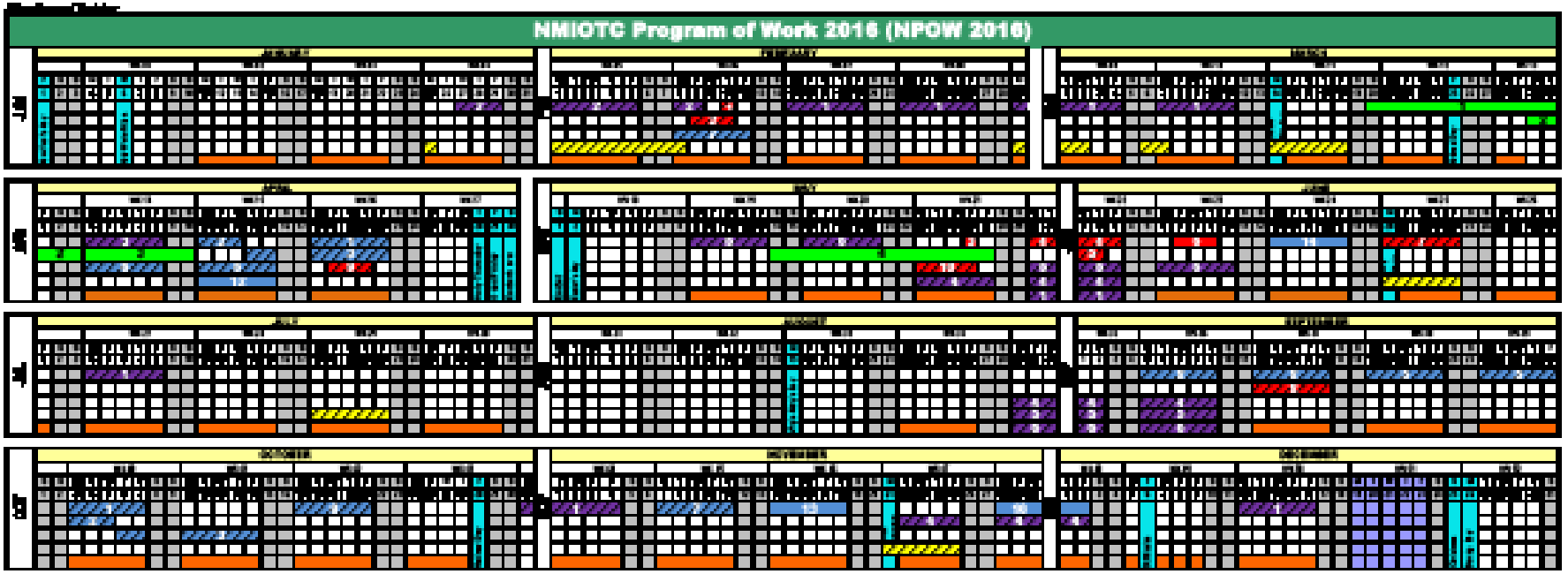
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