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THE RESPONSIBILITIES MODEL FOR MARITIME TRANSPORT TASK

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Abstract: The EU is a leader in the world's maritime economy. Black sea is an important region for the union. Recently some disasters occurred with lost of seafarers' lives. A principle relative model is formulated in accordance with particular responsibilities of the participants in the maritime transport task. Conclusions that masters are overpressed and community maritime misunderstanding are synthesised. Some recommandations for closer cooperation are directed to Black sea countries public institutions, academic sector and maritime **NGOs.**

Key words: Black sea, SAR, disasters, captain, model, responsibilities.

1. INTRODUCTION

Nowadays, at least half of the citizens of the European Union (EU) live along the coasts on less than 50 km of the sea coastline. As a matter of fact, the sea equatorial that is under the jurisdiction of the European governments exceeds in size the land territory. Some twenty of all 28 member states of the EU have their coastal zones and with the accession of Bulgaria and Romania the borders of the union reached the Black sea. The European Union became main player in this region. That has not got only a geo-strategic importance for the energy stability and the diversification of the ways for energy supply to the union, but safety of life at sea and environmental protection issues as well. The marine industry of the countries gives approximately 40% of European gross domestic product. More than 40% of the world merchant fleet that implements the greater part of foreign trade and almost half of the domestic trade by means of the internal water ways belongs to Europe as well. Despite the increasing necessity of an integrated interdependent approach towards defining the marine policies and the appropriate approaches for their implementation, there are certain signs that up to now the activities in the marine sector bear a separate development which is not sufficiently interrelated. That is why as faster the development of the marine industry branches is and as greater the increase of their diversity is, the more indispensable the application of closer coordination and precise planning is.

The motive for the elaboration of this theme has been dictated by the raise of the number of marine accidents in the region, loss of human lives and the unfavourable consequences for the environment. Input was done by the European Parliament in its Resolution from 13th December 2007 concerning the shipping disasters in the Kerch Strait and the Black Sea following by much more legislative instruments, including "Opinion of the Committee on Regional Development for the Committee on Foreign Affairs on an EU Strategy for the Black Sea". Some suggestions are with great importance not only for the future of the Black sea countries but for the EU and nearest territories as well.

"1. Considers the Black Sea region to be a strategically crucial area and believes that an EU Strategy for the Black Sea will contribute to realising the aims of European integration; deems the Strategy essential to the region's sustainable and coordinated development, as well as to the stability and security of the region and of the EU as a whole"; "5. Is in favour of the continuation of programmes supported under the European Neighbourhood and Partnership Instrument (ENPI) and recommends that a sufficient budget be provided for the Black Sea Basin Joint Operational Programme for the next programming period, in order to fully address and continue efforts to achieve all the objectives stated in the ENPI CBC Strategy Paper 2007-2013; emphasises that uniform rules should be drawn up to govern applications, so that any legal entity in any state participating in the programme area can apply as lead applicant; considers that all the countries in the Black Sea Basin Joint Operational Programme should be involved and encouraged to participate actively in the next programming period";

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"10. Takes the view that all infrastructure projects, whether in the area of transport or energy, should be negotiated between all the Black Sea countries concerned, and that coordination should be ensured especially with regard to TEN-T projects and to projects relating to the development of harbours; stresses the importance of better intermodal freight operations, through the integration of short-sea shipping into transport logistics, improved port operations and more efficient hinterland connections; considers that the EU must continue cooperating with its regional partners on improving infrastructure safety, modernising existing infrastructure and creating new infrastructure; calls for effective coordination of search-and-rescue operations in the Black Sea Basin and for the establishment of a Black Sea surveillance strategy";

The aim of this report is to contribute to and stimulate an initiation of a more directive and effective complex of activities by the participants conserned from the coastal countries in close cooperation with institutions of the international maritime community.

The Black sea and Sea of Azov region is an area characterised by many ports, an intensive traffic of various in size and quantity vessels, a complicated navigational and heavy hydrometeorological conditions, especially in winter time. Special attention has to be drawn to the Kerch strait with its approaches and Sea of Azov, where Ukrainean and Russian interests are interwoven. Northern approaches to Bosphorus and the strait itself are also very difficult points for mariners. Regardless of the efforts done to regulate the activities, there is lack of organisation and appropriated practices related to international shipping. One of the most immportant is search and rescue at sea.

2. SOME DISASTERS IN THE BLACK SEA DURING LAST DECADE

Over the past few years in the Black Sea became some tragic events. Seafarers died, ships sunk. We would like to point out recently some sad examples:
m/v "Hera" - according to Turkish authorities sank on 13 February 2004, around noon local time, 7.5 miles north of the Bosphorus (Turkish territorial waters) in very severe storm. Died 17 Bulgarian and two Ukrainian seamen. No one survived;
m/v "Vanessa" - sank on 03 January 2007 г. at dawn, about ten miles from the northern approaches of the Kerch Strait in the Sea of Azov (Ukrainian territorial waters) in very bad weather, ten Bulgarians and one Ukrainian – pilot lost their lives. Only one was rescued;
m/v "Tolstoy" - sank on 27 September 2008 at dawn, 10-12 miles Eastward of cape Emine in bad weather (Bulgarian territorial waters). The crew consists of 10 people - 9 Ukrainians and a Russian captain. Only two were rescued .

Specific exemple is m/v "Katya Z" sailed from Berdyansk (Ukraine, Sea of Azov) on 22.01.2006 with 14 Bulgarian and 4 Ukrainean crewmembers on board. Soon after departure the vessel entered heavy ice conditions and run aground near the port. Why the responsible shorebased authorities gave permission for sailing? As a result mariners rest captured on board for 20 days with limited supplies.
There are some similarities in the cases listed. Common feature is that all tragedies are in close proximity to the coast, without adequate actions of the responsible "Search and rescue" (SAR) services can help the seamen and in heavy weather conditions.

We have no intention to present a larger statistics now. Tragedies are quite enough for lesseons to be learned.

3. MARITIME TRANSPORT TASK – A PRINCIPLE MODEL OF RESPONSIBILITIES

Looking for manners how to improve safety in this region we would like to offer a safety model that includes three parts: base, superstructure and sea-going staff (Shipmaster and crew). The base has two levels: external (working environment) and internal. These terms are contingent. More precise terms could be found.
A) The external level consists of the working environment, where the vessels of international shipping operate. It includes: navigational and weather conditions in the above mentioned area + local authority and services who monitor and assist shipping (e.g. Search and Rescue, VTS, Waterway and buoyage system maintenance, Agency, Pilotage, Medical, Insurance, Border, Customs, Supply, Ecological, Port authorities, Maritime administration, Shipper, Forwarder etc.).
B) The internal level consists of: the ship owner, the operator, the insurers, the registers, the shipbuilders/ship-repairers, the flag administration, etc.

Factors of both groups form the so called Coastal authorities and services group (CAS). On the other side is the Shipmaster together with the crew. There are various philosophies to express the safety model. Two of them are:

$$\text{Safety} = F\,[\text{External} + \text{Internal} + \text{Shipmaster}] \quad (1)$$

$$\text{Safety} = F\,[(\text{External} + \text{Internal}) + \text{Shipmaster}] \quad (2)$$

$$\text{Total risk} = \text{Sum of errors} = \text{Safety} = 100\% = 1 \quad (3)$$

Equation (1) shows that all players are together – "in one boat", instead of (2), where the Shipmaster is some separately. Our supposition is that reality belongs to the second expression. Of course, the true is somewhere in between.

Now we shall consider only the working environment and the processes taking place there, as compared to the safety index. The proposed approach allows focusing our attention to the base, i.e. the Coastal authorities and services, because the safety depends mainly on their actions. We strongly believe that it would contribute to the development of more serious analyses amongst participants in the rest of the levels.

Following such thinking, it could be accepted that:

C) Main participants in the maritime transport task are: Crew (Master), Pilots, Agents, State authorities (Customs, Medical, Immigration, etc.), Port authorities (Stevedores), Harbor master, Vessel Traffic Services, Cargo services (Forwarders). Let's say they are 10.

D) By nature errors are: flagrant/gross, systematic and random, caused respectively by – human, equipment and all the rest. Predominant are the random errors, where they are accumulated in squaring.

Total risk = Sum of participants' errors = Safety (4)

If equally distributed:

$$\sum e_{i-n} = \sqrt{e_1^2 + \ldots + e_n^2} = \sqrt{0.1_1^2 + \ldots + 0.1_n^2} = 1 \quad (5)$$

Then in accordance with (2):

Shipmaster = Safety - F (External + Internal) (6)

or 0.1 = 1.0 - 0.9

That means Master is forced to suffer the all participants' errors!

As it is well known, every component of the operational chain is a potential and real carrier of errors. It is quite evident that the more participants there are, the more errors happen. Unfortunately, in many of the cases the inaccuracies of the coastal participants become evident when the Master and the crew find themselves at sea in heavier conditions. Obviously, the working conditions at sea are heavier then those ashore. So, it is quite natural that the decision taken by the Master could be not the best one and could be followed by certain mistakes. This is one of the reasoins the guilt to be transferred to the ship. We should say that this meaninig is accepted over the world, as shipping is one of the most important branches of the maritime industry.

One of the final objectives is to further inform the maritime community. Moreover, the common knowledge that the Shipmaster is guilty for everything has to be forced out of peoples' mind.

4. REPORT'S FEATURES

Limitations:

- Due to the serious disasters that have recently occurred in the above mentioned region, the descriptions, analyses and proposals refer mainly to the status of the working environment of the international voages operated there. All Black sea countries are involved;
- The report is not intended to investigate what happened with the above pointed vessels. These accidents are an inevitable consequence of the state of numerious factors that influence the safety of shipping in this particular region.

Main stages of the operational process (Master's obligations)

As mentioned before the Master and the coastal participants are the two main parts of shipping. Let us briefly explain some of the weak points of the working environment that closely relate to the safety of the crew, ship, cargo and environment. In this case the inaccuracy of the CAS directly reflect on board.

Some of the most important tasks that should be solved by the crew of a merchant vessel in international trade are:

- navigational (the voyage between two points to be performed in an optimal way, i.e. safely and economically);
- work with the coast authorities and services;
- operational (loading/discharging must be safe and within optimal time limits, complying with the international and national requirements and good maritime practice).

This report does not pretend to analyze the processes in details. Stages and tasks of greater importance are subject to consideration. Following our brief description it could be concluded that the Master is the only person who takes the responsibility for all the ommissions made by shorebased representatives. There are a lot of proves about that. No doubt that good ship operation and maintenance first of all depends on the competance of the coastal specialists. Therefore, in order to properly fulfil their duties they must have sufficient sea-going practice. We would like to remind to those who are not sure about our statement that for a long time world shipping has suffered for competant sea-going staff. Normally, a part of this manpower takes shoarbased vacancies. So it is evidant that specialists who are employed for shoare branches of shipping are not experienced enough. It is well known that the Master has the power on board. However, in practice, the last word does not belong to him.

Actually he has to execute commands given from shoare. Therefore, managing vessels, coastal professionals transfer their competance and incompetance on board

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Recently, especially in winter time, heavy disasters took place in the Black sea and in the Sea of Azov, accompanied by human life loss, serious unfavourable consequences upon environment and numerious damages according to "Total loss" category. This is a clear sign for the necessity of undertaking immediate specific actions on international and national level for a detailed investigation of the state of the working environment and the main factors that influance the safety of shipping in this region;

The accidents stated above represent just "the top of the iceberg", because they are a pure consequence of certain malformations of human awareness, and they have been well known to the majority of the participants in the processes for many years. So, unfortunately, their occurrence seems inevitable and it is not only an indicator for a delayed response but also for the undoubtfull inadequacy of the allegation that a precedent is need to initiate the establishement of preventive legislation;

Of course, Black sea coastal states administrations made a lot in order to improve safety of shipping. Maritime services demonstrate actions that comply with the international and national maritime legislation and good maritime practice. But, if we have a deeper look into this matter, we shall see that there are a number of weaknesses of these same services that they transfer towards the ship administration only, respectively to the Master. The application of such methods does not do any good to nobody, having in mind that the number of people willing to work at sea constantly decreases.

From the practical point of view, there is nothing new there. All this is well known. Probably, there is enough regulative base. Then, how to improve our activities so that much more knowledge and experience to be put in operation?

5.2 Recommendations

This report is not to propose guidelines or manuals, we would just like to highlight some weak points of the processes and we hope that Black sea countries governmental structures, academic sector and maritime NGOs shall work together and cooperate with respective EU institutions:

- Analising the actual state of the search and rescue systems, including environmental protection of the Black Sea countries, as shipping is international and its employees – seafarers have the right to be saved anywhere, if any cases arise;
- Informing and requesting the responsible EU institutions, respectively European Maritime Safety Agency, to plan targeted financial and methodology support for programmes and projects related to solving concrete practical tasks about preventive and post environmental disasters activities, safety of life at sea, maritime search and rescue, efficiency and effectiveness of the systems for Vessel Traffic Services and Port State Control. Balanced role should play non-governmental maritime sector with specialized branch organization and academic community;

- Acceptance of a common understanding of the maritime culture problems, e.g. safer shipping and cleaner oceans, Search and Rescue, Port State Control, Vessel Traffic Services, Piracy policies, Maritime Education and Training standards etc (Figure 1);

Figure 1 The strategical location in the Black Sea Basin

- In this respect it is a good idea the matitime education and training programmes to be standardised not only at international conventional level but at national and academic institutes as well.

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INTRODUCING MAAP, ITS PARTNERS AND THE INTEGRATED COASTAL MANAGEMENT SYSTEM: IMPLICATIONS FOR A JOINT NATECH PROJECT

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Abstract: The paper introduces Philippines, the Province of Bataan and MAAP with emphasis on its geographically location in a typical coastal area. It also shows the Integrated Coastal Management (ICM) Framework and tools that are being implemented thru partnerships that are based on common objectives to build better coastal governance, increase awareness, promote community participation in coastal management and explore ways for dynamic and sustainable partnerships. This is a case study about MAAP and its being a member of the Bataan Coastal Care Foundation, composed of private industrial companies, supporting and initiating various environmental advocacies in the Bataan Province. MAAP contributed directly and indirectly to: Natural and Man-made hazard Prevention and Management (related to NATECH2016); Habitat Protection, Restoration and Management; Water Use and Supply Management; Food Security and Livelihood Management and Pollution and Waste Management. MAAP also contributed thru community projects and publications. Through varied approaches and entry points and in close collaboration with the local government units, MAAP, serves as catalyst in protecting the environment in Bataan either individually or collectively, within their respective spheres of influence and capabilities. Indeed a case point that could be explored as one of the strategies and actions for ASIAN networking on coastal management in addressing environmental issues like climate change. The paper ends with concluding remarks and recommendations as regards 2017 possible IAMU funded project that would address Maritime Safety, Security and Environmental Issues beneficial to the community thru Natural Technological Risk reduction projects or NATECH in partnership with AMFUF/IAMU members and non-IAMU members from Japan (Kyoto University & Osaka University), Thailand (Siridhorn International Institute of Technology of Thammasart University) and Indonesia (Institut Teknologi Bandung).

Key words: Integrated coastal management system, private-public partnership.

1. INTRODUCTION

1.1 The Philippines in Context

The Philippines, found in the Indo-Pacific area, is composed of 32,400 kms of discontinuous coastline [R.T. Perez, pp. 17-24 2001). The Philippines is an archipelagic country consisting of 7,100 islands with 62 of its 79 provinces are coastal (78%); 832 of the 1,496 municipalities are coastal (56%); of the 11 municipalities and 1 city of Bataan, only 1 is land-locked. Part of Bataan is located in the 190- km coastline of Manila Bay, one of the finest but highly impacted natural harbors in the world. Of the 76 million Filipinos in 2000, 40 million resided in the coastal areas (52%). There were 227persons/km^2 in the coastal areas in 1990 and increased to 286 persons/km^2 in 2000. Also, 80% of coastal households were rated as falling below poverty threshold in 1996.

The Philippines is located in the world's centre of marine biodiversity. It lies at the apex of the Coral Triangle, the Amazon of the Seas and is second among the CT6 in reef area of 2.6 M ha. It is considered as a haven for various reef and reef-associated flora and fauna. Most of the people living in coastal areas are highly dependent on coastal fishing, seaweed farming, and mangrove lumber. The country's coral reefs provide annual economic benefits estimated at US$1.1 billion per year (Burke, et al 2002). The Philippine coastal zone is generally composed of mangrove areas, beach areas, seagrass beds and coral reefs. Estuaries and coastal wetlands are also found along the coasts The Coastal

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areas in the Philippines are estimated to make an economic contribution of 60% of the GDP – fisheries, coastal tourism, transportation, energy production and industries.

The Philippine archipelago, which has one of the longest coastlines in the world, will not be spared of the adverse impacts of sea-level rise and extreme climate events that are expected to happen in a warmer world The various activities in the ocean (*Shipping & Navigation; Fisheries; Recreation & Tourism; Industries; Human Settlements)* results to a number of **multiple use conflicts** *(overexploitation; habitat degradation; pollution from land and sea-based; erosion and siltation)* that **impacts climate change** and vulnerability to natural disasters

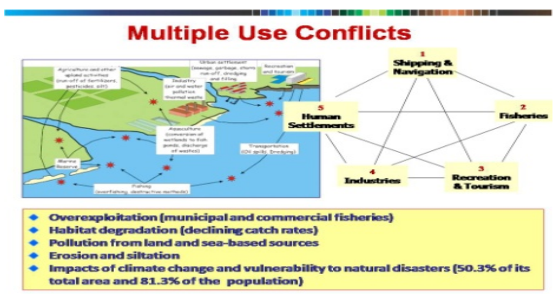

Figure 1

1.2 Climate Change and Its Impact

Climate change is very much evident in the country today because of the various gas emissions namely: CO2, CH4, NO2 and CFC's which are emitted in the environment through various means like fossil fuel combustion, deforestation, fermentation process, fertilizer use and thru various aerosol propellants. These result to rise in temperature, precipitation, and sea level, and changes in water availability and extreme events Climate change's impact on the country is most often associated with extreme weather disturbances such as typhoons and floods , which, in turn, affect many other sectors of economic life.

The Philippines is one of the world's most natural disaster-prone countries due to a combination of high incidence of typhoons, floods, landslides, droughts, volcanic eruptions, and earthquakes. As greenhouse gas emission increase worldwide, the Philippines will continue to be affected by climate variability through changes in temperature, precipitation, and sea-level rise. Apparently, the most significant impact is on coastal fisheries yield and community welfare. This will **affect a number of sectors,** with highest impact on agriculture, forestry food security; water resources like water shortage (El Niño & La Niña phenomena); human settlements; ports, fisheries Coastal zones and marine ecosystems and human health.

Climate change can be addressed through two main approaches: MITIGATION, ADAPTATION and also add INTEGRATION. **Mitigation** seeks to reduce greenhouse gas emissions to lessen the pressures on natural & human systems from climate change (preventive action); **Adaptation** seeks to adjust human and natural systems to new or changing environment due to climate change. Adaptation initiatives include measures aimed at reducing the negative impacts resulting from climate change as well as the identification of new opportunities (such as the economic potential of carbon offsets) and benefits associated with new climatic conditions. **Integration** of climate change policies in the national development policies includes economic, social, and other environmental dimensions. The Bataan Sustainable Development Strategy (BSDS) and Coastal Sea Use Zoning (CSUZ) were formulated to embody the vision and mission of the people of Bataan to chart a course for the preservation of Bataan's rich natural endowments

1.3 Integrated Coastal Management Systems

Existing climate change initiatives in the country include Integrated Coastal Zone Management System (ICZM), coastal policies and regulations (e.g. Fisheries Code), disaster management strategies among others. However, there is lack of integration for these initiatives in the context of climate change.

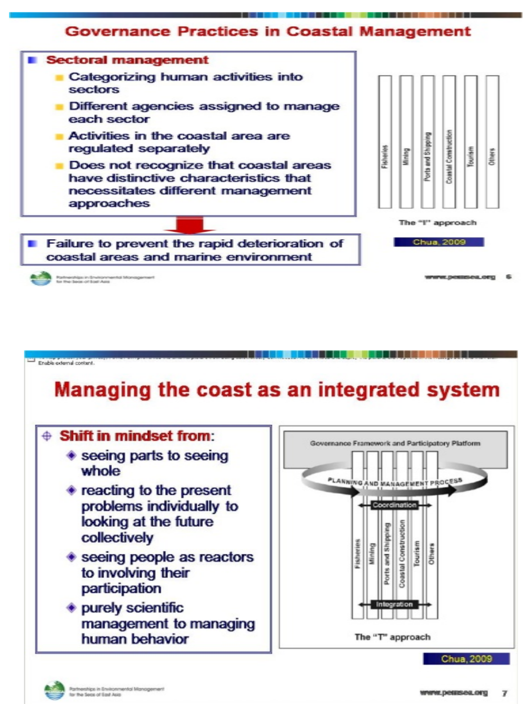

Figure 2

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The **old traditional Governance Practices in Coastal Management** is thru sectoral management that is categorizing human activities into sectors with different agencies assigned to manage each sector. Hence, activities in the coastal area are regulated separately with different management approaches. In managing the coast properly, it must be **managed as an integrated system**. In doing so, a shift in mindset is needed from: seeing parts to seeing whole; reacting to the present problems individually to looking at the future collectively; seeing people as reactors to involving their participation and purely scientific management to managing human behaviour.

In **defining Integrated Coastal Management (ICM),** there seems NO generally accepted definition of ICM; however, there is widespread consensus on its features. So let me define each term. **Integrated** refers to the policy and functional integration in the cross-sectoral programs and plans thru Mainstreaming of ICM plan into socioeconomic development plans of government and assuring that there is vertical integration of responsibilities among various levels of government and between public and private sectors. **Coastal** refers to the land-sea interaction or connectivity that involves cross disciplinary among the sciences, science and technology, economics, socio-political and law. **Management** means that this is needed to enable and strengthen governance thru strategic planning to implementation and monitoring and evaluation of strategies over time.

Figure 3

It is important that the coastal zone/area must be defined and must be based on the principles that form the foundation of ICM practices. A good example of this is the operational boundary of the Bataan ICM Program which is composed of 10 coastal municipalités, 1 city & 1 land -locked municipality.

The ICM Timeline and scaling up in the Philippines have been identified from 19502 to 19602 (Coastal resource development were promoted by the national government); 1970s to 1980s (Regulation of coastal resources instituted by the national government); 1990s to 2000 (Coastal management devolved into the local government as a basic service with the 1991 local government code and 1998 Fisheries Code). Then various laws and bills like: Executive Order 533 (2006);SDS-SEA (2003) PDP 2011-2016 and ICM Bill came into place .

The **Framework for Sustainable Development of Coastal Areas** through **Bataan ICM Implementation** is shown by the various outputs produced or conducted in Bataan such as: the Bataan Sustainable Development Strategy; the Integrated Coastal Land and Sea Use Zoning Plan; the Regular coastal clean up; the Rehabilitation and clean up of selected river systems and the Oil spill contingency plans.

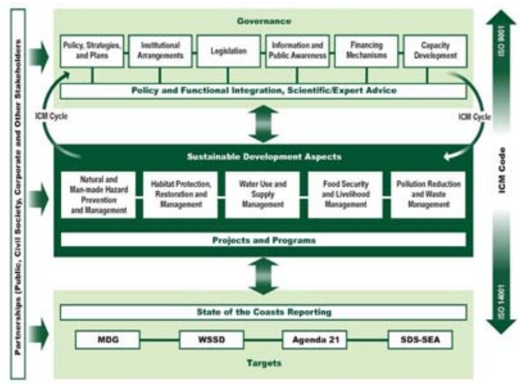

Figure 4

ICM are participated by Individuals, groups, organizations with: Rights, interests or needs that may be affected by the management process (e.g., local communities, fisher folks, fish traders, farmers, tourism operators, developers, industries); Influence, authority or power relevant to the management process (e.g., elected officials, local, provincial and national government) and Expertise or resources relevant to the management exercise (e.g., government agencies, universities, international organizations, NGOs, donors, private sector).

1.4 The Private Sector Support in ICM Program Implementation (BCCFI and MAAP Case Study)

The Bataan Coastal Care Foundation Inc (BCCFI) serves as a catalyst by providing technical and management expertise and counterpart funding for the Bataan Integrated Coastal Management Program (BICMP). The partnership was initiated based on common interest and objectives of the BCCFI and the local government of Bataan (LGU) and to build better coastal governance/ increase awareness promote community participation in coastal resources

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management and explore ways for dynamic and sustainable public-private partnerships in environmental management. The BCCFI is composed of 17 member private companies with MAAP as the only educational institutions as the rest are industrial estates or companies. BCCFI collaborates with LGUs (public) in various environmental efforts to preserve Bataan's coastal resources. Part of these efforts however also responds to climate change.

3. RESEARCH AND METHODOLOGY

A descriptive-evaluation research was uses and was derived from the following methods of data collection: documentary, reports and analysis of past studies; observations, interview and analysis of the socio-economic survey data accomplished by the member industrial private companies of the BCCFI (TOTAL, PETRON, ORICA, PRII and PNOC or 6 out of 17 with MAAP) with focus on their individual and collective initiatives on addressing climate change thru public-private partnership. All the information and data gathered were consolidated and organized in coming up with this paper intended to provide knowledge and insights on the different modalities on addressing climate change which are integrated in the corporate social responsibilities of each member company that converged and collaborated into one with objectives thru the Bataan Coastal Care Foundation, Inc. (BCCFI). The contribution of MAAP as an individual member is also presented that shows the active involvement of students in protecting the environment and assisting the community in strengthening their resilience to climate change.

4. FINDINGS, RESULTS AND DISCUSSIONS

4.1 The BCCFI as case study

Together with the LGUs, the BCCFI plays an active role in the formulation & implementation of strategic plans to ensure that the major environmental concerns of Bataan are addressed while also ascertaining the mitigation of climate change effects. The various ways that the BCCF members either individually or collectively contributes to the ENVIRONMENTAL SUSTAINABILITY PROGRAM through various programs and efforts namely: Emission, Effluent and Waste Management Programs; BCCF Energy Efficiency programs; water management programs; biodiversity programs and basic social services program.

In terms of mitigation, some of the **Emission, Effluent and Waste Management Programs** being practiced by BCCFI members are the use of appropriate technology that allows the refinery to produce High Octane & Low Aromatics gasoline; Installation & commissioning of new Gas Oil Hydrotreater Unit (GOHT3) for diesel fuel; Use of Low Sulfur Fuel Oil in plant operations ; Full implementation of Environmental Management Systems (Air, Water & Solid Waste) ; Waste water Treatment Systems; Reduction of paper & other solid wastes ; Improved efficiency of transport vehicles to reduce fuel consumption and reduce emissions and Regular Coastal Clean-ups. For the Coastal Clean-up activities, BCCF in partnership with LGU's have involved all 87 coastal barangays & 55% or 82 out of 149 inland barangays. All 11 municipalities & the city of Balanga with approximately 78,000 volunteers have collected debris with a total of 491 metric tons from 1999-2008 over 156 km, or 83% of 188- km coastline of Bataan.

Some of the **BCCF Energy Efficiency programs** include**:** Energy Conservation Programs both process and non-process related; Use of Waste Heat Recovery Systems; Improvement of Energy Efficiencies for the prevention of heat/ steam losses and other energy related Cost-cutting Measures. All BCCF member companies are compliant with local environmental laws, with some going for voluntary accreditation of environmental standards

BCCF members are engaged in various water management programs such as: Water Resource Conservation Program; Water Recovery and Recycling System and Waste Water Treatment Systems**.** Recycling Materials Program includes: Waste Segregation ; Recycling of Reject Materials; Recovery and recycling of used car/ forklift batteries**;** Recycling/Reuse of Packaging Materials ; Reduction of Paper Usage**;** Recycling of used palochina/ scrapwoods and Kaizen programs (5-S program) **.** This practice of recycling certainly save trees, oils, landfill space, energy and water. More trees reduce CO2, hence lessen air pollution. Less energy is needed to recycle than it does to make it from raw materials

BCCFI undertakes **biodiversity programs** to protect, develop and increase the diversity of plant and animal life in the habitat through the following activities and projects such as: Earth Day & Tree Planting Activity in cooperation with the province; Tree Planting Activities by individual companies; Refinery adoption of 300 ha. from Lamao Forest Reserve; Development of Green Zones within refinery area by planting mahogany trees ; Luntiang Pilipinas Program/ Mini-forest project and Mangrove reforestation program . Other BCCF Programs on Biodiversity include : Coastal rehabilitation like the Oplan Linis Marina; Establishment of Fishery Reserve Areas; Support to the Pawikan Conservation Program and Establishment of Artificial Reef Projects. All these contribute in reducing CO2 as trees absorb CO2 and produces O2. The BCCFI members also conduct individual programs on biodiversity. In the City of Balanga and the Municipalities of Abucay, Pilar, Orion & Limay, 227, 500 propagules (with a 70% survival rate) & 52, 000 seedlings were planted on a

32,5 hectares by over 5, 000 volunteers from different sectors. Similarly initiatives with people's organization in Orani, Pilar and Limay have resulted to 130, 000 propagules being planted overran of 21 hectares. BCCF has also been supporting the establishment of Fish Sanctuaries in Orion Limay and Mariveles covering a total of 82 hectares. Artificial Reefs have also been established in Limay, Mariveles & Orion with over 600 modules and units.

BCCF believes that awareness is key to understanding, which in turn leads to action. In this light, BCCF continues to actively undertake an information and educational campaign among stakeholders on the Bataan Integrated Coastal Management (BICM) Program. Among the major efforts undertaken are: Publication and dissemination of Bataan Sustainable Development Strategy and Coastal Land and Sea Use Zoning Plan; Sinop-kalat lingap-dagat Program –a joint program with educational institutions on national service training program BCCFI also conducts various community outreach programs/ livelihood programs because BCCFI believes that a happy and healthy community is a key to environmental sustainability. The various **basic social services program** includes: **livelihood programs** as alternative source of income (fish or food processing, meat processing, rag making, mussel production, pastry making), **community organizing activities** (organized cooperatives eg Kaizen Multi-purpose cooperatives at the barangay level and establishment of fisher folk associations), **skills training activities** (entrepreneurship skills training, marketing, financial and packaging of products training), (Christmas Cheers, feeding program , **medical and dental health programs** (pap smear, sputum test, and circumcision) and **educational programs** (scholarships for College and short training courses, book donations and construction of classrooms).

MAAP as a case study

On January 14, 1998, the Associated Marine Officers' and Seamen's Union of the Philippines (AMOSUP) established the Maritime Academy of Asia and the Pacific (MAAP) to ensure continuous supply of high breed graduates as future officers of the new seafaring generation. The actual school operation started in June 1999.

Located on a 103-hectare land in Kamaya Point, Barangay Alas-asin, MAAP is situated in proximity to the scenic coastal waters of Mariveles Bataan, overlooking the Manila Bay and Corregidor. The geographical location of MAAP is fitting for a maritime school that offers three maritime programs: the Bachelor of Science in Marine Transportation (BSMT), Bachelor of Science in Marine Engineering (BSMarE) and the Bachelor of Science in Marine Transportation and Marine Engineering (BSMTE). MAAP offers full scholarship grants to qualified applicants selected nationwide through competitive qualifying entrance examinations. Other benefits include free board and lodging, fleet training, discipline and extra-curricular activities that enhances midshipmen's mental, emotional, social and physical development, the use of the state of the art equipment and facilities and modern instructional methods utilized by world-class maritime institutions, insurance and leadership trainings and exposures. It undertakes the grants with sponsors represented by reputable shipping companies who provide midshipmen with ready-available job opportunities aboard sponsoring company vessels. This **strategic geographical position** of MAAP also encourages appreciation of the coastal maritime environment amongst MAAP employees and students.

As a member of BCCFI, MAAP on its own and it partnership with co-BCCFI members actively contributes to **various interventions to address sustainable development** aspects thru: Natural &Man-made hazard Prevention and Management (NATECH); Habitat Protection, Restoration & Management; Water Use & Supply Management; Food Security & Livelihood Management and Pollution and Waste Management (NATECH). A proposed NATECH project would certainly contribute to Natural and manmade prevention management and pollution and waste management.

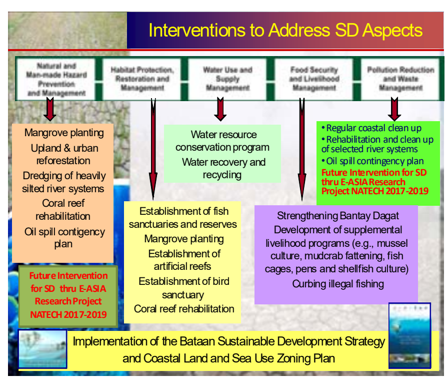

Figure 4

<u>*On Natural & Man-made Hazard Prevention & Management:*</u> MAAP has scope of the natural/man-mad disaster/environmental emergency response plan (e.g. floods, earthquakes, fire) with identified trained & non-trained personnel assigned for the implementation of disaster response plans with early warning system in place, list of all available and adequate fully compliant equipment for implementing the disaster response plans The same equipment are being used at the MAAP ASTC training center for Basic Safety Courses. MAAP developed the MAAP Disaster Risk Reduction & Management Plan (MAAP DRRMP) to respond to disasters & mitigate the impacts of disasters &

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calamities.. MAAP DRRMP fulfills the requirement of RA 10121 (Disaster Risk Reduction Management Act). The plan covers the 4 thematic areas: Prevention & Mitigation; Preparedness, Response, and Rehabilitation, & Recovery. Disaster management aims to reduce or avoid the potential losses from hazards, assure prompt & appropriate assistance to victims of disaster, & achieve rapid and effective recovery. The cycle illustrates the on-going process by which governments, businesses, & civil society plan for & reduce the impact of disasters, react during & immediately following a disaster, & take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the shaping of public policies & plans that either modify the causes of disasters or mitigate their effects on people, property, & infrastructure.

MAAP **Involvement in Community Disaster Risk Management** includes: **Mitigation** to minimize the effects of disaster E.g. building codes & zoning; vulnerability analyses; public education; **Preparedness** to plan how to respond E.g.: *preparedness plans; emergency exercises/training; warning systems.* ***Response*** *to involve efforts to minimize the hazards created by a disaster. E.g.: search & rescue; emergency relief and* **Recovery** *to return the community to normal. E.g.: temporary housing; grants; medical care. MAAP with its student manpower, in cooperation with AMOSUP has provided housing materials to the victims of super typhoon Yolanda. Lando etc* .The MAAP Safety & Security Officer is responsible to see that the DRRMO works ,partners with other national agencies & NGOs to develop capabilities thru regular training & exercise which includes: First Aid Training & competitions; Earthquake assessment; Earthquake and fire readiness & evacuation drills and Search and Rescue Operation.

Figure 5

On Habitat Protection, Restoration and Management : Coastal habitats served as critical-life support systems for a multitude of aquatic living resources. The quality of these habitats must be maintained & improved to sustain their benefits. Establishment of an artificial reef had been part of MAAP's project in partnership with TOTAL, LIQUIGAS, BCCFI and PMO Bataan to ensure the protection of these habitats.

On Water Use and Supply Management: MAAP has water conservation & management plan. MAAP provides full support to EO 26 declaring implementation of National Greening Program as government priority program to reduce poverty, promote food security, environmental stability & biodiversity conservation to enhance climate change mitigation & adaptation. MAAP planted thousands of seedlings in its 103-ha campus for the past 16 yars from1999 to date. MAAP in 1999, had constructed public toilet & ground water through wells for community MAAP water supply both in the campus & housing facility have their respective water supply systems.

On Food Security and Livelihood Management: Fish is a direct product of the coastal zone, providing both food & livelihood to coastal dwellers, & to consumers far from the coast. Fisheries management is a challenging & necessary aspect of managing marine & coastal resources in order to ensure the sustainability of this valuable natural asset. A management strategy, supported by adequate resources & equipment, are markers of local government towards managing this resource. Effective coastal resource management plan hopes to gain local community support to sustainable municipal fisheries development through their active participation on issues identification & prioritization as well as generating suggested solutions & long term commitment to be partner in fishery development. Nutrition status is an indicator that integrates availability & equitability of access to food and livelihood. While other factors (such as agriculture and trade) may affect these figures, nutrition status is also affected by the availability of seafood. MAAP Livelihood programs help optimize productivity of coastal areas and help households maximize their potential for income. On **Sept 16-18, 2015,** funded by NRCP/DOST, MAAP in partnership with NRCP, DepEd and St Francis Xavier Parish Church conducted a Health & Nutrition Livelihood project for the Indigenous People (IP- aeta) of Bataan. The Aeta community was taught simple nutritious recipes, using vegetables found on their backgrounds for their meals or for them to sell in their community as their means of livelihood. With MAAP being located in Bataan, hundreds from Bataan were able to **avail scholarships and free trainings.** In terms of employment, priority is given to Bataan residents provided that they comply with MAAP requirements. **MAAP also provides subsidized training program** which includes subsidized Training Fees - given to organizations such maritime schools or training centers, GOs and NGOs and other agencies which are MAAP's partners in its various end eavors such as in promoting quality MET and goodwill in the community; MAAP Basic Safety Course, Firefighting, and other seafaring courses; MAAP Extension Service Training Program provides assistance to other maritime schools, training centers, and other agencies through provision of trainings, lectures, seminar-workshop, and paper presentations upon their requests ; MAAP Research Paper Review Program for peer review of research papers of other HEIs, organizations, and other research linkages. This promotes research and extension network of MAAP with other institutions.

On Pollution and Waste Management: MAAP has specific strategies & action plans essential to address issues on pollution & waste management. MAAP has sanitation facilities for human well-being with positive impacts on the quality of the environment in meeting one of the MDG targets for environmental sustainability. **MAAP ensures** controlled waste handling & disposal for human & ecological health as well as the aesthetic & recreational values of coastal areas. Solid waste management is a major challenge at MAAP-reduction, reuse, collection, transport, transformation (treatment) & disposal. MAAP has been implementing measures to minimize the problem on solid waste disposal.

On MAAP Contribution thru paper presentation and publications: As a scholarly institution, MAAP contributes in environmental awareness thru paper presentation & publications wherein MAAP initiatives in partnership with the Province of Bataan & other external agencies like PMO, BCCFI, PEMSEA DENR, PENRO, DOST, NRCP, both in local & international have been documented for others to emulate. Some of these have been presented and/or published**.** There are (18) documented coastal & environment protection outcomes by MAAP from 2008 to 2016. On **January 12-13, 2016,** sponsored and hosted by Nakanoshima Center of Osaka University, Osaka, Japan, MAAP thru Dr. Baylon participated in the International Symposium on Natural and Technological Risk Reduction at Large Industrial Parks (NATECH 2016), and discussed joint project INTERA-NATECH : **INTER**-**A**sian initiative on joint **NA**tural and **TECH**nological (Natech) risk reduction at industrial estates. This encourages MAAP to prepare a NATECH project proposal in partnership with Japan, Indonesia, Thailand, Vietnam and India that would contribute to climate change adaptation. The proposed project was submitted on **July 30, 2016** to the International Association of Maritime Universities (IAMU) for possible $ 60,000 funding for implementation on **May 1, 2017 to May 31, 2018**.

5. CONCLUDING REMARKS

ICM is a practical platform for implementing private sector social responsibility initiatives, as it enables one to identify & contribute to social, economic & ecological objectives that are highly relevant to their respective businesses & to the communities in which they operate.

The Bataan ICM program showcases the innovative and effective public-private partnership arrangements among national agencies, local governments, communities & corporate sector enhances marine & coastal governance through shared values, responsibilities & investments among the partners. The BCCFI members either individually or collectively, in partnership with LGUs contributed to the management of climate change through various programs that reduce CO2 and other gas emissions. These prevent increase in temperature, precipitation sea level and prevent change variability and extreme events. **I**ndeed the private-public sector partnership in Bataan is an integral element of the success of climate change mitigation & adaptation.

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A POINT OF VIEW ABOUT VULNERABILITY OF THE MAMAIA BEACH

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Abstract: The beach from Mamaia, one of the most important summer holiday resorts, is located in the southern part of the Romanian coastline and has a length of 8 km. The southern beach of Mamaia, with a length of 3.5 km is protected against coastal erosion by 6 submerged "breaking wave" type dams. The strong erosion of the Mamaia beach began since 1977, when the north breakwater of the Midia Harbor was prolonged up to the depth of 10 m. To stop the coastal erosion and to increase the asset value of the coastal zone and the creation of new beach areas have been established short and medium-term measures that include measures to reduce the wave energy reaching the shoreline, including recharging of sand and works made to retain the sand on the beach (by repairing the existing offshore breakwaters and the construction of new shore-normal groins).

Key words: Mamaia beach, geomorphological changes, coastal erosion, beach protection facilities.

1. INTRODUCTION

The beach from Mamaia, one of the most important summer holiday resorts (having over 80 hotels with 20.000 tenants capacity) is located in the southern part of the Romanian coastline and has a length of 8 km. The beach from the Mamaia resort is an early geological formation which was built mainly by longshore sedimentary supply (from north to south) and subsequently by biogenic deposits which are carried to the backshore by onshore-offshore currents. The beach is deployed on the offshore sedimentary bar between sea and land where there is a lagoon, the Siutghiol Lake. The southern beach of Mamaia, with a length of 3.5 km (44° 14' 51" N, 28° 37' 23" E, 44° 13' 3" N, 28° 38' 27' E) is protected against coastal erosion by 6 submerged "breaking wave" type dams.

2. GEOMORPHOLOGICAL CHANGES OF MAMAIA RESORT BEACH

Mamaia beach width over the time began to decrease as a result of coastal erosion caused mainly by anthropogenic causes: reduced intake of sediment - derived bed load providing on the Danube branches, (Chilia, Sulina and St. Gheorghe), coastal hydrotechnical constructions (the jetty from Sulina, the breakwaters of the Midia Harbor) that disrupt coastal circulation and natural causes: frequent severe storms (in 1976, during 1979-1981, 1985-1988), sea level changes.

Sand shortage from the Romanian shore was strengthened in the Mamaia beach zone because of the building of the dams from Midia in 1953. This was a sedimentary trap for bed load transport from north to south. The strong erosion of the Mamaia beach began since 1977, when the north breakwater of the Midia harbor was prolonged to the depth of 10 m. During 1961-1985 period, in a zone with 8 km of erosion along the beach and 4 km to the offshore, there was a loss of 32.000.000 m^3 of sand [Spătaru, 1986].

Using the geomorphological measurements of the backshore from Mamaia (MB1-MB8) carried-out by NIMRD "Grigore Antipa", the current beach width (1980 baseline year, 2013 end year) was analyzed. The measurements were carried-out at the end of the warm season for the period 1980 - 2013, with topographic level type Ni 025 and Sokkia.

Coastal erosion and the effect of coastal structures were calculated using three sequences of time as follows (Table 1 and Figure 1):

- *1980 - 1988 period of beach changes, due to strong storms, when erosion was severe*

Erosion is generalized throughout the beach with average reduction of - 13.6 m from beach area. The largest withdrawal was determined for southern shoreline of the beach with values greater than - 30 m for MB6 and MB7 transects (Figure 1).

- <u>*1989 - 2013 period of beach changes, after implementation of coastal hydro technical structures with long term effects*</u>

If short-term coastal protection measures implemented had the desired effect, after that, erosion have been reactivate in the northern and southern beach with values between -11.7 m (MB6) and - 35.4 m (MB7). In the center part of the beach the accretion was installed and it reached to 20.7 m for MB3 section (Figure 1).

- <u>*1980 - 2013 long term geomorphological changes*</u>

For the entire period of 23 years is found that in the northern sector, the beach decreased - 45 m (MB1) and in the southern sector it has recovered the best with 36.4 m (MB7). In the central sector has been a relative equilibrium situation where average rates were determined between - 0.15 m and 0.03 m (MB3, MB4 and MB5). Minimum and maximum annual rates reached - 38.8 m in 2005 (MB2) and 104 m in 1989 (MB7 immediately after the beach nourishment) (Table 1, Figure 1).

Table 1: Mamaia beach width variation during 1980 – 2013 period

Beach marks	MB1	MB2	MB3	MB4	MB5	MB6	MB7	MB8
Beach width variation 2013-1980	-45	-27.4	9.2	-4.8	1.1	-1.9	36.4	-7
2009			-12.3					
2006	12.7							
2005		-38.8						
2002				-17.2	-15.2			
1995		27	25.8					
1994				14.2				
1993	-28.2							
1992					19.9			
1991						-32.1		-29
1990							-33.2	
1989						39.8	104	35.6
Average rate 1980 - 2013	-1.4	-0.8	0.3	-0.15	0.03	-0.1	1.1	-0.2

Max. annual rate (green) Min. annual rate (blue)

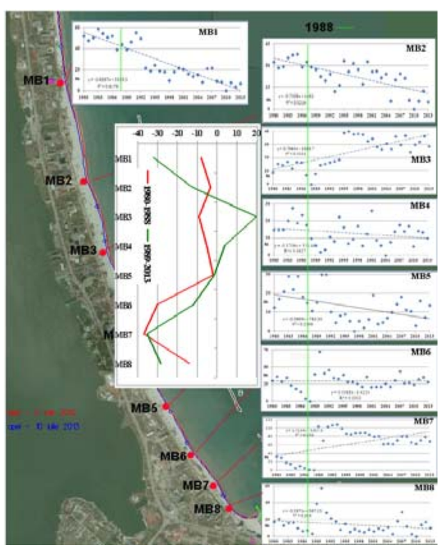

Figure 1 Geomorphologic changes of Mamaia beach (1980 – 2013

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3. CURRENT BEACH PROTECTION FACILITIES

The beach protection measures for Mamaia resort were planned to limit the proportions of the erosion phenomena. In this way, soft and hard solutions were used (Figure 2) [Spătaru, 1993, Tanase, 1992].

Soft solutions for beach protection

- Occasional beach fill (nourishment) operations for warm season durability because these operations where not accompanied by fastening works;

- Experimental works that consist of vertical burying of plastic pipes very close to each other. Unfortunately, frost and thaw processes destroyed these pipes and these works could not reach the goal;

- Vertical reed fence on the beach during the cold season to protect sand dunes of the direct action of the wind. This solution is effective and a widespread protection for Mamaia beach.

Hard solutions for beach protection

- Stick type shape groin built during 1977 -1978, supplemented by beach nourishment (sand from the Tăbăcărie Lake, about 27.000 sq. m.) to protect the Parc Hotel and its swimming pool - in correspondence with the coastal protection forecast;

- Breakwaters were the solution for the protection an rehabilitation of the Mamaia beach, planned in 1979, 1981 and 1985, and consist of dams at a 450 - 500 m distance from the shore having 250-400 m length.

The construction of protection works began in 1988, the adopted solution being 6 detached breakwaters (A - F). In February 1990, the breakwaters A, B and C were almost in the final form and the breakwaters D and E still under construction. About 250.000 sq. m. of sand were transferred from the Siutghiol Lake (by dredging and hydro-transport) to Mamaia beach.

Figure 2 Current beach protection facilities

4. SHORT AND MEDIUN TERM COASTAL PROTECTION MEASURES PLANNED FOR MAMAIA BEACH

Although coastal protection measures were effective in the short term, but mainly due to storms, especially in the cold season period, tourist infrastructure of the beach area has suffered (Figure 3).

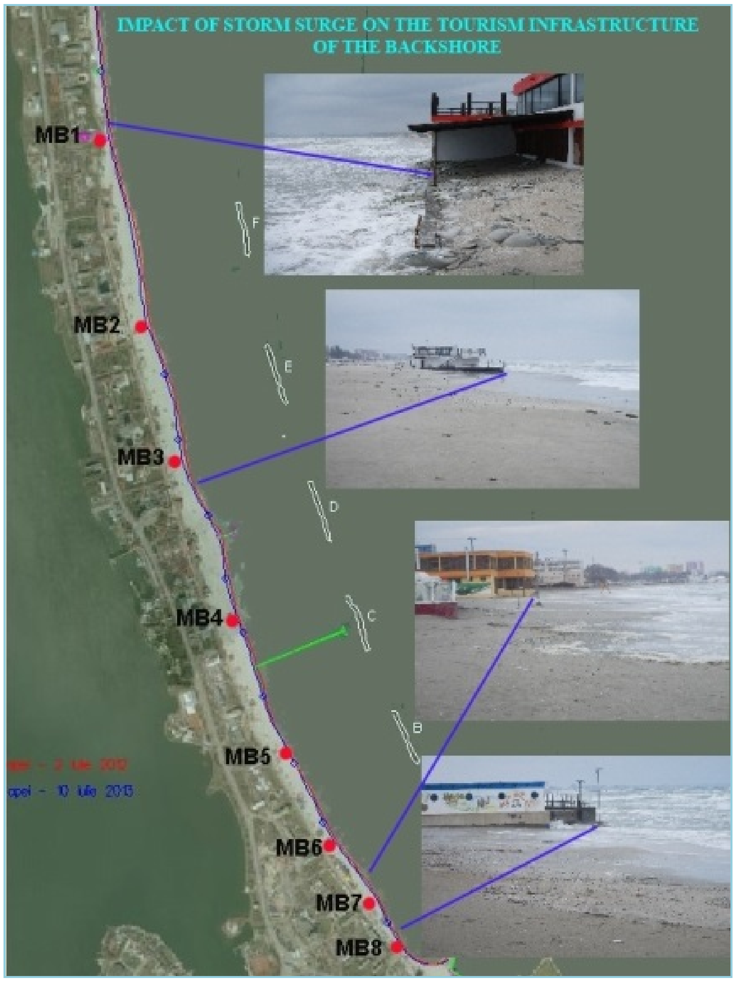

Figure 3 Impact of storm surge on the tourism infrastructure of the beach

To stop the coastal erosion and to increase the asset value of the coastal zone and the creation of new beach areas, between 2005 - 2012 period, a Master Plan was elaborated within two projects: "The Study on the Protection and Rehabilitation of the Southern Romanian Black Sea Shore" [*** 2007] and "Technical Assistance for the Preparation of Projects under Priority Axis 5. Implementation of adequate infrastructure of natural risk prevention in the most vulnerable areas. Major intervention domain 2 - Reduction of coastal erosion" [*** 2012]. Within these projects, a Plan for the Protection of the Romanian Coast over a period of 30 years with measures in the short, medium and long term was elaborated. These works include measures to reduce (dissipate) the wave energy (height) reaching the shoreline, including recharging of sand (by artificial recharge) and works made to retain the sand on the beach (by repairing the existing offshore breakwaters and the construction of new shore-normal groins).

In the Mamaia sub-sectors have been established the short-term measures for Mamaia South and the medium term measures for the Mamaia Center and Mamaia North. For design, the following shore protection facilities were considered (Figure 4):

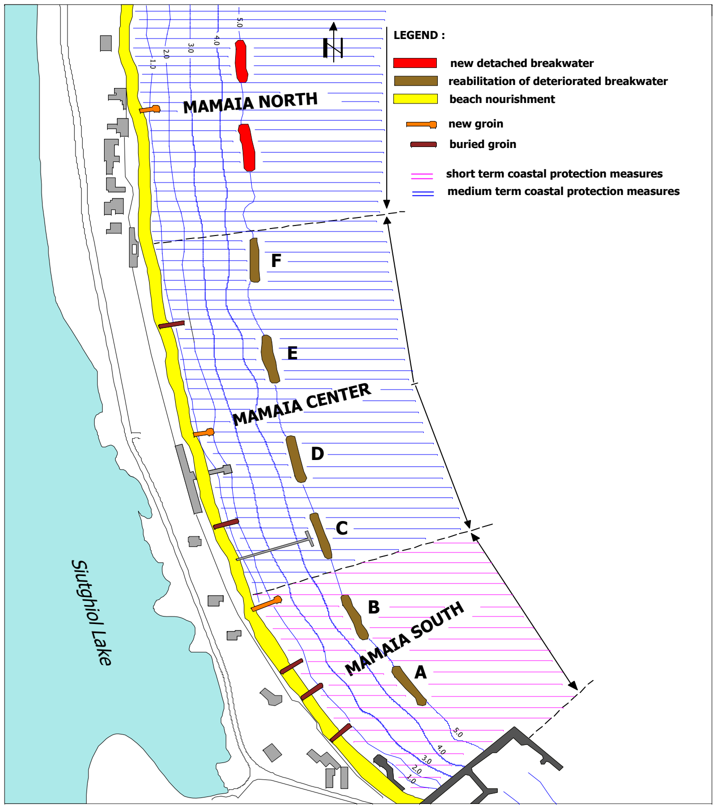

Figure 4 Short and medium term coastal protection measures planned for Mamaia beach

- rehabilitation of the six deteriorated detached breakwaters for all sectors (A – F);
- a beach fill in Mamaia South, placed over a distance of 1.200 m, with a projected sand-retaining groin 200 m long at the north side of the beach fill area, to reduce the strength of wave-induced longshore currents, and three buried groins 70 m long to stabilize beach sand;
- a beach fill in Mamaia Center, placed over a distance of 2.150 m, with two buried groins 70 m long each and one projected 100 m long submerged groin;
- a beach fill in Mamaia North, placed over a distance of 1.900 m, with one projected 100 m long sand-retaining groin and two new detached breakwaters 350 m long each, to reduce (dissipate) the wave energy and increase beach stability.

5. CONCLUSIONS

Shoreline rehabilitation in Mamaia can be done efficiently through measures to reduce the energy of waves and measures to protect the coast and beach stability.

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GLOBAL SOLUTIONS – INTELLIGENT SECURITY AND SAFETY OF LIFE

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Abstract : GS-ISSOL (Global Solutions –Intelligent security and safety of life) is a project with the purpose to improve the safety and the security of people on board ~~the~~ ships or any other place where a community of people works together. The system is consists of one main console and wearable bracelets which will permanently monitor the health activity and the presence of the wearer inside a designated area.

Key words: Global, Intelligent, Life, Safety, Security .

1. INTRODUCTION

In the past years there have been some cases when people on board ~~of~~ vessels were lost at sea or lost their life on board because of the medical response time.

Our system comes with a solution to decrease as much as possible such losses.

GS-ISSOL is based on a wireless system composed of a main console, bracelets and network accessories. The main console which will monitor and display all the information received from bracelets will be installed on the bridge. Also the system will be connected to the GPS, ECDIS and all other required navigation equipment.

When the system is active the main console will monitor all the bracelets on board and will display in real time the activity of each bracelet and the vital functions of the wearer.

2. SYSTEM COMPONETS:

- Main console
- Wearable bracelets
- Network repeaters
- Repeater monitor
- Navigation equipment.

2.1 Main console:

The console will be an interface monitor with a dedicated processing unit.

It will process all the information received from the bracelets and it will display on the monitor information such as wearer's rank, location and vital functions.

There will be four main bracelet activities which will be monitored, all of them with a specific DISTRESS[2] alarm:

- Wearer outside the vessel's area during sea passage = MOB[1] alarm
- Heart rate of the wearer is zero and no movement is detected = Heart alarm
- Bracelet removal without wearer personal security code or cutting off the strap = Alert alarm
- Pressing dedicated DISTRESS button on the bracelet after inserting wearer personal security code = Panic alarm .

Through an algorithm the system will identify any of the above alert scenarios and will display the alarm of the associated bracelet on the console screen on the bridge, on the repeater screen inside the captain's cabin, and it will automatically send an alarm message to all the other bracelets *(Fig. 2)* , at the same time recording which of the bracelets was nearby the alerting bracelet.

In case of MOB alert the main console will also send the information with the GPS coordinates received from that bracelet to the ECDIS unit for position plotting.

The main console will also be connected to the ship's GPS unit with the purpose of correcting the first coordinates received from the bracelet outside the vessel area.

While the system is active during sea passage all the above functions will permanently work.

During port stay, or drills outside vessel area, the system can be deactivated, but only for the alert shown when the bracelet is out of vessel area.

The only person on board which will have access to the main console will be the ship's Captain and he/she will be responsible to activate and deactivate the system. In private, the Captain together with the wearer will have the duty to program the bracelet personal security code. This code will be known only by the wearer and it will be changed upon wearer's replacement. The captain will have the master code so he may allow the wearer to set his personal security code.

2.2 Bracelets:

Bracelets *(Fig. 1)* are assembled as a unibody device with an integrated battery, heart rate sensor, pulse oximeter sensor, a GPS receiver/transceiver, an accelerometer, a circuit breaking alarm strap, a wireless unit, a dedicated DISTRESS button, display, numeric key pad and a magnetic charging unit.

The bracelets will be connected to the system through the wireless unit and they will send information to it such as heart rate, blood oxygen concentration, body movement, GPS coordinates, panic alert and circuit breaking or strap damage alarm.

The bracelet will receive from the main console and will display any given alarm. Ship's local date and time will be displayed any time when needed by the wearer with a simple rise hand gesture.

2.3 Network repeaters :

The network repeaters will be placed on every level and length of the ship to establish a permanent connection between the bracelets and the main console.

These repeaters will have the possibility to be equipped afterwards with surveillance cameras for a much stronger safety and security.

2.4 Repeater monitor:

This monitor has the purpose to relay all the data displayed on the main console and it will be placed inside Captain's cabin.

2.5 Navigation equipment:

The main console will be connected to the ship navigation equipment in order to reduce the time reaction for search and rescue operation in case of MOB alert.

3. FIGURES

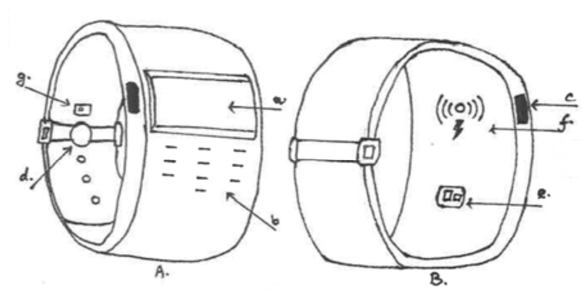

Figure 1 Bracelet

- A = bracelet front view;
- B = bracelet back view,
- a = display,
- b = numeric pad,
- c = DISTRESS button,
- d = circuit breaker clasp,
- e = heart rate sensor,
- f = magnetic charging unit,
- g = pulse oximeter[4] sensor,

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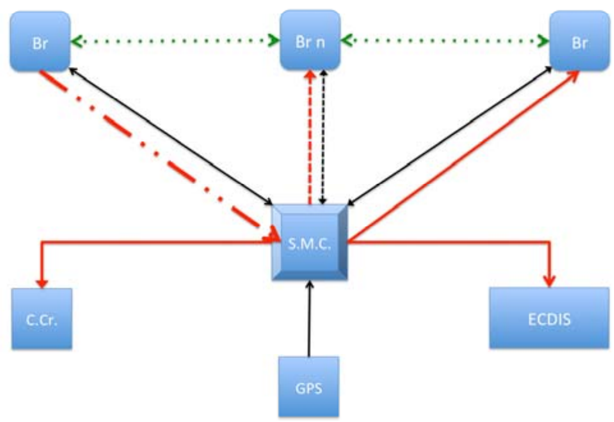

Figure 2 System arrangement scheme

- Br = bracelets;
- Br n = number of bracelets,
- S.M.C. = system main console,
- C.Cr. = captain console repeater,
- ECDIS = Electronic Chart Display and Information System,
- GPS = Ship's Global Positioning System unit,

- = Connection between bracelets for nearby function,
- = Connection between bracelets and main console,
- = Alert sent from the bracelet in distress to the main console,
- = Alert sent from the main console to the entire system,

= Data sent form ship's GPS unit to the main console.

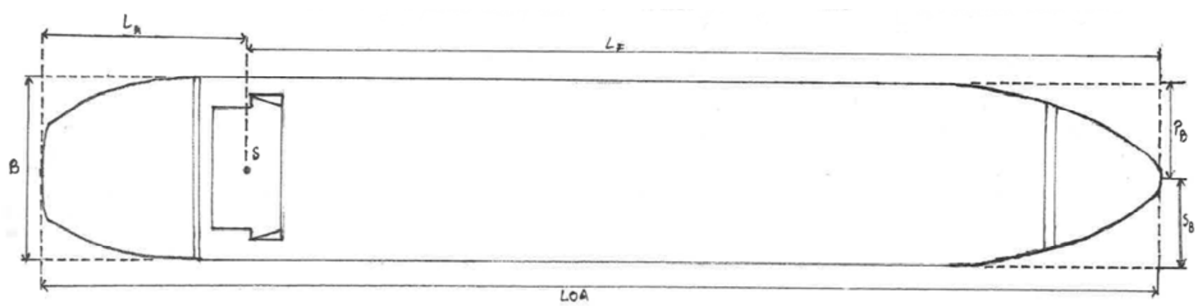

Figure 3 Reference Data

- S = System location;
- LOA = Length Overall,
- B = Beam,
- LA = Length aft from S,
- LF = Length forward form S,
- PB = Port beam from S,
- SB = Starboard beam from S.

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4. BRACELET MOB ALERT:

4.1 Reference lines:

D > PB (1)

D > SB (2)

D > LF (3)

D > LA (4)

D = distance from the system location to the outer limits of ship's dimensions.

Based on the D the MOB alarm will be activated.

4.2 Bracelet positioning module

The location coordinates of the bracelet will be given by a Multi-GNSS chip with an on-board flash memory and an update rate of up to 10Hz which will increase the accuracy to within 2.5 meters. Measuring 5.6 mm x 5.6 mm, with a height of 2.65 mm, the Multi Micro Spider [1] packs in a sub-one second Time To First Fix (TTFF) and an industry-leading sensitivity of -165dBm for two simultaneous constellations. All these will be achieved using less than 9 mW of power.

One of the advantages is the chip working also with GLONASS [2] satellites which will have a better accuracy at high north and south latitude.

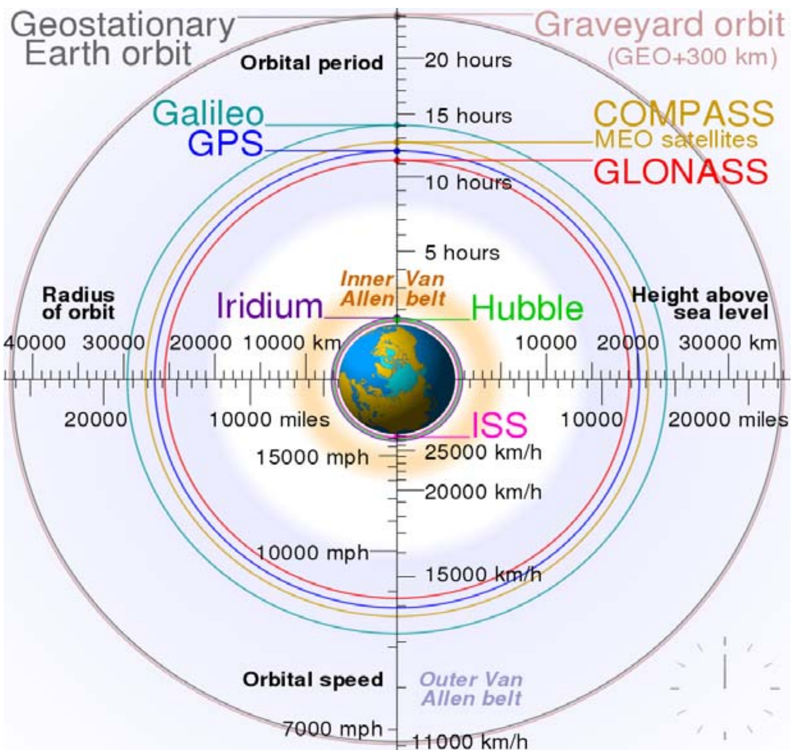

Figure 4 Comparison of GPS, GLONASS, Galileo and COMPASS (medium Earth orbit satellites) orbits with the International Space Station, Hubble Space Telescope, geostationary and graveyard orbits, and the nominal size of the Earth. [3]

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5. SCENARIOS AND CONCLUSIONS

5.1 Scenarios

Scenario one:
„After a day of work, one of the crew members relaxes with the rest of the crew in the recreation room. After a while he decides to go to his cabin to rest for the next day. During the night, he wakes up with a chest pain and dizziness; shortly thereafter not being able to ask for help, he collapses unconsciously on the floor with cardio-respiratory arrest. After a minute, when the bracelet did not received any vital sign from the sensors and no movement was recorded by the accelerometer, the bracelet instantly sends the alarm to the central console alerting the main console, the master of the ship and all the other bracelets in the system. Shortly after receiving the alert, depending on the role of each crew member, the rescue procedures start. Almost four minutes will pass the moment the alert was transmitted and the resuscitation manoeuvres begun. After a few minutes of resuscitation, the victim starts breathing again and he will be continuously supervised until external aid comes."

Scenario two:
During a weekend with beautiful weather and quiet sea one of the crew members decides to go forward of the ship to see if he can find some good spots to make memory photos for his end of contract. In a moment of inattention, as he was leaning too far off the ship's board, he fell into the water. At the same time, the system detects the exit from the ship's perimeter, and the bracelet sends GPS coordinates and the MOB alert to the main console. The console analyses the coordinates received from the bracelet and corrects them with the coordinates received from the ship's GPS, then it immediately sends the alert to the master of the ship, to all the bracelets in the system and it also sends the required information for plotting the MOB position on ECDIS. The officer on watch, after seeing the alarm, immediately drops the MOB life ring. After the master of the ship gives the order the SAR[3] operation begins. Shortly after the SAR manoeuvre began, the person is found and brought safely aboard the ship. "

Based on our concept we hope to improve the safety and security of seafarers' life and in all areas where a group of persons are involved.

5.2 Graph of Lives Lost at Sea

The figures below are related to lives lost on cargo ships and cover the entire international industry for the years 2000-2014. [4]

6. LEGEND

[1]MOB = man overboard, an emergency in which a person has fallen off a boat or ship into the water (From Wikipedia, the free encyclopedia https://en.wikipedia.org/wiki/Man_Overboard)

[2]DISTRESS = A distress signal, also known as a distress call, is an internationally recognized means for obtaining help. A distress signal indicates that a person or group of people, ship, aircraft, or other vehicle is threatened by serious and/or imminent danger and requires immediate assistance. (From Wikipedia, the free encyclopedia https://en.wikipedia.org/wiki/Distress_signal)

[3]SAR = Search and rescue (SAR) is the search for and provision of aid to people who are in distress or imminent danger. (From Wikipedia, the free encyclopedia https://en.wikipedia.org/wiki/Search_and_rescue)

[4]Pulse oximetry = Pulse oximetry is a noninvasive method for monitoring a person's oxygen saturation(SO2). (From Wikipedia, the free encyclopedia https://en.wikipedia.org/wiki/Pulse_oximetry#Indication

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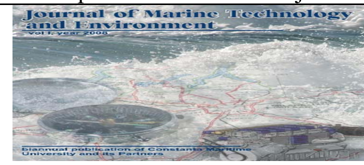

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MODERN VIEW REGARDING THE CONSTRUCTION OF VHF RADIO WAVE COVERAGE AREA

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Abstract: The paper presents a research of the radio coverage areas of closely positioned VHF transmitters. The radius of energy dominance area has been established in respect of the relations between the different transmitter powers. It has been established the virtual position of the transmitters. A methodology is proposed for calculating their position against another.

Key words: Radio propagation, VHF radio wave, VHF-DSC communication system, Mobile communications, Maritime Radio Communication.

1. INTRODUCTION

When building a system using more than one VHF transmitters, it is necessary to determine the coverage area for each.

An area of confident connection is called the region in space where the receipt probability of useful information with interference is greater than the set one. In mobile radio communications it is interesting to know the area in which a transmitter creates higher intensity than another one i.e. it energetically prevails. Energy dominance is expressed as:

$$\frac{P_1}{P_2} = \left(\frac{E_1}{E_2}\right)^2, \qquad K_n = \left(\frac{E_1}{E}\right)^2_{\min}; \qquad (1)$$

Taking into account the factor of superiority, energetically superiority can be written in the following form:

$$E_1 \geq \sqrt{K_n} E_2, \qquad (2)$$

From expression (2) the limits within the spatial area of superiority can be defined made by:

$$E_1 = \sqrt{K_n} E_2, \qquad (2^a)$$

The intensity of the signal box E_1 and E_2 the point of acceptance are respectively equal to:

$$E_1 = \frac{m_1}{D_1}\sqrt{P_1 G_1}, \qquad (3)$$

$$E_2 = \frac{m_2}{D_2}\sqrt{P_2 G_2}; \qquad (4)$$

Where: $- m_1, m_2 -$ coefficients reflecting the conditions of radio wave propagation from the transmitter to the receiver;

$- D_1, D_2 -$ distance communication;
$- G_1, G_2 -$ gain of the antenna;
$- P_1, P_2 -$ power transmitters.

Substituting expressions (3) and (4) in equation (2^a) and deciding in terms of, we get:

$$D_1 = D_2 \frac{m_1}{m_2}\sqrt{\frac{P_1 G_1}{P_2 G_2}}, \qquad (5)$$

2. THEORY

Distance of operation of VHF radios is limited in the area of direct sight. Conditions of radio wave propagation in such a limited area with sufficient accuracy for practice can be considered equal. Then, the limit of supremacy receives the following form:

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$$D_1 = kD_2, \quad (6)$$

$$k_0 = \sqrt{\frac{P_1G_1}{P_2G_2}}, \quad (7)$$

Where k_0 is a constant for given radio installation. From equation (6) follows that the distance of superiority is proportional to the distance of the connection. Ships, however, are moving objects and the distance of the connection can be continuously changed. Therefore, expression (6) is inconvenient to determine the boundary of the area of supremacy.

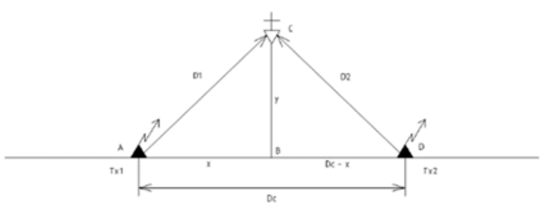

Figure 1 Scheme for establishing an area of superiority in two VHF transmitters

In accordance with Figure 1 we can write the following equations: from the triangle *ABC* we have:

$$D_1^2 = x^2 + y^2, \quad (8)$$

from the triangle *BCD* we have:

$$D_2^2 = (D_c - x)^2 + y^2; \quad (9)$$

Where D_c is the distance between the transmitters.

Substituting (8) and (9) in (6), as pre-record it in a form $D_1^2 = k^2D_2^2$ and perform transformations, we get:

$$(1-k^2)x^2 + 2k^2D_cx + (1-k^2)y^2 = k^2D_c^2,$$

Divide both sides of the equation $1-k^2$, then to the left and right sides add $\left(\frac{k^2D_c}{1-k^2}\right)^2$ and execute transformations. As a result of these operations the equation of a circle of the following type is obtained:

$$\left(x - \frac{k^2}{1-k^2}D_c\right)^2 + y^2 = \left(\frac{k}{1-k^2}D_c\right)^2; \quad (10)$$

3. TYPES OF COVERAGE

From equation (10) in k *<1*, which corresponds to the lower value of the energy potential of the transmitter $Tx2$, it follows that the limit of area is a circle with a radius around the transmitter $Tx2$:

$$R_2 = \frac{k}{1-k^2}D_c, \quad (11)$$

with center shifted to the straight line between the transmitters to $Tx2$ to the value of:

$$a_2 = \frac{k^2}{1-k^2}D_c = R_2k. \quad (12)$$

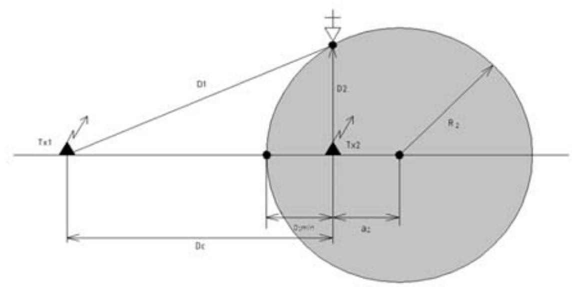

Figure 2 Area of energy supremacy of radio transmitter $Tx2$

In determining the area one should know how far from $Tx2$ to the side of $Tx1$ lies the level signal limit. Obviously, this distance is equal to $R_1 - a_1$ or expressed by D_c:

$$D_{1\min} = R_1 - a_1 = \frac{k}{1+k}D_c, \quad (13)$$

If $k = 1$ which complies with the same power of the transmitters, the area limit on the plane is a straight line perpendicular to the middle of the line joining the stations (Figure 3).

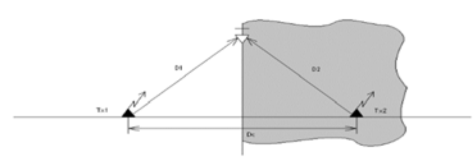

Figure 3 View of the coverage under equal power transmitters

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In $k>1$, which corresponds to the greater power of $T_x 2$ transmitter than the power of $T_x 1$ one, it can be shown that $T_x 2$ prevails in the entire area except the area around $T_x 1$ with a radius approximately equal to:

$$R_1 = \frac{k}{k^2-1} D_c , \quad (14)$$

The center of the area is shifted in relation to the transmitter $T_x 1$ on the opposite side of the transmitter $T_x 2$ of value:

$$a_1 = \frac{1}{k^2-1} D_c = \frac{R_1}{k}, \quad (15)$$

Wherefrom the minimal levels signal distance $D_{1\min}$ is determined:

$$D_{1\min} = 1-(R_1 - a_1) = \frac{k}{k-1} D_c ;(16)$$

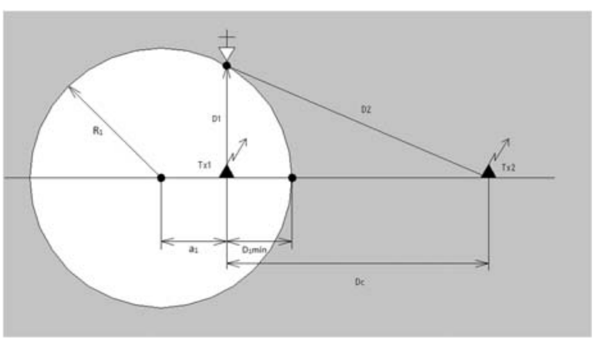

Figure 4 Area of radio $T_x 1$ energy supremacy.

4. CONCLUSIONS

Ratios (11 ÷ 16) explain graphs of change in the intensity of the field of both transmitter signals depending on the distance between them (Figure 2 ÷ 4).

Level signals limits of areas are calculated using the following methodology:

- formula 7 is to calculate value k;
- in formulas 11 and 12 are used to define the meaning of and specify;
- in formulas 14 and 15 specify the meaning of and;
- by formula 13 or 16 the minimum distance to the level signal limit is calculated;
- calculated values are plotted on a topographic or nautical chart.

The analysis of the VHF radio coverage areas of the two transmitters allows for their proper and effective deployment on the terrain. With similar reasoning, algorithms for more than two transmitters can be creating.

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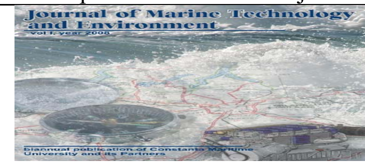

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EXPERIMENTAL RESEARCH ON VHF RADIOWAVE PROPAGATION OF THE BULGARIAN BLACK SEA COAST

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Abstract: The presented material contains the results of an experiment which determines probability propagation law of the electromagnetic field intensity near the Bulgarian Black Sea coast. Examines the conditions of Frequency Modulation (FM) distribution in a specific radio channel and obtains mathematical interpretation of the statistics.

Key words: Radio wave propagation, Propagation of VHF waves, VHF radio system, Radio traffic.

1. INTRODUCTION

Tourism development and utilization of natural resources in the Bulgarian Black Sea coast determines rapid increase in shipping in the area. Many of the vessels are small ships, fishing boats and yachts. They use most widely stationary and portable transceivers operating in the range of Very High Frequency (VHF) waves. The use of VHF marine communications from these moving objects near the coast, in bays, fjords and channels is difficult because in most cases there is no direct line of sight to the coastal radio stations. This leads to disruption of radio communications and reduce the probability of timely notification in case of incidents. The wide variety of terrain and mobility of objects does not allow using deterministic methods for establishing the parameters of the communication channels [1]. To solve this problem need to use probabilistic methods, suggesting experimental study of the prevalence of FM in these specific conditions.

2. PURPOSE

The purpose of the experiment is to study the conditions for propagation of FM based on statistical analysis of experimental data obtained in the region of the Bulgarian Black Sea coast.

By The goal is to obtaining data on the spread of FM, their statistical analysis and obtain
Mathematical relations.

To achieve the target, the experiment is conducted in the following terms:
1. Collecting data for different types of sea-radio paths;
2. Determining the propagation law of the electromagnetic field intensity, based on the experimental data;
3. Specifying the experimentally derived distribution law of the electromagnetic field intensity;
4. Verification of the authenticity of the hypotheses.

Statistical processing of the data from the experiment is carried out with the mathematical statistics apparatus, probability theory and a part of the theory of radio wave propagation.

The object of the research is VHF DSC Channel from the Global Maritime Distress and Safety System (GMDSS).

Input variables of the VHF DSC Channel:
Manageable controllable input variables are the distance from the object to the point of measurement and its location.

Manageable uncontrollable input variables are the transmitter power and the antenna type used.
Unmanageable uncontrollable input variables are the type of atmospheric refraction and the sea state.

As a starting index for the channel is adopted the value of the electromagnetic field intensity at the receiving point.
It is considered that the noise in the channel is constant in the time domain, i.e. no "drift" of the object.

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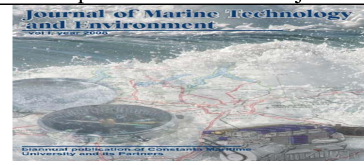

Realities of conducting the experiment require frequency and time constraints in order to avoid problems in radio exchange between ships and shore stations.

Frequency constrain consists in using only the 156,525 MHz frequency.

Time constrains consists in conducting the experiment in daylight and broadcasting not more than 5 (five) sessions in 5 (five) minutes intervals.

The experimental measurements are done by the Regional Telecommunication Control Station – Varna.

3. STAGES AND STAGING

The experiment was conducted on 28 and 29 July 2011. On the first day, it was conducted southward from the city of Varna on Ropotamo River mouth, and on the second day from Varna to Cape Kaliakra.
On the mobile object was used radio Marine DSC / VHF Radio Telephone - STR6000A and antenna model GRP - M VHF 156 to 163 MHz with vertical polarization and height 1,7 m.

Transmitter output power - 25W, DSC Mode.

The stationary measuring station has the following tactical and technical characteristics:
- Location: Varna, "Dzhanavara" Area
- Geographical coordinates: 43 ° 10'51 "N; 027 ° 51'50" E;
- Altitude: 164 m;
- Antenna height above ground level: 15 m;
- Weather: Clear Sky, 30° Celsius – 28^{th} and 29^{th} of July 2011.
- Frequency: 156,525 MHz;
- Antenna System: CC 309;
- Polarization: Vertical;
- Measuring receiver: ESMB, ROHDE & SCHWARZ, 20 MHz - 3000 MHz;
- Measurement accuracy: ± 1 µV / m;
- Receiver tuning:
    - demodulation – FM
    - detector - Average;
    - IF - Bandwidth - 6 kHz;
    - Meas. Time - 200 ms;
    - Squelch - Off.

Software: Software for management and analysis - ARGUS, ROHDE & SCHWARZ.

4. RESULTS

Graphic interpretations of the measured results are shown in Figures 1 and 2.

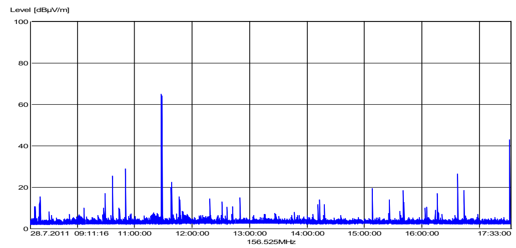

Figure 1 Graphic interpretation of the results measured on 28.07.2011, from 09:11 to 17:33 hours

Thanks to the conducted measurements, data have been obtained for the of the electromagnetic field intensity in dBµV/m, at the receiving point for the marine part of the coastal area.

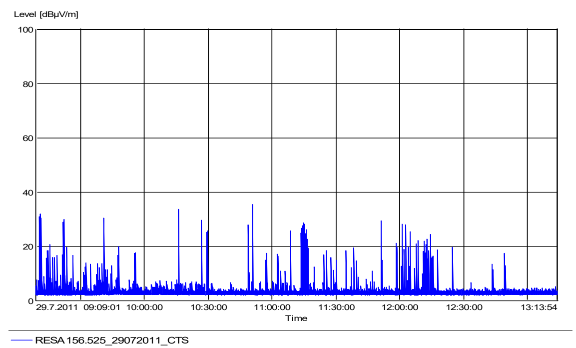

Figure 2 Graphic interpretation of the results measured on 29.07.2011, from 09:09 to 13:14 hours

Table 1. Maximum and minimum measurements of the electromagnetic field intensity, coordinates, distances and bearings

№	Coordinates of the mobile station	Distance, *km*	Bearing, *degrees, minutes*	Maximum measured value, *µV/m*	Minimal measured value, *µV/m*
1.	43°12’40’’N 027°55’55’’E	6,45	58°35’00	40,27	33,88
2.	43°07’44’’N 027°40’15’’E	16,66	249°49’00	142,89	136,46
3.	42°59’24’’N 027°47’06’’E	22,13	196°49’00	3,35	3,31
4.	42°58’12’’N 027°46’55’’E	25,20	201°48’00	7,00	3,43
5.	42°57’07’’N 027°46’30’’E	26,41	195°52’00	7,00	5,56
6.	43°13’06’’N 028°16’03’’E	32,92	082°35’54	6,61	6,09
7.	43°25’43’’N 02°818’16’’E	44,98	052°09’00	9,33	2,92
8.	43°26’17’’N 028°19’08’’E	46,54	052°00’00	16,79	3,59
9.	43°23’59’’N 028°23’12’’E	48,73	059°54’00’’	13,80	9,55

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10.	43°24’20’’N 028°23’14’’E	49,09	059°16’54’’	12,73	5,96
11.	43°24’22’’N 028°23’13’’E	49,10	059°12’23	8,03	7,76
12.	43°24’51’’N 028°23’13’’E	49,6	058°18’54’’	18,80	8,22
13.	43°23’02’’N 028°25’11’’E	50,25	063°09’40’’	20,65	7,33
14.	43°23’10’’N 028°25’11’’E	50,33	062°54’35’’	26,00	10,84
15.	43°23’15’’N 028°25’10’’E	50,4	062°44’31’’	27,54	12,88
16.	43°23’38’’N 028°25’19’’E	50,92	62°07’57	21,89	17,58
17.	43°22’05’’N 028°27’58’’E	52,92	66°40’17’’	59,57	55,59

The coordinates of the mobile station, the distance from it to the receiving station and the measured maximum and minimum the electromagnetic field intensity are shown in Table 1. At each point five attempts were performed. According to the theory for statistical processing of experimental data the experiments in the original material to be processed is reduced to 60 attempts.

5. STATISTICAL SERIES SPECIFICATION

Statistical series and histograms depicting them inevitably contain random elements and these elements need to be removed. This is achieved by selecting specific analytical function to filter the experimental material from the coincidentally stochastic properties of the random outcome of the research. The theoretical function is selected by the appearance of the histogram and the considerations related to the physical conditioning of the radio channel. The statistical moments method is used to calculate the analytical function parameters. This method is selected because it can use the estimates related to the above calculated moments directly from the statistical material.

Specification of the statistical series and determination of the distribution law of the electromagnetic field intensity at the point of receipt magnitude, was made with software STATGRAPHICS. The main reason is that calculations are performed with higher accuracy. An additional reason is that the number of intervals is changed so as to obtain optimal function furthermore allows for the inspection of several distribution laws simultaneously in this case four.

The statistical characteristics and distribution law of the accepted hypotheses are determined. The method of least squares is the criterion adopted, called X - squared – x^2 i.e. allows sufficiently strong theoretical justification from probabilistic point of view. This is achieved by calculating the statistical characteristics of the hypothesis data with the software. After that they are tested for consistency with the supposed distribution laws. Criterion for coordination is the value Pearson criterion (P-Value), it must be greater than 0.05.

The results achieved from the entered data are shown in Table 2.

Table 2: Statistical characteristics of the hypothesis

Count	60
Average	11,734
Median	9,88
Variance	34,4298
Standard deviation	5,86769
Coeff. of variation	50,0059%
Standard error	0,757515
Minimum	2,92
Maximum	26,0

Table 3: Results of the hypothesis test χ^2

	Exponential	*Lognormal*	*Normal*	*Rayleigh*
Chi-Squared	48,3358	14,5554	19,7303	11,4028
D.f.	9	7	8	7
P-Value	2,2103E-7	0,0421405	0,0114061	0,121989

Figure 3 shows the histogram of the statistical series and the distribution laws graphs.

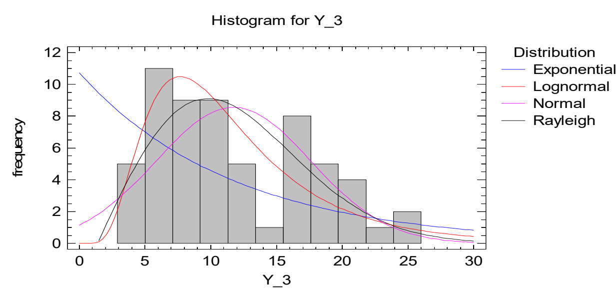

Figure 3 Plot of histogram and distribution laws

Table 3 shows that the hypothesis data are in agreement with the Rayleigh distribution law, since the probability value (P-Value = 0,121989) is greater than 0.05.

The density distribution is:

$$f(x;\sigma) = \frac{x}{\sigma^2} e^{-x^2/2\sigma^2}, \quad x \geq 0, \qquad (1)$$

Where σ > 0 is the distribution parameter.

The σ parameter in the density distribution should take the value of Standard deviation from Table 2.

The value of the parameter σ is 5.87 (Table 2), then the density distribution function obtains the following form:

$$f(x)_{Y-3} = \frac{x}{34,46} e^{-\frac{x^2}{68,92}}, \qquad (2)$$

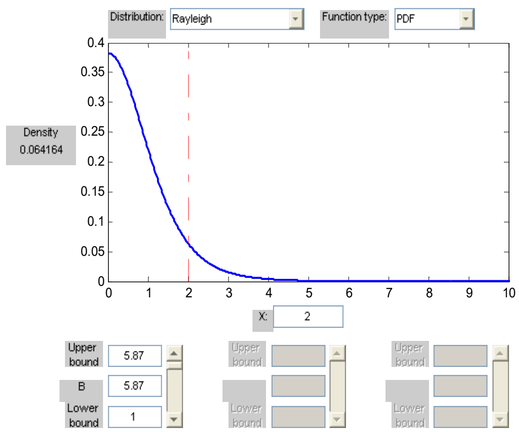

Figure 4 Plot of the density of probabilities function.

Figure 4 shows the graph of the density of probabilities function for formula (2) hypothesis.

6. CONCLUSIONS

The above-mentioned researches make it possible to conclude that the hypothesis is statistically meaningful. On the basis the following condition is true:

$$\text{P-Value} = 0,121989 > p = 0.05, \qquad (3)$$

Furthermore it can be stated that it does not contradict with the Rayleigh distribution.

The analysis of the obtained experimental data and their statistical processing make it possible to conclude that the goal of the research is achieved. For this particular purpose it has been proven that, in the Bulgarian Black Sea coast research area the FM propagation obeys the Rayleigh law.

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THE OIL POLLUTION RISK IN THE BLACK SEA

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Abstract: Leaving from a definition of risk (involving probability, vulnerability and capacity), authors make an introduction in the need to address oil pollution risk in the Black Sea, through proper and thorough organization of thinking. The most visible conclusion is that we have the knowledge in order to prevent oil pollution of the sea and we just need to action in advance, for preventing and not for intervention after oil pollution occurred. Following the risk management cycle is a good way of dealing the problem of oil pollution in the Black Sea.

Key words: oil pollution, risk, risk management, vulnerability, capacity,BlackSea.

1. INTRODUCTION

According to all important authors and authorities dealing with risk notion worldwide, **Risk = Probability x Consequence**, (Sandra Gadd, Deborah Keeley, Helen Balmforth, 2003).

Risk is therefore a function of both the likelihood (probability) and consequence of a specific hazard being realized, so when we think about risk, we need to think about the two factors involved:

- the probability (likelihood) that an adverse event will occur (such as accidental leaking of oil into the sea);
- the consequences of the adverse event (such as affecting environment, businesses or consequently state relations).

Other definition of risk (Understanding DRR) would be: **Risk=(Hazard + Vulnerability)/Capacity**, where:

- Hazard is a natural process or phenomenon, or a substance or human activity that can cause loss of life, injury and other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental degradation;
- Vulnerability is the relative lack of capacity of a community or ability of an asset to resist damage and loss from a hazard;
- Capacity is the combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

Risk has various connotations within various disciplines. In general risk is defined as “the combination of the probability of an event and its negative consequences” (UNISDR, 2009). The term Risk is thus multidisciplinary and is used in a variety of contexts (Dewald van Niekerk, 2011), (UNISDR Terminology on Disaster Risk Reduction, 2008).

2. OIL POLLUTION RISK CONCEPT BREAKDOWN

In the first chapter of this article, authors presented generally the idea of risk, as a function: Risk = f (Probability, Consequence). Consequence also can be seen an a function: Consequence = f(Vulnerability, Capacity). As a conclusion, Risk = f (Probability, Vulnerability, Consequences).

In other words, oil pollution risk depends on the probability of the oil spill to take place, on the vulnerability of the area and on the capacity to prevent/act of the authorities or entities that can preserve or restore balance.

When one talks about the **probability** of the oil spill to occur, we need to take into account all possible sources of pollution, and assess the likelihood of misusing some equipment and cause the oil spill.

Vulnerability is a relatively new concept and deals not only with the vulnerability of human communities on

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the coast, but also with the vulnerability of the environment, of the states and all other stakeholders.

Capacity means capacity to prevent more than capacity to cope with an oil pollution. Capacity is intimately linked with vulnerability; When one talks about capacity, one talks about authority (or lack of authority) to impose legislation, about the very existence of this legislation, and also about the common thinking throughout all the entities involved. Capacity is not only connected to standards and legislation. It might as well be connected to financial power to use different technologies and methods that create a powerful and resilient environment but also financial power to stop an oil spill from spreading (here technologies range from oil spill computer simulation to the use of specially designed dusts and floating devices to neutralize and collect the oil).

The idea of **Stakeholders** also need to be presented here. According to definition, Stakeholder is an entity that can be affected by the results of that in which they are said to be stakeholders, i.e., that in which they have a stake (http://en.wikipedia.org/wiki/Stakeholder). An oil pollution of a sea/ocean affects the environment, communities, businesses, in different amounts. So, stakeholders in this case can be different institutions of the different states, environmental control and preservation organizations, affected communities, affected environment, the polluting entity itself (Woodward, David G., 2002).

These concepts explaining risk (probability, vulnerability, capacity) and stakeholders need to be analyzed and interlinked altogether (see fig. 1.).

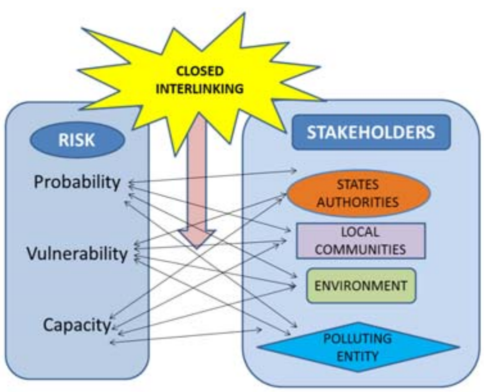

Figure 1 Interlinking between risk connected concepts and Stakeholders

For example, probability depends and can be affected by the stakeholders. Also, a stakeholder is very interlinked with all three concepts explaining risk. For instance, the environment as a stakeholder, can be a factor affecting probability (harsh weather with high waves can lead to marine accidents); it also can influence the idea of vulnerability (a clean strong and resilient environment is stronger and can recover quicklier than a weak environment); Capacity is also influenced by the marine environment in many ways.

Another important issue to discuss here is time because when it comes to oil pollution, to have a true and sustainable prevention when it comes to oil pollution risk, most of your actions need to be targeted not after the moment of oil pollution, but before. Here we start talking about disaster management cycle (Christo Coetzee, Dewald van Niekerk). The idea of disaster management cycle applies to any oil pollution in the Black Sea, because any oil pollution, no matter how small, it is a (small) disaster for that specific small part of environment, where it occurred.

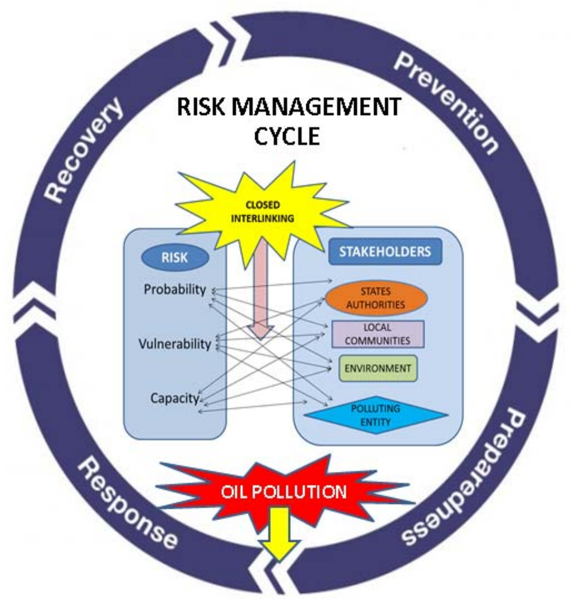

Figure 2 Risk and stakeholders are enclosed in risk management cycle.
(Understanding DRR)

As can be seen in figure 2, the risk management cycle has four steps: response, recovery, prevention and preparedness. The circle in figure 2 is better seen as a spiral. After oil pollution of the sea event occurs, stakeholders take action (response, recovery, prevention and preparedness), in order not just to recovery, but in order to be more prepared for a possible next event. Of course, the idea is to get the risk level ALARP (as low as reasonably possible). If the action is clearly organized and is concentrated on prevention (before) rather than intervention (after), we can talk about sustainable development. This way, all stakeholders take part in the effort and also take the benefits out of it. Sustainable development is effective when after a disaster;

stakeholders cope rapidly and move on (on the spiral of risk management cycle).

3. CASE ANALYSIS – OIL POLLUTION EVENT IN THE BLACK SEA RISK

On 12 november 2007, rough weather - winds of 100 km/h and almost 5 meters high waves in Black Sea and Kerch channel - smashed apart the Russian oil tanker "Volganeft139" and spilled into the sea nearly half of the cargo of the freight ship laden with 4,800 tons of oil.

Figure 3 Map with the position of the oil pollution site. Kerch channel between Sea of Azov and Black Sea (http://www.oiledwildlife.eu)

Other ships were affected, an important quantity of sulphur also reached into the sea. Five people died, other 19 missing, 30,000 birds died (fig. 4.) because of the oil that poisoned them and slicked to their feathers.

Figure 4 A poisoned and oil covered bird lies dying in front of local volunteers removing oil pollution (http://www.theepochtimes.com/news)

The whole ecosystem received an important hit. According to some sources, USD 898 millions is the approximated value of financial losses. Apparently, the oil slicks moved towards the Sea of Azov in the next days (http://www.theepochtimes.com/news), (http://en.for-ua.com).

Russian environmentalist Vladimir Sivyak told the BBC that the sinking of the Volganeft-139 alone was a "very serious environmental disaster". He added that "the heavy oil which has already sunk into the seabed will take years to clean up" (http://www.spiegel.de), (European Parliament resolution).

The image below (fig. 5.) presents the oil spills detected by satellites through the years 2000 - 2004 in the Black Sea, (Temel Oguz), (www.blacksea-commission.org/_publSOE2009.asp).

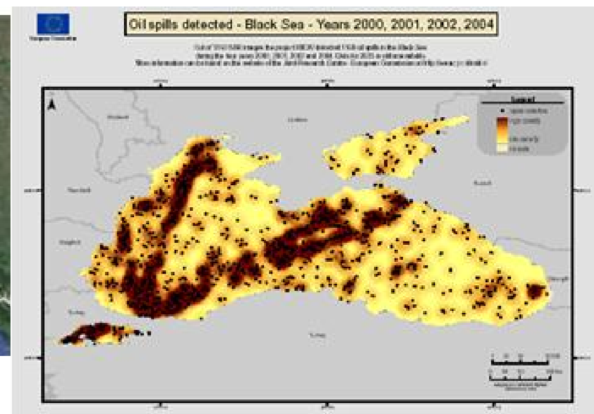

Figure 6 Map with oil spills in the Black Sea in 2000, 2001, 2004 (http://www.oiledwildlife.eu), (http://www.spiegel.de)

As it can be seen from the above case and from the image in figure 6, the problem exists and it's very important to be dealt with in a very serious manner.

The risk management cycle approach presented in figure 2 is one very good method to start with. There are a lot of regional efforts in this direction, which is a good thing, but it lacks organization, because of political, financial, and all sort of interests between the Black Sea coastal states (A 2020 Vision for the Black Sea Region, 2010).

If we ask to ourselves the proper questions and take into account the interlinking between risk connected concepts and the status and possibilities of the stakeholders, having also in mind the "before" and "after" paradigms brought by the risk management cycle, a lot of important responses can arise.

Apparently, the ship (Volganeft 139) was not designed to sail on the sea. The weather forecast is not a novelty nowadays, so the storm and the event could have been better foreseen and prevented (bringing the ship in port, at safety, emptying its cargo). Old ships should be very well checked before receiving approval for marine operations.

There are a lot of information that we can get out of any oil pollution event, in the Black Sea area or in the

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whole world. The important thing is to make steps to a sustainable development of the region, towards solving the problem of oil pollution, in a sustainable way.

4. CONCLUSIONS

The risk of oil pollution in the Black Sea is a serious matter, having in mind the present situation: oil is already brought into the sea by the rivers, the black sea environment is already weakened, because of the international crisis, there are financial problems, also there are important differences and different cultures between the coastal states.

Nevertheless, the stakeholders need to act in an organized manner. Authors, without claiming to discover a new method, propose that as part of a solution, to be created and followed an integrated plan containing: risk connected concept items (probability, vulnerability and capacity) and stakeholders analysis and implication, both interlinked inside the risk management cycle actions.

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A COMPLEX AUTOMATIC MARINE MEASUREMENT SYSTEM IN THE BLACK SEA

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Abstract: In this paper we are presented the first early-warning system from the Black Sea-EUXINUS network. This represents a complex automatic marine measurement system, consisting of measuring instruments installed in key points of the western Black Sea, to monitoring coastal wave along Romanian-Bulgarian border.

Key words: early warning system (EWS), marine geohazard, flooding scenario, gauge, 2D marine seismic, OBS's.

1. INTRODUCTION

Supported and financed between 2010-2013 by the CBC Romania – Bulgaria Program, the project MARINEGEOHAZARD represents the first major initiative related to tracking of marine geohazards, as the first early-warning system from the Black Sea (Figure 1).

Figure 1 Location of monitoring [1]

2. METHODS AND MATERIAL

EUXINUS network represents a complex automatic marine measurement system, consisting of 6 measuring intruments installed in key points of the Western Black Sea, 5 being deployed in water depths up to 150 m (Fig. 2) and one deployed near the shoreline (Fig. 3), representing a key component of the coastal wave station located in Mangalia (Romania), close to the Romanian – Bulgarian border [2].

Figure 2 Offshore buoys

Figure 3 Coastal gauge

These five fully automatic stations are shared between the MARINEGEOHAZARD partners, three of them being located in the Romanian territorial waters and two in the Bulgarian area (Fig. 4).

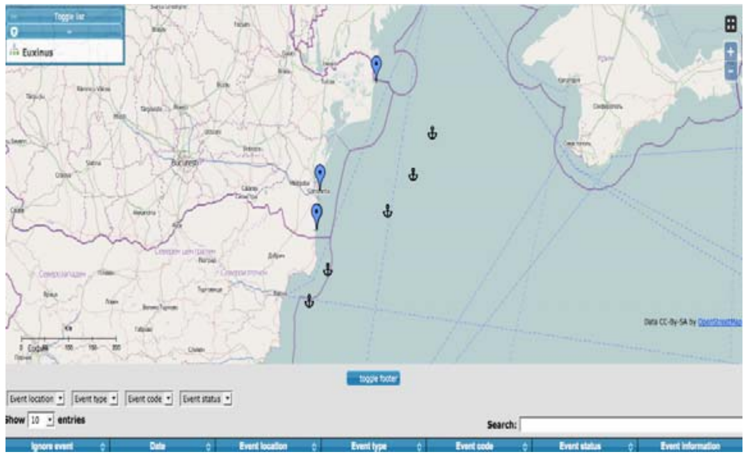

Figure 4 Locations of these 5 offshore buoys - EUXINUS network

Each instrument is equiped with real-time, bidirectional data communication, that allows management from onshore provided by the two National Data Centres located in Romania (GeoEcoMar, Constanta Branch) and Bulgaria (IO-BAS Headquarters, Varna).

Other important key components of the early warning system are Marine Seismic Aquisition System (MSAS) composed from one 2D Marine Seismic Acquisition System with 96 channels streamer (Fig. 5) and 7 Ocean Bottom Seismometers (OBS).

Figure 5 2D Marine Seismic Acquisition System, on-board of the R/V Mare Nigrum

3. RESULTS OF MONITORING

The aim of the 2D Marine Seismic Acquisition System is to deliver information regarding the geological structure of the seabed for all submarine physiographies (Fig. 6). The measurements will provide important data on the stratigraphy and geometry of sedimentary formations, the relationship between the tectonic blocks, as well as active shallow depositional/erosional processes, in order to understand and map potential threats.

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Figure 6 Tools for monitoring [3]

Special attention is paid to the OBSs that will provide important data about regional earthquakes. When used as seafloor recorders, they can acquire data from deeper Earth crustal, offering information about the architecture and composition of crustal and upper astenosphere.

The main target of the whole system is to monitor marine hazards, as effects of the submarine landslides, earthquarkes, tsunami waves and others, to assess the risks for the coastal area and to send early-warning notifications to the authorities.

The joint decision support tool is represented by a cross-border, common database on flooding scenarios of the coastal area, taking into account the entire Romanian-Bulgarian coast as a single unit. The EUXINUS EWS was designed as a modular system capable to be interconnected with other existing national networks (e.g., Romanian and Bulgarian seismological networks), thus creating a strong cooperative supra-system.

4. CONCLUSIONS

The EWS application is addressing the needs for conservation and protection of the marine and coastal environment, including the coordination of emergency responses at cross-border level.

One of the strategic objectives of the Institute of Marine Geology and Geoecology – GeoEcoMar, the coordinator of EUXINUS – EWS, is to provide initiatives for development of international relationships within the Black Sea basin, in-line with European and intergovernmental initiatives such as UNESCO-IOC or EMSO-ERIC.

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ECONOMICAL RISK INDICATORS FOR MARINE ACCIDENTS

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Abstract: This paper analyses the state of risk that should be measured by an effective monitoring system of marine accidents in the Black Sea from an economic and ecological point of view. The analysis is performed using a set of 15 ecological-economic indicators. Indicators represent a valid tool to support the decision making process in marine risk management. Economic indicators include 6 indicators on economic performance, 4 on productivity, 2 on costs and prices, and one general indicator summarizing economic sustainability. From the ecological point of view, 2 indicators plus one general indicator summarizing ecological sustainability are defined. Particular attention is devoted to the selection and analysis of sustainability indicators. The standard distinction among environmental, economic, and ecologic sustainability has been held in this paper.

Key words: ecological-economic indicators, reference points, marine accidents, monitoring system.

1. INTRODUCTION

Indicators represent valid information and is a monitoring tool within the decision making process in risk management. The identification, assessment, and evaluation of indicators are discussed and treated into many scientific and technical documents. In this paper we can define the meaning of the word "indicator" as: "*a variable, pointer, or index related to a criterion. Its fluctuation reveals variations in key elements of sustainability in the ecosystem, the fishery resource or the sector and ecological and economic well-being. The position and trend of an indicator in relation to reference points indicate the present state and dynamics of the monitoring system. Indicators provide a bridge between objectives and actions*".

Indicators are useful to draw an accurate picture of marine accidents risks from a biological, economic and ecological point of view. Moreover, an evaluation of the state of marine accident risk through time can be obtained by comparing indicators to appropriate reference points. These values should be associated with either a critical or an optimal state, where the monitoring system identifies a limit which is necessary to avoid (LRPs, limit reference points) and the latter a target to be attained by the system (TRPs, target reference points). Nevertheless, LRPs and TRPs are not identifiable for many indicators, or the data needed for their estimation is not available in many marine accidents. [2]

An attempt to define a general list of indicators and reference points in marine accidents was made by "The Black Sea Institute" in Bulgaria. Among the reference points proposed, only in a few cases TRPs were defined in accordance to general concepts in marine risk management sustainable literature, such as MSY (Maximum Sustainable Yield) and MEY (Maximum Economic Yield), while the most part of them was defined by the indicators historical level. However, the use of historical levels represents a very suitable method for highlighting the presence of trend and evaluating the state of The Black Sea monitoring system of marine accidents through time.

2. EXPOSE

2.1. General economic characteristic of The Black Sea Basin

2.1.1. Maritime transport and environmental issues

The Black Sea is an important maritime transport route used by merchant ships in international and national trade, by yachts, fishing vessels, war ships and other non-merchant ships. A significant number of important industrial centers are located along the Black Sea coasts and several countries heavily depend on the Black Sea ports for the import of energy. In addition, several of the Black Sea ports are deep-water ports, which is in help to host super-tankers. These ports could serve as a solution for today's bottlenecks with regard to marine export routes through the Bosphorus.

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Consequently, the Black Sea countries believe that maritime transport will increase in the future. Existing routes will be used more intensively, new routes will be introduced and new transit ports will gain importance.

The marine accidents can cause significant ecological-economy damages of The Black Sea Basin. Some statistical data of the similar positions of the ship accidents is shown on figure.1.

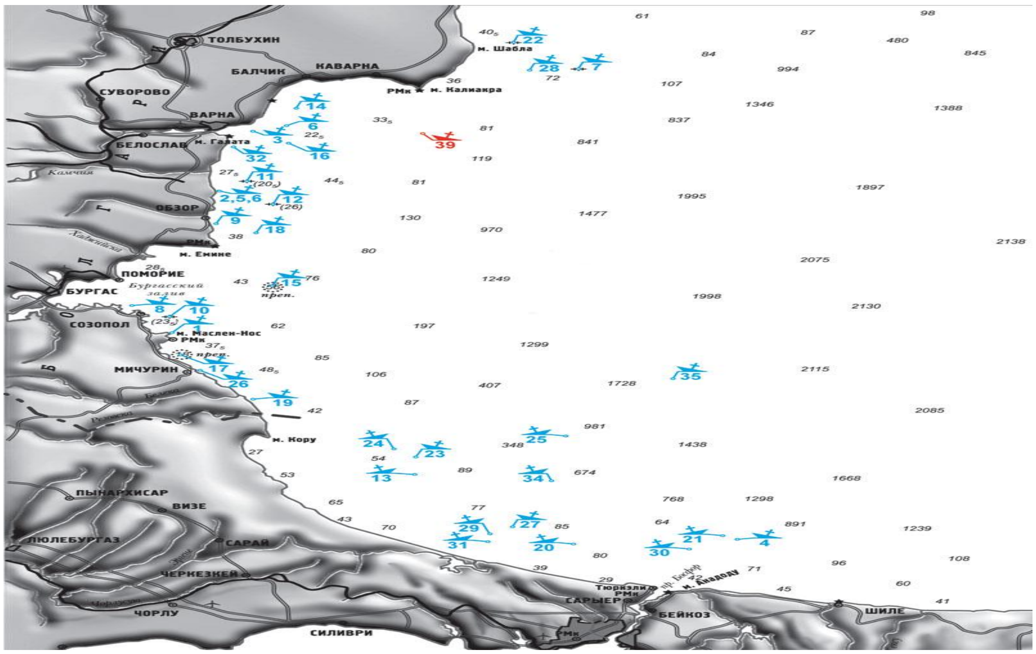

Figure 1 Map of the ship accidents near the Bulgarian Black Sea coast

2.1.1. Fisheries and aquaculture

Apart from being an important maritime transport route, the Black Sea basin is among others a fruitful area for fishing. As mentioned earlier, fishing has traditionally been an important sector to most Black Sea countries. The production of fish, mussels and clams by aquaculture in the all country coasts parts of the sea basin must be statistically data tracked through the years for making an economical statement of their importance.

2.1.2. Tourism

The countries around the Black Sea are important tourist destinations. As their importance as tourist destinations clearly depends on the Black Sea basin itself, it is very important to maintain the Black Sea basin's status and undertake actions for the preservation of the region.

It is an interesting and at the same time a negative for the economic development fact that intensive coastal tourism leads to pollution of the sea, especially when wastewater treatment plants lack the capacity to treat all wastewater and, as a result, discharge a certain (substantial) quantity directly into the sea. Coastal protection through beach nourishment instead of using protection barriers (due to unattractive sight) may have negative environmental effects as well. Although less significant, marine tourism activities may also affect the environment. For instance, diving and recreational bathing can damage marine vegetation.

2.1. Methodology of the Black Sea monitoring system of marine accidents

The team of experts from The Black Sea institute tried to point what indicators should include a monitoring system of the marine accidents that should measure the ecological- economic risk. The analysis must be performed using a set of 15 ecological-economic indicators. Indicators represent a valid tool to support the decision making process in marine risk management. Economic indicators include 6 indicators on economic performance, 4 on productivity, 2 on costs and prices, and one general indicator summarizing economic sustainability. From the ecological point of view, 2 indicators plus one general indicator summarizing ecological sustainability should be defined. Particular attention should be devoted to the selection and analysis of sustainability indicators. The standard distinction among environmental, economic, and social sustainability will be set out as a target. [1].

As for the evaluation of marine accident risk sustainability, two specific indicators have been defined from an economic and ecological point of view. The approach followed in this paper is based on the consideration that natural, economic and human resources are involved in fisheries contemporarily, and marine accident risk sustainability is possible only if the availability of all kinds of resources is ensured in the long term.

From an economic point of view, this means safeguarding the ability of the sector to attract investments by protecting its profitability. Therefore, the level of economic sustainability can be measured by comparing the profitability of investments in fishery to those in other sectors. In this paper, the traditional indicator for profitability, represented by the return on capital invested (ROI), is compared to the average rate of the Bulgarian Coast securities with a long term maturity. The indicator of economic sustainability (ESI) is then obtained as a difference between the two rates of profitability. When the value of ROI is lower than or very close to the BTP rate (the value of ESI is negative or very close to zero), investments in public bonds are preferable to investments in fishery and the status of the fisheries under investigation cannot be considered as economically sustainable.

Table 1 displays the list of the economic indicators on the status of marine accidents and their description. As for the evaluation of economic performance, traditional indicators based on the return on the capital invested and indicators related to the quota of revenues directed to production factors have been used. A number of indicators are used in the evaluation of productivity as well. They can be divided into two groups, physical and economic productivity indicators, where the former are expressed in terms of landings and the latter in terms of revenues. The last four economic indicators, related to market variables, are to measure the evolution of landings prices and of the most relevant costs in marine accidents, specifically maintenance and fuel costs. [3,4]

Table 1**.** Ecological-economic indicators on the status of risk monitoring of marine accidents and description.

№	INDICATOR	DESCRIPTION
1.	Added Value/Revenue	percentage of revenues which is directed to salary, profit, opportunity cost and depreciation.
2.	Gross Operative Margin/Revenue	percentage of revenues which is directed to profit, opportunity cost and depreciation.
3.	ROS (Return on Sale)	percentage of revenues which is directed to profit and opportunity cost.
4.	ROI (Return on Investment) (%)	percent ratio of net profit plus the opportunity cost in relation with the investment.
5.	Revenue/Invested Capital (%)	percent ratio of revenues in relation with the investment.
6.	Net Profit per vessel (000 €)	average net profit of each vessel.
7.	Landings per vessel (ton)	average production of each vessel in terms of weight of landings.
8.	Landings per GRT (ton)	average production in terms of weight of landings for each capacity unit (GRT) of the vessels.
9.	Landings per day (ton)	average production in terms of weight of landings for each day at sea.
10.	CPUE (kg)	average production of each effort (GRT*days/N.vessels) unit in terms of weight of landings.
11.	Revenue per vessel (000 €)	average production of each vessel in terms of market value.
12.	Revenue per GRT (000 €)	average production in terms of market value for each capacity unit (GRT) of the vessels.
13.	Revenue per day (000 €)	average production in terms of market value for each day at sea.
14.	RPUE (€)	average production of each effort (GRT*days/N.vessels) unit in terms of market value.
15.	Average price (€/kg)	average market price of landings.

The approach described above can only be partially applied for measuring social sustainability. The availability of human resources in marine accidents cannot be treated as that of other economic resources, and comparing the labour remuneration in the fishery sector to those of other economic sectors would result in a mistake. Moreover, the level of flexibility of labour market is not comparable to that existing in capital market.

2. CONCLUSIONS

Especially in areas such as the Black Sea, the principle of cross-border/international cooperation is important as multiple states are involved. Due to the existing thematic approaches in the countries concerned, national coordination will be important as well. Inter-ministerial committees or single coordinating bodies responsible for risk management and planning may be a solution to effectively and efficiently coordinate the development and implementation of system of measuring the environmental risk management. With regard to managing the seas, a solution could be to establish an independent management body. This way, control will not be bound to a national territory, which may be more effective to e.g. protect the migration loop of fish or control shipping. In the future report that will be made about the economical part of the risk, these recommendations will be explained in detail by focusing on the following points:

- Stakeholder involvement;
- Institution and legal framework;
- Data collection, knowledge, creation and evaluation;
- Coherence with terrestrial planning;
- Monitoring and control.

In order to evaluate and implement the Economical part of the Environmental Risk Management and Risk Assessment and Prevention in the Black Sea basin, it is recommended that the parties involved should work according to sequence the economical data about the key principles. A more detailed analysis could be obtained by integrating the set of ecological-economic indicators, presented in the paper, with biological indicators on the status of marine accidents resources.

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