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Coastal and Marine Issues and Their Relation to Ecosystem Survey

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ABSTRACT: Protecting and preserving the environment and marine resources is a constant concern of countries. The seas and oceans face increasing threats to their flora and fauna from pollution, both from land and sea sources. Overexploitation of marine resources and overfishing pose serious threats to biodiversity and the balance of marine ecosystems. Especially for countries that rely on fisheries resources to feed their populations in closed or semi-closed seas. It is unusual to highlight overfishing by ships, as coastal states' resources do not allow for effective safety controls and as a result, there are a number of severely depleted fisheries worldwide. It is therefore vital that conservation and management measures for straddling fish stocks and highly migratory fish stocks continue and increase, as it is a resource that has transcended many national jurisdictions. According to the priorities of the current research project, which include alignment and adaptation to the regulations of the Saudi marine environment, the research group of the current marine ecosystem project tries to analyze the variables contained in maritime transport and shipping and to measure the impact of these variables on the marine ecosystem, by focusing on four national priority areas: 1) reliable and long-term seafood supply; 2) thriving coastal ecosystems; 3) sustainable coastal development; and 4) risk resilience in coastal communities. Prioritizing coastal issues and gathering desired outcomes from.

1 INTRODUCTION

Designing reliable electronic navigational charts is essential for safe navigation and protection of the marine environment, including delicate ecosystems such as coral reefs and seamount biodiversity. As a result, fishing has been a key economic activity in many countries, and they have faced threats, including the increasing presence of international fishing vessels close to shore, often subsidized without oversight, in search of highly migratory and straddling fish stock regions. The scarcity of some fish has adversely affected marine ecosystems through illegal, unreported, and unregulated fishing, as envisaged by the draft resolution on sustainable fishing. In addition, the sea transport of radioactive materials and hazardous waste also requires effective liability regulations, such as the use of oceans and seas as transport routes for radioactive waste. Furthermore, there is a lack of information for some shipping countries, as well as a failure to provide adequate information about these modes of transportation and routes. Not to mention the increasing degradation of the marine environment and the heavy exploitation of living marine resources. This leads to the deterioration of the marine environment from land activities and ships, and is ultimately a phenomenon harmful to human health. Therefore, the growing interest of countries and marine organizations is to develop international rules and regulations to prevent pollution of the sea. Organizations. In addition, international coordination

and cooperation are therefore essential for the effective management of the oceans and seas, with particular emphasis on improving nautical charting capacity and protecting vulnerable marine ecosystems. Therefore, hydrographic surveys and nautical mapping are necessary for the safety of navigation and protection of the environment. Other issues that need to be addressed include managing and preventing illegal activities related to marine resources, such as B. Some illegal, unreported and unregulated fishing vessels use re-flags as a means to evade control. There must be a mechanism to address the challenges posed by pollution, including preventing soil pollution, transboundary environmental damage, safety of navigation, phasing out of single-structure tankers and safety in the transport of radioactive materials. An important aspect of the marine ecosystem is the conservation of biodiversity, habitats, fauna, and flora through the creation of marine protected areas.

The lack of regulation in this critical area has caused many disasters in the past, and it was in the interest of the world community to protect and conserve this species. The protection of ecosystems and the safety of navigation require marine navigation charts (an important navigational aid), which are necessary to protect coral reefs and prevent accidents with significant impacts on people and the environment.

The importance of maritime transport is increasing because it is the best and most economical way to transport huge volumes of foreign trade to the countries of the world and has a positive economic impact on the cost of the transported unit of goods. Therefore, light has been shed on the protection and conservation of the marine environment and marine resources. Proactive measures have been taken to prevent and reduce pollution from ships and land-based activities, including oil spills. In addition, by eliminating illegal, unreported, and unregulated fishing activities. The potential for marine damage is very high with many international shipping lines calling at the ports of the Kingdom of Saudi Arabia. As such, controls need to be put in place to ensure ships transiting national waters comply with international standards. Also, work to prevent accidents that could seriously endanger the country's sustainable development and people's health. It is worrying that industrial fishing fleets have managed to wipe out nine-tenths of the largest and most economically important fish species. Efforts to improve fishing protection are encountering an increase in illegal, unregulated, and unreported fishing activities on the high seas. With the resulting negative impact on global fisheries. . (UN, report, 2003).

2 THE AIDS OF MARINE NAVIGATION

Gone are the days when a ship's navigator had to resort to unconventional ways to plan and navigate a voyage at sea. Thanks to technological advances, today's ship officers have a variety of ship navigation devices that greatly simplify their lives. In addition, today's seafarers are trained to know the workings and operation of all modern navigational devices that have made the journey at sea smoother and safer. With modern facilities and automation, a ship today has several advanced navigational equipment systems that provide accurate data for the voyage.

1. Gyrocompass It is used to find the right direction. Unlike a magnetic compass, a gyrocompass is not impeded by an external magnetic field. It is used to find the correct north position, which is also the Earth's axis of rotation, to provide a stable source of direction. Its repeater system must be present in the control platform for emergency control.
2. Radar Sea-going vessels rely on S-band and X-band frequency radar systems for navigation because they can detect targets and display information on the screen, such as the ship's distance from land, floating objects (an island, rock, iceberg, etc.)), other ships and obstacles to avoid collision. A rotating antenna captures the ship's surroundings.
3. Magnetic Compass. The magnetic compass works in conjunction with the Earth's magnetic field and is the primary means of indicating direction. It is used to get a planned course for the trip. This ship navigation equipment is usually attached to the centerline of the ship on Monkey Island. A transmitting magnetic compass is built in so the output can be viewed in the bridge field.
4. Autopilot. The ship's bridge layout is full of equipment and tools used for navigation. The autopilot is considered one of the most effective bridge navigation devices as it assists the human operator in steering the ship by keeping the controls on the autopilot, which allows them to focus on broad aspects of the operation. It is a combination of hydraulic, mechanical and electrical system and is used to control the ship control system from a remote location (Navigation Bridge).
5. ARPA. Automatic Radar Plotting Aid displays the position of a ship and other nearby ships. The radar shows the position of nearby ships and chooses the course for the ship, avoiding any type of collision. This bridge navigation equipment constantly monitors the ships around and, in this case, automatically records the number of targets; B. ships, boats, stationary or floating objects, etc., and record their speeds or courses. It also plots them as vectors on the display screen and constantly updates the parameters with each rotation of the antenna, calculating their closest points of approach to own ship and also the time beforehand.
6. Automatic Tracking Aid. Just like ARPA, Automatic Tracking Aid displays tracked target information graphically and numerically to create a planned layout for a safer and collision-free course. Usually a large target with a circumference of 800 m or more is considered a landmass and is not tracked. Echoes below 800 m are considered targets to be tracked.
7. Speed and Distance Gauge This bridge equipment on a ship is used to measure the speed and the distance a ship is traveling from a fixed point. By calculating the same, the ETA of the ship will be adjusted or communicated to the port authority and agent.
8. Sonar There are many modern ship navigation tools on ships and sonar is one of the instruments

that has been in the game for almost 100 years. It is used to measure the water depth below the ship's bottom using sound waves, which work on the principle of the transmission of sound waves and an audio pulse, which bounces off a reflective layer and returns to the source as an echo.

9. Electronic Chart Display Information System. ECDIS is an evolution of the navigation chart system used on naval ships and ships. With the use of electronic navigational equipment, it has become easier for ship's crew to pinpoint locations and reaching directions is easier than before.
10. Automatic Identification System AIS is also among the types of navigation systems that help determine the location and other navigational statistics of ships. AIS uses VHF radio channels as transmitters and receivers to send and receive messages between vessels, striving to fulfill many responsibilities. (GT) sailing in the international area to carry a class A AIS transponder.
11. Long Range Tracking and Identification (LRIT) System LRIT is an international tracking and identification system adopted by the IMO under their SOLAS Convention to provide a thorough tracking system for vessels of 300 gross tons and over embarking on international voyages in all over the world. This maritime gear is equipped to increase awareness of the maritime field.
12. Rudder angle indicator. The rudder angle indicator, as the name suggests, shows the angle of the rudder. The display is provided on the navigation bridge equipment panel so that the ship's navigator can control the ship's rate of turn and rudder angle. The display also takes place in the bridge wing and in the engine control room.
13. Voyage Data Recorder. A VDR or Voyage Data Recorder is a crucial instrument in ship navigation equipment list installed on a ship to continuously record important information related to the operation of a ship. It contains a voice recording system for a period of at least the last 12 hours. This recording will be recovered and used for accident investigations. The meaning of the VDR is comparable to a black box installed in an airplane.
14. Rate of Turn Indicator. This navigation tool shows how fast the vessel is turning at a constant rate (useful in piloting and maneuvering), usually shown as a number of degrees. The speed at which a ship turns is measured in degrees per minute. This indispensable tool assists a helmsman in safely steering a course.
15. GPS Receiver. A Global Positioning System (GPS) receiver is a display system used to show a ship's location using global positioning satellites in orbit. With the recording of the ship's positions, the speed, the course and the time are recorded. The distance traveled between two marked positions can be calculated.
16. Acoustic receiving system. This acoustic system is required for a ship with a fully enclosed bridge. It allows the navigation officer in the cabin to hear the sound signals (such as fog or ship's horn) from other ships nearby. This is installed in the ship's bridge equipment console and assists the navigator in performing the lookout duty in accordance with the International Regulations for the Prevention of Collisions at Sea.
17. Navigation Lights. All boats, large or small, must have night-lights as part of the navigation system. This system was introduced by the United States in 1838, followed by Great Britain in 1849. In 1889, the International Maritime Conference was established by the United States to establish appropriate policies to prevent maritime casualties. In 1897 these rules were officially adopted internationally. The navigation lights are one of the most important pieces of navigation equipment needed for sailing the high seas as they enable one's ship to be clearly visible to other ships nearby.
18. Ship's Whistle. A ship's horn is known as a whistle and is generally supplied in duplicate. One is air powered and the other is electrically powered. The whistle should be operable both manually and electrically from the bridge. Among the various instruments used in difficult navigation such as bad weather, fog, poor visibility, heavy traffic, etc., the ship's whistle or horn helps in alerting the nearby ships. In an emergency, the horn is used to notify and alert the ship's crew and other ships in the vicinity.
19. Daylight Signaling Light. They are light signaling devices used for emergency signaling during the day (and can also be used at night). Like other shipboard emergency instruments, the power source for the lamp is not solely dependent on the ship's main power supply. The lamp housing should also be made of weatherproof and seawater-resistant material.
20. Pilot Card. It is an informative booklet provided to the ship's pilot. It consists of ship's dimensions, draft, turning circle, maneuvering, propulsion equipment and other navigational tools and instrument list for safe maneuvering.
21. Itinerary. An itinerary must be available on board in order to refer to previous voyage plans or to plan a future voyage. Among the various navigational aids carried on a ship, a voyage plan is a tool for the deck officer to ensure the safety of the ship also from an economic and legal point of view. It is prepared by collecting various information such as weather, meteorological data, current and future ship cargo data, other navigation data, etc.
22. Bow bell. It is used to indicate the ship's presence in fog or bad weather and to sound the alarm in an emergency together with the ship's main horn or whistle.
23. Maneuvering Booklet. This booklet records the performance of the propulsion system and ship when maneuvering in various weather conditions and situations for quick reference. The main contents of the maneuvering booklet are: Vessels General Description Deep Water Maneuvering Characteristics Stop and Speed Control Deep Water Maneuvering Characteristics Shallow Water Maneuvering Characteristics Wind Maneuvering Characteristics Low Speed Maneuvering Characteristics More Information.
24. Black Spherical Shape. This is a time of day waveform used to determine ship characteristics with a different arrangement of spheroidal shapes. For e.g. a ship at anchor will show a black sphere at the foremost end of the forecastle, and an uncommand ship will show two black spheres in a vertical line at its tallest mast.

25. Records of navigational activities All navigational activities performed by the ship's officers and crew using different navigational devices on the bridge should be recorded and kept on board for immediate reference. This is mandatory and the most important logbook.
26. Records of maintenance of navigational equipment. The printed copy of the entire ship's navigational system and equipment list must be kept on board ships as records for the ready disposal of port and regulatory authorities and must be signed by the ship's master and officers on duty.
27. Wheelhouse poster Present on the navigating bridge, it shows detailed information about the ship's maneuvering characteristics, including turning radius, stopping and maneuvering characteristics of the ship.
28. Transmitting Heading Devise Transmitting Heading Devise or THD is an electronic device used to display the ship's true heading information. The THDs compliance information is contained in Chapter V of the SOLAS Convention.
29. Black Diamond. A black diamond is displayed during the day when the ship is being towed or a ship cannot maneuver independently.
30. Ship Flags various types of ship flags, with different colors and characters, are used to indicate the position of a navigational vessel. Signal flags are well known, have been used since ancient times and are still used on all ships.

These are the various bridge equipment and their uses installed on the ship to assist the deck officer in navigating the ship safely. If we missed any gear or you would like to add more to the list, please comment below. (Karan, 2020, Marine Navigation).

3 THE METHODOLOGY USED TO CREATE THE QUESTIONNAIRE

The process by which the questionnaire was made by utilizing the scientific material that was used to develop the questionnaire. In accordance with the Saudi plan to safeguard the marine environment, a questionnaire was created to gather data on the five most significant marine-related problems (such as marine biotechnology, fisheries, aquaculture, seafood safety, coastal communities, ecosystem health, coastal hazards, and maritime transport).

Furthermore, respondents to the questionnaire were asked to rank (on a scale of one to five) the significance of a list of outcomes that describe priority statistical indicators. Finally, various pertinent authorities assessed the questionnaire. From a team list of several issues and statistical factors relating to the "most essential" issues, the arbitral bodies were requested to choose the "most significant" concerns from a broad list of numerous topics and statistical metrics relating to the maritime environment. Following this were sustainable and resilient coastal communities; critical habitat conservation; land and open space conservation; healthy coastal and marine ecosystems; and safe seafood production. The effect of ships and navigational aids on the maritime ecology is another factor. The arbitration was conducted in person according to the following procedures and bodies:

1. King Abdul-Aziz Port, Eastern Province (16)
2. Marine specialists (17)
3. Professionals with maritime expertise (19)
4. Jeddah Islamic Port-King Abdullah Port in the Western Region (16)
5. Experienced-Representing the National Center of Meteorology (15)
6. High mariner expert from liner shipping companies (25)

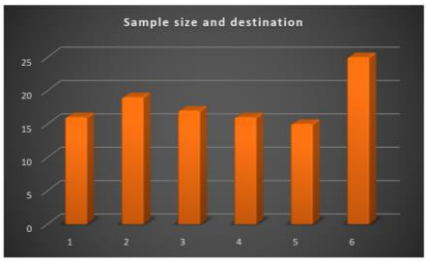

Figure 1. Sample size and destinations. [1]King Abdul-Aziz Port, Eastern Province[2] marine specialists[3] professionals with maritime expertise [4] Jeddah Islamic Port-King Abdullah Port in the Western Region [5] Experienced-Representing the National Center of Meteorology[6] high mariner expert from liner shipping companies

The following tables summarize the statistical variables of the maritime transport-ecosystem relationship.

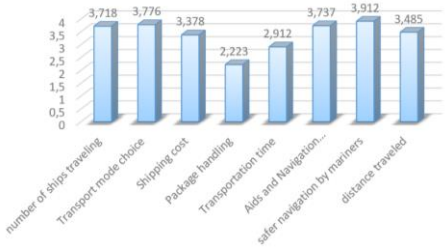

Figure 1. Mean Weighted

The first variable is the distance covered by a ship, which has a bad influence on marine life since it pollutes the environment with its fuel emissions, makes noise with its propellers, and runs into wildlife or fishing gear. This variable placed fourth overall with a MW of 3.718. The second variable, multitude of ships traveling, likewise exhibits a negative correlation, since it outcomes in significant pollution from noise and fuel emissions. This variable placed second overall with a MW of 3.776.

Table 1. Description of the independent variables (sea transport)

Description of the independent variable (Marine transportation)	The degree of importance from 1 to 5 1(f)	2(f)	3(f)	4(f)	5(f)	Mean Weighted	S.D	Independent Variable Ranking
distance traveled	5	11	8	13	56	3.718	21.12	4
number of ships traveling	9	12	16	22	44	3.776	13.95	2
Transport mode choice	8	15	23	44	13	3.378	14.15	6
Shipping cost	35	34	16	12	6	2.223	13.18	8
Package handling	11	38	22	23	11	2.912	11.11	7
Transportation time	10	16	12	18	47	3.737	15.09	3
Aids and Navigation equipment	4	5	11	19	76	3.912	30.22	1
Safer navigation by mariners	16	22	11	4	50	3.485	17.71	5

Table 2. Description statistical information of the independent variables (sea transport)

Description of the independent variable	Statistical results Mean	S.E.M.	S.D	Variance	Coef. Var.
distance traveled	18.6	9.447751055	21.12581359	446.3	1.13579643
number of ships traveling	54.18638293	30.89295616	115.5908576	13361.24636	2.133208591
Transport mode choice	20.6	6.241794614	13.95707706	194.8	0.6775280125
Shipping cost	20.6	6.241794614	13.95707706	194.8	0.6775280125
Package handling	35.73402855	14.12322689	52.84427623	2792.51753	1.478822242
Transportation time	264.9608437	197.6621985	739.5842253	546984.8263	2.79129631
Aids and Navigation equipment	39629.39084	39028.57342	146031.55	2.13252136	3.684930476
safer navigation by mariners	1523324301	1523222255	30.2242	730.8	3.741406737

Table 4. The ecosystem components most affected by shipping

The components of ecosystem most affected by shipping	The degree of importance from 1 to 5 1(f)	2(f)	3(f)	4(f)	5(f)	Mean Weighted	SD	Independent Variable Ranking
air pollution	15	13	8	13	56	3.718	21.12	4
water pollution	9	12	19	22	44	3.776	13.95	2
noise pollution	8	15	23	44	13	3.378	14.15	6
disturb wildlife	38	34	10	12	6	2.223	13.18	8
damage habitats	19	38	21	26	11	2.912	11.11	7
overfishing	10	16	21	12	47	3.737	15.09	3
habitat loss	4	15	11	19	76	3.912	30.22	1
ocean acidification	16	22	14	14	52	3.485	17.71	5

From the above table and focusing on Aids and Navigation equipment:

Table 3. Description the statistical information of Aids and Navigation equipment

Parameter	Value
Population standard Deviation (σ)	27.0333
Variance (σ2)	730.8
Sample standard deviation (S)	30.2242
Standard deviation confidence interval	[18.1083,86.8508]
Sample variance (S2)	913.5
Sample size (n)	5
Mean ($\bar{x}$)	23
Median	11
SEM	12.0897
Sum of squares	3654
MAD (Mean)	21.2
MAD (Median)	7
Sum	115

Standard deviation (σ): 27.0333

Sample standard deviation (S): 30.2242

$$Sum = \sum x_i = 4+5+11+19+76 = 115$$

$$Mean = \frac{\sum x_i}{n} = \frac{4+5+11+19+76}{5} = 23$$

$$Sums\ of\ squares = \sum (x_i - \bar{x})^2 = (4-23)^2 + (5-23)^2 + (11-23)^2 + (19-23)^2 + (76-23)^2 = 3654$$

$$\sigma 2 = \frac{\sum (x_i - \bar{x})^2}{n} = \frac{3654}{5} = 27.0333^2$$

$$S2 = \frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{3654}{4} = 30.2242^2$$

$$Sums\ of\ absolute\ deviations = \sum |x_i - \bar{x}| = |4-23| + |5-23| + |11-23| + |19-23| + |76-23| = 106$$

$$Mean\ Absolute\ Deviation\ MAD = \frac{\sum |x_i - \bar{x}|}{n} = \frac{106}{5} = 21.2$$

$$Standard\ Error\ of\ the\ Mean\ SEM = \frac{S}{\sqrt{n}} = \frac{27.0333}{\sqrt{5}} = 12.0897$$

The table (1) above shows the statistical significance of the independent variable (maritime transport) from the point of view of the study sample, with the results coming about as follows:

- Aids and Navigation equipment (MW) 3.912
- Number of ships traveling (MW) 3.776
- Transportation time (MW) 3.737
- Distance traveled (MW) 3.718

Figure 2. Description of the independent variable (Marine transportation)

Table 5. Degrees of correlation between navigational devices and aids and the components of the marine ecosystem

Variables	The components of ecosystem most affected by shipping					Pearson correlation coefficient(r)
	1(f)	2(f)	3(f)	4(f)	5(f)	
V1 air pollution	15	13	8	13	56	0.9798
V9 distance traveled	5	11	8	13	56	
V2 water pollution	9	12	19	22	44	0.9954
V10 number of ships traveling	9	12	16	22	44	
V3 noise pollution	8	15	23	44	13	1
V11 Transport mode choice	8	15	23	44	13	
V4 disturb wildlife	38	34	10	12	6	0.9793
V12 Shipping cost	35	34	16	12	6	
V5 damage habitats	19	38	21	26	11	0.945
V13 Package handling	11	38	22	23	11	
V6 overfishing	10	16	21	12	47	0.9365
V14 Transportation time	10	16	12	18	47	
V7 habitat loss	4	15	11	19	76	0.9894
V15 Aids and Navigation equipment	4	5	11	19	76	
V8 ocean acidification	16	22	14	14	52	0.9743
V16 safer navigation by mariners	16	22	11	4	50	

The first row of the table provides a description of the independent variable, which is maritime transport. The second row provides a description of the dependent variable, which is the ecosystem. The last column includes statistics that represent how each variable is measured in terms of its level of significance.

Table 6. Results correlation coefficient (r) between the independent variable (Marine transportation) and the components of ecosystem most affected by shipping

Parameter	Value
Pearson correlation coefficient (r)	0.9758
P-value	0
Covariance	253.241
Sample size (n)	40
Statistic	27.485

4 CONCLUSIONS

The ocean directly affects marine organisms at multiple trophic levels, affecting fisheries, with impacts on food production and human society. Deterioration of the marine environment is a major concern, both due to changes in the marine systems themselves caused by maritime trade through shipping transport, and the potential impact on populations, as the ecosystem services provided by marine systems include the effects of increased atmospheric carbon dioxide and greenhouse gases . Other influences on the marine environment include rising ocean temperatures, rising sea levels, changes in circulation and weather patterns, and changes in ocean chemistry, which can affect all species and their habitats (Bend off et al. The multipressure effects of ocean warming). In addition, acidify the life history of marine invertebrates.

Through the statistical outcome of the ongoing study, we find that there is a strong correlation between the magnitude of the impact of the marine ecosystem and the optimal utilization of navigational aids, which are essential to support the flow, of trade between the different sides of the world, to guarantee the well-being safety of the human life and to promote, trade, exchange and growth among the countries of the world where the opinions of the arbiters have settled. Regarding a variety of components of navigation operations and the scope of their impact on the marine ecosystem, in addition to the close connection between cargo mobilization operations and the environmental dimension, there was also a close correlation between the selection of mode of transport and the environmental dimension impacts, in addition to the air pollution measures, which rise with the sea distance traveled by ships. During its trading voyages between the ports of the countries of the world and a close connection between water pollution and the number of ships sailing in the different oceans and seas and other close interplay between components of navigation operations and their influence on the environmental dimension.

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