EJSDR
European Journal of Sustainable Development Research
e-ISSN : 2458-8091

Environmental Management Planning and Policies of Marine Pollution at the Strait of Canakkale (Dardanelle)

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Abstract

The Strait of Istanbul (Bosphorus), the Strait of Canakkale (Dardanelles), and the Sea of Marmara are the Turkish Straits Sea Area-TSSA, some of the most critical significant components sea routes used for global maritime transport. Turkish Straits Sea Area, from past to present, has historical, geopolitical, geographical, strategic, and economic significance. *The Turkish Straits management and control issues have been passed to the Republic of Turkey with the adoption of the Montreux Convention in 1936.* The Turkish Straits are a natural waterway that is unique in the world. There are settlements on two sides of both Istanbul and Çanakkale Straits, and transportation provides by bridges that provide land passage. The control and maintenance of maritime safety and management processes such as local shipping traffic between the two coasts, innocent transit in international maritime transport, security navigation, and marine environmental management are under the authority of the Republic of Turkey. With the increased factor of energy transportation from the Black Sea recently, the Turkish Straits have gained more importance. This study tries to explain Environmental Management Planning and Policies of Marine Pollution by Ship transportation at Strait of Canakkale.

Key words

Turkish Straits Sea Area (TSSA), Çanakkale Strait (Dardanelle), Oil Pollutions, Collusion, MARPOL, Strategy of Maritime Management.

1. INTRODUCTION

The Republic of Turkey has a significant geopolitical and strategic position. Due to the straits, Turkey connects the continents of Asia and Europe. Also, the Turkish Straits consist of three major elements; Istanbul, the Strait of Canakkales, and the Marmara Sea. The Straits are a great example of the natural seaway of the world. Well-known Bosporus and Dardanelles names came from ancient times [1].

Moreover, Turkish authorities do not longer use these terms on the charts with geographic names. The Turkish strait sea area's all parts belong to the sovereign sea territory of Turkey and are subject to the regime of internal waters by UNCLOS sentences. The Turkish Strait Sea Area is the most suitable and safe waterway between the Mediterranean and the Black Sea due to its significant recent energy transportation. From 1936, The Turkish Straits, have been begun to govern by the Montreux Convention. The Montreux Convention has treaty obligations. Due to the obligation, the Republic of Turkey gave annual reports to the League of Nations Secretary-General.

Then in 1945, they gave these reports to the United Nations Secretary-General. Reports had consisted of general information about straits and navigational safety etc. These reports, which also go to the High Contracting Parties, are entitled,' Rapport Annual Sur le Mouvement des Navires a Travers Les Detroits Turcs' (Annual Report Concerning the Movement of Ships through the Turkish Straits). A significant detail in favor of using the 'Turkish Straits' expression came from a United Nations document. This document belongs to the Third United Nations Conference on the Standardization of Geographical Names. This Conference was held in Athens, in 1977, by 152 attended participants representing 59 countries, with observers from 11 non-governmental and international scientific organizations. The main aim of the Conference was to use national names to standardize the names of geographical locations. The resolutions of the Conference empower Turkey in the use of the name 'Turkish Straits.' [3,4].

This conference's result document's title is proof of the international credence of the expression 'Turkish Straits.' [2,3,5]. In recent years, straits have been the most critical trade way of the world cause of the oil and oil products due to the importance of energy transportation. Throughout recorded history, the strategic location has led to conflicts between Turkey and the countries interested in the Black Sea in terms of political, economic, and trade interests. Nicolae Titulescu, who was representative of Romania, expression "Straits are the hearts of Turkey, but also lungs of Romania," affirms the importance of the Straits in the Montreux Conference. [3,7]

Turkey is in the middle latitudes. So, it could quickly feel like 4 season and their effects. Due to this reason, The Turkish Straits Sea Area has exceptional conditions in terms of the marine environment, which includes atmospheric and oceanographic conditions, plant and animal diversity, and the terrestrial environment. Many different marine species and fishes live and use straits for migration. Due to this condition, the area also has roles as a biological corridor and biological barrier between the Mediterranean Sea and the Black Sea and forms a valuable acclimatization zone for migrating species. The Turkish Straits have been exposed to dense marine traffic for centuries, and a substantial increase has occurred in the size and tonnage of the ships passing through the Straits with hazardous cargo varieties and the amounts they carry by the neighboring Black Sea states, the Central Asian Turki Republics. Recently increase in the number of vessels that navigate the Straits and being on the transportation way of hazardous goods pose serious environmental and safety hazards for the Turkish Straits Sea Area and its surrounding residential areas. The high density of marine traffic affects straits and makes navigation somewhat tricky. The Straits have faced many casualties and collisions that caused severe environmental problems due to oil spilling [3,8].

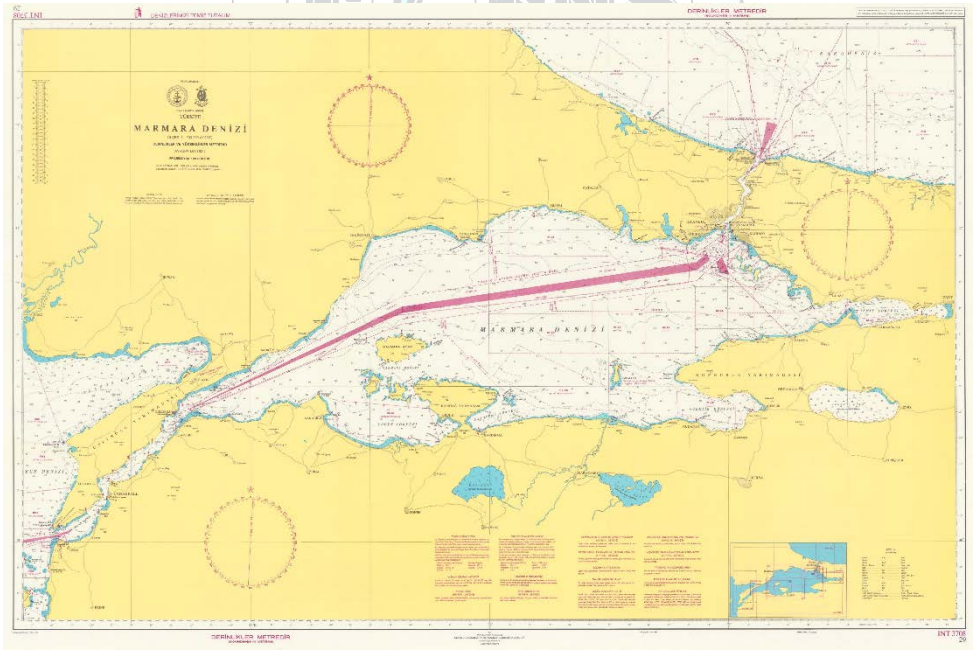

Fig. 1 The Turkish Strait Sea Area overview from paper chart number TR29.

2. THE STRAIT OF CANAKKALE OVERVIEW

The Strait of Canakkale is one of the significant components of the Turkish Strait Sea Area(TSSA). Strait of Canakkale is almost 20 NM longer than the Istanbul strait. Canakkale's Morphological and geographical status is quite different from the strait of Istanbul [9]. The surveyed current direction of the Çanakkale Strait is NE-SW. Between the Biga and Gelibolu peninsula, areas are very narrow.[10,16] From Anafartalar to the north and the

Biga ridge to the south of the Çanakkale Strait has an average depth of -55 meters and reaches a depth of -90 meters. [16] Çanakkale Strait constitutes 22% of the Turkish Straits Sea Area, and the sea traffic separation lane is limited to 40 ° 26',00 N - 026 ° 45',25 E and 40 ° 01',52 N - 026 ° 11',18 E and has shown the Maritime Traffic Regulations for the Turkish Straits. The Strait of Canakkale is defined between the longitude passing through Zincirbozan Lighthouse in the north and the line between Mehmetçik Cape Lighthouse-Kumkale Cape Lighthouse in the south [16].

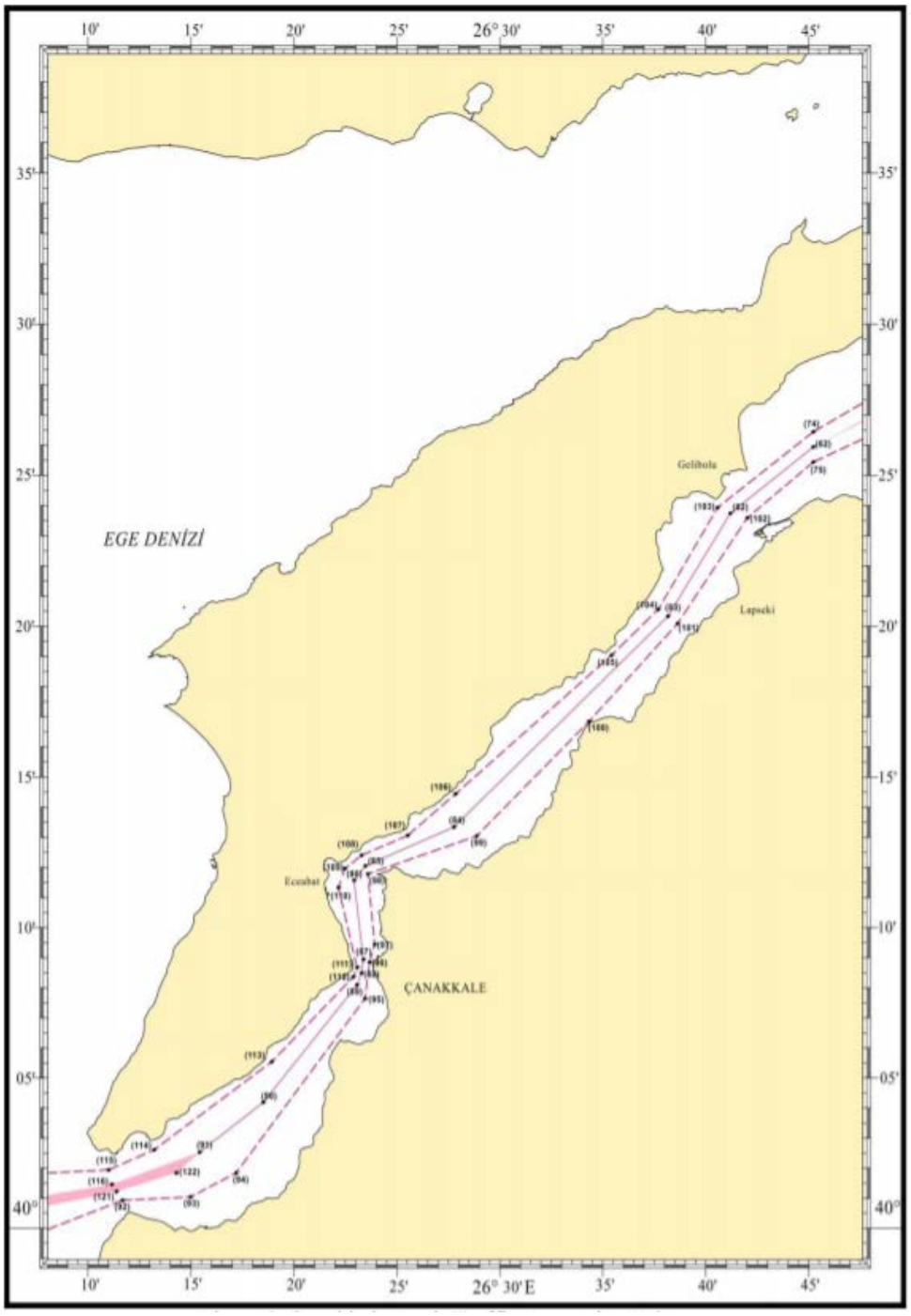

Fig. 2 The Strait of Canakkale Traffic Separation Scheme.(KEGM,2022)

The Strait of Canakkale has a different geographical status than Istanbul. Furthermore, the Strait of Canakkale's length is two times longer than Istanbul's. However, Canakkale's geomorphological structure is rugged on the north and south lines.

3. THE STRAIT OF CANAKKALE'S MARINE SCIENCE INFORMATION

The Strait of Canakkale constitutes 22.56% of the Turkish Straits' sea area. Kilitbahir and Çanakkale point is the narrowest part of the strait with1300 meters, and the shore of Intepe and Domuz Dere is the widest part with 8135 meters. Not only The Istanbul Strait but also Strait of Canakkale has two different currents. Both two strait's first current face is the surface current which comes from the Black Sea to the Aegean Sea through the Marmara Sea. and the second face or water column is the undercurrent coming from the first layer of the Mediterranean and passing through the Aegean Sea towards the Marmara Sea direction. Although nearly 600 km3 of water is lost annually(surveyed) by surface current coming from the Black Sea, it gains approximately 300 km3 of water per year thanks to the undercurrent coming from the Mediterranean Sea via the Turkish Straits. [13,16]. The surface current values between the Sea of Marmara to the Aegean Sea are 0.5 and 5 knots. According to a hydrographic survey, this area's current speed reaches 2 knots per hour at Gelibolu. With geographic status and meteorological effects south side of Nara Cape and in front of Kilitbahir point, the current value is 5 knots. Especially between Çanakkale with Kepez area current value is also strong.

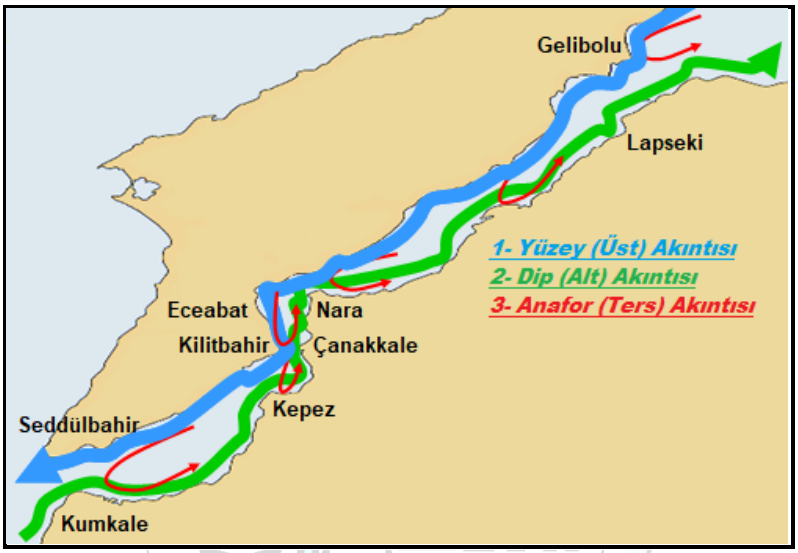

Fig. 3 Current Atlas of the Strait of Canakkale [16].

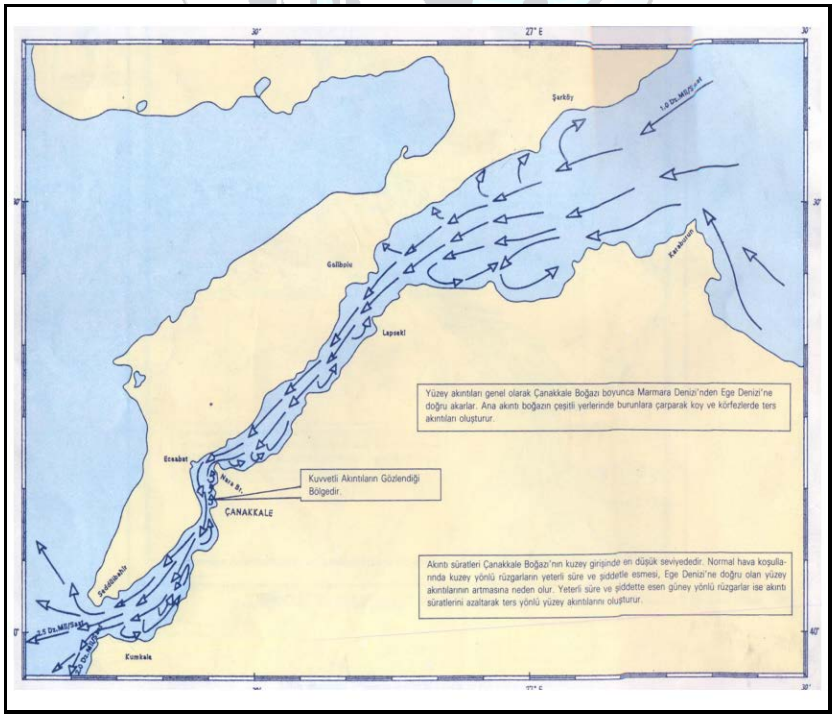

Fig. 4 TN-ONHO-The Strait of Canakkale's current chart.(TN-ONHO)

Table 1. Surveyed Wind general values of Canakkale city by Ministry of Environment and Urbanisation [17].

MONTHS	Average wind speed (m/s)	Fastest wind direction	Fastest wind speed (m/s)	Average number of stormy days	Average number of days with strong winds
NOV	3,8	N	20,6	1	18
DEC	2,8	SSW	14,9	0	7
JAN	4	S	22,1	4	14
FEB	4,1	NE	19,5	4	11
MAR	3,9	NNE	19	1	15
APR	3,1	SSW	20,1	1	9
MAY	3,2	S	15,9	0	8
JUN	2,9	NNE	17	0	12
JUL	3	NNW	16,5	0	19
AGU	3,7	NNE	14,9	0	22
SEP	3,3	ENE	14,9	0	19
OCT	2,7	WNW	23,7	1	13

When northerly winds blow, the speed of the upstream increases. The excess water of the Black Sea reaches the Aegean with the discharge current of the upper current; To compensate for this, the intense Mediterranean-origin waters enter the Marmara with the undercurrent. While the dominant wave direction of the upper current is in the North direction in January and February, it is in the North direction in general besides being South direction from time to time due to the Lodos wind in April. In other months, since the effect of the Northwind is not as effective as in the winter months, the dominant wave directions in the Northeast direction are determined by the general Northeast direction of the strait. Wavelengths are generally 0.6 m. However, maximum values are reached in March, and wavelengths of 3-9 m are detected. The main factor in this change is the hydrological increase in the stream-based water inputs around the Black Sea. The salinity effect is also an essential issue at Strait of Canakkale. The incredibly first layer is the surface current coming from the Black Sea that reaches the entrance of the Çanakkale Strait. Also, the value takes from 16-17 to % 22-26 with the effect of the Marmara Sea salinity ratio. On the other hand, the salinity value is observed to be %27-28 in the middle of Strait of Canakkale, and it reaches % 33 towards the south area. The salinity ratio value of the Mediterranean between the southern exit of the Çanakkale Strait reaches up to % 36-37. The first layer is the current surface is also affected by meteorology. It shows effect via wind. Two directions are essential for current effects North-Northeast and South-Southwest.

4. THE STRAIT OF CANAKKALE OIL SPILL RESPONSE POSSIBILITIES OVERVIEW

In the Turkish territorial waters safety responsible is the Directorate of Coastal Safety. The Directorate is working under the Ministry of Transportation and Infrastructure. Moreover, Its mission is to assist and improve the safety of navigation in Turkish Territorial Waters. The objectives of coastal safety are to assist the cruise security of Turkish and foreign-flagged ships sailing in our seas and territorial waters, provides coastal safety and ship rescue services, pilotage tugboat services and set up and operate their related devices and facilities, save lives, goods, and ships, helps, tow, removes shipwrecks and carry out towage and diving services related to them, makes and operates all kinds of investments related to coast radio stations, Automatic Identification System, dGPS and similar systems established and establishes for safe navigation and to increase the safety of navigation. The existing response equipment to marine pollution that may occur after marine accidents in the Strait of Canakkale is as below; A total of 3 open sea barriers, two-port barriers, four skimmers, and 5 Sea Slug are among the vehicles to be used in possible marine pollution, 2 of which are standard, 1 of which is inflated. All of the opportunities for response to marine pollution in the Strait of Canakkale are established at the station in Akbaş. In addition, there is

a Trash and Debris Boom (Open Sea Purpose) for intervention in Lapseki, which is the entrance of the Strait of Canakkale from The Marmara Sea. Furthermore, all these solution materials are at the Akbaş Rescue station.

Fig. 4 Boom equipment example.

Fig. 5 Port / Harbor Offshore Barriers.[18]

5. ENVIRONMENTAL MANAGEMENT PLANNING AND POLICIES IMPORTANCE

From the General Directorate of Coastal Security statistics, a total of 43.759 ships in 2019 and 42.036 ships passed at Strait of Canakkale in 2020. Also, the same Directorate statistics, more than 60 accidents occurred in and around the Çanakkale Strait at the end of 2019. Eight accidents occurred at the north entrance, 16 of them at a south point and 36 numbers of them in the middle of the Strait of Canakkale. It is an essential policy to effectively fight against marine pollution, protect natural resources, not disturb the marine ecological balance, and coordinate with the relevant institutions/organizations and municipalities at the regional and national levels.

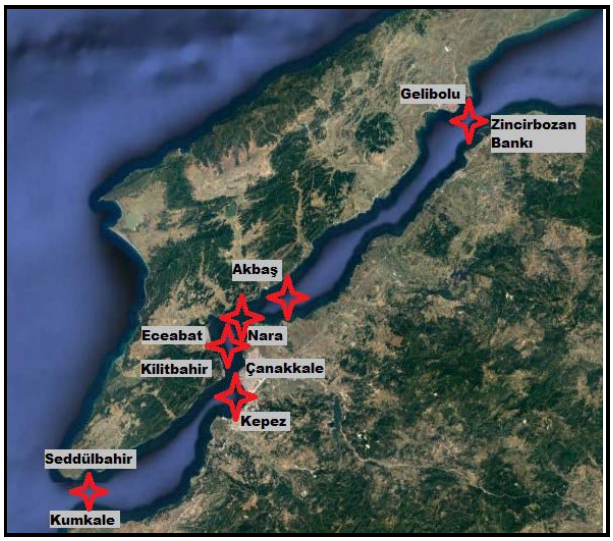

Fig. 6 Accident Chart of the Çanakkale Strait [16].

Also, in the Official Gazette dated 24/6/1990 and numbered 20558 It has become a party to MARPOL 73/78 (International Maritime Convention for the Prevention of Pollution of the Seas by Ships) with the published convention. The paragraph (ö) of the third clause of the 5th article of the second part of the Waste Management Regulation came into force by being published in the Official Gazette dated 02.04.2015 and numbered 29314. It is forbidden to pollute the environment by pouring into the soil, seas, lakes, streams and similar receiving environments; directly filing and storing has a provision. As it is known, in subparagraph (h) of Article 9 of the National Environmental Law No. 2872, "The country's by protecting sea, underground and surface water resources and aquaculture production areas. It is essential to ensure that it is used and protected against pollution". Also, in Article 8, "All kinds of wastes and residues, in a way that will harm the environment, as determined in the relevant regulations. To give directly or indirectly to the receiving environment in violation of the standards and methods, It is forbidden to store, transport, remove and engage in similar activities." place for judgment is given. Table 2 shows the marine environment regulation list used to protect seas and oceans.

Table 2. Marine Environment Regulations (https://www.iaphworldports.org/legal-database-on-international-maritime-conventions-impacting-on-ports/maritime-environment)

Int. Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969
Convention on the Prevention of Marine Pollution by Dumping of Wastes and other matter, 1972
Int. Convention for the Prevention of Pollution from Ships of 1973 MARPOL73/78
United Nations Convention On the Law of the Sea, 1982
Convention on Biological Diversity-1993
Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000
International Convention on the Control of Harmful Anti-Fouling Systems on Ships, 2001
Convention on the Protection of the Underwater Cultural Heritage 2001
IMO Resolution A 949(23) guidelines on places of refuge for ships in need of assistance, 2003
International Convention for the Control and Management of Ships Ballast Water and Sediments, 2004
Nairobi International Convention on the Removal of Wrecks, 2007
Hong Kong International Convention for the Safe and Environmetally Sound Recycling of Ships,2009

As described in section 4, there is a station that working for oil spill prevention at Akbaş position. This station placed in the middle of the Strait of Canakkale. Geography, meteorology status, and surface layer current affect negatively the operation.

6. CONCLUSION AND RESULTS

According to the general studies and the results obtained from the simulation applications with the data in hand, possible marine accidents in the Dardanelles will cause significant damage. In particular, the increase observed in

chemical cargo transportation and tanker usage, which has increased due to energy transportation, has focused attention on chemical tankers. The result of a possible chemical tanker accident is very significant to intervene in the accident as soon as possible, depending on the place and region of the accident. In the geographical limitation observed in the Dardanelles, it is difficult to intervene when an accident occurs on the Nara-Eceabat and Kilitbahir-Çanakkale lines, the narrowest region in the valley structure and where the current density increases. In rapid intervention, The European side of the Strait of Canakkale should be protected by coastal protection barriers. In addition, for the shores of the Anatolian side of the Strait of Canakkale, the Kepez region should be protected with coastal barriers. Especially in accidents that cause marine pollution, it is necessary to contain the oil with a floating fence barrier or inflatable fill barrier to reduce the spill effect. In this way, it will be possible to clean the sea. In case of a possible maritime accident in the Strait of Canakkale, the Ministry of Interior, Coast Guard Command intervenes with the equipment available in the Lapseki station (except for the open sea barrier) and with the possibilities and capabilities of the Ministry of Transport and Infrastructure, General Directorate of Coastal Safety in the Akbaş station. Considering these two stations and their facilities, it is recommended to establish stations in other places, although they have good opportunities.

CONFLICT OF INTEREST STATEMENT

The author declares that there is no conflict of interest.

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