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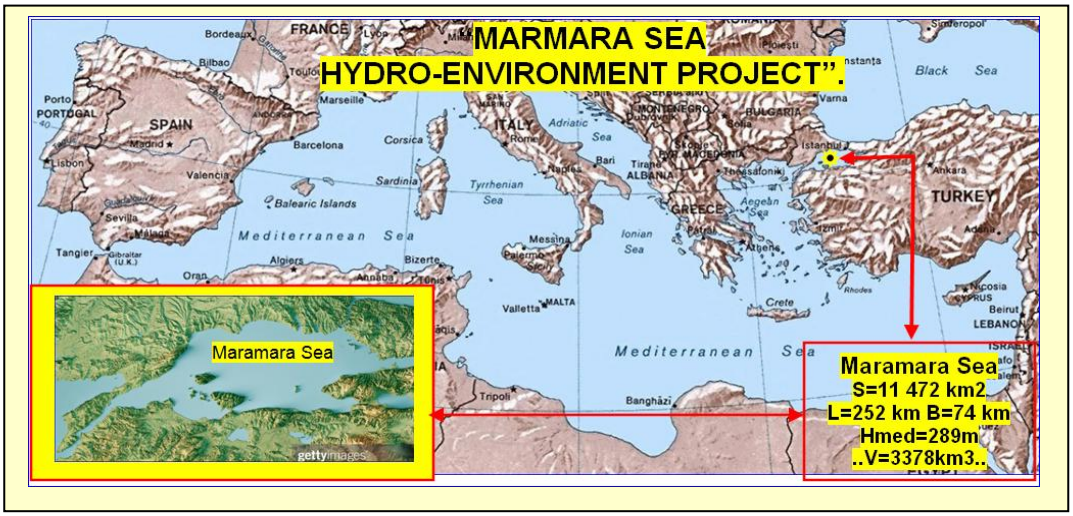
PROJECT - 4 –

“THE ENVIRONMENTAL PROJECT OF THE MARMARA SEA”.
"The Marmara Sea must be as clean as the Mediterranean”.
“THE LARGEST PORT IN THE MEDITERRANEAN CAN BE BUILT IN THE GULF OF SAROS."



ENVIRONMENTAL POLLUTION IN THE SEA OF MARMARA.

- In early June 2022, the southern shores of Istanbul were covered by a layer of gelatinous mold, which blocked tourism activities,fishing, and poisoned the marine life.The phenomenon of microalgae spread along the coastline is known in tropical areas,the Mediterranean Sea,and the Sea of Marmara. the current situation,the Sea of Marmara serves as a dumping ground for urban,industrial,marine waste,etc. hese,along with climate change, high pressure, temperature increase, and lack of marine water circulation,have produced a layer of mold on the surface of the sea.
- Specialists identified the cause and consequences of the mold formation. They proposed cleaning the surface of the sea as an emergency intervention. In the long-term perspective, it is expected that the Sea of Marmara will be declared a Protected Area. This implies a multi-year program of measures to register, monitor, manage, clean, and process all urban, industrial, agro-agricultural, marine, and wastewaters that are discharged and pollute the Sea of Marmara
- The project authors believe that the *Marine Protected Area* program is insufficient to keep the waters of the Sea of Marmara clean.The natural increase in the water circulation speed between the Sea of Marmara and the Mediterranean Sea would directly impact the cleanliness of the Sea of Marmara's waters. The goal of the study is to turn the Sea of Marmara into a "small Mediterranean"

- . This can only be achieved by increasing the natural circulation speed of marine waters within the Sea of Marmara and between the Mediterranean Sea and the Sea of Marmara. One way is to open new communication channels between the seas. To conceptualize the project for increasing the natural speed of marine waters, we will provide a view of the coexistence of the Sea of Marmara with the Black Sea and the Mediterranean Sea.

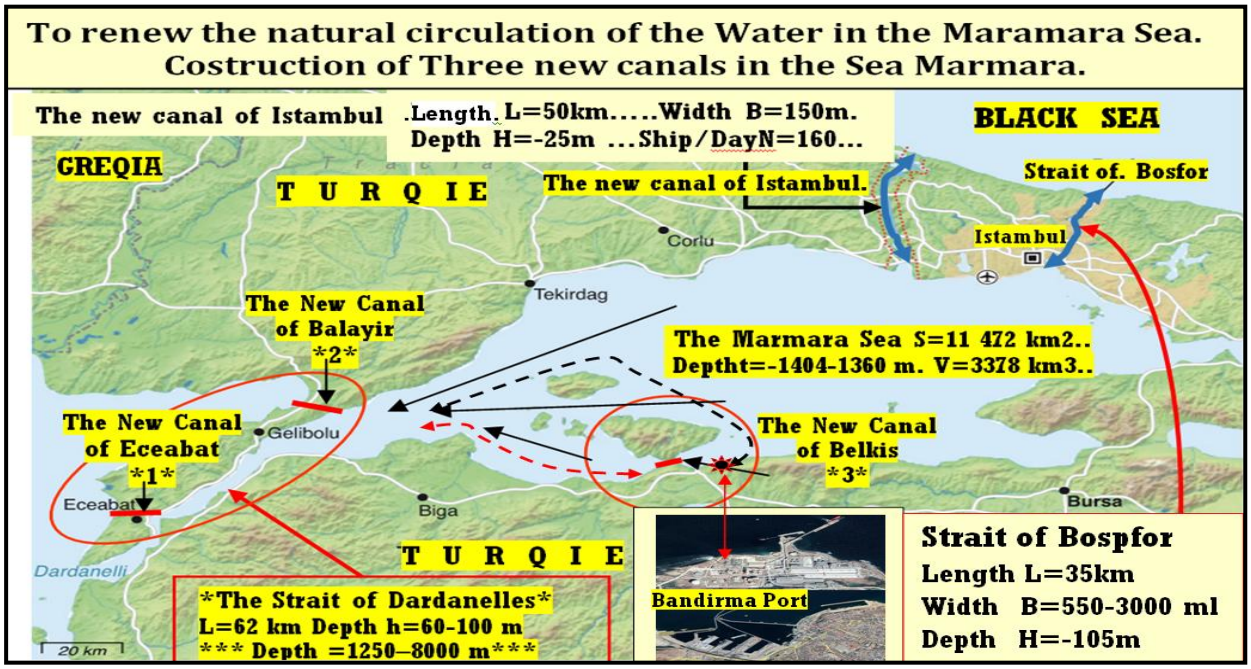


Fig.1 The planimetry of the Marmara Sea and the three channels planned to be constructed.

THE THREE TURKISH STRAITS AND THE SEA OF MARMARA

1. The Bosphorus Strait, the Sea of Marmara, and the Dardanelles Strait are three strategic straits that connect the Black Sea to the Mediterranean Sea.
2. The Bosphorus connects the Black Sea with the Sea of Marmara and is one of the narrowest and most heavily trafficked maritime straits in the world. It stretches approximately 30 kilometers in length and varies in width from 700 to 3,500 meters,making it a complex waterway to navigate,especially for large ships.The Bosphorus has significant strategic importance for international transportation, as it represents a key point for connecting Russian ports and other Black Sea regions with global markets. Both sides of the Bosphorus are urbanized.
3. The Sea of Marmara is an inland sea of Turkey that links the Bosphorus with the Dardanelles Strait. It is relatively small, covering an area of about 11,472 km², with depths ranging from 1,360 to 1,404 meters and a volume of 3,378 km³, but it plays an important role in maritime transport. This sea serves as a transit point for ships traveling between the Black Sea and the Mediterranean. Hydrologically, the Sea of Marmara acts as a communicative vessel between the Black Sea and the Mediterranean. Every year, 211 km³ of water, or 6,690 m³/sec, flows from the Black Sea to the Mediterranean via the Sea of Marmara and the Dardanelles Strait. Additionally, the Sea of Marmara is one of the most urbanized and touristic seas in the Mediterranean. Its shores are home to over 25 million residents and receive more than 15 million tourists annually. Major communities along its coast include Istanbul, Bursa, Kocaeli, Tekirdağ, and Ereğli. The high urban and industrial intensity and lack of water circulation contribute to the pollution of the Sea of Marmara.

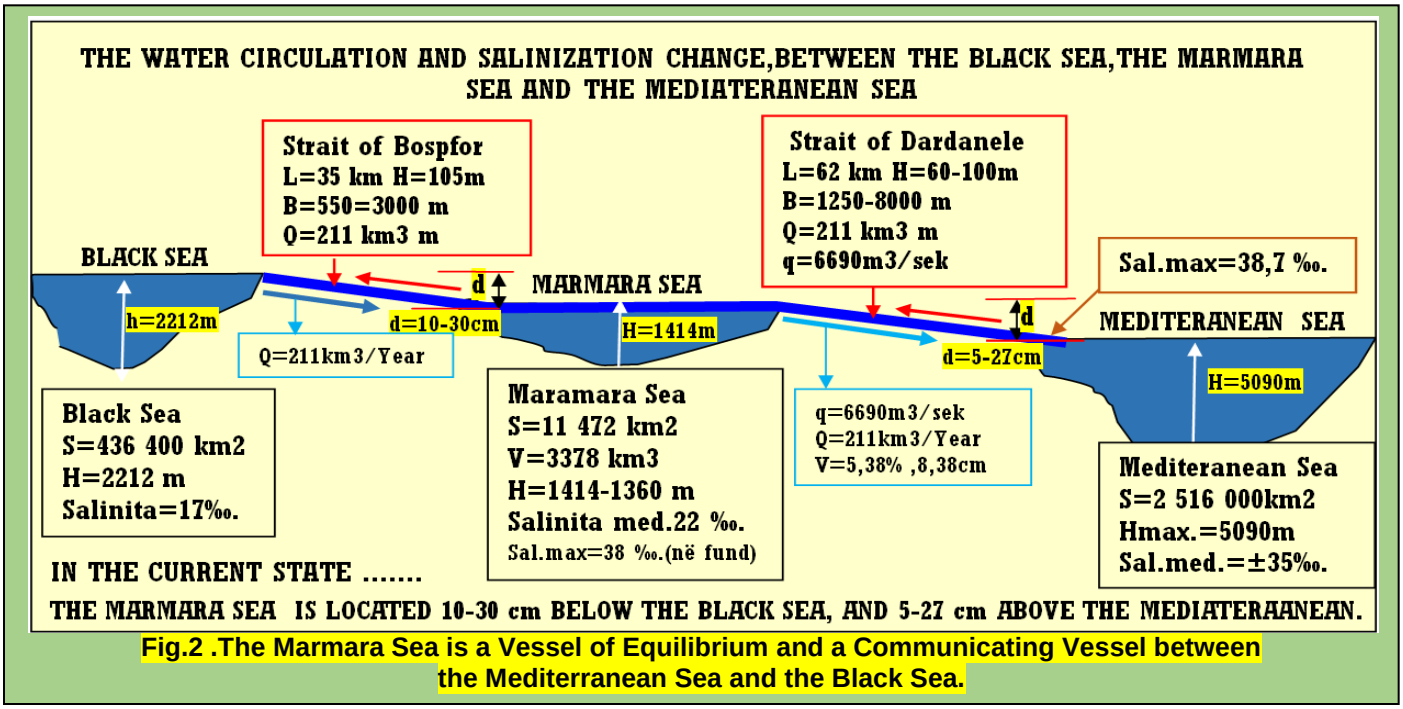


Fig.2 .The Marmara Sea is a Vessel of Equilibrium and a Communicating Vessel between the Mediterranean Sea and the Black Sea.

1. **The Dardanelles Strait**:The Dardanelles connects the Sea of Marmara with the Aegean Sea and stretches over approximately 62km,width 1250-8000m,depth 60-100m.This strait holds exceptional historical and strategic importance,serving as a critical point controlling entry to the Black Sea and facilitating Europe's supply of energy and other goods via the Mediterranean route. The Dardanelles faces navigational challenges due to its powerful water currents and significant variations in width.These three straits are highly important for commercial movements and have a direct impact on the economic and political stability of the region and global energy markets.
2. The volume of water passing from the Black Sea through the Sea of Marmara and the Dardanelles Strait to the Mediterranean is 211km³,or about 1/16 of the annual volume of the Sea of Marmara. According to hydrometric measurements, the level of the Sea of Marmara is 10-30 cm below the level of the Black Sea and 5-27 cm above the level of the Mediterranean. The level of the Sea of Marmara, between the two seas,shows that Marmara acts as a communicating vessel between the two seas. However, there is a disturbance in the communication between the sea through the Bosporus Strait and the exit through the Dardanelles Strait. The geometric shape of the two straits differs significantly, which hinders the circulation of waters between the Mediterranean and the Black Sea. The physical shape of the two straits slows the rapid circulation of waters from the sea into the Mediterranean, particularly the Dardanelles Strait, which prevents the free movement of waters. If the Dardanelles Strait did not exist,or if it were five times wider and straight,the pollution in the Sea of Marmara would not occur.
3. In the annual cycle, two strong marine water flows pass between the Sea of Marmara and the Mediterranean. The salinity in the Sea of Marmara reaches around 22‰, while at the exit of the Dardanelles Strait (Sedd el Bahr Seddubahir) or in the Mediterranean, the salinity reaches 35‰. The difference in salinity between the Sea of Marmara and the Mediterranean (22‰ - 35‰) **shows that the exchange of waters between the two seas is not free; it is open, but not uniform. The only barrier is the length and dimensions of the Dardanelles Strait. The exchange of waters between the Sea of Marmara and the Mediterranean should be open and as natural as possible. If the natural purity of the waters of the Sea of Marmara is maintained, the waters of the Mediterranean should circulate without obstacles in the Sea of Marmara, opening new communication channels.**

"WHAT THE PROJECT OFFERS"

- The project foresees,for the first time,the opening of three new maritime channels.The Eceabat Channel and the Balayr Channel directly connect the Sea of Marmara with the Mediterranean Sea. The Belkys Channel is an internal maritime link.The channels are named after the urban centers near them.The construction of the new Istanbul maritime channel, between the Black Sea and the Sea of Marmara, on one hand solves the transport and passage of goods via sea, while on the other hand increases the water flow from the Black Sea to the Sea of Marmara. According to the authors, the Istanbul Channel will open by 2030 Its construction increases the urgency for the construction of new channels between Marmara and the Aegean or Mediterranean Sea.Traffic between the Sea of Marmara and the Mediterranean Sea will be free in the future, and the communication channels will be extended and expanded. The construction sites for the three maritime channels have been selected based on the surface currents and depth determined by the maritime charts of Mustafa Eryilmaz in 1999.

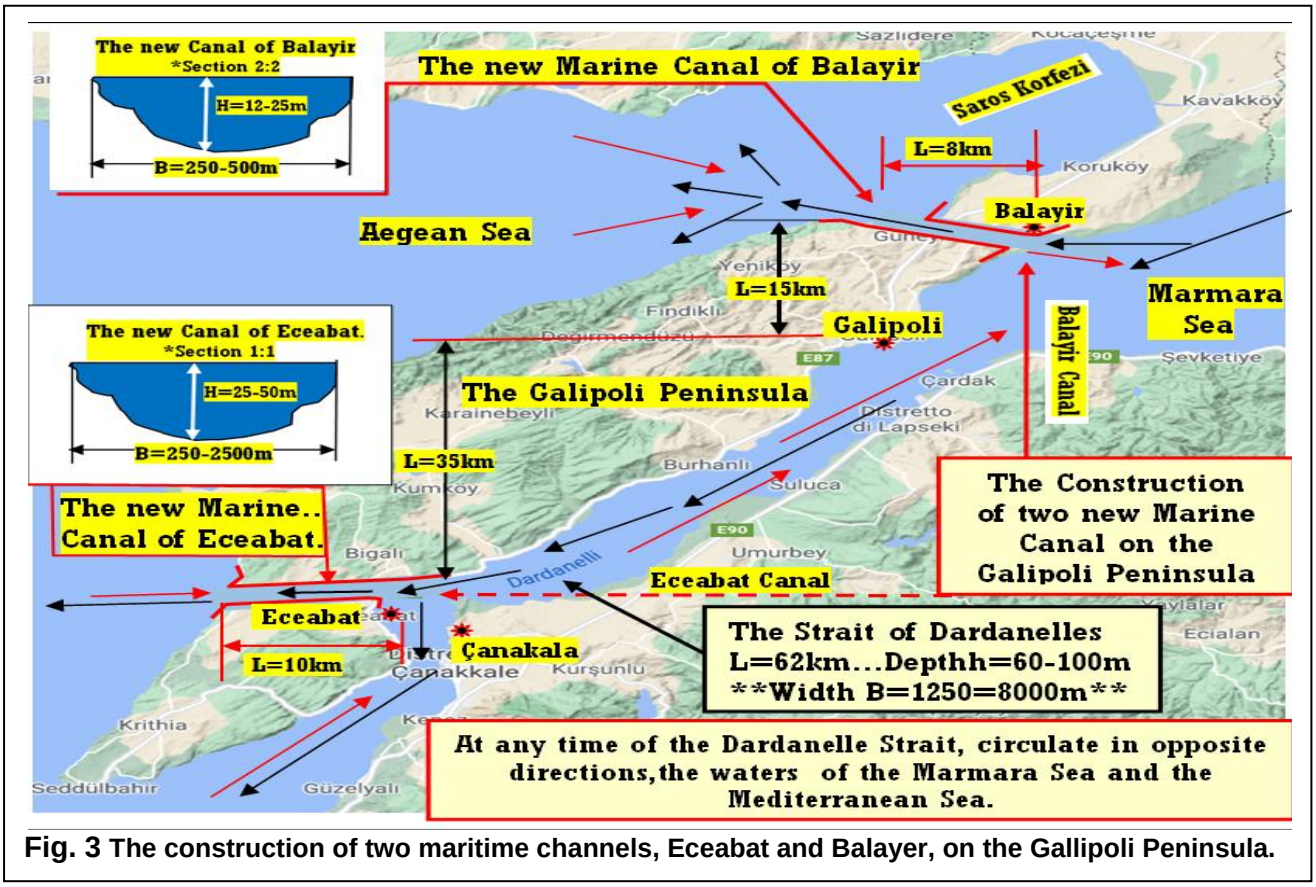


Fig. 3 The construction of two maritime channels, Eceabat and Balayer, on the Gallipoli Peninsula.

THE NEW BALAYR MARITIME CHANNEL

- The construction of the new Balayr Channel doubles the contact between the waters of the Sea of Marmara and the Mediterranean Sea, near the Dardanelles Strait. This depends on the dimensions of the channel. The discharge of waters from the Balayr channel is favored by the counter-ice currents in (Gulf of Xeros, Saros Gulf) in the Aegean Sea from the Mediterranean side, circulating around the island Samothraki. The Balayr Channel is located about 50 km above the Eceabat Channel and about 15 km above the city of Gallipoli. The Bosporus Strait, Gulf of Izmit, and Gulf of Erdek are all affected by the channel's dimensions. Its impact on the waters, between the Sea of Marmara and the Mediterranean, and on the cleanliness of the Sea of Marmara's waters from the construction of the Balayr Channel is part of an emergency construction plan to preserve the clean waters of the Sea of Marmara.

THE NEW ECEABAT MARITIME CHANNEL.

- The construction of the new Eceabat maritime channel increases the water traffic between the Marmara Sea and the Mediterranean Sea by 2-3 times near the Dardanelles Strait. This is also confirmed by the maps created by researcher Mustafa Eryilmaz in 1999. On the Mediterranean side, Eceabat's water is drawn by the counterclockwise current near the island of Samothraki and the counterclockwise flow passing under the island of Gökçeada. The opening of the channel is supported by opposing surface and subsurface currents. The Eceabat Channel is six times shorter and has no curves compared to the Dardanelles Strait. The entry and exit points of the Eceabat Channel, on the Mediterranean and Marmara coasts, can be visually distinguished both day and night. It can serve as a maritime agreement for the transport and transit of goods.Freeing the Dardanelles Strait for maritime transportation, tourism, cultural-sport trade,fishing,urban centers,etc., means that the Eceabat maritime channel can also serve as an Urban Water Space for Marmara through the construction of the channel, which must be built for the clean waters of the Marmara Sea.

REGULATION OF INTERNAL WATER CIRCULATION IN THE SEA OF MARMARA WITH THE BELKYS MARITIME CHANNEL

- The Belkys Channel regulates the internal circulation of waters in the Sea of Marmara. It transforms the Kapidag Peninsula into an island symbolically, connecting the Gulf of Erdek with the Gulf of Bandirma through a waterway. The Marmara islands, Avsa, Pasaliman, and the Kapidag Peninsula, along with Emrali Island, and the Gulf of Gemlik and Izmit, block the surface and underground circulation along the southwestern shore of the Sea of Marmara. Particularly, the Kapidag Peninsula forms the Gulf of Erdek and the Gulf of Bandirma, creating marine spaces with very slow circulation. The construction of the Belkys Channel will release the circulation of waters from the coastal areas of the Gulf of Gemlik, Peramo or the Gulf of Bandirma, and the Gulf of Erdek to the southern shores of the Dardanelles Strait. According to hydrological calculations,the new Belkys maritime channel will accelerate internal circulation in 1/3 of the southwestern waters of the Sea of Marmara. Besides the freedom of water circulation,the Belkys Channel allows goods coming from the Mediterranean and processed at the Bandirma port to sail through the Gulf of Erdek, saving 30-50 km of sea route with each crossing. The level of water circulation within the Sea of Marmara is determined depending on the dimensions of the new Belkys Channel.

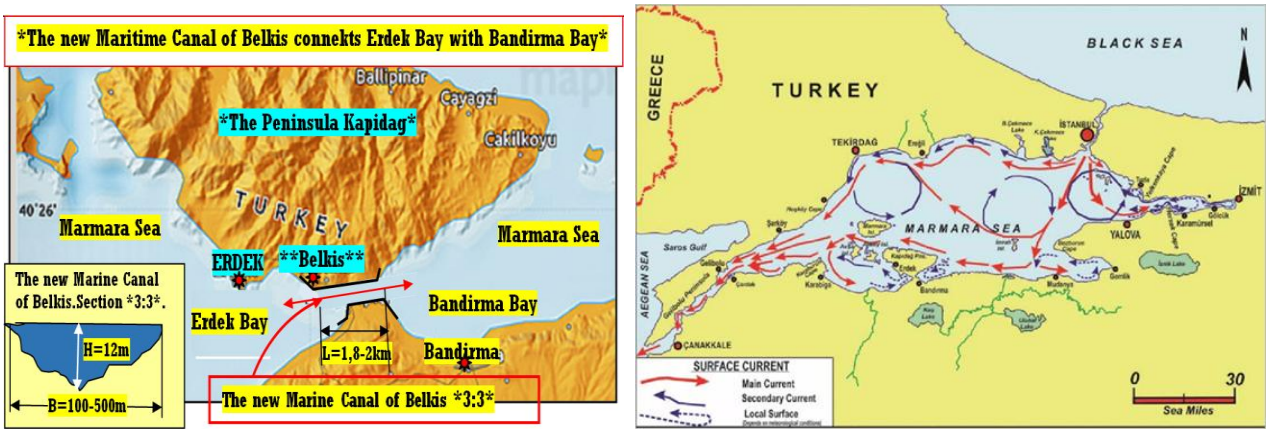


Fig. 4 The position of the Kapıdağ Peninsula and the Belkız Channel. The currents of the Marmara Sea, surface, deep, and local.

NATURAL HARBOR OF KORFEZI BAY
THE LARGEST AND DEEPEST PORT OF THE MEDITERRANEAN SEA, OR "THE ROTTERDAM OF THE AEGEAN SEA"

- The Gulf of Saros has natural characteristics that make it suitable for building a Mega Port of global dimensions, similar to the Mega Port of Rotterdam in the Netherlands. It is a deep and sheltered gulf, and the presence of small islands, along with its maritime conditions, creates an ideal environment for constructing a large port. Such a port would enable a logistics and trade center for maritime transport, with the potential to handle large cargo and facilitate international trade connections.

1. Land transport routes are N=1.5 times shorter than sea transport routes from the Black Sea.
2. Korfezi Port - Edirne: L = ±150 km…….....Korfezi Port - Plovdiv: L = ±300 km
3. Korfezi Port - Sofia: L = ±450 km…….Korfezi Port - Plovdiv to Bucharest: L=±600 km
4. Korfezi Port - Plovdiv to Bucharest to Kishinev: L = ±950 km
5. Korfezi Port - Plovdiv to Bucharest to Kyiv: L = ±1300 km

PORT INDICATORS

1. Total port area: S = 300 km² (30,000 hectares)
2. Water basin area: S = 255 km² (25,500 hectares)
3. Land area for port and terminals: S = 45 km² (4,500 hectares)
4. Port depth: H = -20 m
5. Anchorage pier perimeter length: L = 30–45 km
6. Maximum cargo handling capacity per year: V = 450–500 million tons
7. The Saros Korfezi Port is often compared to the Port of Rotterdam.

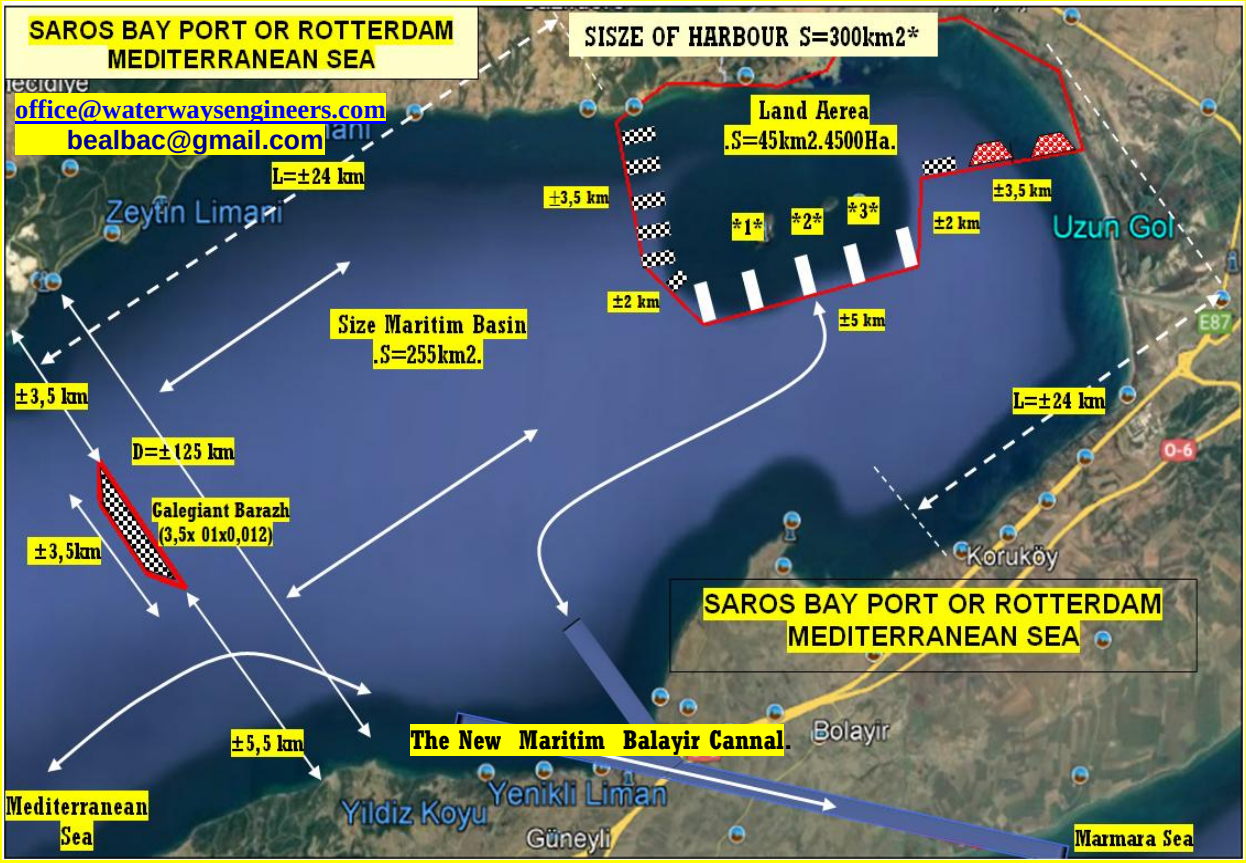


Fig. 5 The construction of the largest Mediterranean port in the Gulf of Saros... Variant.