

## **Bosphorus: Is The Passage Getting Safer?**

### **Istanbul Boğazı : Geçişler Artık Daha Güvenli mi?**

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#### **Abstract**

The Bosphorus (Istanbul Strait) is the most critical passage in the World for vessels passing through; mainly due to its narrowness, its shape with several sharp turns and headlands which limit to have an extended sight for a proper look-out and close the view behind, complex as well as day-to-day changing nature of its currents.

The localities with high risk for grounding or stranding in the Bosphorus are: Umur Bankı, Yenikoy, Bebek, Kandilli; for collisions the evidence suggests that critical areas are Beşiktaş, Bebek, Kandilli, Kanlıca, Yeniköy, Beykoz and Sarıyer.

The Montreux Convention relating to freedom of passage and navigation establishes and regulates the regime with certain formalities for a merchant and naval vessel since 1936. The Strait is kept open for shipping traffic day and night, and serves as an international waterway of commercial importance.

Turkish Government has taken constructive steps forward to enhance navigation and environmental safety in the Region, the Strait of Istanbul inclusive, by implementing maritime traffic regulations and setting VTMIS which is fully operational since mid-2003.

So far, the outcome is promising, and the annual rate of casualty has decreased significantly. However, it is too early to judge how far the VTMIS has been effective in achieving the ultimate goal.

**Key words :** Strait of Istanbul, Vessel Traffic and Information System (VTMIS), shipping casualty, shipping traffic, Traffic Separation Scheme (TSS).

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## Introduction

### *1. General Features of the Strait*

Maritime transportation is the dominant purveyor of international freight distribution. Such ongoing evolves over a global maritime space. International maritime routes are thus forced to pass through specific locations corresponding to passages, capes and straits. These routes are generally located between major industrial zones such as Western Europe, North America and East Asia. The most important strategic passages tend to be shallow and narrow, impairing navigation.

The Strait of Istanbul is likewise a narrow and confined seaway open for international shipping, and is one of the major trade arteries in the world. It connects the Black Sea to the Aegean Sea and then to Mediterranean. It also forms a vital link between the riparian states of the Black Sea, the Mediterranean nations, and the world beyond (Fig.1).

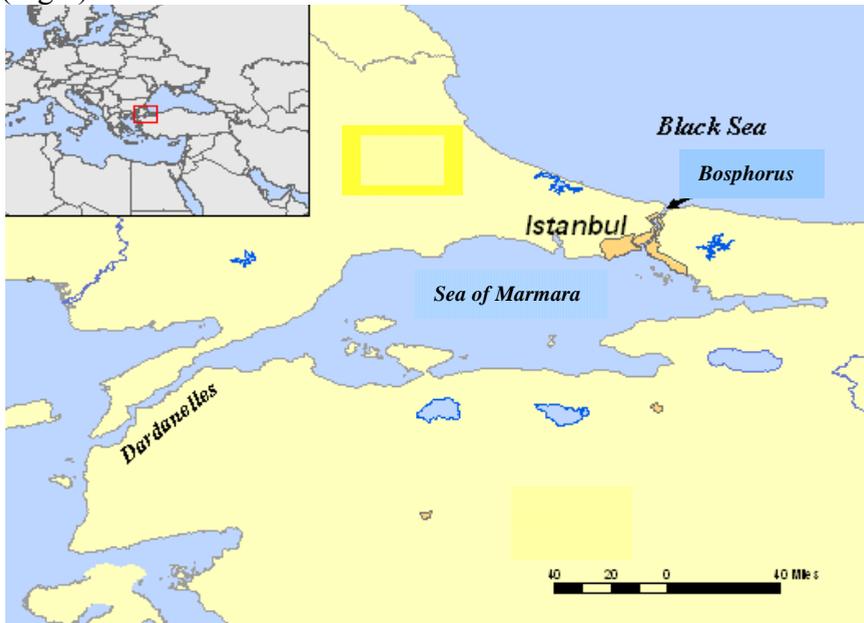


Fig. 1 Bosphorus and the Turkish Straits Region

It separates the two Continents, namely Asiatic and European Turkey, and is also the integral part of the Turkish Straits which comprise the Dardanelles, Sea of Marmara and Bosphorus, the whole area being known as the Turkish Straits Region (TSR). The Strait passes through the heart of the metropolis of Istanbul, an overcrowded, already-polluted city of 15 million inhabitants. The waters of the Strait are noted for difficult currents.

The Strait of Istanbul is a tricky navigable conduit. Due to angular windings, transits, up or down, require several major alterations of course as much as 80°, with severely limited vision around these bends. Channel however contains 12 turns, four of those are blind. Shape of the Strait limits to have an extended sight for a proper look-out particularly beyond several headlands, except a few, as those close the view behind, while proceeding through the current traffic lane allocated for the vessel (Akten, 2002).

## *2. Passage and maritime traffic*

The Montreux Convention, relating to freedom of passage and navigation establishes and regulates the regime with certain formalities for a merchant and naval vessel is in force since 1936. The Strait is kept open for shipping traffic day and night, and serves as an international waterway of commercial importance.

When the Montreux Convention was signed merchant traffic was not dense, approximately 13 vessels a day. Moreover, at that time, ships were quite small in size and shipping could not pose a threat to the shore. Sixty years later however, the role of merchant shipping became more important. In recent years, it flows at an average rate of 47000 vessels a year. Tankers passing through can be as large as 150 to 160 thousand tons (Suezmax ships). Furthermore, under the terms of the Montreux Convention, use of pilots is voluntary.

A “left-side up” navigation scheme was applicable in the Bosphorus within the period 1934-1982. Vessels proceeding from the Sea of Marmara had to keep the port (European) side of the channel and as close inshore as possible to avoid collisions, according to Article 25 of the Collision Regulations in force in that time. From 01 May 1982 however, the Collision Regulations 1972 became fully applicable,

and hence a “right-side up” scheme now applies in the Strait (Chapman and Akten, 1998).

Turkey introduced the traffic separation schemes in the Turkish Straits Region, the Strait of Istanbul inclusive, in full compliance with the Rule 10 of the current International Collision Regulations to enhance safety of navigation. The new schemes have been in use since 01 July 1994. Hence, the navigable channel is divided into an “up lane” and a “down lane”.

The Strait of Istanbul poses dense shipping transits. Mean of yearly figures covering the traffic separation schemes period, 1994 – 2003 in particular, indicates that on a daily basis 130 vessels (or 5 to 6 vessels an hour) navigate the Strait. When local traffic is taken into account, almost another 2000 crossings a day (or roughly 85 crossings an hour) must be added to the figure above. Therefore, any time in any day nearly 100 “floating bodies” use the Strait – either crossing or proceeding up or down (Akten, 2003).

The Turkish Straits, for the last 10 years at least, have turned into one of the key shipping chokepoints of the world seaborne oil trade, such as the Suez Canal, the Straits of Malacca, the Strait of Hormuz and the Straits of Dover. It was previously the same in 1892 when oil cargoes loaded in the Black Sea port Batumi were delivered by tankers to their customers in the Far East destination(s), passing through the Turkish Straits. (Akten,2004b)

Nearly 123 million tons of oil passed through the Turkish Straits in the year 2002,<sup>1</sup> representing 5 per cent of the oil traded by sea. Aggregate figure is 6578 for all tankers, chemicals and LPGs inclusive, passed through the Strait of Istanbul, up or down, in 2003. Similarly, 1400 tankers carrying LPG and chemicals further used the Bosphorus, which means additional 4 tankers a day - but smaller in size. All-in bases, 18 tankers a day, many of them large oil tankers, carrying oil and other hazardous materials pass by Istanbul through the Bosphorus. (Akten, 2004b) The reason why oil transiting through the Bosphorus

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<sup>1</sup> Relevant figures for previous years are as follows : In 1997, 61 million tons; in 1998, 67 million tons; in 1999, 85 million tons; in 2000, 91 million tons; and in 2001, 101 million tons, respectively.

has growth substantially in recent years is the exploitation of oil fields around the Caspian Sea.

Although pipelines offer an alternative, the cost differentials are clearly advantaging the use of maritime transportation. For instance, the cost of moving oil along the Baku – Ceyhan pipeline ranges between \$1 and \$2 per barrel while shipping oil by tankers through the Black Sea costs 20 cents per barrel (Rodrigue, 2004). About 6,000 tankers are transiting through the passage each year, which is getting close to capacity.

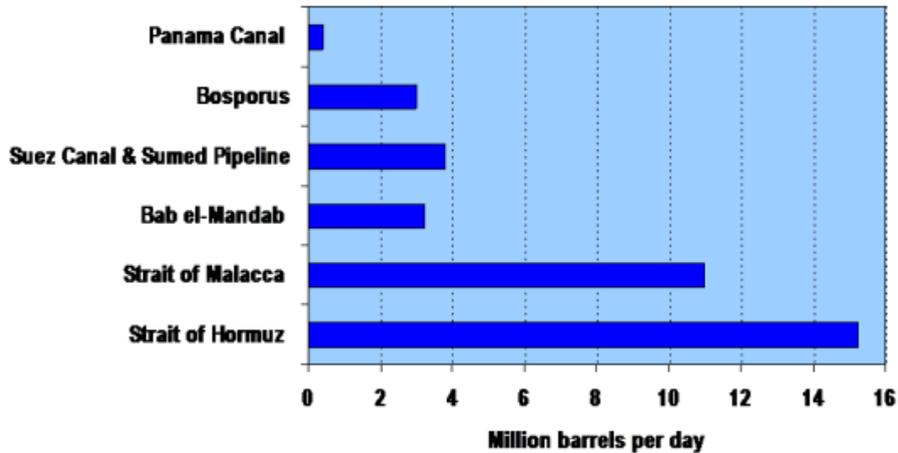
The geostrategy of maritime petroleum circulation is mainly composed of six major chokepoints, namely Turkish Straits, Suez Canal, Bab el-Mandab, Panama Canal, Straits of Malaca and Strait of Hormuz; two of which, Hormuz and Malaca, being extremely of high importance. Strait of Hormuz represents the most important strategic passage in the world, solely because of its access to the oil fields of the Middle East through the Persian Gulf, while Malacca is an active commercial point of transit between the Indian and Pacific oceans (Rodrigue, 2004).

The heavy traffic through the Bosphorus undoubtedly presents substantial risks to the local environment. If statistics of the number of vessels passing through the straits are considered in relation to the physical characteristics of the straits, it is abundantly clear that the probability of a serious environmental catastrophe occurring in or around Istanbul is very high.

Large vessels use the Strait although there exists navigational constrains for such vessels and their share figure wise have constituted nearly 5 percent of the total traffic. A Large vessel is specified in the Turkish Bye-law as “a vessel of 200 metre or more in length”. Development of large vessel traffic in the Bosphorus is shown in Table. 5:

Fig. 2. Indicates the oil shipped through six major chokepoints for the year 2003:

Fig 2. Oil Transited at Major Strategic Locations, 2003



(Source: Energy Information Administration, World Oil Transit Chokepoints, Rodrigue,2004)

Table 2. Large vessels and tankers traffic in the Bosphorus

Year	Bosphorus traffic total	Large vessels	Tankers	Daily average	
				Large vessels	Tankers
1994	18720	-	-	Large vessels	Tankers
1995	46954	6491	-	-	-
1996	49952	7236	4248	19	11
1997	50942	6487	4303	18	11
1998	49304	1943	5142	5	14
1999	47906	2168	4452	6	12
2000	48079	2203	4937	6	13
2001	42637	2453	6516	7	18
2002	47253	3113	7427	8	20
2003	46939	2923	6578	8	18

### 3. Shipping accidents

Shipping accident is a term generally used for any accident results in financial loss, either in life or property or both (Akten, 2004a).

Turkish Straits with regard to the risk of casualty and environmental sensitivity is one of the most critical corners of the world. The Strait of Istanbul in particular faced 480 marine accidents of different types in 1953-2003 period. Figurewise, 214 collisions, 143 groundings, 78 stranding, 30 fires / explosions and 15 others (such as rudder blockade, vessel's list, or engine breakdown), totalling 480 accidents and casualties occurred in the Bosphorus.

Table 3 indicates the breakdown of the casualties occurred in the area for this period in terms of main casualty groups: i.e. collision, stranding, grounding, foundering, and fire / explosion.

Table 3. Shipping accidents in the Bosphorus (1953-2003)  
(Akten,2004a)

Navigation scheme	Period	Collision	Grounding	Stranding	Fire/ explosion	Others	Total
“left-side up”	1953-1982	79	17	14	none	-	110
“right-side up”	1982-1994	105	89	50	25	-	269
Traffic Separation Schemes	1994-2003	30	37	14	5	15 a	101
Total	1953-2003	214	143	78	30	15	480

a includes rudder blockade, vessel's list and engine breakdown

Groundings and stranding are the major casualty types occurred in the Bosphorus and constitutes 46 percent of all casualties – risk factors being currents, sharp turns and darkness (Akten, 2004a).

An accident study based on the accident ratio(s) for different regions of the Strait of Istanbul indicates however that the most critical region is the narrowest part of the Strait, i.e. the region within the lines between Rumelihisarı-Anadoluhisarı and Ortaköy-Beylerbeyi. (Region-4), as is shown in Table 4: (Koldemir, 2004)

Table 4. Shipping accidents occurred in different regions of the Strait (1998-2003)

Region Nr.	Length (nautical mile)	Number of accidents	Accident ratio
1	3,55	3	2,8169
2	3,30	15	15,1515
3	3,50	11	10,4760
4	2,60	13	16,6667
5	3,45	12	11,5942

Regions - Part of the Strait joining the lines in between:

Türkeli Feneri / Anadolu Feneri and Rumeli Kavağı / Anadolu Kavağı  
(*Region: 1*)

Rumeli Kavağı / Anadolu Kavağı and Kalender / Beykoz (*Region: 2*)

Kalender / Beykoz and Rumelihisarı / Anadoluhisarı (*Region :3*)

Rumelihisarı / Anadoluhisarı and Ortaköy / Beylerbeyi (*Region :4*)

Ortaköy / Beylerbeyi and Ahırkapı Feneri – İnciburnu Feneri (*Region: 5*)

Pilotage through the Bosphorus for a large / deep draft vessel usually takes 2 hours. This follows that under prevalent normal conditions of the Strait up to 12 vessels a day prescribed in Regulation 25 can pass through. The maximum annual through- capacity would then be 4380 vessels a year.

## Conclusion

The Montreux Convention has successfully governed navigation in the Turkish Straits for nearly 60 years. Much has changed since the signing of the treaty: the size and number of ships on the water, the type of cargo on board, and the needs of interested parties. To compensate for these differences, Turkey has instituted the Regulations with the goal of protecting shipping, the environment, and human life (Scharfenberg, 1996).

Free navigation through the Straits does not mean unregulated passage. The right of free passage is valuable only to the extent that safe passage is effectuated. Turkey's rules provide practical guidelines necessary for the safe management of heavy traffic in the narrow Bosphorus waterway. The Regulations aim to assist masters to ease and enhance safe passage through the Strait wherein difficult twists

and turns during transit exist. The Montreux Convention implicitly gives Turkey the power to adopt such a regulatory scheme (Scharfenberg, 1996).

Nevertheless, Turkish Government has taken several constructive steps forward to enhance the navigation through the Strait, inter alia, maritime traffic rules and the VTMIS.

Comparison of the accident rates based on annual shipping traffic through per ten thousands for the periods of “right-side-up” (1982-1994) and the Traffic Separation Scheme (TSSs)(1994-on) clearly indicates that the yearly casualty rate has sharply been reduced especially after the maritime traffic regulations have been implemented.

Average yearly accident ratio was 12.2 per ten thousand up to the implementation of the traffic separation scheme, i.e. until mid-1994. The same corresponding ratio for 1995-2003 period however, is 2.3 per ten thousand. It is therefore good to say that the current Regulations and steps accordingly taken are appropriate to enhance navigational and environmental safety.

## **Özet**

İstanbul Boğazı, Türk Boğazlar Bölgesi içinde yer alan ve Karadenizi Marmara'ya bağlayan deniz geçididir. 17 Deniz mili uzunluğu olan bu dar ve kıvrımlı geçit, gündün-güne değişebilen akıntıları yüzünden gemiler için kaza rizikosu yüksek bir su yolu olma özelliğine sahiptir.

İstanbul Boğazı uluslar arası deniz trafiğine açıktır. Montrö Sözleşmesiyle, bayrağı ve yükü ne olursa olsun, ticaret gemilerine barış zamanında transit (geçiş) ve seyir serbestisi tanınmıştır. Ancak bu serbesti, hem belli formalitelerin yerine getirilmesine, hem de “zararsız geçiş” koşullarına bağlıdır.

İstanbul Boğazında 1953-2002 döneminde 461 deniz kazası olmuştur. Bu kazaların 110 tanesi “sol seyir döneminde”(1953-1982), 269 tanesi sağ seyir düzeninde (1982-1994), 82 tanesi de trafik ayırım düzeni (TAD) uygulamasının başladığı gündün bu yana olan dönemde (1994-2002) meydana gelmiştir.

Deniz Trafikği konusunda yürürlüğe konmuş kurallar ve 2003 yılında devreye alınmış VTMIS Sistemi sayesinde Boğaz'daki deniz kazalarında ciddi düşüşler gözlenmiştir.

İstanbul Boğazında kazaların asgariye indirilmesi, dolayısıyla seyir güvenliğinin artırılması sadece İstanbulluların can güvenliği ve tarihi çevre için değil, dünya ticaretinin aksaksız yürütmesi bakımından da çok önemlidir.

## References

- Akten, N. (2004a). Analysis of shipping casualties in the Bosphorus. *J. Navigation*, The Royal Institute of Navigation 57(3), London., 345-356.
- Akten, N. (2004b). The Bosphorus : Growth of oil shipping,marine casualties. *J. Black Sea/Mediterranean Environment* 10: 209-232.
- Akten, N. (2003). The Strait of Istanbul (Bosphorus): The seaway separating the continents with its dense shipping traffic. *Turkish J. Marine Sciences* 9 : 241-265.
- Akten, N. (2002). The Bosphorus : Factors contributing to marine casualties. *Turkish J. Marine Sciences* 8 : 179-195.
- Chapman, S.E. and Akten, N. (1998). Marine casualties in the Turkish Straits - A way ahead, *Seaways*, the International Journal of the Nautical Institute, November, London, 6-8.
- Koldemir, B. (2004). Kaza kara noktaları; İstanbul Boğazı'ndaki deniz kazaları için bir uygulama, *Trafik ve Yol Güvenliği* 2. Uluslar arası Kongresi, Gazi üniversitesi, 5-7 Mayıs, Ankara,6-7.
- Oral, N. (2001). User Fees for Straits, *Proceeding of the International Symposium on the Problems of Regional Seas*, Türk Deniz Araştırmaları Vakfı, (B.Öztürk,N.Algan eds.),12-14 May,Istanbul, 109.
- Rodrigue, J.P. (2004). *The Strategic Space of International Transportation*, Hofstra University,Hempsted-N.Y, 2-8-9.
- Scharfenberg, S.A. (1996). *Regulating Traffic Flow in the Turkish Straits: A Test for Modern International Law*, *Emory International Law Review* 10(1), Spring 1996, 1-2.

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