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STRATEGIC DEVELOPMENT OF MARITIME TRAFFIC ORGANIZATION ON THE ADRIATIC SEA

STRATEGIJSKI RAZVOJ ORGANIZACIJE POMORSKOG PROMETA U JADRANSKOM MORU

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Review
Pregledni rad

Summary

The paper deals with strategic development of the maritime traffic organization on the Adriatic Sea. In the paper a proposal for the introduction of a routing system on the Adriatic Sea is presented. Also, the structure of the proposed ADRIA VTS system is discussed. The aim of the proposed measures is to increase the level of protection of the Adriatic Sea against large-scale pollution.

Sažetak

Članak se bavi strategijskim razvojem organizacije pomorskog prometa u Jadranskom moru. U članku se predstavlja prijedlog za uvođenje sustava ruta u Jadranskom moru. Također se razmatra ADRIA VTS sustav. Cilj predloženih mjera je povećati razinu zaštite Jadranskog mora protiv onečišćenja velikih razmjera.

1. Introduction
Uvod

Pollution prevention of the sea and sea coast imposes itself as a basic determinant in the maritime policy of any coastal state. The significance of pollution prevention grows proportionately with the ever-growing importance of the branches of economy based on marine technologies or those in close connection with the sea. As a state with traditional maritime orientation the Republic of Croatia links significant economic potentials to marine-related industries (*i.e.* tourism, maritime transport, shipbuilding). Therefore, it is of outmost importance for the Republic of Croatia, as well as for its neighbouring states to enhance, as much as possible, the level of pollution prevention of the sea and seashore.

Generally, every pollution of the sea from ships, whether by oil or by any other marine pollutant, might be classified either as small-scale pollution or as large-scale pollution. Small-scale pollutions are mainly the consequence of intentional working operations such as tank cleaning procedures or because of minor equipment failure and/or human error. Consequently, they cannot be prevented by traffic regulation. On the other side, large-scale pollutions are predominantly caused by accidents such as collisions and strandings. Therefore, the volume and organization of maritime traffic in particular area directly determine the level of marine pollution in that area.

According to MARPOL 73/78 the internationally recognized measures for marine environment protection can be assigned to two basic concepts: the concept of special areas "*where for recognized technical reasons in relation to its oceanographic and ecological conditions and to the particular character of its traffic, the adoption of special mandatory methods for the prevention of sea pollution by oil is required*" and the concept of particularly sensitive areas "*which need special protection through action by IMO because of its significance for recognized ecological or socioeconomic or scientific reasons and which may be vulnerable to damage by maritime activities*". In special areas the main goal is achieved through discharging limitations, while in particularly sensitive areas the predominant measures are those that indirectly assist protection of the marine environment by preventing casualties. Since the Mediterranean Sea has already been declared as a special area, a further step to increase the level of protection of the Adriatic Sea is its declaration as a particularly sensitive area. Such declaration would, according to IMO [1], permit the introduction of the routing measures intended for the establishment of safe traffic flow in the selected area.

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2. The present and the future status of maritime traffic in the Adriatic Sea
Sadašnji i budući status pomorskog prometa u Jadranskom moru

Maritime traffic in the Adriatic Sea is characterized by various regions featuring significantly different traffic organization and volume. It can be divided into the following sub-areas: the area with unrestricted traffic flow between the Italian coast and the outer edge of east-coast islands, the area of restricted traffic flow between the Croatian mainland and the outer edge of east-coast islands, and port-approach areas in the vicinity of large ports.

Generaly, the area of unrestricted traffic flow contains two traffic flows. The main flow lies along the east coast of the Adriatic Sea, towards northernmost Adriatic ports (Venezia, Trieste, Koper and Rijeka). The other one, lying along the west Adriatic coast, is used by ships heading to and from Italian ports on the Adriatic coast. It accounts for a much smaller traffic volume.

Both traffic flows, predominantly the eastern one, are used by large merchant ships, up to 200.000 dwt, carrying the bulk of oil, chemicals, harmful substances and other dangerous goods or pollutants. The four largest ports of the north Adriatic receive annualy up to 8.500 SOLAS ships and load or unload up to 55 mil. tons of liquid cargoes per year [2], mainly pollutants. Consequently, the islands and coast they are passing by are the areas with the highest risk of pollution. Traffic density is small. According to computer simulations of the traffic flow the number of ships in the area is less than 200 vessels at a time [3].

The area of restricted flow along the Croatian coast is characterized by seasonal traffic (during summer months) of primarily tourist vessels, yachts and boats. At the present time the number of vessels on the international voyages or carrying pollutants and heading to ports in the area is small, with predominately smaller ships. Except for regular passenger lines and local transport of oil products there is no traffic of ships carrying dangerous or harmful cargoes. The traffic density is comparatively high, especially during summer months, but the risk of pollution is low.

The areas in the vicinity of the main ports are characterized by high density traffic. The traffic includes both small ships on the local lines and large ocean-going ships. The quantity of oil, chemicals, dangerous, harmful substances and pollutants is comparably high, resulting in a very high inherent risk of pollution. The areas with the highest risk are the Bay of Trieste with the ports of Trieste and Koper, and the Bay of Rijeka.

After war operations in the Croatia and Bosnia and Herzegovina have been terminated, it is reasonable to expect a significant increase of maritime transport. This increase will result in several negative consequences regarding pollution prevention.

First of all, the increased number of ships will result in an increased traffic density in the non-restricted area as well as in the approaching waterways. Consequently, the increased number of dangerous situations should be expected, particularly in the near-port areas, resulting in an increased probability of strandings or collisions at sea. These consequences should not be expected only on well-established waterways but also on the waterways to the smaller ports with a lower-quality navigational support from shore.

Additionaly, an increase of average vessel's size and cargo quantities, particularly of dangerous goods and harmful substances, is to be expected, as well as the development of new ports and terminals with specialized cargo facilities. The first signs of these trends have already been noticed (e.g. plans for the LNG terminal in the Sepen Bay on the Island of Krk, specialized coal port in the Bay of Plomin and LPG terminal in the port of Koper). The main consequence of this trend is a significant increase of the worst-case scenario probability.

Therefore, there are clear indications that present maritime traffic organization will not satisfy the near-future needs. Moreover, if coastal state authorities want not to exceed the present accident rate, they must take steps to improve present and future traffic organization on the Adriatic Sea.

According to internationally agreed principles and presently available technology the coastal state can improve the organization of traffic flows using relatively simple passive measures such as traffic routing or more active measures such as surveillance and control of traffic flow.

3. Maritime traffic routing in the Adriatic Sea
Usmjeravanje plovidbe u Jadranskom moru

The basic goal of a routing system is to improve navigation safety in areas of converging or heavy traffic or in areas where the freedom of ship movement is lessened [4]. The routing system may also have other aims and intents that are explicitly quoted, among which special emphasis is placed on traffic separation of ships sailing in opposite directions, as well as on the organization and simplification of traffic routes.

The routing system is defined as a set of measures which includes the traffic separation schemes as the most important and most effective measure, two-way routes, recommended directions, areas to be avoided, inshore traffic zones, roundabouts, deep water routes and precautionary areas. Applied measures are heavily interrelated and in a wider area they have to make a consistent system. Based on IMO practice so far, the traffic separation schemes are used to the greatest extent, followed, thereafter, by the precautionary areas. The other measures, such as roundabouts, are relatively infrequently used.

To be internationally recognized, the applied routing measures must be approved by IMO. Such practice is in existence since 1968. Since then, the IMO has defined the conditions, definitions and general principles of establishment of routing measures. The accep-

tance of the IMO as the sole organization qualified to approve the traffic separation scheme is explicitly cited in rule 1(d) of the International Regulations for Preventing Collisions at Sea, 1972.

Ships' routing in territorial waters of a littoral state is regulated in the UN Convention on the Law of the Sea, 1982. According to the Convention the littoral state has the right, among other things, to set up regulations that refer to navigational safety. A foreign vessel using the right of innocent passage is liable to adhere to these provisions. However, littoral states are called upon to follow the recommendations of competent international organizations when establishing these measures, which is, no doubt, a reference to IMO.

A fundamental change of the status in the routing measures has been enforced in 1995 by amending a rule V/8 of the SOLAS Convention [5]. It underlines that the routing measures, besides safety of life at sea and safety of navigation, can be used for the protection of the sea and coastline and can be declared compulsory for all types or for some types of vessels. An exception has been provided for naval vessels or for other vessels when there are justifiable reasons for this (e.g., safety, etc).

Accordingly, the Ministry of Maritime Affairs, Transport and Communications of the Republic of Croatia have decided during 1995 to initiate work on the establishment of the Routing System in the Adriatic Sea. The project has been assigned to Faculty of Maritime Studies in Rijeka. It has been divided in two phases.

The outcome of the first stage is the proposal of the routing measures located, partially or completely, in the international waters. The proposal already made by the assigned Work Group is intended to:

- reduce the possibilities of collision by means of:
- simplification of traffic flow,
- decreasing the number of close-quarter situations, especially of ships sailing on opposite courses,
- dispersion of the anticipated positions of crossings to wider area,
- simplifying the traffic relations during collision avoidance manoeuvering, and
- reducing the overall area density of maritime traffic;
- reduce the probability of groundings and strandings by moving the traffic further away from the coast for the purpose of diminishing the influences of navigational errors and, also, giving more time to salvage teams to render assistance to ships in danger or in distress.

Conceptually, the sailing routes of the proposed traffic system are laid down in such way that:

- follows the existing flow of maritime traffic, as much as possible,
- provides for the least possible number of course changes,
- satisfies requirements regarding navigation coverage and hydrographic researches of the area of navigation area, and
- make possible the traffic surveillance from shore assuming application of the presently existing technology.

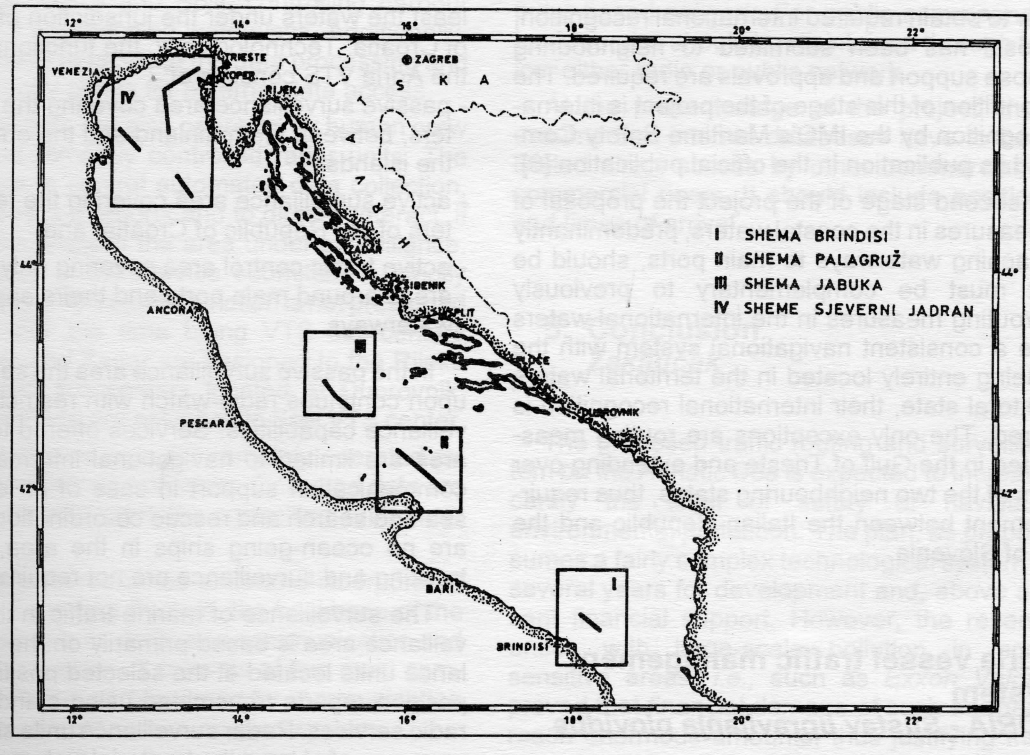

Figure 1. Routing system on the Adriatic Sea
Slika 1. Sustav usmjeravanja plovidbe u Jadranskom moru

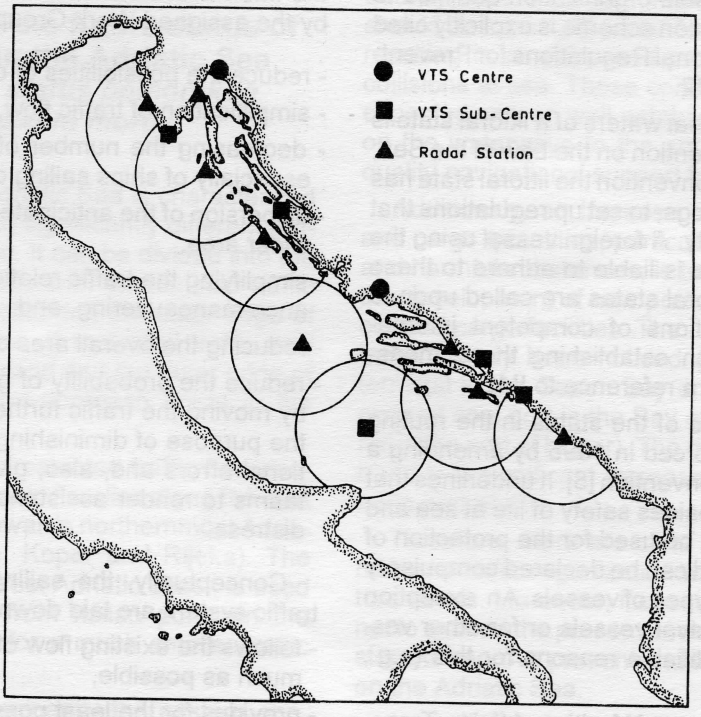

Figure 2. Locations of the ADRIA VTS units
Slika 2. Smještaj ADRIA VTS jedinica

Consequently, the proposed routing system consists of four logical entities. They are to be located east of the port of Brindisi, west of the Island of Palagruž, west of the Island of Jabuka and in the northernmost area of the Adriatic Sea.

In order to obtain required international recognition, the proposal has been submitted to neighbouring states whose support and approvals are required. The closing condition of this stage of the project is international recognition by the IMO's Maritime Safety Committee and its publication in the official publication [6].

As the second stage of the project the proposal of routing measures in the coastal waters, predominantly on approaching waterways to main ports, should be made. It must be complementary to previously adopted routing measures in the international waters and make a consistent navigational system with the former. Being entirely located in the territorial waters of each littoral state, their international recognition is not required. The only exceptions are routing measures located in the Gulf of Trieste and extending over the waters of the two neighbouring states, thus requiring agreement between the Italian Republic and the Republic of Slovenia.

4. Adria vessel traffic management system
ADRIA - Sustav upravljanja plovidbe

As the last stage of the project a development of the marine traffic surveillance system is planned. Generally, the system has to provide the following functions: data collection and evaluation, information service, navigation assistance service, traffic organization service and support for allied activities [7, 8].

According to present plans the Adria VTS system has to be organized as a coastal system, covering at least the waters under the jurisdiction of the Republic of Croatia. Technologically, the functional structure of the Adria VTS consists of:

- passive surveillance area covering the inner waters, between the mainland and the outer edge of the islands,
- active surveillance area covering the territorial waters of the Republic of Croatia, and
- active traffic control area covering only the limited areas around main ports and theirs approaching waterways.

In the passive surveillance area the service is based upon continuos radio-watch with restricted radar surveillance capabilities. Services offered to ships in the area are limited to navigational information support, communication support in case of an emergency at sea and search and rescue co-ordination. Since there are no ocean-going ships in the area, the position tracking and surveillance are not required.

The surveillance of marine traffic in the active surveillance area is based primarily on the radar surveillance units located at the selected positions and ship position reports transmitted using standard maritime radio services. Radar surveillance units should provide coverage of at least the territorial waters of the Republic of Croatia and, as much as possible, of the area of potential exclusive economic zone of the Republic of Croatia. Ship Position Reporting System should be

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