NAVIGABLE WATERWAY BETWEEN THE DANUBE AND THE AEGEAN SEA - POSIBILITIES

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Abstract

This Project has more than 100 years history, which tell us the evolution of aims, needs and proposed solutions.

In 1904 started real initiative for building the navigable route in order to connect the Danube with the Aegean Sea. An American firm of New Jersey (USA) in 1908 made a preliminary project design of a navigable route Morava-Vardar (Axios).

The idea raised by the Governments of Greece and former Yugoslavia and

in 1961, preliminary project plans were elaborated. Mission of the United Nations experts visited former Yugoslavia in 1973 to investigate the background of the project and to assess its validity. The experts concluded it was likely that a waterway could be economically justified.

In period from 1973 till 2006, engineers from Serbia prepared complete preliminary design for future waterway.

The Danube-Aegean waterway, 650 kilometers length, has to overcome approximately 812 meters of fall, or a fall of only 1.25 meters per kilometers of length. If we compare the Danube-Aegean project fall, with the fall on some European canals (Vienna-Budweis Canal, Danube-Moldau Canal, Bohemian-Moravian Canal, etc.) it is obvious that the Danube-Aegean waterway is technically far easier to construct than the above referred to canals.

Question is: What this waterway can provide to the countries on Balkan region and what benefit European countries can have from exploitation of this waterway.

By the influence of resent global strategic events central European countries must think about hypothetical restriction of energy supplement from Russia. Alternative solution is to supply European country with middle east oil by waterway Vardar (Axsios) - Pcinja - South Morava - Great Morava - Dunav (Danube). In this moment oil transportation looks more objective then transportation of other gods. Along the coast of waterway it is possible to install fiber optic cable for hi - speed data transfer during the canal construction.

Waterway could transform Serbia in to the partner of EU and USA and could provide global oil trade security.

Keywords: NAVIGABLE WATERWAY, DANUBE, AEGEAN SEA, POSIBILITIES, NIKOLA STAMENKOVIC, MORAVA - VARDAR (AXIOS)

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The idea was accepted by the Governments of Greece and former Yugoslavia and in 1961, and preliminary project plans were elaborated. Mission of the United Nations experts visited former Yugoslavia in 1973 to investigate the background of the project and to assess its validity. The experts concluded it was likely that a waterway could be economically justified.

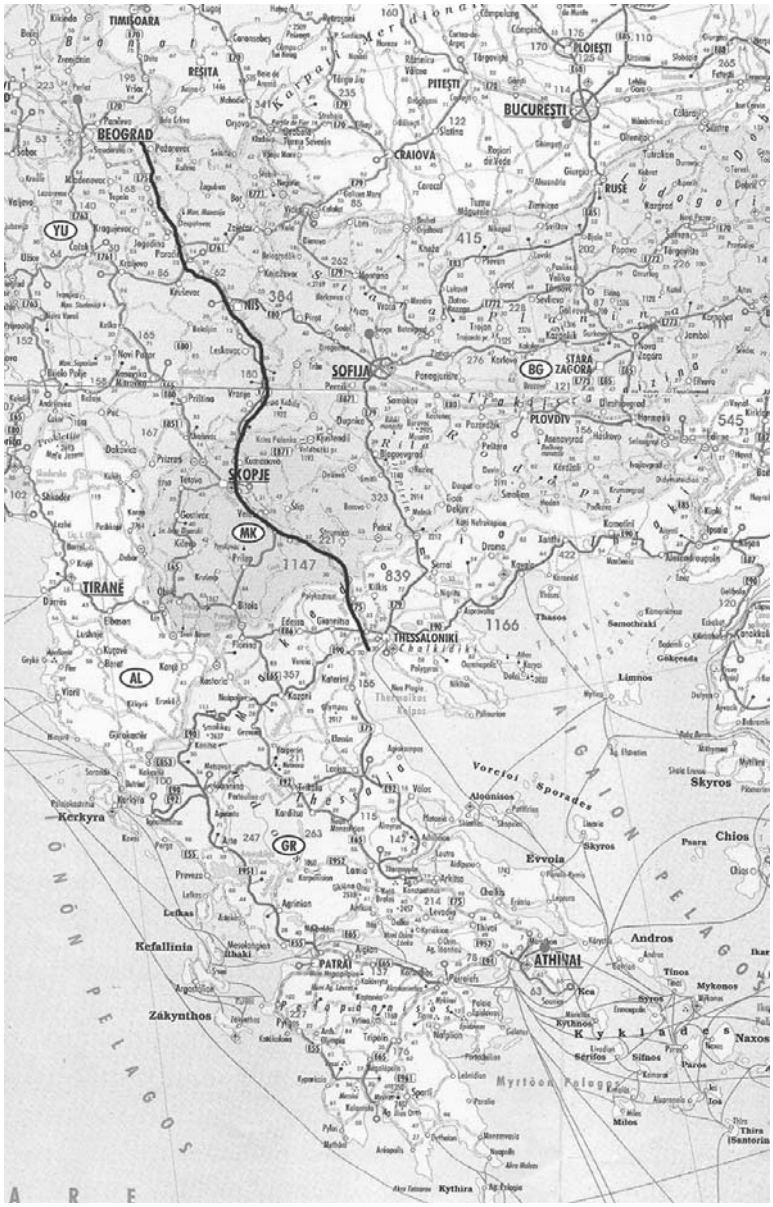

Figure 1 -Navigable route for connection the Danube river with the Aegean Sea

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- Minimal canal with on navigation depth is 28 m
- At curves the radius of canal axis not less then 800 m
- dimension of canal locks (minimum length 190 m, minimum with 12 m and minimum water depth 3.5 m)

Project established five different part of waterway:

First part from Danube to Stalac, approximately 150 km with total altitude difference of 58 m. On this part according project design are 7 steps with locks. on this part from Danube to Stalac Morava can be made navigable by means of canalization.Technical solution of water way Danube - Morava - Vardar (Axios) was based on dimensions for standard Danube vessel: boat (length 80 m, width 9.5, draft 2.5 m and 1350 tonnage) and barges (length 70 m, width 9.5, draft 2.5 m and 1250 tonnage).

Basic dimensions of navigable canal ware:

- Water depth in the middle on canal cross section is 4 m
- Water depth at lower end on canal cross section is 3.75 m
- Canal with on water level is 43 m
- Minimal canal with on navigation depth is 28 m
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Second part from Stalac to watershed (Presevo), approximately 196 km with total altitude difference of 266 m. On this part according project design are 30 steps with locks on this part 107 km could be construct as canalization of river South Morava and 89 km can be obtained by construction of a navigable canal.

Third part is from watershed (Presevo) with vessel lift (multiple locks "flight" type) to horizontal canal between Danube drainage basin and Vardar (Axios) drainage basin. Length of this part is approximately 30 km with total altitude difference of 36 m.

Forth part is from horizontal canal between Danube drainage basin and Vardar (Axios) drainage basin to the border between former republic Macedonian and Grice. Length of this part is part is approximately 202 km with total altitude difference of 386 m. On this part according project design are 22 steps. There are 4 multiple locks ("flight" type 36 m each) and 18 ordinary hydrostatic locks

Fifth part is from border between former republic Macedonian and Grice to Aegean Sea, approximately 73 km with total altitude difference of 44 m. On this part there are 3 steps. At the end of last part is canal 16 km length as connection of river Vardar - Axios and pot Thessalonica.

Estimation of potential traffic is based on possible lock capacity. In one locks there is possible to deploy two vessel total tonnage 2500 tons. Time sickle for perform inlet - outlet operations is 30 min. Hypothetical maximum goods flowing true lock is 120000 tons per day, or maximum 43.8 millions ton per year. Average quantity of goods flowing thru locks is 5000 t/hour x 18 hour x 250 days = 22.5 millions tons per year.

Table of cost estimation in accordance with prices in 2006, below, give as general picture of investment value:

Table 1.

Waterway Danube - Vardar (Axios) - Aegean sea parts	percent of investment	cost in millions of euro
1. Great Morava	9 %	450
2.. South Morava	30 %	1500
3. Vardar (Axios) - Thessalonica port	48 %	2400
4. River regulation of West Morava river 73.2 km (till Ibar river)	6 %	300
5. River regulation of Nisava river 15 km	2 %	100
6. River regulation of Vardar river 35 km (till Skopje)	5 %	250
T O T A L :	100 %	5000

Project can be completed within five years.

Today we have two different approaches in making Morava river and South Morava river navigable. First approach is named "River solution" and odder approach is "Canal solution".

Both solutions have advantages and disadvantages and must be reviewing again three new European standards: EU Water Framework Directive (2000/60/EC) and the Flora Fauna Habitat (92/43/EEC) and Wild Birds Directives (79/409/EEC.

Inland Navigation Europe (INE) with support of European Commission is responsible for promotion of inland waterways transportation. INE developing the European waterways infrastructure, deploying intelligent technologies according European framework directive by RIS (River Information System) and promotion of Marco Polo program for keep goods flowing in Europe, but not jet considered this southeast route.

A 1350 tonnes barge is consuming four to seven times less fuel than a road truck. With only 5 litres of fuel, an inland barge can transport one tonne of cargo over a full 500 km. With the same amount of fuel, a train would come to a halt after 333 km, a truck after barely 100 km, and an airplane would crash after only 6,6 km of flight.

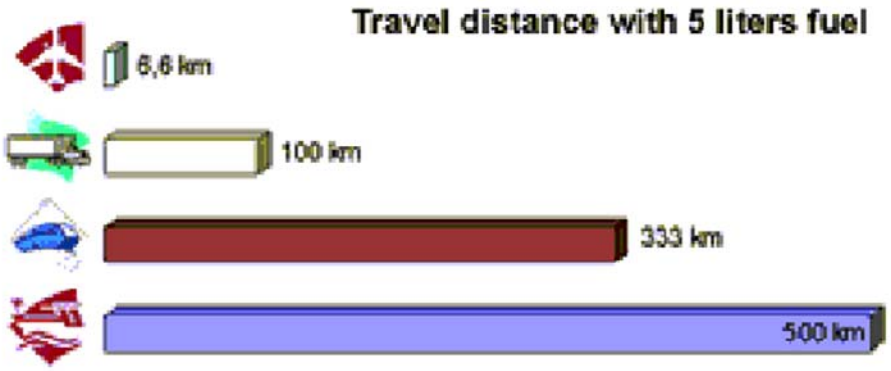

Figure 2. Travel distance with 5 liters fuel

External or social costs can be caused by accidents, noise, pollution, climate change, infrastructure, and traffic jams. Inland navigation by far enjoys the best score, in a EU-comparison of the average external costs. External costs for road transport have been calculated at € 24,12 per 1000 ton-kilometres. For transport by railway, external costs are € 12,35 and for inland navigation they are estimated at a maximum of € 5.

Table 2. Marginal average external costs per mode of transport - €/1.000 tkm

Kind of cost	Road	Railway	Inland navigation	Shortsea shipping
Accidents	5,44	1,46	0	0
Noise	2,138	3,45	0	0
Pollution	7,85	3,8	3	2
Climate costs	0,79	0,5	negligible	negligible
Infrastructure	2,45	2,9	1	Less than 1,0
Traffic jam	5,45	0,235	negligible	negligible
Total	24,118	12,345	Maximum 5,0	Maximum 4,0

Idea of making navigable river Morava and canal connection with river Vardar and Aegean see is compatible with European strategy in pushing and promotion of Inland Waterway Transport.

More inland navigation brings benefits such as increased safety and security, energy - efficiency and low emissions. Integrating inland navigation into multimodal transport policies is indispensable for smart growth enhancing more mobility, safety and quality of life.

This project will provide river regulation benefits all over region and solve environmental problems in drainage basins. This waterway could be important link in pan - European waterway network.

CONCLUSION

Serbian authorities could start immediately with detailed technical documentation. According Inland Navigation Europe INE (www.inlandnavigation.org) Marginal average costs of transport by mode Euro/1000 tkm is: Road 24.12 euro, Rail 12.35 euro and Inland navigation max. 5.0 euro. There is no question about future trends in transport and Serbia must prepare plans for future.

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