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CASE-STUDY REPORT

Introduction

Many of the world's river and lake basins and ground water aquifers are shared by two or more countries. In a United Nations study, international river and lake basins were estimated to comprise about 47 percent of the world's continental land area. In Africa, Asia, and South America, this proportion rises to at least 60 percent. Most countries that share ownership of water resources also depend on those resources. Thus, the size of a country's share of a commonly-held water body has important direct and indirect effects on the country's well-being. If the common waters are rivers, these direct and indirect effects are unidirectional, and can create problems that are particularly difficult to resolve. The direct effects of water allocation in international river basins are crucial because water is an essential input for many productive processes, and alternative sources may be impractical. Rivers do not respect national boundaries and give rise to major economic and environmental concerns. When a river flows through two or more countries it is defined as an international watercourse and these trans-boundary waters or watercourses may serve more than one function.

International watercourses may be used to draw international boundaries, but they can also be used for irrigation, fishing and the production of hydroelectric energy. According to international law, any country situated on the bank of an international water body cannot perform any kind of activity in that river that might cause negative externalities in other countries. Improper management of these international water bodies has given rise to various socio-economic problems.

But neither is it possible to ignore the indirect outcomes (externality effects) of water allocation. These considerations may include not only reduction of water level and flow volume (because of excessive withdrawals upstream), but also deterioration of water quality (as a result of pollution in return flows upstream) and increasing flood risk. It is hardly surprising that international rivers have often been the focus of regional tensions and conflicts. For example, the Nile River, shared by several East, Central and North African countries has been a source of conflict between neighbouring states. This is due to the way the Nile has been managed over the years. Until nowadays, the only legal management tool is the "Nile treaty" signed between Egypt and colonial rulers in East and Central Africa in 1929. For many, this is archaic considering the changes that have occurred since then. These changes include, technological advancement, increased demand of water emanating from population growth, divergence of interests caused by environmental and political differences, improved awareness, globalisation and historical development. It is hoped that through a co-operative mode of management, recurrent interstate conflicts will be reduced.

This report explores the dynamics that drive the choice between conflict and cooperation in the Greek Transboundary Rivers. It seeks to broaden the range of perceived benefits, as some are obvious and some are much less apparent, but also to reveal the obstacles to cross border cooperation.

This is the reason for the statistical research on economical, political, and social parameters of the neighbouring countries. For example, the total surface area of a country is an important geographic variable that works negatively to the cooperation. Comparatively large countries are less likely to seek treaties with smaller riparian

neighbours, since larger countries are likely to be more economically powerful than smaller neighbours and are likely to control a sizeable portion of the relevant river basin. Asymmetric country characteristics are impediments to the formation of formal agreements. It is expected that smaller countries generally have lesser economic or political power as compared to larger states. Therefore, these smaller countries are expected to rely more heavily on neighbouring countries. This increases the probability that smaller nations will seek to form treaties.

The principles of sustainable and integrated management of water resources focus on the need to use the natural boundaries as the basis for any management plan. When those boundaries are shared by more than one countries (Greece-Bulgaria, Greece-Albania etc), two major issues arise: the concerted management of transboundary water bodies and the harmonization of policies. For example, an agreement was signed in 1995 between Greece and Bulgaria on the Transboundary River Nestos after many years of negotiations and since then both countries failed to show a joint effort to put it into action. The new Water Framework Directive (WFD) 2000/60 introduces river basin management, not only for the European Union member countries but also for the candidate countries, providing thus a common framework between countries for the cooperation, planning and management of rivers.

This report outlines the current status of cross border cooperation in two representative Greek transboundary rivers, River Nestos and River Evros, which is heavily affected by flood over the past years.

Maritza – Evros – Meric River Basin (river shared by Greece, Bulgaria and Turkey)

The Maritza/Evros/Meriç basin (Figs. 3a and 3b), including Arda, Tundja and Ergene tributaries, is one of the major river systems located in the eastern Balkans, with a total length of 550 km and a total catchment area of 39.000 km². About 66% belongs to Bulgaria, 28% to Turkey and 6% to Greece. About 218 km of the river are located in Greece, with 203 km of the river forming the borderline with Turkey.

Maritsa/Evros/Meriç river itself has 321 km and a catchment of 21.083 km² in Bulgaria and 3.340 km² in Greece. Major cities are Pazardik (130.000 inhabitants), Plovdiv (340.000 inhabitants), Stara Zagora (150.000) and Haskovo (80.000) as well as Edirne on Turkish river side (115.000 inhabitants). Both these municipalities and the many industries located in the basin cause a lot of pollution. The delta area (about 150 km²) is a very important ecological site, protected under the RAMSAR convention. The mean discharge of the river at the mouth is about 1.610 m³/s. Water is mainly used for irrigation and water supply of cities and villages.

Two major tributaries of the Maritza have transboundary sub-catchments themselves:

- ❖ Arda river flows eastward from the Eastern Rhodope mountains (240 km and 5.200 km² in south-eastern Bulgaria; only 30 km and 345 km² in Greece) including Kardjali (60.000 inhabitants) and includes various big reservoirs.
- ❖ Tundja river (350 km length and 7.982 km² in Bulgaria;). Main cities are Kazanlak, Sliven (136.000 inhabitants) and Yambol (110.000).

The tributaries Ergene (from Easter Thrace/Turkey) and Arda (Bulgaria and Greece) may induce severe floods and cause a lot of damage to downstream areas.

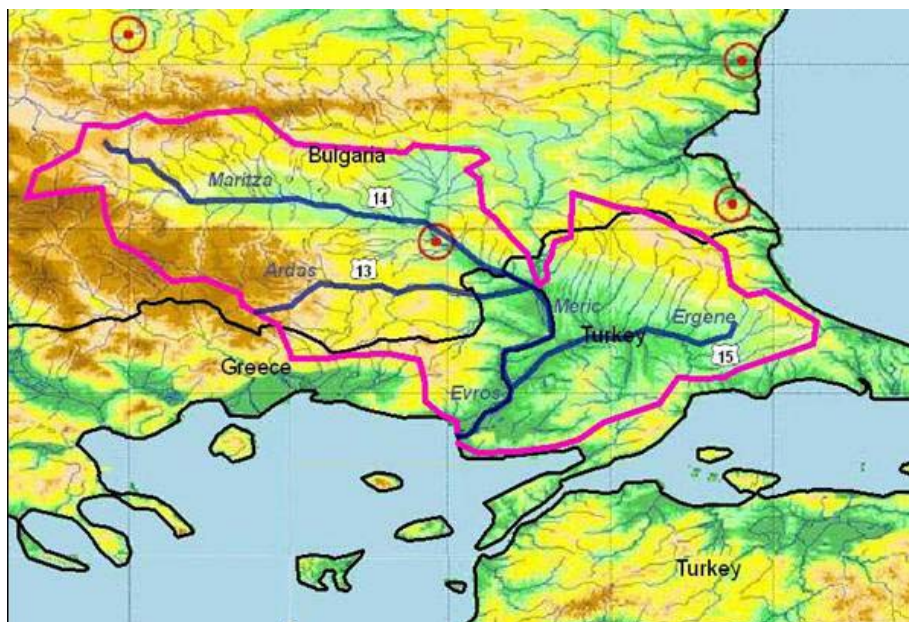


Figure 3a. Transboundary river of Maritza – Evros – Meric

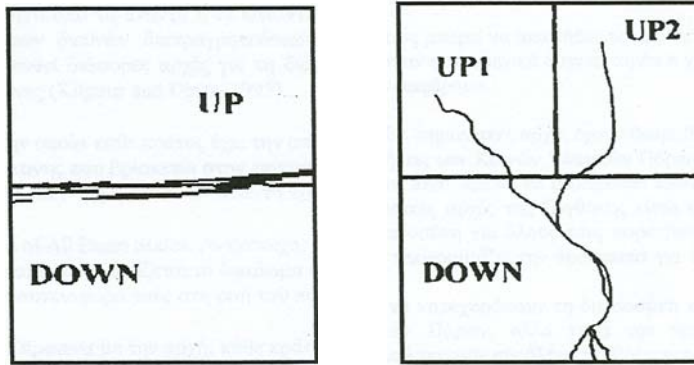


Figure 3b. A combined type of Y-3 countries and borderline river

Bulgaria	Greece	Turkey
Geographical characteristics		
<u>Longitude/Latitude at downstream outlet</u>		
?	41o-43o N / 24o-26o E	?
<u>Size of Basin (km²)</u>		
21,083 (+ Arda 5,200)	3.340 (+ Arda: 345)	14.650
<u>Length (km)</u>		
321,5	180	Ergene: 180
<u>Topography, including altitude range (m)</u>		
Maritsa River springs from the Rila Mountain near the summit of Mancho (2,378 m a.s.l.). It runs south-east following the Balkan mountains, crossing to Thrace. Maritza river has 100 tributaries, situated symmetrically on both sides. Tundja and Arda rivers are the main tributaries. The mean catchment altitude is 579 m asl. The mean slope is 7.3 ‰ and the density of the river net 0.74 km/km ² .	The delimitations of river Evros boundaries are to the north the mountain chain of east Rodopi, to the south the Aegean sea, to the west the palisades and low land areas which extend up to the northern Rodopi mountain chain and to the east the border line between Greece and Turkey. Altitude varies from 0 to 622 m	The topography of the region is mainly composed of Strandja Mountains lying parallel to the Black Sea with the highest peak (1,018 m) close to the Bulgarian border. In the south (the coast of the Marmara Sea), there are single peaks such as Tekir Mountain and Isiklar Mountain. Between these mountainous areas is the Ergene river basin with its tributaries flowing from north to the south and from the south to the north.
<u>Geology</u>		
Malko Belovo karst drainage catchment. • The Perushtitsa-Ognianovo karst drainage catchment. • The Kuklen-Dobrostan karst drainage catchment. • The Luki-Hvoina karst drainage catchment. • The Velingrad karst drainage catchment • The Late Triassic karst-shaped limestones (Sakar mountain)	The geological structure of the area is composed by two basic units: • The Thrace mass. • A geosyncline. The Thrace mass contains the mountain chains of Rodopi and Aimou. The geosyncline is located at the southern part of the area and mainly in the river valley till the outlet of the river. The Thrace mass is consisted of crystalschist formations such as gneiss, granite, and volcanic rocks. Sand, limestone and clay form the geosyncline of the river valley. Generally the area shows a great paleontological and geological interest	The Thrace basin in north-western Turkey is a triangle-shaped Tertiary sedimentary basin formed by extension in late Middle Eocene to latest Oligocene times. Basement-related normal block-faulting then caused rapid subsidence, and the deposition of thousands of metres of thick marine clastics. Some basement faults evolved into boundary faults separating shelf areas from deep basinal realms, and greatly affected the rate of sedimentation and facies distribution in the basin.

<u>Rainfall, average annual and seasonal distribution, etc.</u>		
Between 550 and 620 mm in the low land section of the river and increasing to 900 – 1.100 mm in the mountain regions. Precipitation maximum is observed usually in May and June, while the precipitation minimum is observed in July and August and in some years in February.	Average annual rainfall: 500 - 1.100 mm	600 mm with 35% in winter, 25% in spring, 27% in autumn, and 13% in summer.
Demographic properties		
<u>General location of the basin</u>		
Evros transboundary river, is located on the Balkan Peninsula. About 480 km long, it rises in the Rila Mountains (Bulgaria), and flows SE between the Balkans and Rhodope Mountains., past Plovdiv, to Edirne, Turkey, where it turns south to enter the Aegean Sea near Enez.		
<u>Total population in basin</u>		
1.758.000 people	133.048 people	987.216 people
<u>Population of principal cities or towns</u>		
Stara Zagora: 156.000 inh. Haskovo: 87.610 inh Pazardjik: 86.100 inh	Alexandroupoli: 35.699 inh.	Edirne: 134.400 inh
<u>GDP per head (\$)</u>		
7.560	18.730	6.800
<u>Religion</u>		
Christians (84%), Muslims (12%), Other (4%)	Christians (98%), Muslims (1,3%), Other (0,7%)	Muslims (99,8%), Other (0,2%)
Land uses		
Cereals, industrial crops, tobacco, fresh vegetables, rosaries, grassland, fallow land, forests, pastures etc	Land uses include grazing, agriculture, commercial fisheries and hunting The land close to the delta is used for agriculture (about 150 km ²), where cotton, medic, sugar beet, sunflower, tomatoes and asparagus are grown.	About half of the area is used for farming (mainly wheat, sunflower, and rice). Additionally, sugar cane, sesame, corn, onion, garlic, bean, watermelon, melon, and zucchini are produced. Dry farming system without following is practiced with wheat-sunflower rotation. Not only dry farming but also irrigational farming is popular in the region.
Water Resources / Uses and Environment Situation		
Mean annual surface water resources 4.030 hm ³	Mean annual surface water resources: 6.800 hm ³	Surface water demand 302 hm ³ /year Groundwater (planned irrigation) 116,8 x 302 hm ³ /year
<u>Net usable capacity of surface reservoirs</u>		
14 reservoirs with a total net capacity of 1.200 hm ³	?	8 reservoirs
<u>Water uses</u>		
For water supply: 118.000 hm ³	Water supply, irrigation, industrial use, hydroelectric power, thermal waters	Agricultural purposes (irrigation), industrial water supply (Lüleburgaz-Çorlu-Çerkezköy), water supply for municipalities.

<u>Environmental properties</u>		
?	Drainage works carried out between 1950 and 1970 (including channel construction and embankment of the river) caused major hydrological and land use changes in the delta. As a result, parts of wetland habitats have been lost and others seriously modified.	The area has very sensitive eco-systems especially the Meriç (Evros) delta for immigration of the birds seasonally. Also wetlands such as Gala Lake are very sensitive, regarding salt water intrusion from Aegean sea if the stream level is not high enough in the Meriç (Evros) River.
<u>Competent authorities</u>		
Ministry of Environment and Water (MoEW) Executive Environment Agency Ministry for Regional Development & Public Works (MRDPW) Municipalities + water companies	Ministry for Environment, Physical Planning and Public Works Public Power Corporation (DEH) Ministry of Agriculture General Secretariat for Civil Protection	DSI (State Hydraulic Works) EIE (Electrical Power Resources, Survey and Development Administration of Turkey)

International agreements / conventions and national legislation

Although Maritza/Evros/Meriç River, shared by Greece, Bulgaria and Turkey, is the second longest river after the Danube in the Balkans, this river and its tributary Arda (shared by Greece and Bulgaria) are lacking considerable recent bilateral or trilateral agreements. This situation is mainly due to the past nontrusted political relationships between the three countries. Parts of the Evros/Meriç River bed serve as state border between Greece and Turkey. Thus, both Evros and Ardas rivers are located in a military controlled area. Special permit from military authorities is needed for all scientific or other activities near the rivers. Its delta is an important bird area protected by the Ramsar Convention and the Bern Convention on special species of flora and fauna. It is also cited in the list of regions of special protection according to the EU Directive 79/409/EEC and the national Greek legislation 66/81.

Regarding Greece and Bulgaria, bilateral cooperation in the use of water dates back to 1964. Both countries ratified the Helsinki Convention for protection and use of transboundary watercourses (1992; in Greece in force since 1996) and the Espoo Convention. After the implementation of Helsinki Convention, Greece and Bulgaria are cooperating by a joint monitoring in the three common river basins, i.e Struma, Mesta (including the tributary Dospat) and Maritsa (including the tributary Arda). In the following years, bilateral agreements on the use of other transboundary rivers waters were signed. Also, cooperation in scientific and technical field for the best management of water resources is established.

The main agreements on the protection and use of transboundary watercourses are:

- GR-BG agreement on co-operation for the use of watercourses flowing through the two countries (Legislative Decree 4393/1964);
- Second Protocol of the GR & BG agreement about the regulation of economic questions and development of the economic co-operation (Legislative Decree 4393/1964);
- Agreement between GR & BG concerning the formation of a joint committee for the cooperation in the field of electric energy and the use of cross-border river waters (Sofia, 1971);
- Agreement between GR & BG on scientific and technical cooperation (Athens, 1973/1976);

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- Protocol for the Joint GR-BG Technical Working Group and Environment Group (approved 1990); Protocol for the co-operation of GR-BG Experts for flood control of Strymonas River (approved on 1980); The Agreement from 1964 on flood protection refers to the section downstream of a series of reservoirs in Bulgaria. It operates between local authorities (when the BG reservoir gates release excess water upstream, they send a warning to the GR local authorities).
 - Protocol of the Meeting of the Joint GR-BG Committee of Experts for the preparation of a common proposal to the EU for the joint monitoring and control of water quality and quantity of the transboundary rivers Maritsa/Evros, Mesta/Nestos and Struma/Strymonas. (1991).

Institutions / distribution of responsibilities

Greece

At local level, The Region of Eastern Macedonia and Thrace, located in Komotini, acts according to the new water law as regional coordinating authority of the basin. The Prefecture of Alexandroupolis manages and plans the Evros irrigation system. Recently, a new management body (Foreas Diachirisis) has been formed following the Directive 92/43/EEC, now responsible for water quality management of the Evros delta. TOEV (Water Irrigation Company) is in charge of the management of irrigation water rights and metering for farmers in Evros irrigation region. DEYA, Municipal Enterprises for Water Supply and Sewage of Komotini and Alexandroupoli are responsible for fresh water abstraction and distribution to local towns. Municipalities are in charge of urban water supply and sewage in cities with less than 30,000 people.

At national level, the Ministry of Environment is responsible for integrated water management. For transboundary rivers the Ministry of Foreign Affairs is also involved. Next are the Ministries of Economics, of Agriculture and of Defence to some extent.

The General Secretariat for Civil Protection (GSCP) in Greece is established in 1995 by law under the Ministry of Interior, Public Administration and Decentralization. In May 2002, a new Law (N. 3013) upgraded the role of Civil Protection in Greece, emphasizing the importance of citizen protection and assigning roles to local authorities. The GSCP's main areas of activities are among others, the readiness of the personnel and means of civil protection (CP), the elaboration of the available scientific information for the mobilization of resources in case of emergencies, the coordination of response and recovery actions in emergencies and the coordination of emergency planning actions at national level.

No integrated planning of water resources is operational in the Evros river catchment. The decision-making process is not effectively coordinated between local, regional and national levels. Most of the water is used in a non-sustainable way. There are no plans for mitigating catastrophic floods. Concerning planning of water quality, parts of the Evros and Ardas catchments on Greek side are designated as NATURA 2000 sites. For these, planning and decision-making is carried out according to the provisions of the relevant national and EU legislation.

A major plan for flood protection of the Evros area was developed in the 50's, after World War II. There is a need to update and modernise the flood control and mitigation planning in the area. A preliminary study was conducted in 1999 (one year after the devastating floods in 1998). Recommendations for further studies and measures were not followed up.

Though many of the management and conservation projects in the area are quite well defined, stakeholder participation was never a priority. All major decisionmaking processes take place at central national level, without any involvement or participation of local stakeholders. Only recently, under the application of the WFD, reference is made to stakeholder information and participation.

There are no systematic plans or efforts for public sensibilisation and awareness on the use of water from the river.

Turkey

State Hydraulic Works (DSI) is responsible for all surface and sub-surface water resources in Turkey (monitoring and planning, designing, constructional, and operational activities) based on the following law:

Law Number 6200: DSI's

Establishment Law

Enacted: December 18, 1953;

Published in Official Gazette:

December 25, 1953

Effective: February 28, 1954

Decisions are shared between the Ministry of Energy and Natural Resources and Ministry of Environmental and Forestry, and local communities. State Hydraulic Works (DSI) does the planning and has several irrigation projects. The Ministry of Environment and Forestry has carried out several wastewater treatment projects in the basin.

Conclusions

Greece

- ❖ No recent international agreements.
- ❖ Absence of an International River Committee.
- ❖ Poor cooperation between Greece and Turkey on environmental issues.
- ❖ 2-3 dams on Bulgarian territory may cause sudden floods on Greek side.
- ❖ Dumping of dangerous pollutants (e.g. radio-nuclides) on Bulgarian side.
- ❖ The river supplies irrigation water to all three countries.
- ❖ Irrigation systems are ineffective and need modernisation.
- ❖ There is no agreement on the schedule of water abstraction.
- ❖ Illegal hunting and overgrazing
- ❖ Illegal water abstractions.

It is only during the past few years that Greece and Bulgaria have started some timid efforts for an agreement at any scale (local or national) on the protection and management of Evros and Ardas. However none of these efforts has come to a successful result. Unfortunately there are no similar efforts with Turkey, although the political climate between the two countries has recently very much improved.

Bulgaria

- ❖ Global climate change affected the region over the last 20 years, resulting in a ca. 30 % decrease of precipitation and associated water resources.
- ❖ Transboundary river water resource distribution between Bulgaria and Greece are for years subject of negotiations. It seems now that a reasonable agreement will be achieved.
- ❖ A shortage of water for drinking and irrigation exists in some settlements and regions.
- ❖ Construction of dams is necessary in order to regulate the runoff and to assure the necessary water quantity during the year.
- ❖ Construction of WWTPs is necessary for most of the towns downstream the main river course and for some industrial enterprises in the basin.

Turkey

Water discharge of the Meric (Evros) depends on the operating rules of the Bulgarian dams, where water storage occurs in the summer period. An agreement is needed between the 3 countries for all discharges and ecological issues. Major problems are untreated industrial wastewater discharges and pollution from overuse of fertilizers and pesticide. Uncontrolled water supply for irrigation and industrial purposes is also an important problem. The cities of Çorlu and Lüleburgaz in the Ergene basin have limited flood risk. The Evros delta is important for rice production (use of river and also groundwater). When the water level is too low because of the limited releases from the Bulgarian dams, salt water intrusion occurs (affecting water quality and the wetland life).