TRANSNATIONAL INTEGRATED MANAGEMENT OF WATER RESOURCES IN AGRICULTURE FOR EUROPEAN WATER EMERGENCY CONTROL (EU.WATER)

Priority Axis: Protection and Improvement of the Environment
Area of Intervention: A.O.L. 1.2 Improve integrated water management and flood risk prevention
Project Duration: 36 months

Summary of the Regional Report for the collected information: Sarigkiol basin, Western Macedonia, Greece" (in English)

WP3: Knowledge capitalization and sensitive area maps

Act 3.2: Organization / rationalization of data concerning the available information, deliverables and guidelines about water management in agriculture (relevant normative frameworks & agronomic features included)

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Greece is organised in 14 Water Districts, 9 regions are situated on mainland and 4 are constituted by groups of islands (1 region is autonomous-Athos). These regions are divided into 51 prefectures and include areas with homogeneous enough hydrological and hydrogeological features. The protection and management of the river basins and the implementation of the WFD (European Water Framework directive) are a responsibility of the 13 Regional Water Directorates. The institutions involved in water management are the following: **National Water Committee** composed by 6 ministers, **National Water Council**, **Central Water Agency**, **Regional Water Councils**, **Regional Water Offices/Directorates**.

The EUWATER project will be carried out in the pilot area "Sarigkiol basin". Sarigkiol basin is part of the Region of Western Macedonia, which represents the 9th Greek Water District, including 65% of the national water resources. Overexploitation and nitrogen pollution of agricultural origin are the main environmental pressures induced by humans; they have a significant negative effect on the area's groundwater. In a large part of the area irrigated agriculture is practised.

Sarigkiol basin is located in the north-west part of the Kozani prefecture territory, with a surface of 469.2 Km^2, which are covered by agricultural land (32.7% - 153.3 km^2), by forests and semi natural areas (56.9% - 266.8 Km^2) and by urban or artificial surfaces (10.4% - 49.1 km^2), which includes coal mines and steam electric power plants that cover 31.7 km^2 (Corine Land Cover 2000). At the west side there is Askio Mountain, at the east side there is Vermio Mountain, at the south side there is Skopos Mountain. The north border is nowadays the open pit of the south field lignite mines and partly the tectonic horst of Komanos. Important surface waters (e.g. lakes and rivers) are not existed in the study area except Soulou Torrent (non significant flow and small river bed, is used as a drainage pathway), which intersects the basin and was artificially opened up in 1954.

The lowlands (elevation <1000 m asl including lignite pite) and mountainous areas occupy 300.8 and 168.4 Km^2, respectively, of the total area. The min, max and mean altitude of the basin is 640, 1796 and 952 m and the min, max and mean slope is 0, 116.5 and 18%, respectively.

The area is characterized by a semi-arid, Mediterranean climate, with an annual mean tempereture 11.3 °C and an annual rainfall of 639.6 mm with the most raining periods Automn and Spring, while summers are usually dry. The relationship between

the mean annual rainfall P (mm) and the elevation H (m) is described by the regression straight line: $P = 0.28H + 373$

Soil profile analyses and soil map development for Sarigkiol basin have been conducted by Soil Science Institute of Thermi-Thessaloniki (N.AG.RE.F., 2007) according to the USDA classification. Specific soil parameters such as hydraulic conductivity and organic matter were correlated with the soil texture using pedotransfer functions (PTFs). Organic matter (OM) was determined using obtained PTF by Dexter, (2004) and saturated hydraulic conductivity (K_s) combining two equations the one parametric sand depended PTF of Ferrer-Julia et al. (2004) and the other clay depended PTF of Dane and Puckett (1994).

From a geological point of view, carbonate rocks are mostly distributed on the highlands and Neogene and Quaternary deposits cover the lowlands. Lignite deposits occurring in the Plio-Pleistocene sediments (Voudouris, 2006; adapted from IGME).

The main aquifer systems are developed in Quaternary deposits, Neogene sediments and in carbonate rocks. The water needs of the basin, are predominantly being covered by the exploitation of both alluvial and karstic aquifers, through a large number of boreholes (greater than 500).

The alluvial aquifer of the Sarigkiol basin covers an area of 60 Km^2 and its maximum depth reach at 110 m below ground surface (b.g.s.). The depth to water table in the alluvial aquifer ranges from 7 to 75 m below ground surface. The alluvial deposits host a phreatic aquifer superimposed on successive confined or semi-confined aquifers. There is hydraulic connection between them due to its “lens” form, as well as with the phreatic aquifer. Despite the documented heterogeneities however, it is suggested that on a regional scale a uniform aquifer may be considered (Voudouris, 2006). Based on hydrochemical data, it is concluded that, the Ca-Mg-HCO_3 water type is the dominant type. High nitrate (NO_3^{-}) concentrations are locally recorded in basin. Total Hardness varies between 300-400 mg/L $CaCO_3$ indicating that the waters are hard (IGME, 2001).

In Sarigkiol basin the most important pollution sources, which are related to human activities, are originated by agriculture activities, urban, industrial, mineral extraction mines, abandoned waste fields, animal breeding wastes and LCWM operations.