Assessment of the vulnerability and the climate change impact on the water resources of an insular Mediterranean Watershed

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The objective of the current study is to estimate the potential effect of climate change by examining different scenarios in the hydrologic regime of small intermittent flow basin subject of severe floods and drought phenomena. The case study, Tsiknias river (Lesvos), an intermittent flow river and its regime is highly sensitive to precipitation fluctuation and temperature variability. However, the river is connected to its downstream part to a Natura 2000 area, which hosts high biodiversity and endemic species and recharges a coastal aquifer suffering by saline intrusion phenomena. Therefore, the hydrologic regime of the river is essential for the conservation of the high diverse coastal environment.

SWAT (Soil and Water Assessment Tool) is used to estimate the water flow for the period 2015-2017 and to generate the future scenarios from 2017 to 2100. With the software IHA (Indicator of Hydrologic Alteration) the flow median values per month for the historical and future time series are estimated.

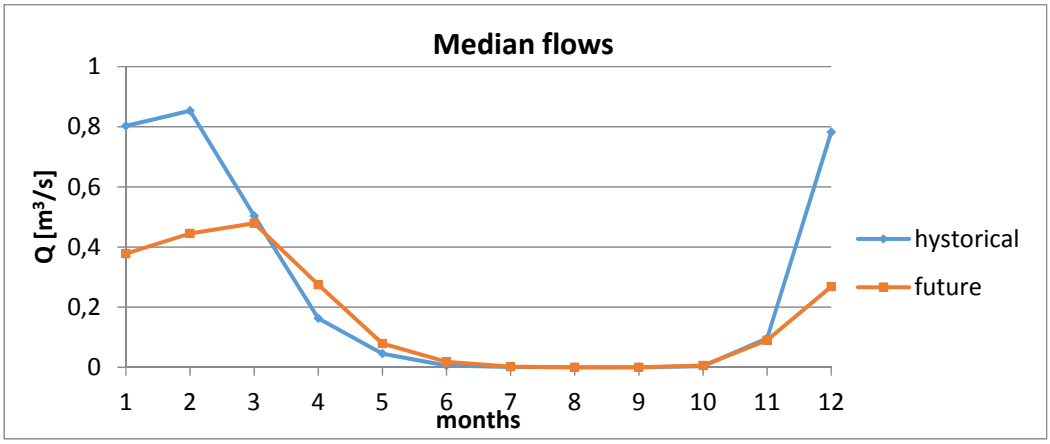

Figure 1 Median monthly flows of Tsiknias river for the historical and the CC scenario

Groundwater predominantly contributes to the water supply and consumption in Lesvos. However, increasing demand for water in irrigation and industrial application has led to the displacement of previously sustainable practices in water consumption. Furthermore, although the potential for reclaiming water from wastewater exists in the Aegean, current water resource programs have failed to realize sustainability in their management by not integrating them into practice. Since 2015, the island of Lesvos have been used as a popular gateway for migrant crossing into the European Union creating additional pressure on its resources. An essential issue in addition to that of water supply lies in the threat posed by the water quality deterioration through heavy metal concentration and saltwater intrusion.

A significant decrease of the annual flow in the river of almost 40% during the next 100 years is predicted by the various CC scenarios. This phenomena can result in droughts, harming both the local agricultural, ecological system and the social-economic one. So, water retention measures have to be taken such as the construction of a reservoir to store water and the creation of a diversion channel between the Acheronas river and the Tsiknias river to prevent from flood phenomena. Meanwhile, there is the need of public consultation, in order to increase acceptability of water sources management solutions and incorporate public perspectives in planning and decision making.