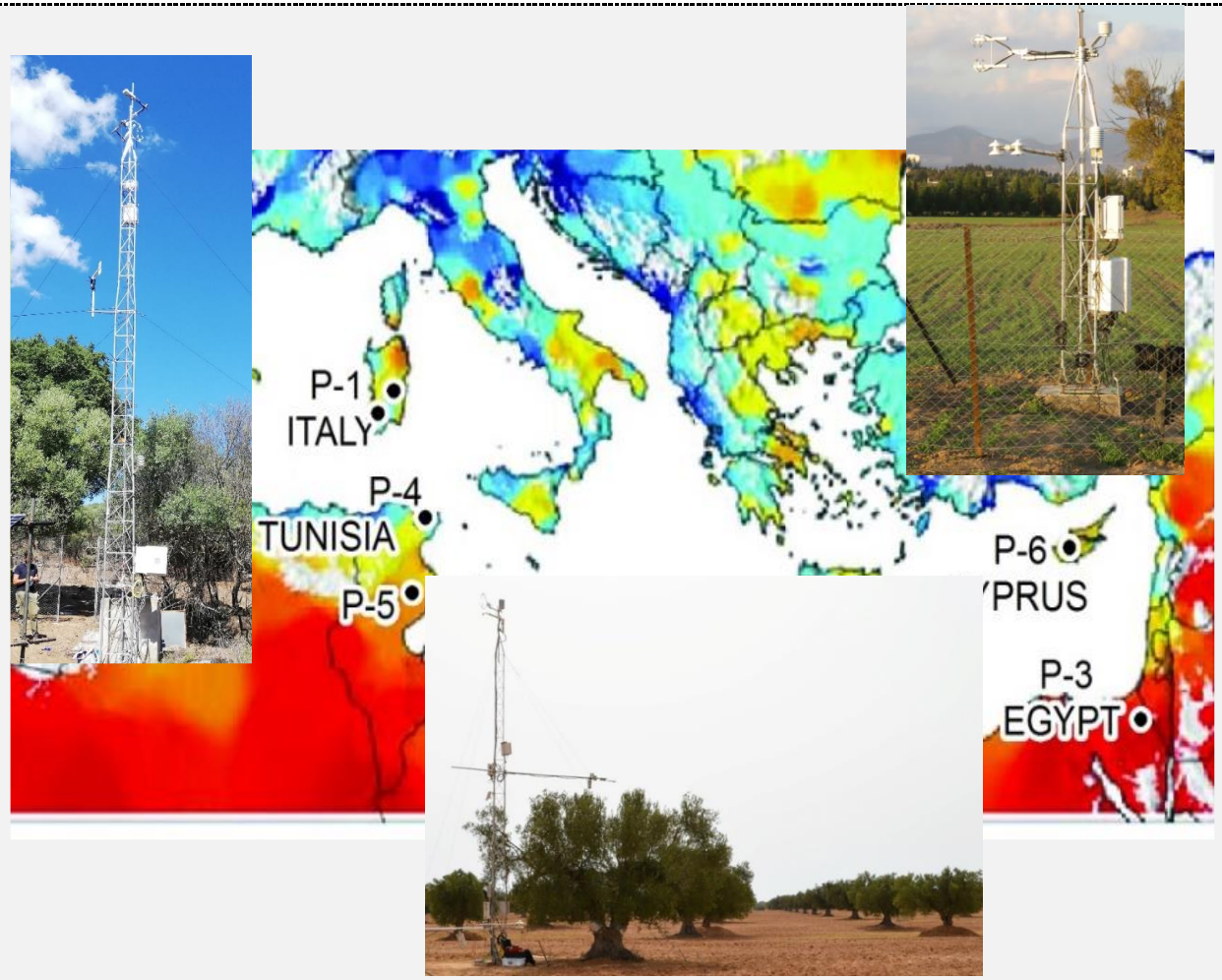
WATERWORKS 2017 RDI FUNDED PROJECTS BOOKLET

Title of the project: Strategies for increasing the water use efficiency of semi-arid mediterranean agrosilvopastoral systems under climate change

Acronym and LOGO: FLUXMED



Representative image of the project:

Project Coordinator: Nicola Montaldo – nmontaldo@unica.it
Università degli studi di Cagliari (UNICA)
Country: ITALY
Photo:

Project partners *(1 per partner)*

Project partners:
Institutions: Energy Environment and Water Research Center, The Cyprus Institute
Country: Cyprus
Contact points: Adriana Bruggeman - a.bruggeman@cyi.ac.cy

Project partners:
Institutions: Faculty of Engineering, Ain Shams University
Country: Egypt
Contact points: Ashraf M. Elmoustafa - elmoustafa010@yahoo.co.uk

Project partners:
Institutions: Centre d'Etudes Spatiales de la BIOsphère
Country: France
Contact points: Gilles Boulet - Gilles.Boulet@ird.fr

Project partners:
Institutions: Institut National de la Recherche en Génie Rural, Eaux et Forêts
Country Tunisia
Contact points: Rim Zitouna Chebbi - rimzitouna@gmail.com

Project website:
www.fluxmed.eu

Abstract:

The Mediterranean regions are subjected to a large variety of climates, ranging from arid to sub-humid with summers characterized by high temperatures and low precipitation. At the same time the water scarcity highlights the need for careful water resources management and planning in Mediterranean regions. In the Mediterranean regions there is a persistent declining trend of precipitation and runoff decreases, contributing to a desertification process with dramatic consequences for agricultural and water resources sustainability. Climate change projections point to an amplification of changes in global precipitation patterns and trends, with further drier trends for the Mediterranean area and dramatic consequences on water resources for managed and natural systems. To face the upcoming water crisis, there is a need to develop stronger international cooperation in water research and enhance the resilience of agricultural and natural systems to climate

change. In water-limited regions the conservation of water through improving agriculture and environmental management practices is highly needed, and the use of water-efficient and drought-tolerant tree and crop species a prerequisite. Land planning strategies need to be investigated under both current and future scenarios, due to the impact of these strategies on the environment and the water resources.

Keywords: (In relation with Water JPI SRIA)
Resilience; resilient water systems; Water security; Multiple pressures on water systems; scarcity; Climate change; management

Open keywords:
Climate change; Mediterranean basins, eddy covariance tower, water resources management, forestall management, evapotranspiration, soil moisture

Project structure (WPs description):

WP1-Project Management and Coordination

WP2- Experimental fields and watersheds: a new transnational Mediterranean watershed monitoring network. This work package will consist in the instrumentation and the monitoring of the experimental sites using meteorological or micrometeorological sensors, and the monitoring of rainfall and streamflow in the hydrologic basins. Analysis and data elaboration will be performed for: control and quality check of data; estimation of evapotranspiration (ET) components in agricultural and natural environments; estimation of relationships between ET and soil moisture in different field sites.

WP3- Ecohydrological modelling. This work package will develop iinnovative spatially distributed versions that couple land surface models (LSMs) and vegetation dynamic models (VDM) and rainfall-runoff hydrologic models for simulating also runoff propagation at the basin scale.

WP4- Remote sensing and data assimilation. This work package will obtain vegetation indices and surface temperatures (Ts) from images of ASTER, NOAA AVHRR, SEVIRI and SENTINEL. Ts and vegetation indices estimates from remote sensing will be tested with the observations of the field campaigns and will be used for developing a Data assimilation system.

WP5- Analysis of land cover change strategies and climate change scenarios. Future climate scenarios will be generated starting from historical climate data perturbed following the IPCC future climate scenarios of the Fifth Assessment report. Annual, seasonal, monthly and daily statistical series for precipitation, runoff, and temperature and annual and seasonal trends will be computed. Climate models for future scenarios will be selected after comparing the models' outputs with the observed data in each investigated region. An opportunely adapted stochastic generator will be used for accounting the unstationarity of the climate processes and the climate changes. The use of ecohydrological models, data assimilation system and IPCC scenarios will allow to to identify the impacts of contrasting vegetation and crop types on the soil water balance, surface runoff, and water use under current and past Mediterranean climates, to predict the impact of future climate scenarios on soil water balance, runoff, and water use, and to develop a set of land cover change strategies (e.g. forestations/deforestation, use of more drought-tolerant crops and woody vegetation) for climate change scenarios that optimize the water uses and increase system resilience.

WP6: Development of water management and planning systems. This work package will develop a multipurpose and multiuser water management system to improve the multipurpose and multiuser water resources management and planning systems for the opti-mization of the water infrastructure (e.g., reservoirs, groundwater recharge, water harvesting) and uses (irrigation, animal production systems, drinking and industrial activities) under current and future climate change scenarios. Water resources management optimization models (WARGI by UNICA, Hec-ResPRM, and others) will be applied and improved to define the economic efficiency and the optimal water allocation in the water system configurations throughout the evaluation of multiple planning and management rules.
WP7: Quantifying benefits and sharing methodologies with stakeholders and dissemination. This work package will include the dissemination and exploitation activities to stakeholders (both public authorities and companies and private companies) and scientific community. In particular within the WP7 we will: organize start-up stakeholder meetings in all case studies to tap into the knowledge and experience of all local stakeholders and fine-tune the planning of the monitoring and modeling activities; conduct participatory seminars; identify acceptable scenarios in view of simulated impacts; conduct participatory seminars for discussing possible configurations; share methodological developments; deliver results and disseminate outcomes. Project results will be made available to the scientific community, to foster the development of multidisciplinary activities focusing on hydrology, climatology, hydraulic construction, environmental sciences, water and irrigation management. Scientific publications in international and national journals, participation to the main international conferences, a final report of the activities and three public workshops will be the way to disseminate and communicate the results also beyond the scientific community. A project web site, a “Google” research page and a “Facebook” page will be created for an effective communication and transfer of the results. The project results will have implications in the operative water management of single farmer, irrigation consortia and water basin and environmental authorities.