Project title: *"Innovative precision technologies for optimised irrigation and integrated crop management in a water-limited agrosystem"*
Proposal acronym: HYDROSENSE
LIFE + Nature and Biodiversity- Environmental Policy and Governance - Information and Communicati on Country: **Greece,** Number: **LIFE08 ENV/GR/570**

Duration: 2009-2012

Coordinating beneficiary: **GAIA Environmental Research and Education Centre of the Goulandris Natural History Museum**

Partners:

- ***National Agricultural Research Foundation – Institute of Soil Mapping and Classification (NAGREF)***
- ***Benaki Phytopathological Institute (BPI)***
- ***University of Thessaly (UTH)***
- ***Agricultural University of Athens University (AUTH)***

Budget:Total 1.288.503
Associated beneficiary's own contribution in €: 668.002
Amount of EC contribution requested in €: 620.502
NAGREF's budget: 219.787 € (own contribution), 193.287 € (EC contribution)

Objectives

The **HydroSense** project proposal aims to improve the water, fertilizer and pesticide use efficiency of a major Mediterranean agricultural crop (cotton) by employing principles of site-specific management and advanced technologies in proximal remote sensing. In Greece and adjacent Mediterranean countries, conventional agricultural practices are closely related to the problem of water scarcity due to water over-consumption for irrigation of agricultural crops, the intensive use of pesticides and chemical fertilizers and, ultimately, the depletion, salinization and contamination of ground water. Consequently, there is an increased interest in crop production systems that optimize yields while conserving soil, water and energy and protecting the environment. Taking into account the Water Framework Directive (WFD), the proposed project aims to demonstrate recent advances in site-specific management in order to:

a) improve water, nitrogen and pesticide use efficiency of agricultural crops in dry Mediterranean environments

b) improve water, nitrogen and pesticide use efficiency of agricultural crops in dry Mediterranean environments

c) exhibit a high degree of innovation by the use of proximal remote sensing such as the employment of advanced canopy sensors

d) demonstrate the economic effectiveness of the system by reducing inputs while maintaining productivity

e) provide tools for adjusting agricultural policy by upscaling in-field data to regional scale and by constructing a new design of water pricing

f) diffuse the innovative technologies to farmers by interactive training through the website and GIS database in the broader watershed scale

g) have the potential to be applied in other agricultural crops and other geographical areas of water-limited environments

Actions and means involved

The project consists of the following actions:

1. Task management for the setting of procedures and rules for the effective coordination of the project
2. Preparatory actions
    a. Selection of pilot areas within each demonstration site representative of the diverse soil types, topographic features, evapo-transpiration potential and farming community interests prevailing in the Pinios watershed (**Action 2a**).
    b. Communication with the targeted users (stakeholders/farmers) (**Action 2c**).
    c. Soil mapping and delineation of management zones based on soil organic matter and associated water retention and nutrient characteristics. Purchase and installation of remote sensing and differential irrigation systems (**Actions 2b, 2d, 2e**).
3. Zone monitoring and timing of variable-rate inputs
    a. - Remote monitoring and mapping of spectral canopy reflectance in each zone leading to the timing of irrigation and fertilization events (**Actions 3a, 3b, 3c**)
    b. Field monitoring of crop stress and soil nutrient status (**Actions 3d**)
    c. - Pesticide and herbicide management, always according to the principles of Integrated Crop Management. (**Actions 3e**)
    d. -Yield mapping for the purpose of estimating productivity and environmental performance indicators (**Actions 3f**)
4. Evaluation of performance indicators

a. - Input-output accounting systems evaluated in terms of water, nutrient, energy and pesticide use and efficiency within and between demonstration sites. Process-oriented indicators will be assessed in terms of soil quality and crop stress (**Actions 4a, 4b**)

b. - Minimum data set for in-field monitoring (**Action 4c**)

5. Development of regional database

    a. - Soil and crop mapping. Two satellite images will be taken before and after cotton planting. The first satellite image will be used to define soil management zones and the second to define crop management zones in the watershed area (**Action 5a, 5b**)

    b. - GIS database. The processed satellite images, soil survey maps and survey on current crop management practices will be used to develop a GIS database to store crop and crop characteristics, water consumption and agri-chemical inputs in the watershed sections (**Actions 2f, 4, 5b**)

    c. - Projection of variable-rate inputs from the plot area level to the watershed level based on the management practice data in the GIS database (**Action 5c**)

6. Water pricing and recovery of irrigation costs

    a. - Estimation of financial, environmental, and resource costs of the various uses in the watershed to give a full cost assessment of water uses (**Action 6a**)

    b. - Assessment of welfare effects and policy effectiveness of water pricing methods. Users and stakeholders will be involved to avoid conflicts and resolve issues of affordability and acceptability (**Action 6b**)

7. Training of local stakeholders

    a. - Legislation, procedures, hazards and risks, integrated management, application equipment, and record keeping for advisers and distributors, and farmers (**Action 7**)

8. Dissemination plan

    a. - Diffusion of innovative technologies. Implication of farmers at a broader scale by the formation of a human network, access to the website, assessment of farmer needs for equipment and providing services for variable-rate applications. Notice boards, press releases, leaflets, meetings, workshops, conference presentations, technical publications, website, demonstration visits (**Action 8**)

9. Monitoring of project progress for the setting of procedures and rules for the effective progress monitoring and evaluation (**Action 9**)

10. Auditing (**Action 10**)

11. An after LIFE+ communication and dissemination plan will utilize tools such as website maintenance, scientific publications and presentations to mass media, educational programs and even a remote sensing mobile unit for providing extension services to farmers (**Action 11**).