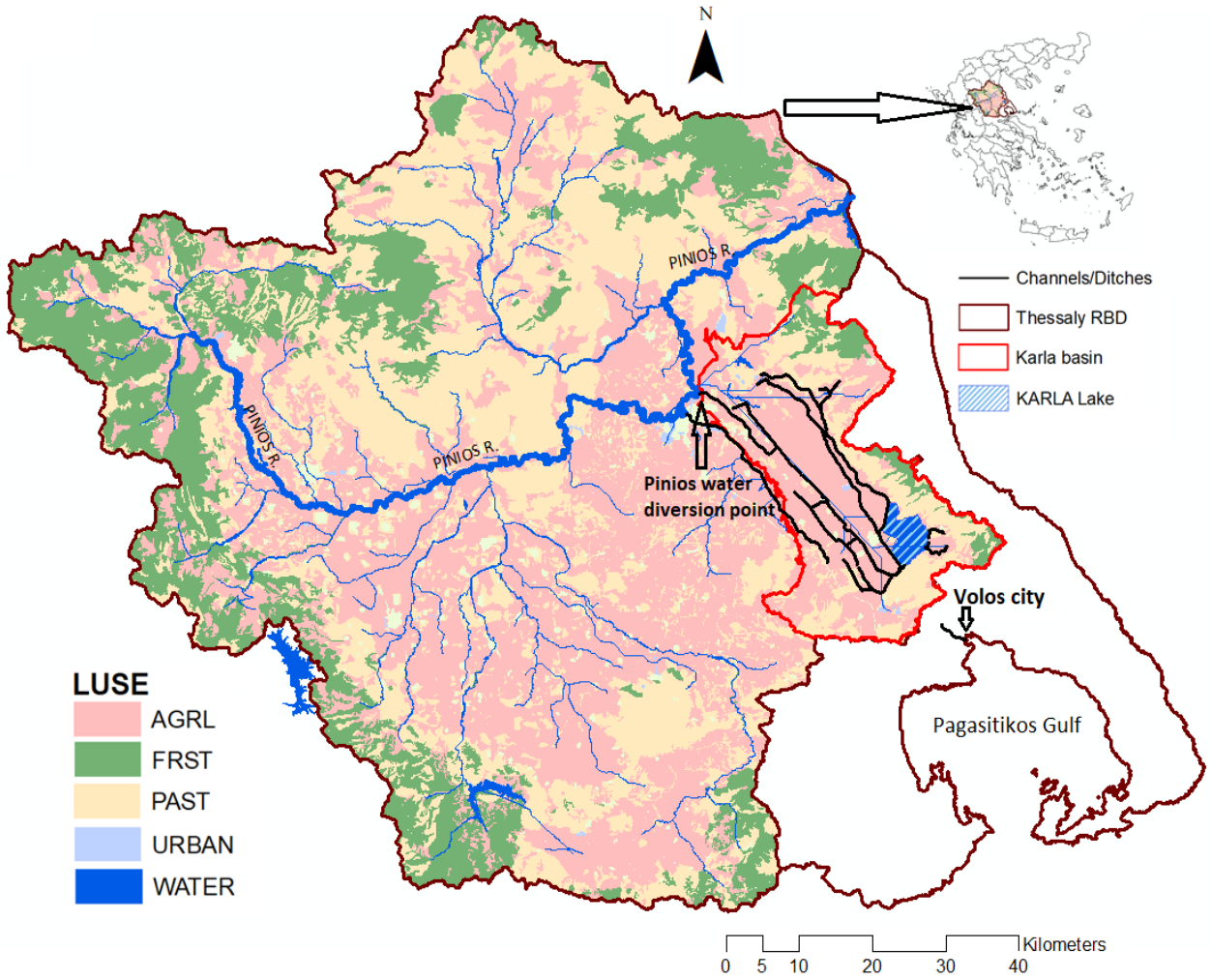
Ecosystem services evaluation from sustainable water management in agriculture: An example from an intensely irrigated area in central Greece

Yiannis Panagopoulos, Dimitrios Karpouzos, Pantazis Georgiou and Dimitrios Papamichail

Department of Hydraulics, Soil Science and Agricultural Engineering, School of Agriculture, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece.

Correspondence: ypanag@agro.auth.gr; Tel.: (+302310998708)

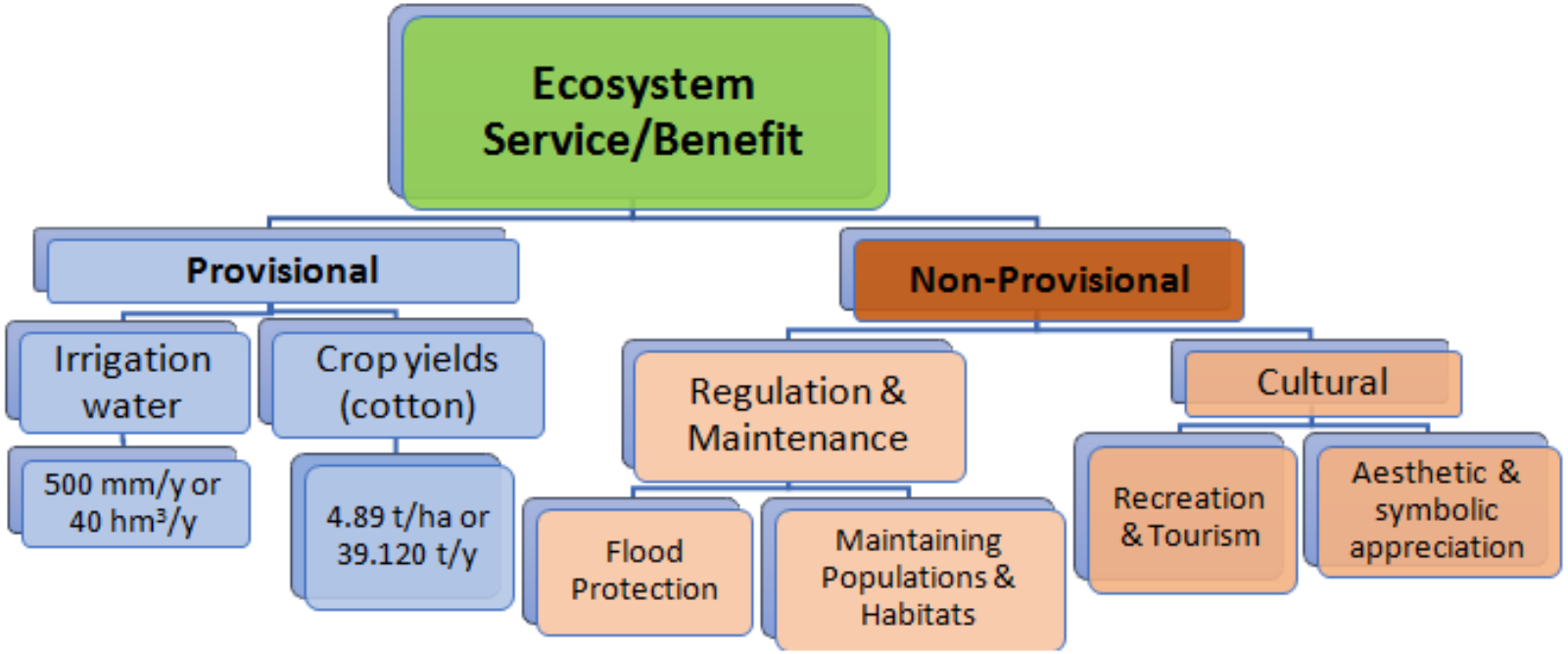
Case study: Lake Karla, Pinios river basin, Greece



- An artificial reservoir of 38 km^2 constructed in 00's for water retention in a water scarce region
- The natural lake Karla was drained in 1960's to gain agricultural land
- But water scarcity and overexploitation of groundwater caused significant and economic problems and raised the need for lake recreation
- It collects runoff water and discharge water from Pinios river (diversions in the wet period)

Methods for the analysis:
•Literature information and reported data
•Hydrologic modelling (SWAT)
•Real data from the first operation years of the project

Ecosystem services identified or quantified

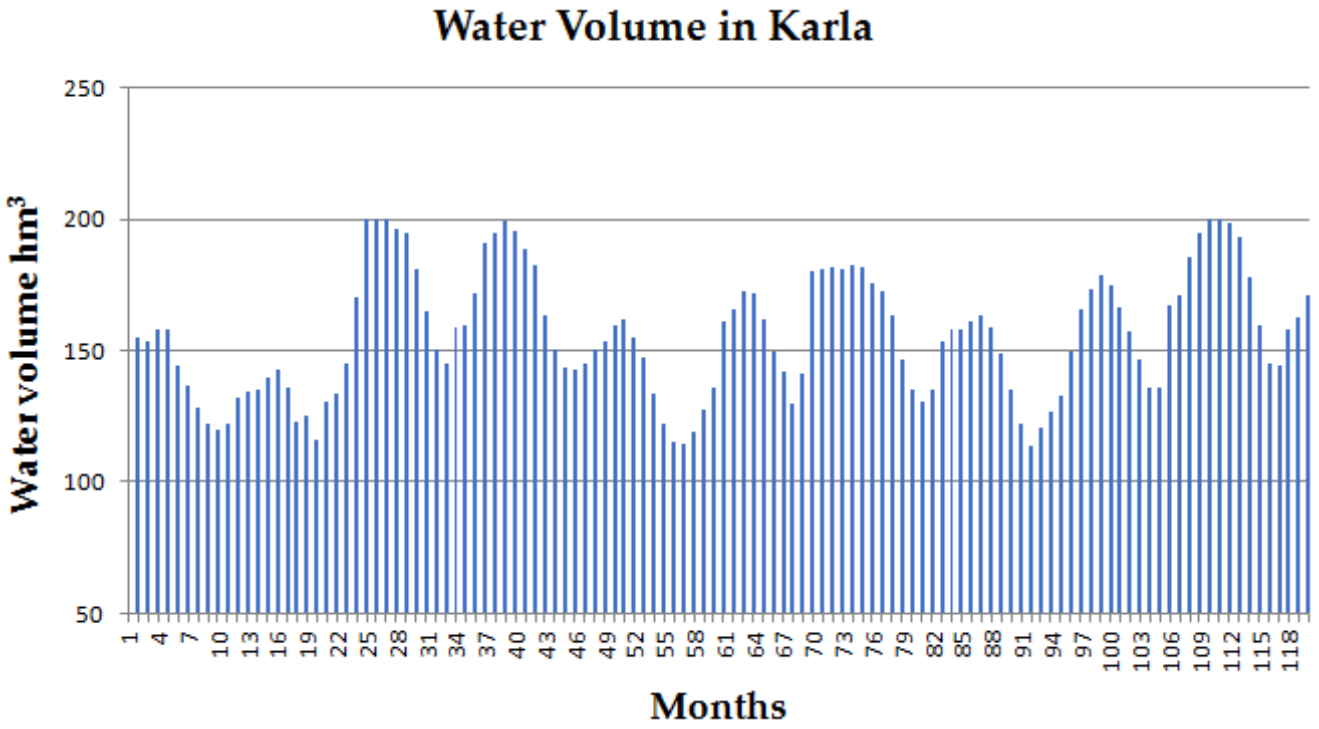


- Crop yields are doubled without groundwater pumping – water supply is ensured
- Flood protection of the surrounding areas
- Significant aquifer recharge
- Ecosystem development (Natura and Ramsar site) Birds, fish etc.
- Recreation and tourism opportunities

Ecosystem services provided by Lake Karla

Left: crop areas irrigated by water from Lake Karla
Middle: part of the lake with bird nesting areas
Right: the museum, a touristic attraction

Water volume in the Lake



Volume of water stored in Lake Karla at the end of each month simulated within a 10-y (120 months) historic period starting in 2001 (1=first month of the simulation).

Required minimum water volume: 100 hm^3

Project viability and future actions

- Raise awareness among all of the users/stakeholders for the benefits but also for the maintenance and development actions required.
- Of high priority is the construction of the remaining parts of the initially planned collective irrigation network around the reservoir.
- A volumetric pricing of irrigation water that is counterbalanced by crop productivity should be also established.
- The minimum water level in the reservoir has to be maintained so that the lake acts as an important reservoir for biodiversity and healthy ecosystem, maintaining its fish and bird species.