LIFE14 CCA/GR/000389 - AgroClimaWater
Promoting water efficiency and supporting the shift towards a climate resilient agriculture in Mediterranean countries

Deliverable C2: Report on Assessment of Water efficiency of the participant F.ORs before LIFEAgroClimaWater

Action C2: Identification and assessment of water efficiency in the three F.ORs – Before LIFEAgroClimaWater

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Terminology / Abbreviations

Term	Description
a.i.	Active Ingredient
AFI	Assofruit Italia Società Cooperativa Agricola
ALSIA	Agenzia Lucana di Sviluppo e di Innovazione in Agricoltura
AWMS	Agricultural Water Management Strategy
B	Borax
CaO	Calcium oxide
CD	Code
cv.	Cultivated Variety
CW	Coastal Water
D.Lgs	Decreto Legislativo (It) / Legislative Decree (EN)
DAC	Decentralized Administration of Crete
DEYAN	Municipal Enterprise of Agios Nikolaos
DEYAVA	Inter municipal Water & Sewage Company of the Northern Coast of the Prefecture of Chania (Diamimotiki Epihirisi Ydrefsis Apohetefsis Voriou Axona)
E	Evapotranspiration
e.g. / i.e.	For example
EC	European Commission
EGRIB	Ente di Governo per I Rifiuti e le Risorse Idriche di Basilicata
EIPLI	Ente per lo sviluppo dell'Irrigazione e la trasformazion fondiaria in Puglia
ELSTAT	Hellenic Statistical Authority
etc.	et cetera
EU	European
EWS	European Water Stewardship
F.OR.	Farmer Organization
FEK	Government Gazette / Official Journal of the Hellenic Republic
GDP	Gross Domestic Product
ha	Hectare
HCVAs	High Conservation Value Areas
HMWB	Heavily Modified Water Body
IBA	Important Bird Areas
ISTAT	Italian National Institute for Statistics
IWS	Integrated Water Service
JMD	Joint Ministerial Decision
K	Potassium
K_2O	Soluble Potash / Potassium oxide
KEDHP	Platanias Municipality Development Enterprise
km	Kilometre
km/hr	Kilometre per hour
L.D.	Legislative Decree
LW	Lake Water
m^3	Cubic meters
Max	Maximum

MgO	Magnesium oxide
Min	Minimum
mm	Millimeter
Mm^3	Million cubic meters
N	Nitrogen
Na_2O	Sodium oxide
No./ n.	Number
NVZs	Nitrate Vulnerable Zones
OAK	Organization for the Development of Crete S.A. (O.A.K. S.A.)
OJ	Official Journal
P	Phosphorous
P	Precipitation
P_2O_5	Phosphoric Acid / Diphosphorus pentoxide
PD	Presidential Decree
PPP	Plan Protection Products
R	Surface runoff
R.D.	Regio Decreto (IT) / Royal Decree (EN)
RW	River Water
S	Surfur
SAC	Special Areas of Conservation
SIC	Sites Community Importance
SO_3	Sulfur trioxide
SPA	Special Protection Areas
sq.km	Square kilometer
SSWM	Storage in the soil, aquifers or reservoirs
T	Temperature
tn	Tone
W.S.	Weather station

SUMMARY

The main scope of Action C2 is the identification and impact assessment of the water management practices implemented in the pilot areas before LIFE AgroClimaWater project, on an individual (per parcel/orchard) and on the group (per Farmer Organization - F.OR.) level, in terms of the evaluation of water efficiency of agricultural practices applied on the parcels and the readiness of the three F.ORs to implement the Agricultural Water Management System (AWMS) (Action C3) proposed in Action A.2..

For the implementation of the present deliverable C2 "Report on Assessment of **water efficiency of the participant F.ORs' before LIFE AgroClimaWater**" the following data collected through the 3 AWMS forms were analysed:

- the applied agricultural practices in each registered orchard per pilot area (1st AWMS form),
- the High Conservation Value areas (HCV areas) that are located in the three pilot sub-basins (2nd AWMS form), and
- the available mechanisms and processes that are implemented by each F.OR. in reference to the water management (3rd AWMS form)

Deliverable C2 is divided into the four parts that are related with the description of the current situation of the three pilot areas in Greece and Italy, the agricultural activities that take place within them, its impacts on water bodies and High Conservation Value Areas (HCVAs) considering the climate change and the assessment of the readiness of the three F.ORs to take adaptive actions:

- Part A "*Description of the targeted areas*"
- Part B "*Description of the agricultural sector in the targeted areas*"
- Part C "*Estimation and assessment of the impacts of current agricultural practices considering the climate change*"
- Part D "*Evaluation of F.ORs' governance strategy*"

Moreover, apart from the final deliverable C2 three more sub-deliverables delivered in reference to the estimation of the renewable water resources of the two Greek pilot areas, the runoff, leaching and erosion risk assessment and the analysis and classification of the plant protection products and fertilizers that applied in the three pilot areas:

- Sub-deliverable C2.1 "*Water Availability in LIFE AgroClimaWater Pilot sub – basins in Crete*"
- Sub-deliverable C2.2 "*Runoff, leaching and erosion risk assessment and use of agrochemicals in high risk areas*"
- Sub-deliverable C2.3 "*Inventory of applied substances in the project's registered farms*"

Description of the targeted areas

In the frame of LIFE AgroClimaWater project, four pilot sub-basins selected for the implementation of agricultural water management adaptation to climate change strategies. Three of these sub-basins are located in Crete Island, Greece "Voukolies" and "Maleme" and "Havgas-Milatos" and the fourth pilot sub-basin "Agri" is located in Basilicata region, in Italy.

The Voukolies and Maleme sub-basins are located in the Municipality of Platanias and they cover an area of 33.29 sq.km, almost 6.8% of the total area of the Municipality of Platanias. 30% of the population in the municipality of Platanias works in the agriculture, forestry & fishing sector and another 20.5% works in accommodation & food service activities. Within Voukolies and Maleme sub-basins there are no mountainous areas as the flat areas occupy their largest part (94.44%) and the slopes are higher than 20% only in a small area (13.55%). Tavronitis river, which is consisted of three tributaries Sebroniotis, Roumatianos and Derianos, and Maleme stream are consist the main hydrographic network of the targeted area. The main water source for all water uses in this area is the groundwater body of "Porous of Kampos Chanion". In particular, there are 4 boreholes and 2 wells utilized for drinking water, 55 wells and 1 borehole utilized for irrigation use and a private well for industrial water use.

The Havgas-Milatos sub-basinare located in the Municipality of Agios Nikolaos and it covers an area of 29 sq.km. In Municipality of Agios Nikolaos the most part of workforce, 30.3%, is employed in the accommodation & food service activities and is much higher than the part that works in the primary agriculture sector, 5.2 %. The majority of these sub-basin' area is semi-mountainous (80.94%), followed by flat areas (18.66%) and various slopes from 0% to higher than 40% dominated in the whole sub-basins. The hydrographic network of Havgas-Milatos sub-basins consisted of third category streams which includes streams whose surface flow lasts only for a short time period (almost 3 months) and no peatlands are formed in their beds during the summer period. Four groundwater bodies located within Havgas-Milatos sub-basins are the water sources for all uses. Two boreholes and 1 well abstract water from 2 out of 4 groundwater bodies for drinking use and also 12 boreholes and 35 wells used for irrigation purposes.

The pilot Agri sub-basin is located in the Metapontino area in the Region of Basilicata, Italy, it covers an area of 401.87 sq.km and its economy based mainly on agriculture (45.7%) and service/other activities (20.8%). Within Agri pilot sub-basin semi-mountainous (72.81%) and plain elevation zones (27.15%) are dominated and its morphology varies significantly as in half of the sub-basin's area the slopes are less than 10% while in the rest area they range from 0 to over 40%. The main hydrographic network of pilot Agri sub-basin consisted by Agri river and its tributary Fosso Valle ditch. In the Metapontino area dams and weirs are the main source for all the water uses. More specific, within the selected pilot sub-basin of Agri the "Monte Cotugno" dam and the "Gannano" weir provide water for multiple uses and irrigation, respectively.

Description of the agricultural sector in the targeted areas

For the scope of LIFE AgroClimaWater project 301 orchards were registered in the three pilot orchards and more specific 100 orchards in Voukolies and Maleme sub-basins (91 olive, 8 citrus and 1 avocando), 101 olive orchards in Havgas-Milatos sub-basin and 100 orchards in Agri pilot sub-basin (15 olive, 19 citrus, 48 peach and 18 apricot). In total 11 different agricultural practices applied more or less in all registered orchards in the 3 pilot areas and the situation per pilot area is described below.

From the registered orchards within Voukolies and Maleme sub-basins 16 olive and 1 citrus orchards are organic and the rest conventional. Soil cultivation is applied once per year to 17 olive and 2 citrus orchards, weed mowing is applied once or twice per year in 50 olive and 6 citrus orchards, while cover crops are not grown during winter in none of the registered orchards. In addition, chemical control of weeds is applied in 38.4% of olive and 25% of citrus orchards. Pruning is applied in all registered orchards once per year (winter time) but in citrus trees it is not as intense as in olive. Burning of pruning is applied in all citrus orchards and in the majority of olive orchards, with the 82.4% of olive farmers burning it at the orchard and the 4.4% use it for heating. Shredding of pruning and dispersion to the orchard is applied only to the 13.1% of olive orchards. Therefore, a potential source of organic material that could be used for mulching and increasing of soil organic matter is available. Organic material spreading from external sources, is quite low both in olive and citrus orchards, with manure applied in only 8 olive orchards (8.8%) and compost in 3 olive (3.3%) and 1 citrus orchard. Irrigation water is applied in 47 out of 91 olive orchards (51.6%) and the 100% of citrus orchards. The average annual application of irrigation water was 63 mm and 325 mm for olive and citrus orchards, respectively, doses which represent a significant deviation from what is considered as typical irrigation water requirements for each cultivation in the area, resulting in the conclusion that there is a significant potential for improving irrigation water use efficiency in the area. Fertilizers are used to 85.7% of olive and in all citrus orchards and while all olive orchards are over-fertilized and citrus orchards seem to be either adequately or under-fertilized in most cases. Plant Protection Products (PPPs) are used to 82.4% of olive and in all citrus orchards, in dosages which are in accordance with the guidelines.

Within Havgas - Milatos sub-basin olive tree cultivation represents a significant percentage as a land use, reaching 37.4% of total land area. 10.9% of the registered orchards are organic and the rest conventional. Soil cultivation and weed mowing is applied to 11.9% and 45.5% of orchards, respectively. The use of cover crops during winter was only applied in 5.9% of orchards and chemical control of weeds was limited to 2% of orchards, while grazing by livestock was applied in a significant percentage of orchards (22.7%). Pruning is applied periodically or on an annual basis to 73.3% of the orchards. While burning of pruning in the field is applied in the majority of cases (in more than 90%), shredding of pruned wood was reported in 2% of registered orchards. Organic material spreading from external sources is quite low, with manure applied in only 3 orchards. Irrigation water is applied only in the 11% of orchards with the average annual amount to range from 60 to 625 mm. Fertilizers are applied in 39.6% of registered orchards but in none irrigated orchard, and in dosages which are slightly or significantly higher than the estimated actual requirements. As far as the PPPs are concerned they are used in 32.7% of olive orchards and in dosages which are in accordance to guidelines.

From the registered orchards within Agri pilot sub-basin 8 olive, 2 citrus and 7 peach orchards are organic. The rest orchards and all apricot are conventional. Soil cultivation is applied in 73.3% of olive, 89.5% of citrus, 95.8% of peach and in 78% of apricot orchards. Weed mowing is applied in 26.6% of olive, in 89.5% of citrus, in 81% of peach and in 78% of apricot orchards, while cover crops are applied during autumn-winter only in 80% of olive orchards. In addition, chemical control of weeds is applied in 80% of olive, 89% of citrus, 96% of peach and in 78% of apricot orchards. Pruning is applied in 70% olive orchards once per year, while the remaining 30% olive perform pruning every two or three years. Also, in 58% of citrus, 94% of peach and 61% of apricot pruning is applied twice a year (summer and winter time). Burning of pruning is applied only in olive orchards by all farmers, where they use a small percentage of them for heating (fireplace). Shredding of pruning and dispersion to the orchard is applied to all olive, citrus and peach orchards and in 61% of apricot orchards, increasing the soil organic matter. Organic material spreading from external sources is used only in olive orchards, with manure applied only in 20% of olive orchards. Irrigation water is applied in 80% of olive, 95% of citrus, and in all peach and apricot orchards. The average annual volumes of irrigation water used per year and cultivation are within the typical water requirements that is stated in the production regulation. However, 47% of olive, 5% of citrus and peach and 22.2% of apricot orchards are over-irrigated. Fertilizers are applied in 60% of olive, in all citrus, 74% of peach and 45% of apricot orchards and in the majority of the cases the applied dosages are in line with the national legislation requirements. PPPs are used in 86.6% of olive, in all citrus and apricot and in the majority of peach orchard approximately four to five times per year. As far as herbicides is concerned they are applied twice per year in 20% of olive, 50% of citrus, 75% of apricot and in the majority of peach orchards.

Estimation and assessment of the impacts of current agricultural practices considering the climate change

The water source provides water for multiple uses in Voukolies and Maleme sub-basins is the groundwater body of Porous aquifer of Campos Chanion whose quantitative status is assessed as good with no increasing trend for further deterioration. Its water table remains stable in an annual basis while every summer it is reduced due to the increase of demand and the absence of precipitation. The fact that the water consumption is equally allocated to potable and irrigational use in combination with the fact that the water quantities used for irrigation of the majority of registered orchards could not be characterized as adequate lead to the conclusion that no significant environmental and/ or socioeconomic impacts have been identified on the water body by anthropogenic pressures, agricultural included or natural pressures.

In Havgas - Milatos sub-basin 3 groundwater bodies with good quantitative status, Coastal karst aquifer of Sisi-Milatos-Elounda, Karst aquifer of Fourni – Elounda and fractured aquifer of Dikti, provide water for multiple uses. While the 65.85% of the consumed water used for irrigation the average annual application of irrigation water is within the limits set by the by the Decentralized Administration of Crete in the relevant local legislation. As a result no significant environmental and/ or socioeconomic impacts have been identified on the water bodies by anthropogenic pressures, agricultural included or natural pressures. However, local over exploitation and increased salinization during summer on two out of three of them are mentioned.

Monte Cotugno dam and Gannano weir are the main water sources provide water for several uses in pilot Agri sub-basin. Monte Cotugno, whose quantitative water status is unknown, provides almost the half of its water capacity to water consumers and a quantity is stored as a reserve for the next year. As the 93.96% of its water is provided to agriculture in Basilicata Region the pressure might impose by the agriculture on the dam is severe especially during the dry years and the summer period the water provided is not ample to satisfy all the water needs. As far as Gannano weir is concerned it regulates mainly the water volumes released from Pertusillo dam, thus neither impacts nor pressures are expected to be imposed by water abstraction as water from the weir is used for irrigation purposes when there is sufficiency water availability.

The largest part of Voukolies and Maleme sub-basins is characterized by moderate to high runoff, high erosion and moderate leaching potential. Moreover intense agricultural practices are applied in the majority of the registered orchards as the 85% are fertilized and in the 83% PPPs are used. Specific pollutants and priority substances are applied in the 50% and 3%, respectively and PPPs classified as H400 and H410 are used in 2% and 47% of the registered orchards respectively.

The majority of the area within Havgas-Milatos sub-basin is characterized by moderate to high runoff and erosion and low leaching potential. As far as the registered orchards is concerned the 39.6% are fertilized and in the 32.7% PPPs are used. Specific pollutants and priority substances are applied in the 39.6% and 3%, respectively and PPPs classified as H410 are used in 19.8% of the registered orchards.

The area within pilot Agri sub-basin is characterized by moderate to high runoff, low to moderate erosion and low to moderate leaching potential. As far as the registered orchards is concerned the 91% are fertilized and in the 94% PPPs are used, specific pollutants and priority substances are applied in the 48% and 43%, respectively and PPPs classified as H400 and H410 are used in 35% and 94% of the registered orchards, respectively.

The ecological and chemical status for the majority of surface water bodies and HCVAs in all 3 pilot areas is almost totally unknown, as it has been identified as either excellent or good only in 3 Greek out of 21 (10 surface water bodies and 11 HCVareas) and 9 Italian out of 20 (3 surface WB and 17 HCV areas). However, the qualitative status of the groundwater bodies is known for all the groundwater bodies as it has been identified as good for the Greek (five ground water bodies) and not good for the Italian groundwater bodies (two ground water bodies).

Considering the intense agricultural activities, the higher than moderate runoff and erosion risk potential, the low to high leaching potential (depending on the area) and the fertilizers and PPPs that are used in the majority of the register orchards it can be assumed that in cases where non good agricultural practices are applied, the agricultural activities can impact all the surface water bodies and HCVAs in all 3 pilot areas and all the groundwater bodies in Voukolies-Maleme and pilot Agri sub-basins. With the exception of the 3 HCVAs in Greece and 9 in Italy, the impacts imposed to the rest surface affected destinations (water bodies and HCVAs) by anthropogenic activities/pressures and agriculture particularly so far cannot be assessed due to the luck of information in reference to the chemical status of all water bodies. As far as the groundwater bodies are concerned it can be assumed the agricultural activities have no impact on the Greek groundwater bodies in terms of their quality so far in contrast to the 2 Italian groundwater bodies and the Nitrate Vulnerable Zone of the area for which it can be assumed that the anthropogenic activities and in particular the agricultural activities have an impact on the environment in general and specifically the groundwater bodies.

Evaluation of **F.ORs' governance strategy**

According to the analysis and the results of the fulfilled 3rd AWMS forms and each of the 7 criteria of the 4th EWS principle the readiness of the three F.ORs is assessed as low. Nevertheless, AFI's F.OR demonstrate medium readiness in two out of the seven criteria in reference to the linking water management to management of other sources and the ensuring continuous improvement, while Mirabello's F.OR demonstrate for these two criteria high and medium readiness. The higher degree of readiness for those two criteria is directly connected to other management systems that Mirabello's and AFI's F.ORs are already implementing. In the case of Platanias' F.OR, the readiness for all the seven criteria is considered as low.

Moreover, in this deliverable a general aspect of 23 mechanisms, procedures and actions that have to be considered towards the establishment and the successful implementation of water management governance actions) by the three F.ORs, were given in accordance to the minimum baseline requirements of EWS Standard (the 4th Principle).

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INTRODUCTION

The main scope of project's action C2 is the assessment of the water efficiency of the three participants F.ORs before the LIFE AgroClimaWater project in order to proceed with the formulation of the Water Management Adaptation Strategy (WMAS) for the three FORs (Action C3). In addition, through this deliverable the four principles of EWS standard as it was adopted in the Agricultural Water Management System (AWMS) formed in the frame of action A2 in reference to the identification and assessment of the impacts of current agricultural practices on water sources and High Conservation Value Areas (HCVAs) as well as the identification of the initiatives undertaken by the participant F.ORs' regarding water management are implemented.

All data collected through the 3 AWMS forms of AWMS that are related to:

- the applied agricultural practices in each registered orchard per pilot area (1st AWMS form),
- the sensitive water sources and destinations that are located in the three pilot sub-basins (2nd AWMS form), and
- the available mechanisms and processes that are implemented by each F.OR. in reference to the water management (3rd AWMS form)

were analyzed and their results are presented in present deliverable "Report on Assessment of water efficiency of the participant F.ORs' before LIFE AgroClimaWater".

Deliverable C2 is divided into 4 different parts. **Part A "Description of the targeted areas"** includes a detailed description of the current situation in each of the 3 pilot sub-basins with respect to the geographic and demographic characteristics, as well as the economic activities. Moreover, a description of the most important geological-hydrological, topographic and hydrographic characteristics as well as the available meteorological data is followed. The legal framework in the field of water policy and the water tariffs that are applied per water use and pilot area were also presented. The last section of Part A presents the water sources used for abstraction of water, the receptors that could be potentially affected by pollutants discharged by the agricultural practices in the project's pilot areas and the High Conservation Value (HCV) Areas within a buffer zone of 25 Km.

The **Part B "Description of the agricultural sector in the targeted areas"** concerns the analysis of the data related to the applied agricultural practices and the dominant tree crops and soil conditions of the greater targeted areas Also, this section includes a detailed analyses of the agricultural practices that are applied per pilot crop (e.g. mowing, cover crops, pruning, etc.) as well as the water consumption and the quantities of agrochemicals utilized per registered orchards in the three pilot sub-basins based on the data collected through the 1st AWMS form and entered in the projects web-based platform.

The impacts that agricultural activities pose on each pilot area are presented in Part C **"Estimation and assessment of the impacts of current agricultural practices considering the climate change".** This part can be divided also into two sub-sections one which is related to the impacts on the water quantity of water bodies used for water abstraction and a second one in which the impacts of the agricultural activities on potentially affected destinations, water sources' quality and HCVAs status, are described. The first section includes the estimation of the annual water consumption per water use per pilot area. Also, taking into account all the available data, the water availability during different hydrological conditions (wet, mid and dry) of either groundwater or surface water bodies that are utilized for abstraction was estimated and it is presented in this part. The comparison between the annual water availability and the annual water consumption resulted in the determination of water stress period during the year due to the agricultural activities and the estimation of the participation of the agricultural sector. Moreover, the data collected or estimated for the pilot sub-basins in terms of water consumption, water bodies' and HCV areas status and their protection goals as they are presented in the relevant studies were evaluated and the impacts of agriculture per source of water abstraction were identified. The second section of Part C includes a correlation between the agricultural practices (fertilization, use of PPPs, irrigation) and the agrochemicals that are applied in the three pilot areas (data collected through the 1st AWMS form) and the runoff, leaching and erosion conditions that dominated in each registered orchard and pilot sub-basin which resulted in the determination of the potential affected destinations (both water bodies and HCVAs) due to agricultural activities. Then comparing the above mentioned results with the available information in the regional River management plants and other studies on the qualitative status for each water body and potentially affected destinations, an assessment of the impacts on water quality of receptors and significant natural areas was determined.

For the implementation of Part C of deliverable C2 several studies were required and as a result the following three sub-deliverables were also produced and delivered with the final deliverable C2:

- *Sub-deliverable C2.1 "Water Availability in LIFE AgroClimaWater Pilot sub – basins in Crete":* Estimation of the renewable water resources of the two pilot areas of LIFE AgroClimaWater project in Tavronitis river basin in the Municipality of Platanias and Havgas - Milatos river basin in the Municipality of Agios Nikolaos, in dry, medium and wet conditions.
- *Sub-deliverable C2.2 "Runoff, leaching and erosion risk assessment and use of agrochemicals in high risk areas"*: Development of a methodology for runoff, leaching and erosion risk assessment for the identification of runoff, leaching and erosion potential for the whole pilot sub-basins and the registered orchards and its correlation with the applied agricultural practices.
- *Sub-deliverable C2.3 "Inventory of applied substances in the project's registered farms"*: Analysis and classification of the plant protection products and fertilizers that are applied in each registered orchard according to the European and the National (Greek and Italian) legislations.

The last part of deliverable C2 is **Part D "Evaluation of F.ORs' governance strategy".** In this part the project's scientific team analyzes all the data collected through the 3rd AWMS from, assesses the readiness of the 3 F.ORs' to take adaptive actions, in line with the 4th Principle of the EWS standard so as to propose actions in the frame of action C3 and presents the most significant results.

PART A – DESCRIPTION OF THE TARGETED AREAS

1. THE PILOT SUB-BASINS WITHIN THE GREATER TARGETED AREAS

1.1 Voukolies and Maleme pilot sub-basins in Platanias Municipality, greece

Fig. 1: Geographic framework - Crete Island and Platanias Municipality are highlighted

In the frame of project LIFE Agroclimawater, the two pilot sub-basins "Voukolies" and "Maleme" selected for the implementation of water management adaptation to climate change strategies are situated in the municipality of Platanias, in Crete in Greece.
The Municipality of Platanias (Fig. 1) is located at the west northern part of Crete Island, between Kissamos Bay on the east and Chania Bay on the west. Platanias falls within the administrative boundaries of Regional Unit of Chania. Municipality of Platanias covers an area of 491,78 sq.km, rendering it as one of the largest municipalities of Greece, with 51 local communities and 125 active settlements.
The Municipality of Platanias includes 5 river basins (Fig. 2), from which the area of Tavronitis basin was selected for the implementation of the project after a two stage evaluation process applied in the frame of project's Action A.1 ("Report on project's targeted areas and pilot sub-basins characteristics"). Finally, in Tavronitis basin the two pilot sub – basins covering a total area of about 33.3 sq.km were selected as the project's pilot area.

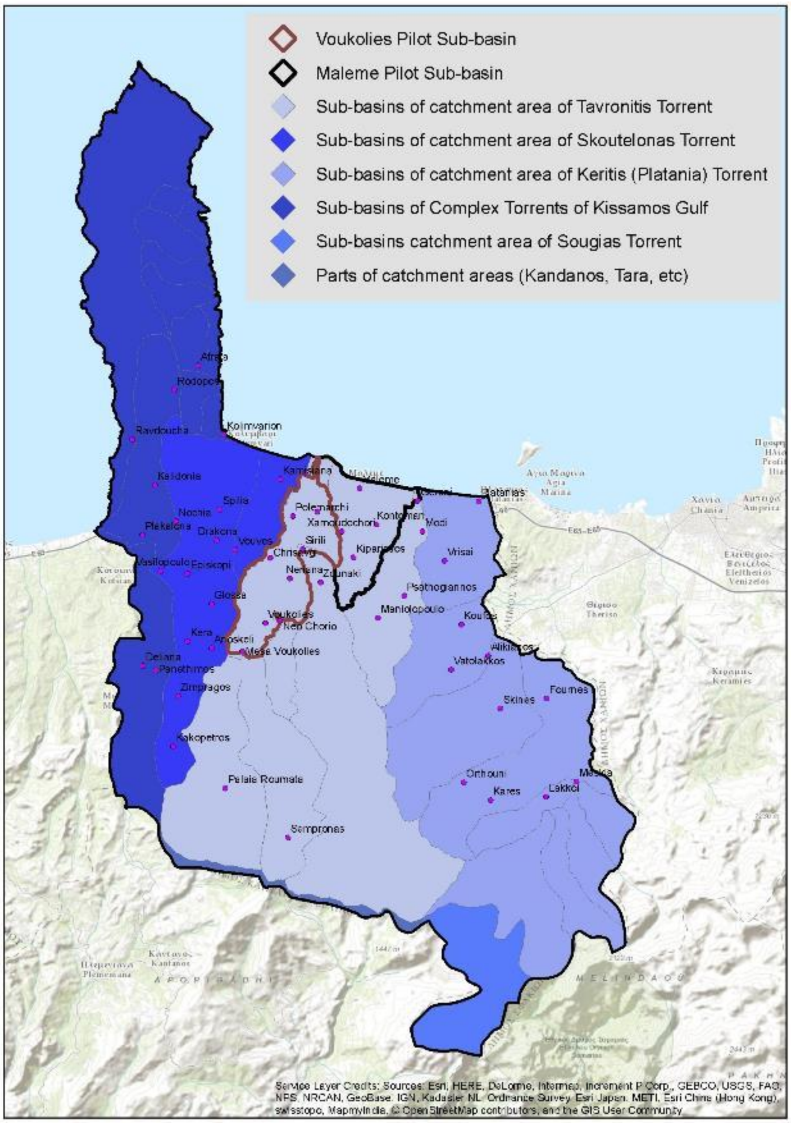


Fig. 2: River basins and pilot sub-basins within Municipality of Platanias

1.2 Havgas - Milatos pilot sub-basin in Agios Nikolaos Municipality (Mirabello area), Greece

The second pilot sub-basin in Crete in Greece that was selected for the implementation of water management adaptation to climate change strategies, is "Havgas - Milatos" situated in Municipality of Agios Nikolaos (Mirabello area).

The area in Crete known as Mirabello, covers the administrative area of Agios Nikolaos Municipality (Fig. 3), as reformed with the Law no 3852/2010. Its capital is the city of Agios Nikolaos, however its historic seat is Neapoli. Geographically, the Municipality is located in the northwestern part of the regional unit of Lasithi. The Municipality of Agios Nikolaos covers an area of 511,99 sq.km and it consists of three Municipal Units, 4 Municipal Communities, 21 one Local Communities, one 117 settlements and 5 islets.

Fig. 3: Geographical framework - Crete Island and Municipality of Agios Nikolaos is highlighted

The Municipality of Agios Nikolaos includes seven (7) river basins (Fig. 4), from which the area of Havgas – Milatos basin, covering a total area of about 29 sq.km, was selected for the implementation of the project after a two stage evaluation process applied in the frame of project's Action A.1 (See deliverable "Report on project's targeted areas and pilot sub-basins characteristics").

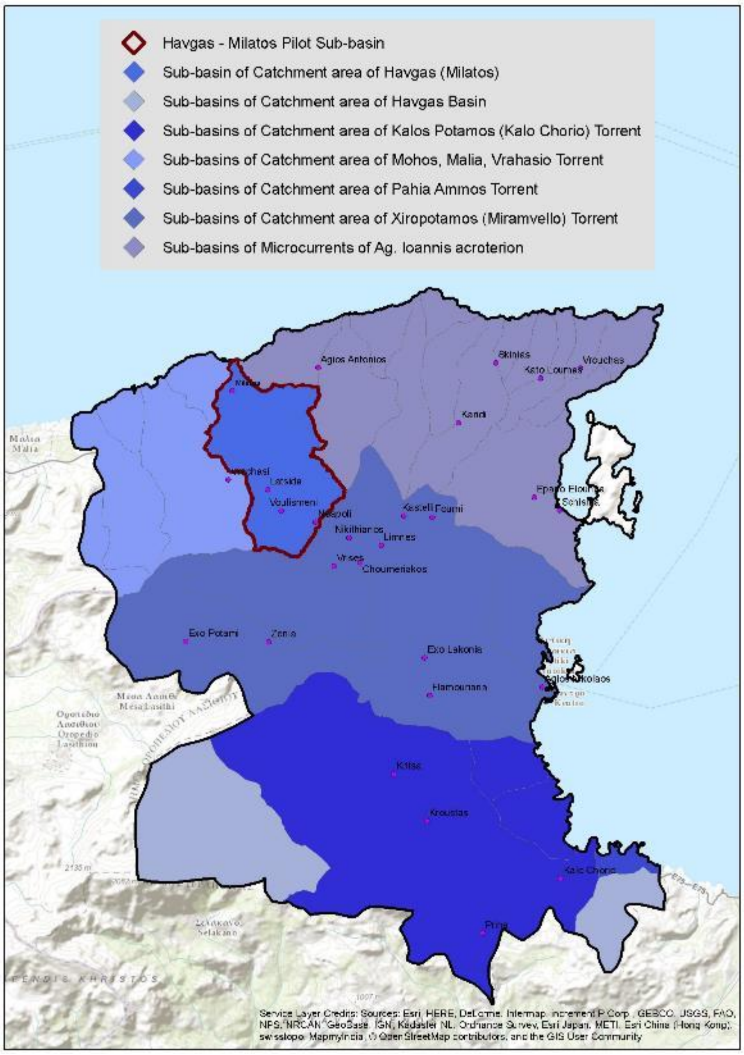


Fig. 4: River basins and pilot sub-basin within Municipality of Agios Nikolaos

1.3 Agri pilot Sub-basin in Metapontino area, Italy

Finally, the pilot sub-basin "Agri" selected for the implementation of water management adaptation to climate change strategies, is situated in the Metapontino area in the Region of Basilicata, in Italy.

Metapontino, which overlooks the Ionian Sea, covers about 800 sq.km of the Matera province in Basilicata region and beyond, including the entire plain of Metaponto and the surrounding hills.

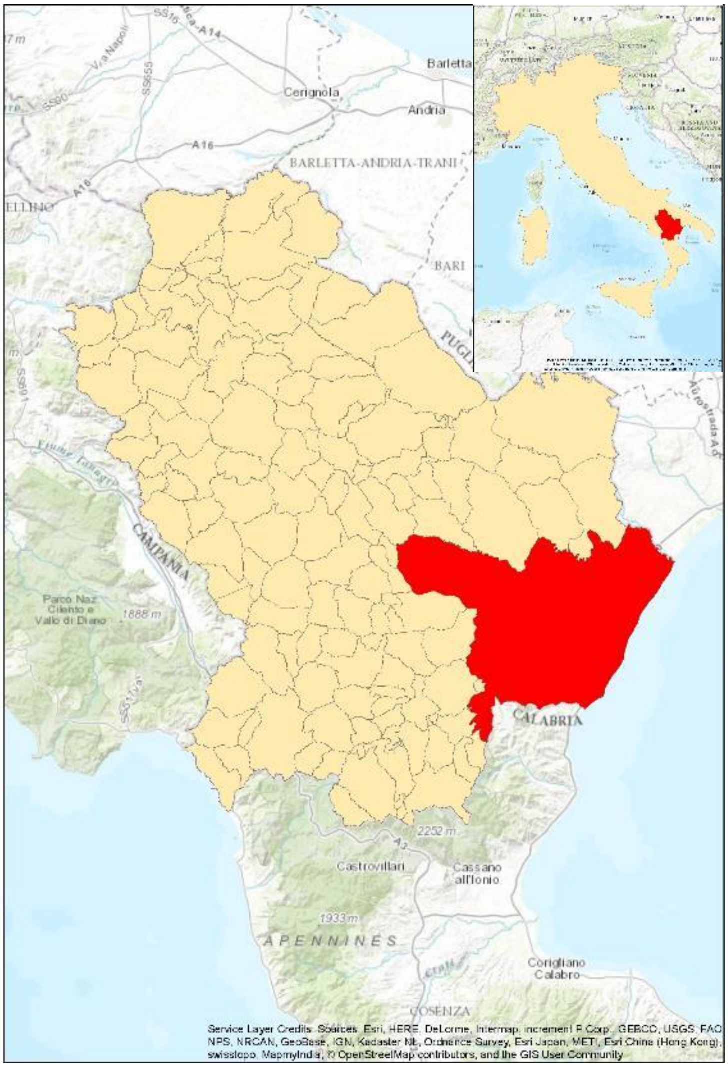


Fig. 5: Geographical framework - Vasilicata Region and Metapontino area is highlighted

Metapontino area includes five (5) river basins (Fig. 6) these of Bradano, Basento, Cavone, Agri and Sinni river, from which the lower part of "Agri – river basin" was selected for the implementation of the project after a two stage evaluation process applied in the frame of project's Action A.1 (See deliverable "Report on project's targeted areas and pilot sub-basins characteristics"). The pilot area of Agri riner basin covers an area of about 305 sq.km.

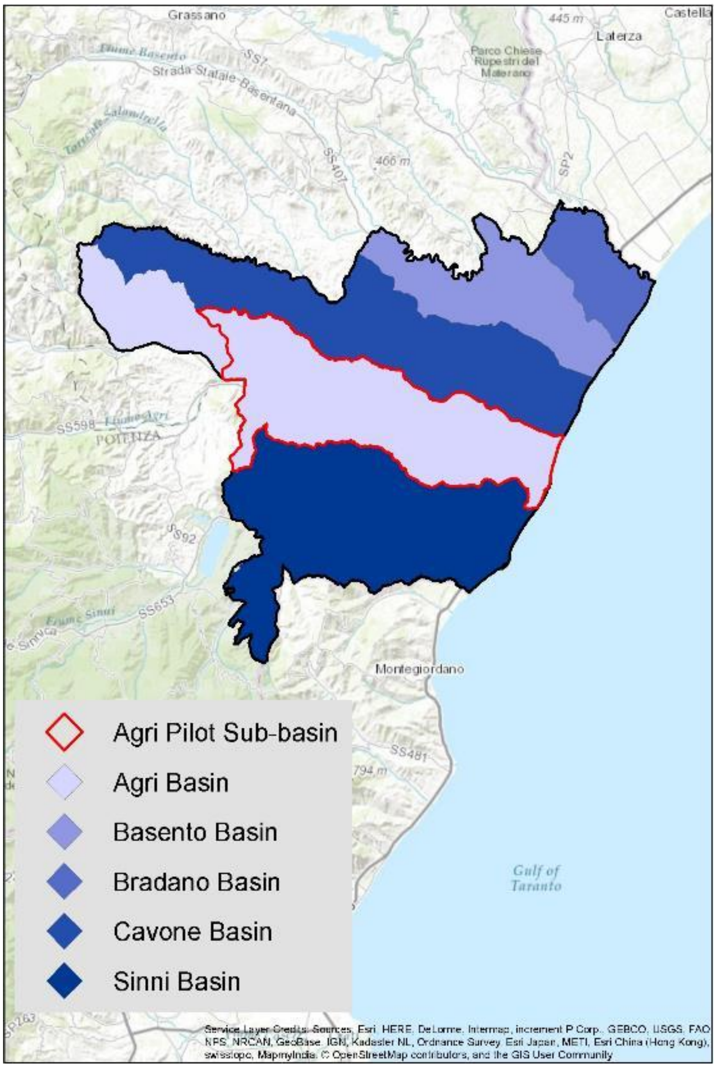


Fig. 6: River Basins and pilot sub-basin in Metapontino Area

2. DEMOGRAPHIC CHARACTERISTICS AND MAIN ECONOMIC ACTIVITIES

2.1 Pilot sub-basins in Crete, Greece

Within Voukolies sub-basin the local Communities of Tavronitis, Voukolies, Neo Chorio Kidonias, Neriana, Polemarchi, Tavronitis and Chrisavgi are found. It holds a great part of the Municipal Unit of Voukolies and a small part of the Municipal Unit of Platanias (Law no 3852/2010). It covers an area of 19,42 sq.km, which is 3,95% of the total area of the Municipality of Platanias.

According to the last Population census conducted by ELSTAT in 2011, the population of the local communities that are in the sub-basin of Voukolies is shown on the following Table 1.

Table 1: Population of the Local Communities, which are within the sub-basin of Voukolies

Municipal Unit	Local Community	Population
Voukolies	Voukolies	894
	Neo Chorio Kidonias	5
	Neriana	68
	Polemarchi	170
	Tavronitis	973
	Chrisavgi	136
Platanias	Vlacheronitissa	152
TOTAL		2398
Municipality of Platanias		16874
% population		8.28%

In Maleme sub-basin, the local Communities of Kontomari, Kiparissos, Maleme, Xamoudochori and Sirili are situated. It has an area of 13,87 sq.km, which is 2,82% of the total area of the Municipality of Platanias. The permanent population of these local communities, according to the last population census held, is presented on Table 2, (ELSTAT, 2011).

Table 2: Population of the Local Communities, which are within the sub-basin of Maleme

Municipal Unit	Local Community	Population
Platanias	Kontomari	382
	Kiparissos	171
	Maleme	710
	Xamoudochori	163
	Sirili	171
TOTAL		1597
Municipality of Platanias		16874
% population		9.46%

The catchment area of Havgas - Milatos Torrent has a northwestern-southeastern development and is located at the northern area of Ag. Nikolaos Municipality, about

17km away from Agios Nikolaos city. The Havgas – Milatos pilot sub-basin covers part of the Municipal Unit of Vrachassi (settlement of Milatos) and part of the Municipal Unit of Neapoli. It covers an area of about 29 sq.km, with a ranging length of 8km and width of 5km. According to the last population census conducted by ELSTAT in 2011, the population of the municipal and local communities that are in the sub-basin of Havgas - Milatos is as follows in Table 3:

Table 3: Population of the Municipal and Local Communities, which are within the sub-basin of Mirabello

Municipal Unit	Local Community	Population
Neapoli	Neapoli	2708
	Agios Antonios	21
	Voulismeni	337
	Latsida	249
Vrachassi	Vrachassi	335
TOTAL		3650
Municipalilty of Agios Nikolaos		27074
% population		13.48%

As far as the unemployment rate is concern, it is presented in the Table 4. The values are referred to year 2011 when the financial crisis in Greece has firstly begun. Today the unemployment rate is much higher in Greece as it is depicted in Table 4.

Table 4: Unemployment rate in Greece and project greater targeted areas (ELSTAT 2011)

Administrative Unit	Total Population	Inactive population	Active population			
			Employed	Un-employed	Total	% Unemplo-yment
GREECE	10.816.286	6.229.650	3.727.633	859.003	4.586.636	18,73
CRETE Region	623.065	353.192	225.718	44.155	269.873	16,36
Regional Unit of HERAKLEION	305.490	171.824	109.627	24.039	133.666	17,98
Regional Unit of RETHYMNON	85.609	49.968	30.499	5.142	35.641	14,43
Regional Unit of LASITHION	75.381	42.376	28.593	4.412	33.005	13,37
Municipality of Agios Nikolaos	*27.074*	*15.000*	*10.413*	*1.661*	*12.074*	*13,76*
Males	*13.372*	*6.696*	*5.745*	*931*	*6.676*	*13,95*
Females	*13.702*	*8.304*	*4.668*	*730*	*5.398*	*13,52*
Regional Unit of CHANIA	156.585	89.024	56.999	10.562	67.561	15,63
Municipality of Platanias	*16.874*	*10.370*	*5.532*	*972*	*6.504*	*14,94*
Males	*8.548*	*4.427*	*3.499*	*622*	*4.121*	*15,09*
Females	*8.326*	*5.943*	*2.033*	*350*	*2.383*	*14,69*

The unemployment rate has dramatically increased in Greece the last years, from 7,8% in 2008 to 24,9% in 2015. The unemployment rate in the 1st trimester of 2016 has decreased as compared with the respective trimester of 2015 (
Table 5). Nevertheless, in Crete where the project's pilot areas are located in it is increased from 27,2 to 28,3%.

Table 5: Unemployment rate (%) in Greece: Workforce Survey – 1st semester 2016 (ELSTAT, press release June 2016)

Administrative Regions	1st trimester	
	2015	2016
Greece	26,6	24,9
East Macedonia & Thrace	24,8	23,9
Central Macedonia	27,4	25,4
West Macedonia	29,0	33,3
Epirus	25,5	25,7
Thessaly	26,8	27,8
Ionian islands	28,9	19,6
West Greece	29,0	30,0
Central Greece	26,4	27,7
Attica	26,7	23,4
Peloponnese	23,9	20,6
North Aegean	20,2	18,5
South Aegean	25,4	21,2
Crete	27,2	28,3

The number of active population works in the main economic activities in Greece is presented in the Table 6. From this table it is shown that the 30% of the population in the municipality of Platanias works in the Agriculture, forestry & fishing sector following by the population works in the Accommodation & food service activities, 20,5%. In municipality of Agios Nikolaos the most part of workforce, 30,3%, is employed in the Accommodation & food service activities that is much higher than the part that works in the primary sector, 5,2 %.

Table 6: Number of employed population per economic activity sector (ELSTAT 2011)

Administrative Unit	TOTAL Employed population	Economic activity sectors																	
		A. Agriculture, forestry & fishing	%	F. Construc-tion	%	G. Wholesale and retail trade, repair of motor vehicles and motorcycles	%	H. Transpor-tation and storage	%	I. Accommo-dation & food service activities	%	N. Admini-strative & support service activities	%	O. Public admini-stration & defence, compulsory social security	%	P. Education	%	Q. Human health & social work activities	%	Other Activities	%
GREECE	3.727.633	372.209	10,0	254.081	6,8	651.739	17,5	192.871	5,2	291.589	7,8	102.192	2,7	359.779	9,7	294.359	7,9	236.831	6,4	971.983	26,1
CRETE Region	225.718	33.258	14,7	16.774	7,4	36.071	16,0	8.838	3,9	34.147	15,1	6.467	2,9	17.282	7,7	17.911	7,9	13.679	6,1	41.291	18,3
Regional Unit of HERAKLEION	109.627	14.660	13,4	8.024	7,3	18.667	17,0	4.925	4,5	14.531	13,3	3.629	3,3	7.316	6,7	8.800	8,0	7.197	6,6	21.878	20,0
Regional Unit of RETHYMNON	30.499	5.139	16,8	2.369	7,8	4.426	14,5	812	2,7	6.101	20,0	613	2,0	2.013	6,6	2.463	8,1	1.477	4,8	5.086	16,7
Regional Unit of LASITHION	28.593	7.015	24,5	1.887	6,6	3.839	13,4	770	2,7	5.130	17,9	667	2,3	1.977	6,9	1.917	6,7	1.473	5,2	3.918	13,7
Municipality of Agios Nikolaos	10.413	541	5,2	861	8,3	1.473	14,1	335	3,2	3.155	30,3	287	2,8	795	7,6	778	7,5	697	6,7	1.491	14,3
Regional Unit of CHANIA	56.999	6.444	11,3	4.494	7,9	9.139	16,0	2.331	4,1	8.385	14,7	1.558	2,7	5.976	10,5	4.731	8,3	3.532	6,2	10.409	18,3
Municipality of Platanias	5.532	1.659	30,0	298	5,4	705	12,7	229	4,1	1.134	20,5	144	2,6	302	5,5	192	3,5	162	2,9	707	12,8

2.2 Agri pilot sub-basin, Italy

The Agri sub-basin has a population of 43.643 inhabitants and covers an area of 401,87 Sq.Km within Metapontino area. The municipalities that fall within the territory of the Agri sub-basin are Craco, Montalbano Jonico, Policoro, Scanzano Jonico, Colobraro, Stigliano and Tursi (Fig. 7).

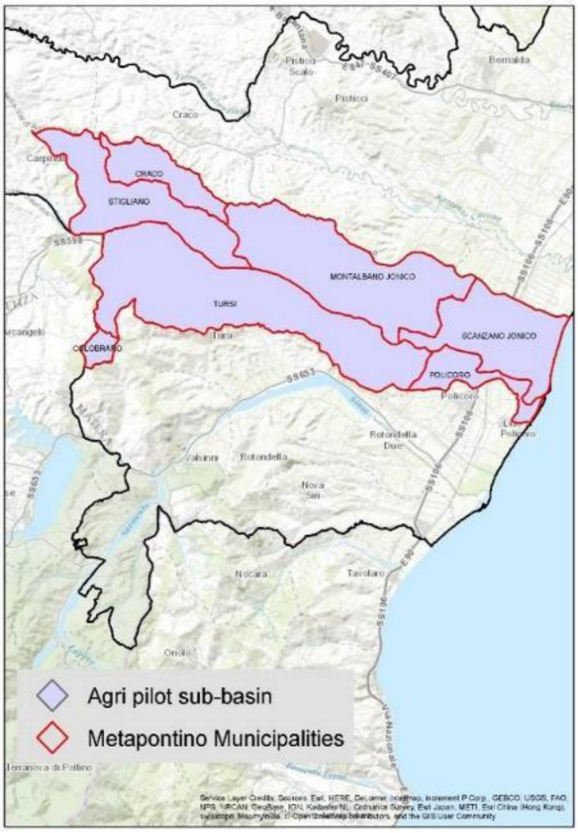


Fig. 7: Municipalities within Agri pilot sub-basin

According to the Italian National Institute for Statistics (ISTAT 2016) the population of the municipalities that are within Agri sub-basin is shown on the following Table 7. The population of Basilicata Region represents the 0.95% of the total population of Italian nation. According to the data, the area has 573.694 inhabitants today (281.443 men and 292.251 women). Instead the population of the municipalities in Agri sub-basin are the 7.61% of the total population that lives in Basilicata Region.

Table 7: Agri Sub-basin population (ISTAT 2016)

Administrative Unit	Population		
	Male	Female	Sum
Italy	29.334.000	31.023.000	60.357.000
Basilicata Region	281.443	292.251	573.694
Municipality of Colobraro	618	648	1.266
Municipality of Craco	366	379	745
Municipality of Montalbano Jonico	3616	3.741	7357
Municipality of Policoro	8.471	8.842	17.313
Municipality of Scanzano Jonico	3.792	3.772	7.564

Municipality of Stigliano	2.065	2.296	4.361
Municipality of Tursi	2.505	2.532	5.037
TOTAL	21.433	22.210	43.643
% Population (Basilicata)	7.62%	7.60%	7.61%
% Population (Italy)	0.96%	0.94%	0.95%

Moreover the Agri sub-basin density population is nearly 72 peoples per km^2. These values remain much lower than the Italian average, but in line with the average for the Basilicata region.

The following Table 8 represents the Gross Domestic Product (GDP) per municipality in Agri sub-basin. According to the last Population census conducted by ISTAT in 2012, the GDP per capita of Basilicata Region is 18.809.2 €, 70.3% of the Italy's GDP per capita. The Agri sub-basin with a GDP per capita of 12,399 € has a low contribution (46.3% respect the Italian GDP per capita). Within the sub-basin the municipality of Policoro has the higher GDP per capita of 14.460 €.

Table 8: GDP per Municipality (Agri sub-basin, source: ISTAT 2012)

Administrative Unit	**GDP per capita 2012 (€)**
Italy	26.760
Basilicata Region	18.809,2
Municipality of Colobraro	11.705
Municipality of Craco	10.345
Municipality of Montalbano Jonico	13.382
Municipality of Policoro	14.460
Municipality of Scanzano Jonico	10.564
Municipality of Stigliano	13.765
Municipality of Tursi	11.584
Agri sub-basin mean	12.399

As shown on Table 9 Basilicata Region has 364.296 inhabitants considered to be economically inactive and 209,398 considered to be economically active and 209,398 with an unemployment rate of 5.5% that is in line compared with the Italy's unemployment rate. The Agri sub-basin framework changes and the Municipality of Montalbano Jonico reach the higher rate with an unemployment rate of 10.0 (twice times the Regional unemployment rate).

Table 9: Unemployment rate in Italy and project greater targeted area (ISTAT 2013)

Administrative Unit	Total Population	Inactive population	Active population			
			Employed	Un-employed	Total	% Unemplo-yment
ITALY	60.357.000	34.880.000	22.391.000	3.086.000	25.477.000	5.1
BASILICATA Region	573.694	364.296	177.845	31.553	209.398	5.5
Municipality of Colobraro	*1.266*	*796*	*372*	*97*	*470*	*7.7*
Males	*618*	*389*	*182*	*48*	*229*	*7.7*
Females	*648*	*408*	*191*	*50*	*240*	*7.7*

Municipality of Craco	*745*	*451*	*233*	*61*	*294*	*8.2*
Males	*366*	*221*	*115*	*30*	*145*	*8.2*
Females	*379*	*229*	*119*	*31*	*150*	*8.2*
Municipality of Montalbano Jonico	*7.357*	*4.731*	*1.891*	*736*	*2.626*	*10.0*
Males	*3.616*	*2.325*	*929*	*362*	*1.291*	*10.0*
Females	*3.741*	*2.405*	*961*	*374*	*1.336*	*10.0*
Municipality of Policoro	*17.313*	*10.561*	*5.592*	*1.160*	*6.752*	*6.7*
Males	*8.471*	*5.167*	*2.736*	*568*	*3.304*	*6.7*
Females	*8.842*	*5.394*	*2.856*	*592*	*3.448*	*6.7*
Municipality of Scanzano Jonico	*7.564*	*4.538*	*2.443*	*582*	*3.026*	*7.7*
Males	*3.792*	*2.275*	*1.225*	*292*	*1.517*	*7.7*
Females	*3.772*	*2.263*	*1.218*	*290*	*1.509*	*7.7*
Municipality of Stigliano	*4.361*	*2.935*	*1.208*	*222*	*1.430*	*5.1*
Males	*2.065*	*1.390*	*572*	*105*	*677*	*5.1*
Females	*2.296*	*1.545*	*636*	*117*	*753*	*5.1*
Municipality of Tursi	*5.037*	*3.143*	*1.491*	*403*	*1.894*	*8.0*
Males	*2.505*	*1.563*	*741*	*200*	*942*	*8.0*
Females	*2.532*	*1.580*	*749*	*203*	*952*	*8.0*

According to Table 10, the main economic activity sectors of Basilicata region are agriculture and fishing (20%), industry (22%), service/other activities (28%) and wholesale (18.3%).

Agri pilot sub-basin has an economy based on mainly on agriculture (45.7%), with good production of oil and wine, and service/other activities (20.8%).

The cultivation of fruit and citrus trees is very typical such as in the whole Metaponto area. In fact, the area has a strong presence of agricultural companies for the compaction of the fruit. Exports of fruits to Europe are the strong point of the economy of the area.

Seaside tourism and archaeological tourism are very important and are developing quickly; the importance of archaeological tourism is due to the presence of the National Archaeological Museum of Siris, which presents the findings discovered at Heraclea in chronological order from the Neolithic to the Roman era. Heraclea (today Policoro), Siris and Pandosia which hosted personalities like Pythagoras and were the scenes of terrible battles such as the one fought by Pyrrhus against the Romans. Signs of this historic past can be found at the archaeological digs in Metaponto and Policoro and in their very important museums, which have so many exhibits that, despite the vast show area available, not everything can be displayed.

The industrial sector with a percentage of 12.5% is represented by the small and medium-sized companies. Also, the 10.2% of the population in the Agri sub-basin works in the construction sector while another 18.3% in the wholesale and retail trade sector. The most traditional and popular activities include artisan enterprises, related to farming and pastoral culture.

Table 10: Number of employed population per economic activity sector and per Municipality (SMAIL)

Administrative Unit	TOTAL Employed population	Economic activity sectors									
		Agriculture and Fishing	%	Industry	%	Construction	%	Wholesale and retail trade	%	Service / Other activities	%
ITALY	22.391.000	6.247.089	27.9	4.209.508	18.8	1.097.159	4.9	5.664.923	25.3	4.679.719	20.9
BASILICATA Region	177.845	356	20.0	391	22.0	213	12.0	320	18.0	498	28.0
Municipality of Colobraro	372	121	32.5	34	9.1	27	7.3	35	9.4	76	20.4
Municipality of Craco	233	80	34.3	2	0.9	14	6.0	15	6.4	9	3.9
Municipality of Montalbano Jonico	1.891	625	33.1	169	8.9	113	6.0	241	12.7	233	12.3
Municipality of Policoro	5.592	1.735	31.0	647	11.6	569	10.2	1.035	18.5	1.219	21.8
Municipality of Scanzano Jonico	2.443	1.723	70.5	268	11.0	128	5.2	420	17.2	358	14.7
Municipality of Stigliano	1.208	387	32.0	72	6.0	120	9.9	162	13.4	189	15.6
Municipality of Tursi	1.491	1.019	68.3	70	4.7	166	11.1	189	12.7	167	11.2
TOTAL	13.230	6.046	45.7	1.653	12.5	1.350	10.2	2.417	18.3	2.749	20.8

3. GEOLOGY AND HYDROLOGY

3.1 Voukolies and Maleme pilot sub-basins

Voukolies and Maleme sub-basins are located in the Quaternary and Neogene sedimentary formations. These formations are practically alluvial deposits (al), which consist of clayey sand materials and unbounded materials of clay, sand and breccia-conglomerates in the beds and mouths of torrents, debris cones, carbonate and phyllitic colluvial deposits (H.sc,cs), Pleistocene fluvioterrestrial deposits with pebbles and breccia of varying size and lithologic composition and in places conglomerates alternating with sandstones and clays (Pt.c).

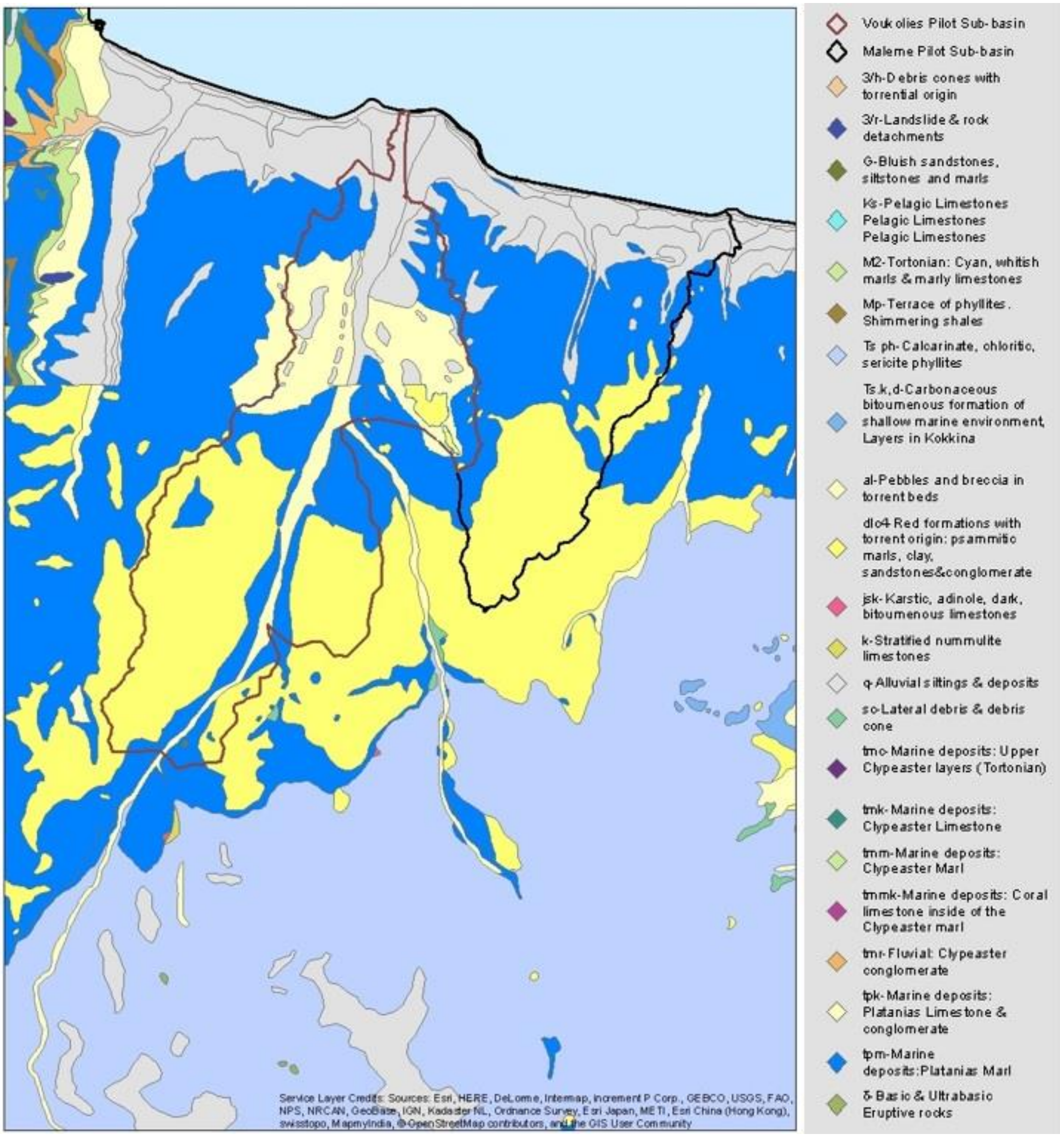


Fig. 8: Geodatabase Map Extract of Platanias pilot areas, depicting the geological formations

The Neogene deposits (Ng) are indivisible and consist of thick bedded to ungroomed, marly limestones which to the upper grow into marly clay formations.

Furthermore, the pilot areas are located in the Porous water System of Kampos Chania (GR 1300022), which is divided into two main aquifer systems the Neogene system in the west and the Quaternary system in the east.

The Quaternary and Neogene formations have varying permeabilities and groundwater capacities as a result of the geological composition of the rocks. The aquifer of the Neogene formations is not uniform both horizontally (superimposed aquifers) and vertically (different adjoining separated aquifers tectonically or small aquifers –locally). The granural non-alluvial deposits (pl & tpm) have low to very low permeability (P3).

In areas that are covered by conglomerates and marly limestones (dlc4) of the Neogene deposits individual aquifers of moderate to low capacity and moderate to low permeability (P2) are formed. In addition, in these Neogene deposits, layers and interpolations of gypsum (Γ) with considerable thickness are found. The aquifers formed inside of these formations (GR1300330) are of degraded quality because of the high content of sulphites.

Last, geological formations consisting of sandstones, conglomerates and quaternary deposits, terraces as well as new alluvial formations (qf2), occupy the boundaries of the greater riverbed of Tavronitis River from the coastline up to Voukolies. These have high to moderate permeability (P1).

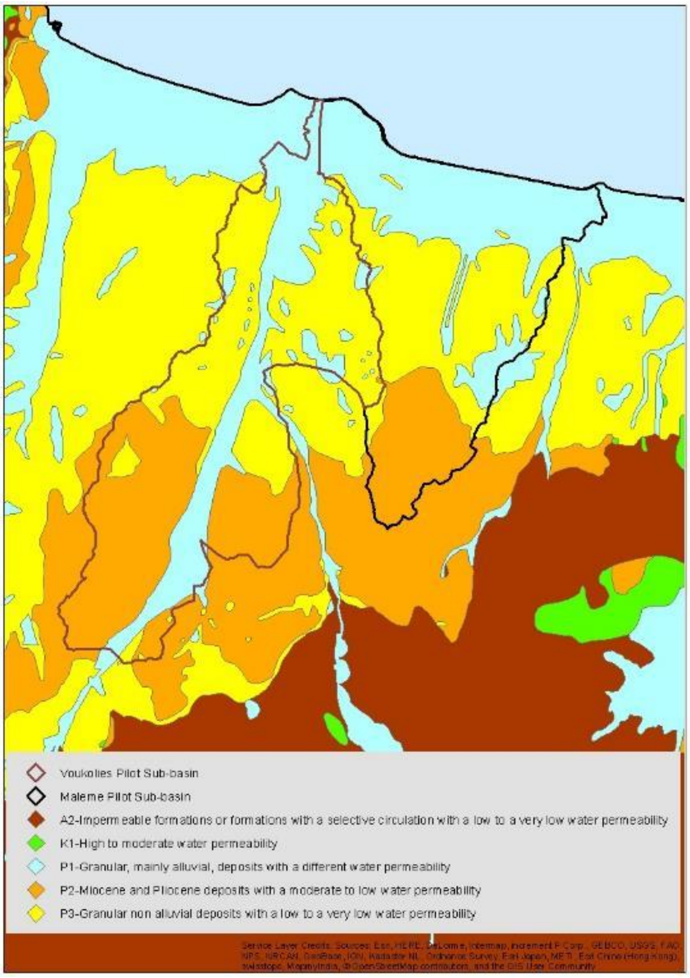


Fig. 9: Geodatabase Map Extract of Platanias pilot areas, depicting the hydrogeology

3.2 Havgas - Milatos sub-basin

The central and eastern parts of the catchment area of Havgas - Milatos Torrent consist of an autochthonous to parautochthonous rock system, which includes the semimetamorphic Platenkalk Serie (Jm-Es.K1 & Jm-Es.K1) and the underlying limestones, dolomites with the interpolation of schists. In these formations the karstic aquifers GR1300115 and GR1300116 are formed and have moderate to low permeability (K2).

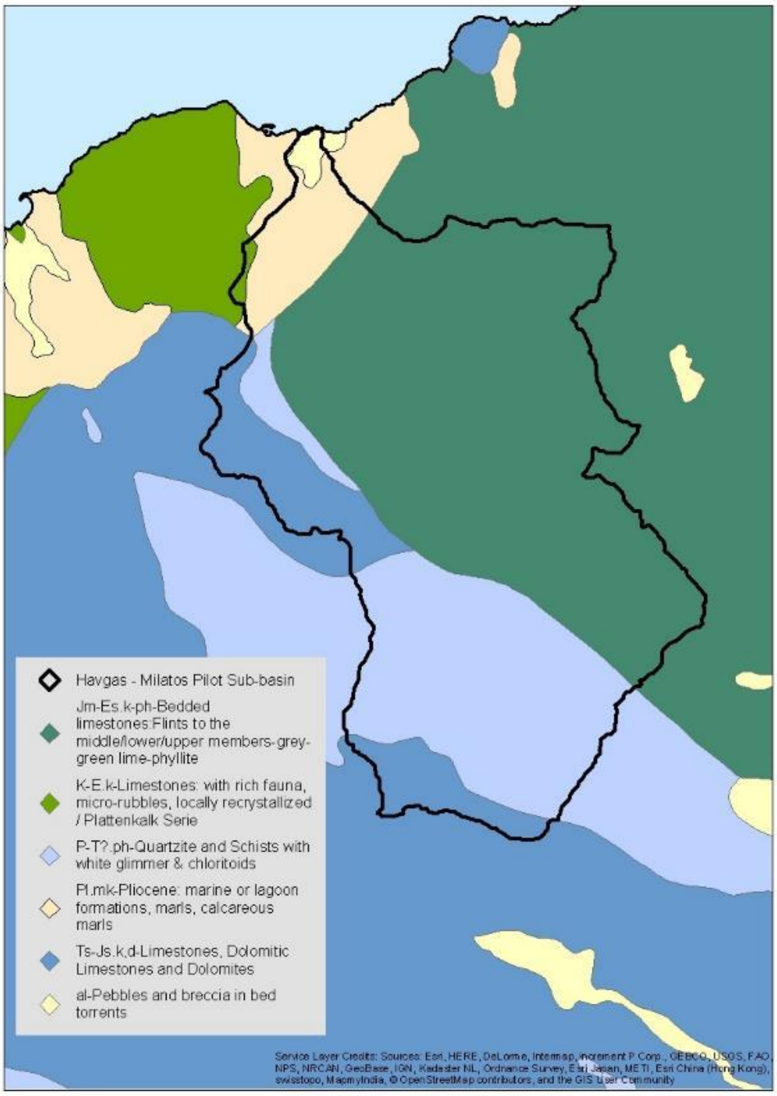


Fig. 10: Geodatabase Map Extract of Mirabello pilot area, depicting the geological formations

In the south-southwestern part of the pilot sub-basin, in a southeastern – northwestern elongated development, the tectonic cover of the Phyllitic-Quartzitic Series (Permian – Upper Triassic) is found. In this unit, phyllites, quartzites and shales (P-T?.ph) are found and are interpolated between bedded limestones or metaflysch and the calcareous rocks of Tripolis zone (Jm-Es.K1 & Jm-Es.K1).

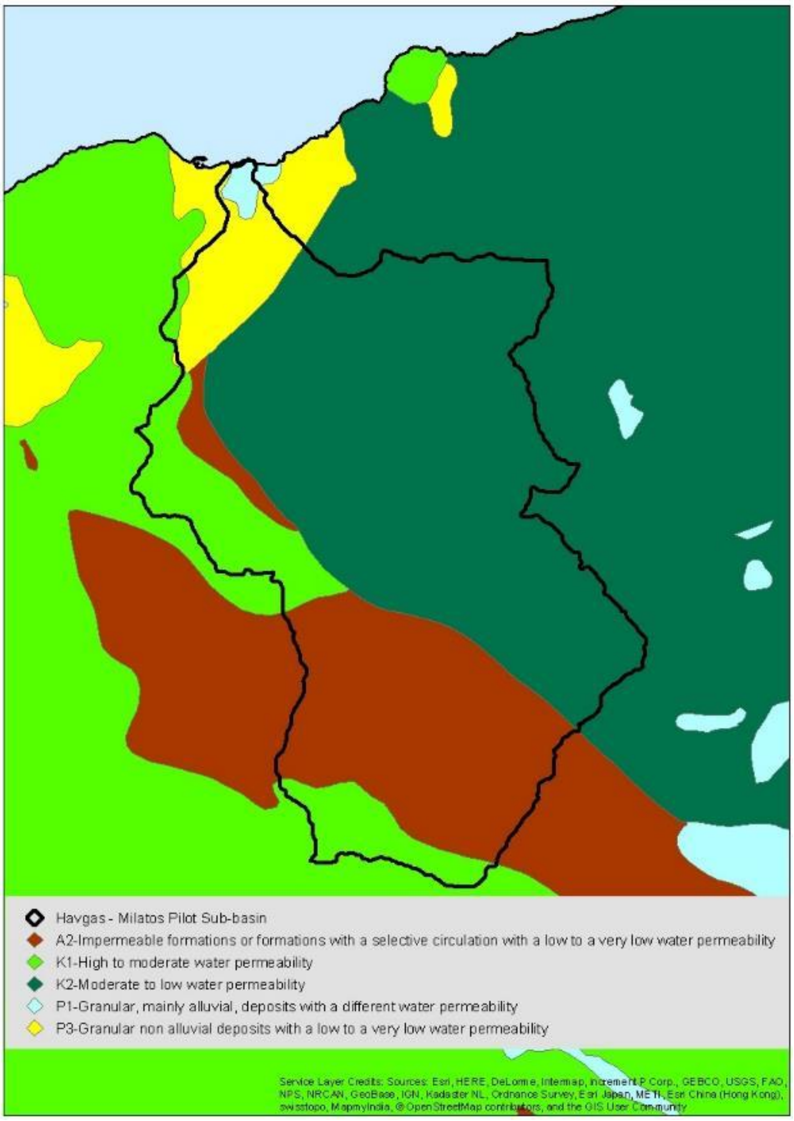


Fig. 11: Geodatabase Map Extract of Mirabello pilot area, depicting the hydrogeology

These formations are practically impermeable or with a selective water circulation and consequently have low to very low permeability (A2). In addition, they form the fractured system of Dikti (GR1300240). In some areas, low capacity aquifers can be found, which are often under overexploitation.
A small area of the western part of the basin, is built of limestones, dolomitic limestones and dolomites (Ts-Js.k,d & K-E.K) of the allochthonous carbonate system (tectonic cover of Tripoli). In the above formations the Karstic Systems of Mallia – Selena (GR1300112), North-East Mount Dikti (GR1300113) and Lakonia-Almyros – Ag. Nikolaos (GR1300114) are formed, with a total area of approximately 223 sq.km. These carbonate systems (GR1300112 & GR1300113 & GR1300114) are comprised of limestones, dolomitic limestones and dolomites (Ts-Js.k,d & K-E.K) and characterized by high to moderate permeability (K1). During summer season, underground water reserves in some areas are overexploited.

The rest of the western part of the pilot sub-basin is covered by low surface spread Pliocene deposits (Pl.mk). In essence, these deposits are marls and marly limestones with low thickness and low to very low permeability (P3).

Finally, in the lowland, south of the maritime coastline, there is a development of a small scale alluvial field, though, without any particular hydrogeological interest.

3.3 Agri pilot Sub-basin

The Agri Sub-basin insists between the confluence with the river Sauro and the coast.

The inner part of Agri Sub-basin (Serra di Croce, Coppa Mountain, Piso Mountain, Serra S. Arcangelo) is characterized by hilly area. In this area there is the presence of Mesozoic-Tertiary, successions related at Sicilide Unit and at Lagonegro unit. This area is made of clay and marl with interbedded carbonatic sediments (calcilutites and limestones), which lie stratigraphically discordant contact: arenaceous-pelitic sequences deposited in appennine basins of the upper Miocene (Flysch of Gorgoglione); clayey and sandy Pliocene-Pleistocene successions of Sant'Arcangelo Group.

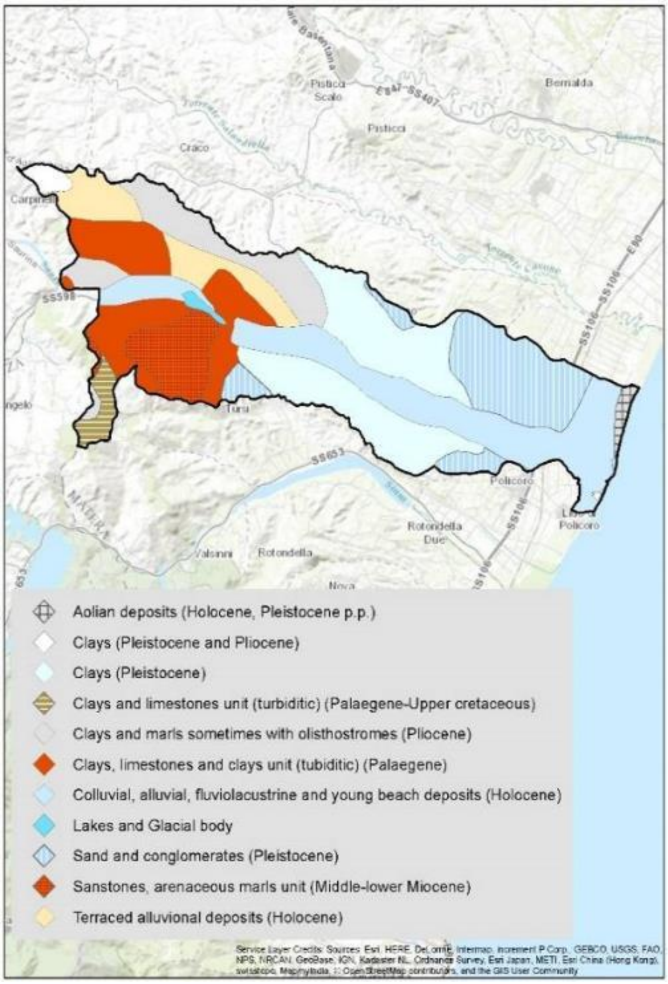


Fig. 12: Geodatabase Map Extract of Agri sub-basin, depicting the geological formations

Proceeding towards the coast the basin has low hilly morphology and is characterized by the presence of blue-gray clays Pleistocene dell'Avanfossa Bradanica. In the coastal area it is found alluvial gravelly, sandy and clayey and sandy deposits of coastal dunes and the actual beach.

The hydrogeological systems of the pilot sub-basin are made of Silicatic sediment rock aquifers and unconsolidated aquifers (more than 60% of the territory, Fig. 13).

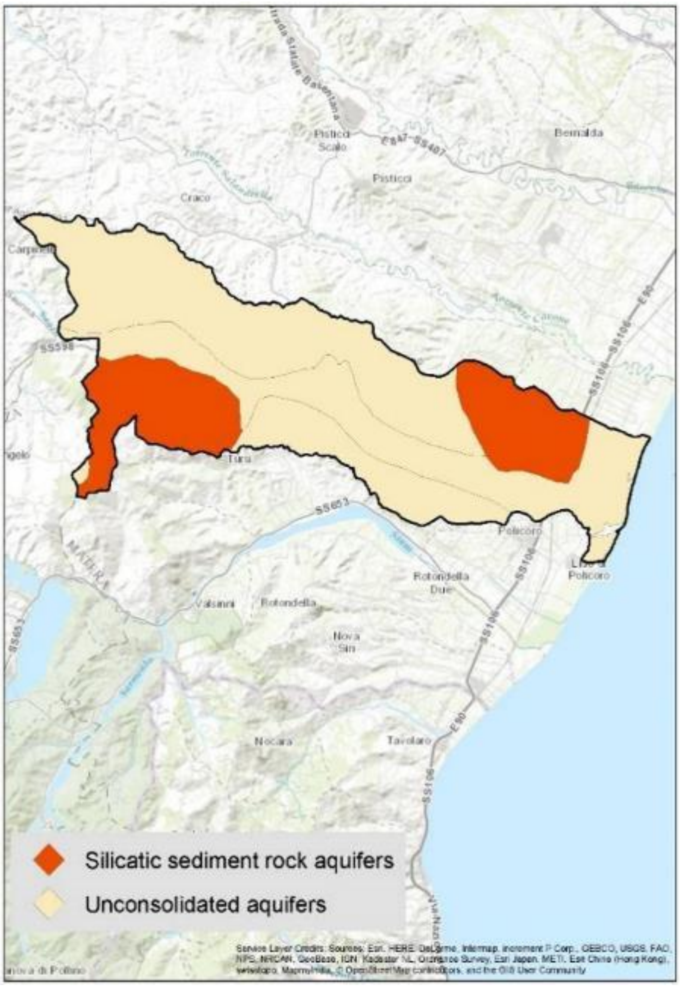


Fig. 13: Geodatabase Map Extract of Agri sub-basin depicting the hydrogeology

The stratigraphic and structural composition of the Agri basin influences the infiltration of meteoric precipitation and the evolution of the water circulation in the subsurface. The stratigraphic sequences in outcrop can be grouped into complex hydrogeological characterized by different type and degree of permeability.

In Agri sub-basin there are two hydrological structures:

- Acquifero alluvionale del fiume Agri;
- Piana del Metaponto.

Both Hydro structures are clastic systems of alluvial and fluvial-lacustrine basins intramontane: lithological complexes consist of gravel, sand and clay alluvial and fluvial-lacustrine; there are also detrital complex. The permeability is mainly for porosity and the degree is extremely variable from low to high in relation to the granulometric characteristics, the state of densification and/or cementation of the deposit; water outflow takes place at the levels with higher permeability, often overlapping and interconnected. These systems include aquifers flat with "potential medium-low water."

4. TOPOGRAPHY

4.1 Voukolies and Maleme sub-basins

The Digital Terrain Model of the Voukolies and Maleme pilot sub-basins in Municipality of Platanias is shown in Fig. 14, while the respective geomorphologic units present in the pilot sub-basins are depicted in Fig. 15.

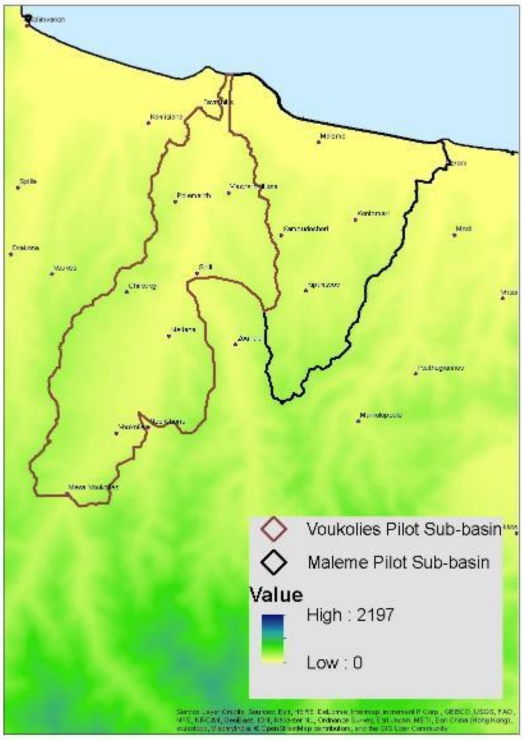


Fig. 14: Digital Terrain Model of the pilot areas of Platanias

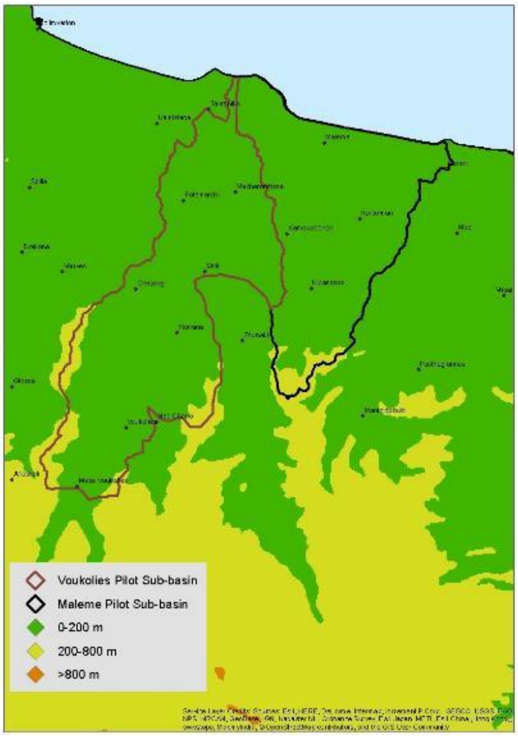


Fig. 15: Geodatabase Map Extract depicting the altitudes of the pilot areas of Platanias

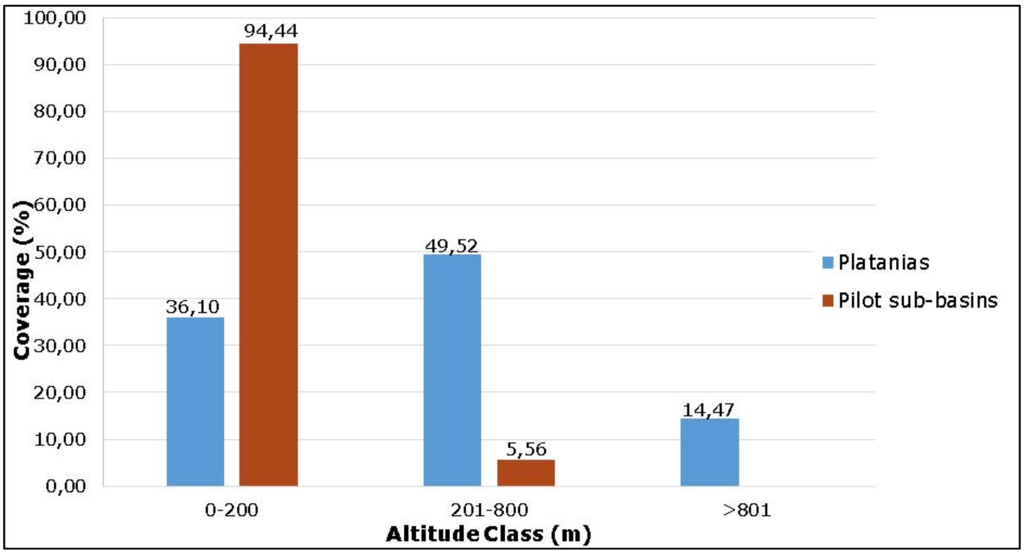


Fig. 16: Histogram showing the % coverage of three altitude classes of the Municipality of Platanias and the selected pilot sub-basins

Based on the above figures, as well as the altitude histogram of both Platanias Municipality and the selected pilot sub-basins, in contrast to the wider area of interest, there are no mountainous areas in the selected sub-basins of Platanias (Fig. 15). In these pilot sub-basins, flat areas occupy the largest part covering an area of 31,39 sq.km (94,44%) and the rest 1,9 sq.km are semi-mountainous areas (5,56%).
As far as the slope classes of the pilot areas are concerned, these are presented in Fig. 16.

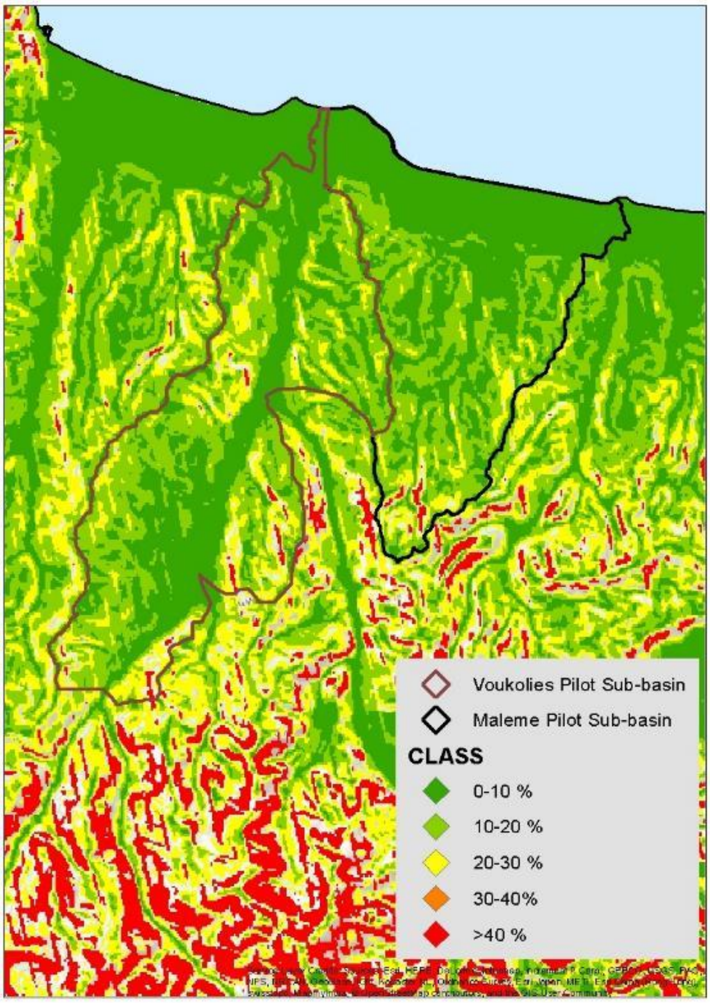


Fig. 17: Digital Slope Model of the pilot areas of Platanias

Based on the altitude histogram provided below (Fig. 18) the slope classes of 0-10% and 10-20% show the higher frequencies in the pilot sub-basins with a rate of 48,14% and 38,31%, respectively. As expected, within the pilot sub-basins the remaining slope classes (20-30%, 30-40%, >40%) follow with a downward trend. The above, however, is not true of the greater area of the Municipality, where the slope classed of 10-20% and >40% prevail, as mentioned earlier.

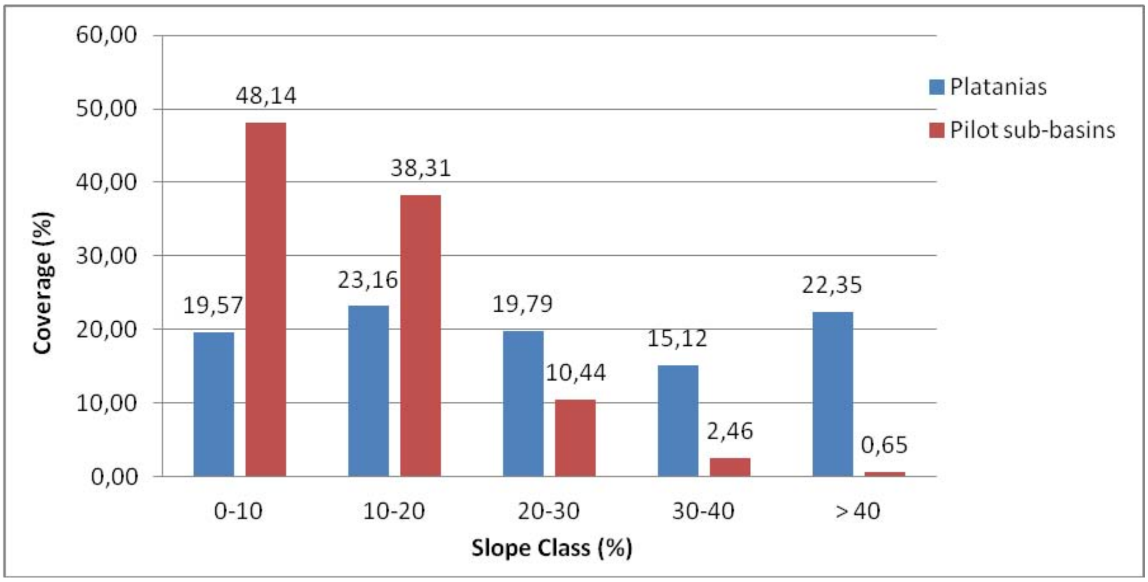


Fig. 18: Histogram depicting the slope classes of the Municipality of Platanias and the pilot areas respectively

4.2 Havgas – Milatos sub-basins

The Digital Terrain Model of the Havgas – Milatos pilot sub-basin in Agios Nikolaos Municipality is shown in Fig. 19, while the respective geomorphologic units present in the pilot sub-basin are depicted in Fig. 20.

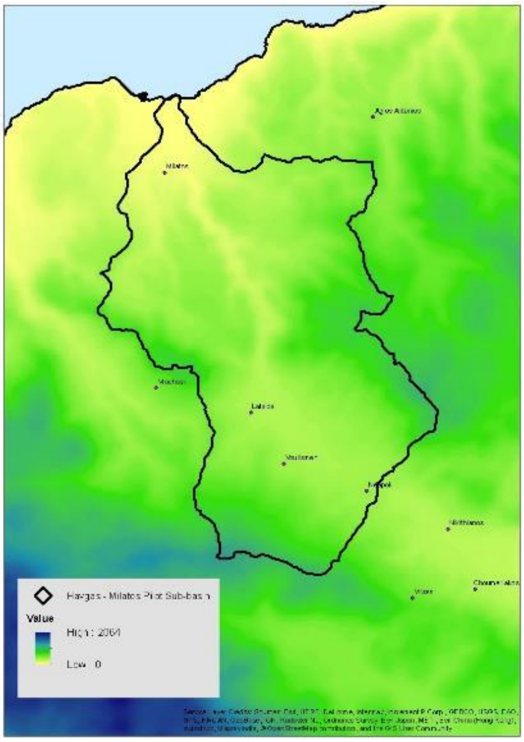


Fig. 19: Digital Terrain Model of the pilot area of Mirabello

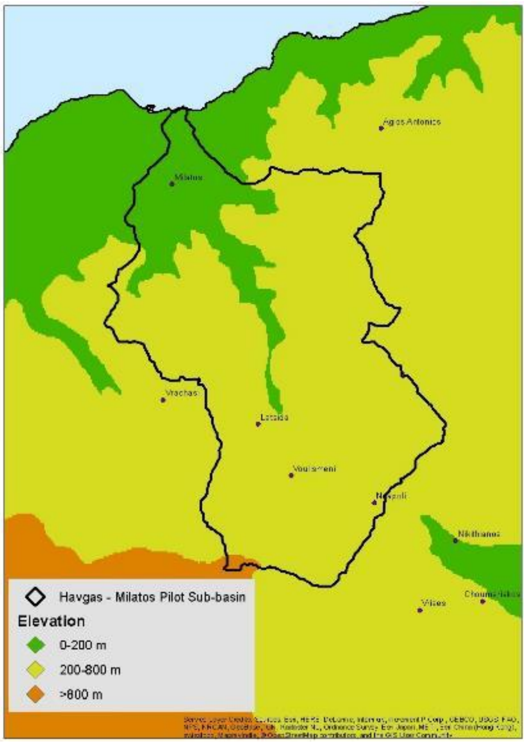


Fig. 20: Geodatabase Map Extract depicting the altitudes of the pilot area of Mirabello

Based on the above figures, as well as the altitude histogram of both Agios Nikolaos Municipality and Havgas – Milatos sub-basin (Fig. 21), similarly to Agios Nikolaos Municipality, the largest part of the pilot sub-basin are semi-mountainous areas that cover an area of 23,64 sq.km (80,94%), followed by flat areas covering 5,50 sq.km (18,66%) and mountainous areas of only 0,12 sq.km (0,40%).

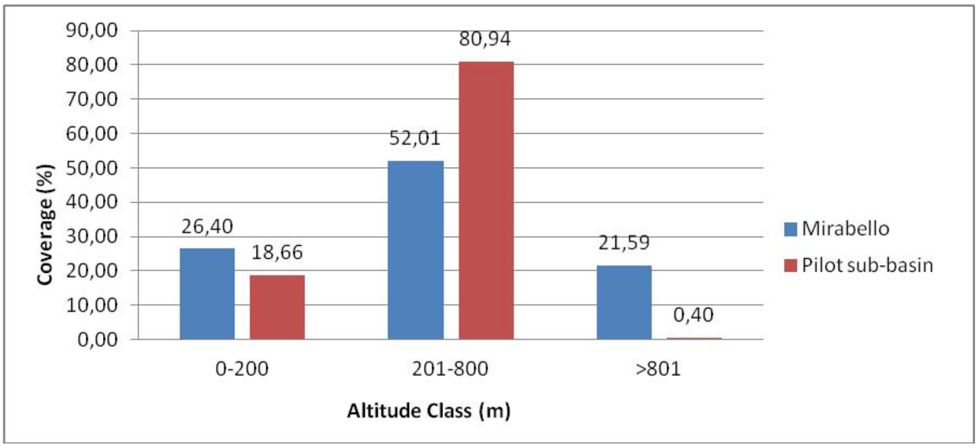


Fig. 21: Histogram showing the altitude of the Municipality of Ag. Nikolaos and the pilot area respectively

The Digital Slope Model of Havgas - Milatos pilot sub-basin is shown Fig. 22.

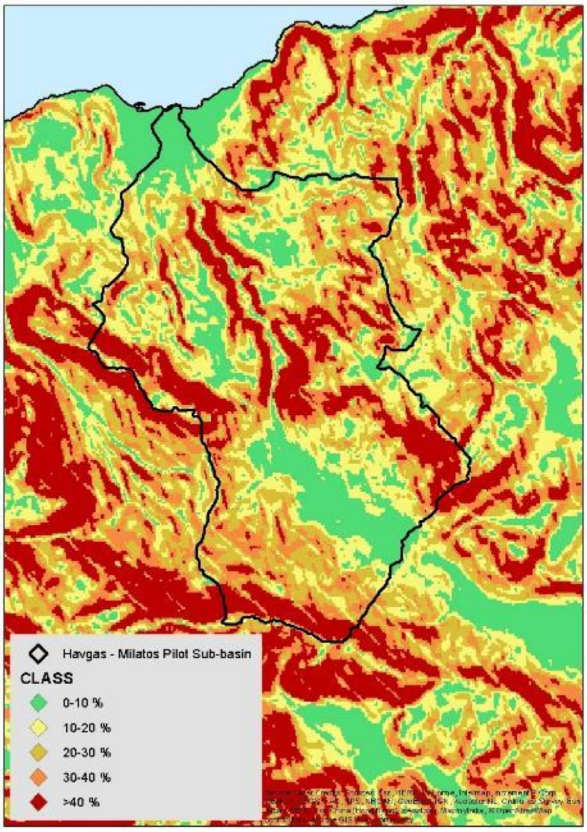


Fig. 22: Digital Slope Model of the pilot area of Havgas - Milatos

Based on the altitude histogram provided below (Fig. 23), similarly to the greater area of Agios Nikolaos, the occurrence of the five classes of slopes in the pilot sub-basin presents a uniform view. The classes of 10-20% and 20-30% present the greater frequency.

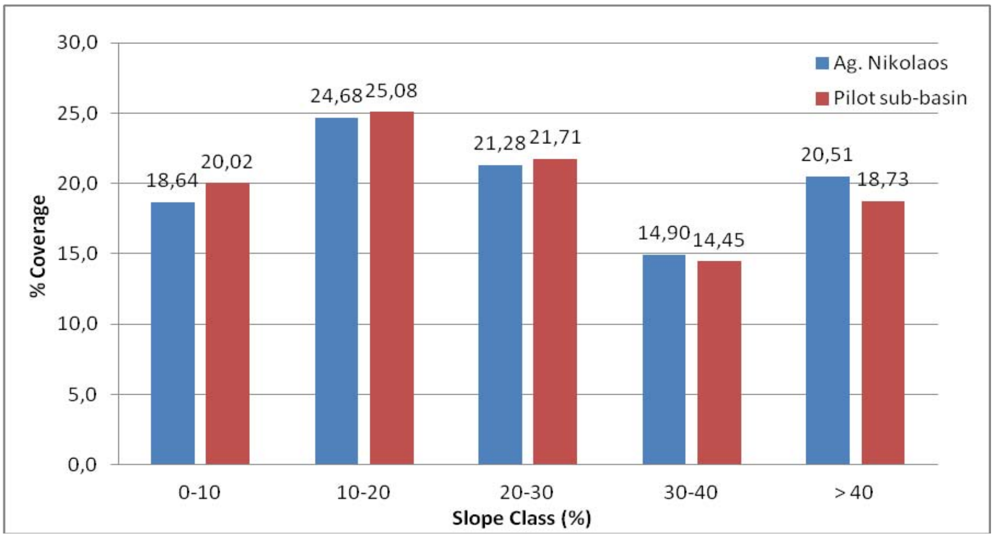


Fig. 23: Histogram depicting the slope classes of the Municipality of Ag. Nikolaos and the pilot area respectively

4.3 Agri pilot sub - basin

The Digital Terrain Model of Agri pilot sub-basin is shown in Fig. 24, while the respective geomorphologic units that are presented in the pilot sub-basin are depicted in Fig. 25.

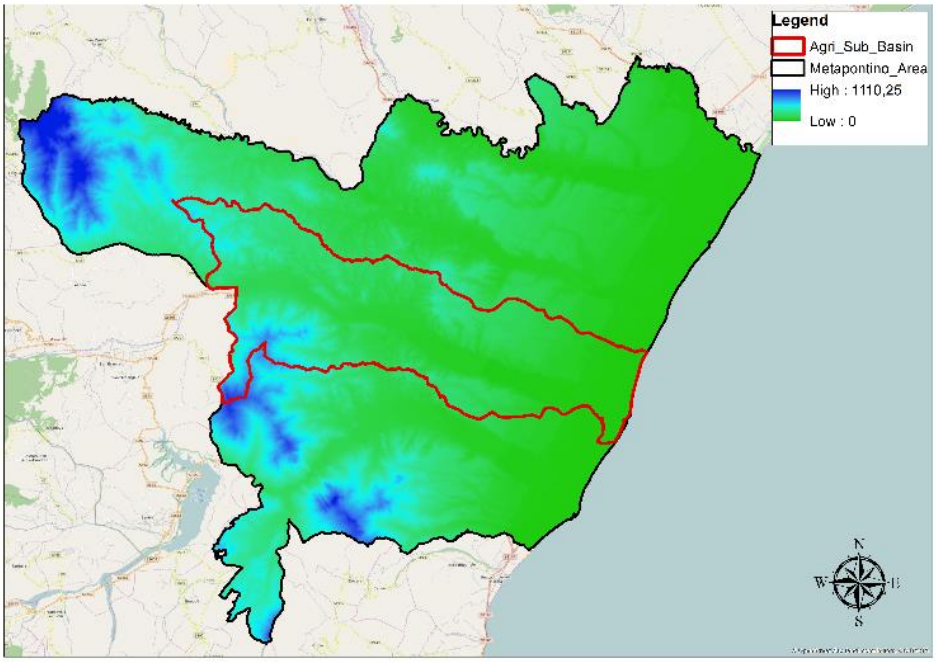


Fig. 24: Digital Terrain Model of Metapontino area

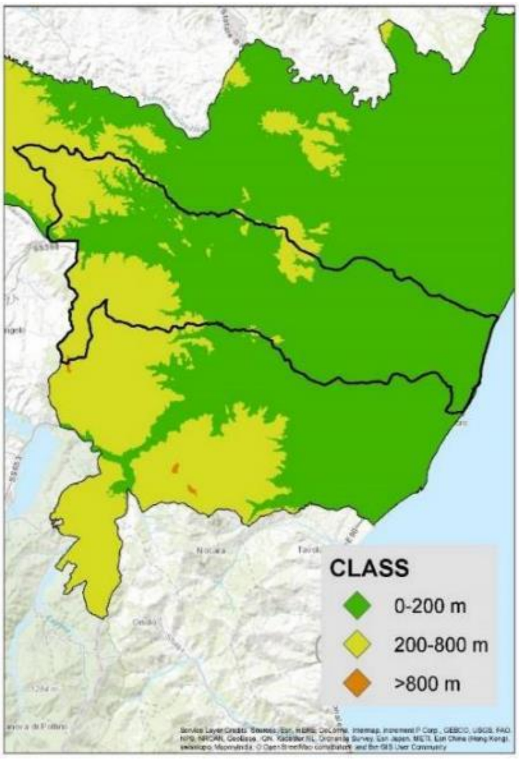


Fig. 25: Geodatabase Map Extract depicting the altitudes of Metapontino area and the pilot Agri sub-basin

According to European standard classification three elevation zones are included within the Agri sub-basin (Fig. 25) i) the mountainous zone, with an altitude of 800 m and above, ii) the semi mountainous zone with an altitude of 200-800 m and iii) the plain zone area with altitudes of up to 200 m above the sea level.
Based on the above figures, as well as the altitude histogram of Metapontino area and Agri sub-basin (Fig. 26), the semi mountainous and the plain elevation zones cover about 99.96 % of the territory within Agri sub-basin and there are no mountainous areas in the selected sub-basins of Agri (0.04%). More specific, the flat areas cover almost the 72.81% of the territory and the 27.15% are semi-mountainous areas.

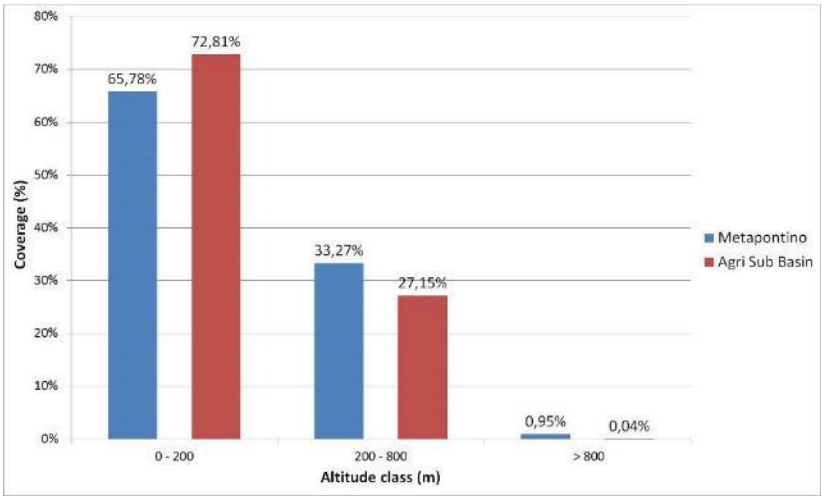


Fig. 26: Histogram showing the % coverage of three altitude classes of Metapontino area and Agri Sub-basin

In the general area of Metapontino semi-mountainous and the plain elevation zones cover about 99.05 % of the territory. The percentage of mountainous area is 0.95%. The important mountain ranges of Metapontino area are the Monte Pollino (2.248 m), Serra Dolcedorme (2.267 m) and Monte Sirino (2.005 m), (Basilicata Olucania)
The Digital Terrain Model of Municipality of Metapontino area is shown in (Fig. 27), while Fig. 28 represents the slope classes of Metapontino area and Agri sub-basin, respectively.

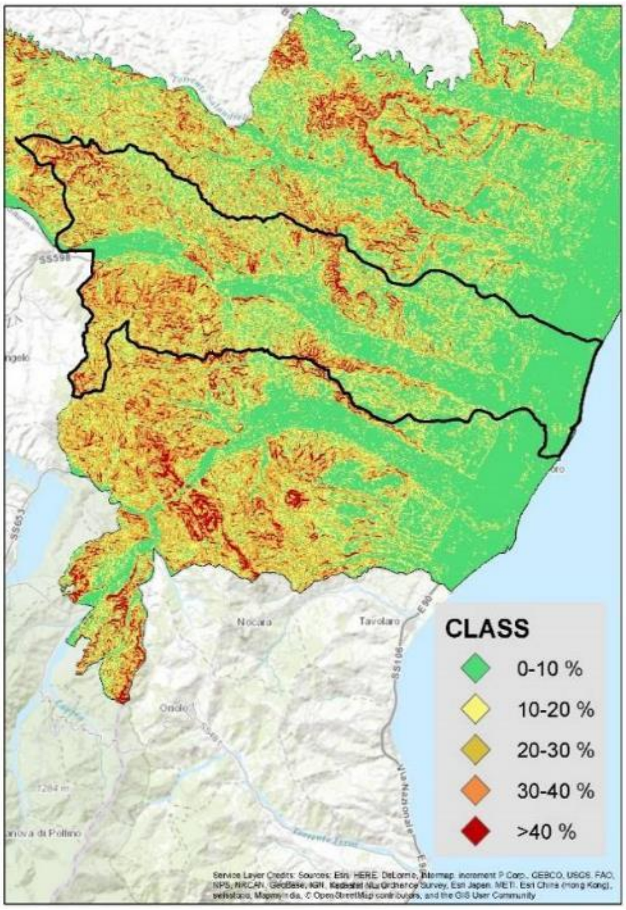


Fig. 27: Digital Slope Model of the pilot areas of Agri sub-basin and Metapontino area

Agri sub-basin morphology is quite different with a range of slopes from 0 to over 40% (Fig. 27). As it is shown in Fig. 28 the five classes of slopes presents a rather uniform view in both Metapontino area and Agri sub-basin. More specific, the slope classes of 0-10%, 10-20% and 20-30% show the higher frequencies in the pilot sub-basin with a rate of 50.23%, 22.04% and 13.37%, respectively. As expected, within the pilot sub-basins the remaining two slope classes (30-40% and >40%) follow with a downward trend.

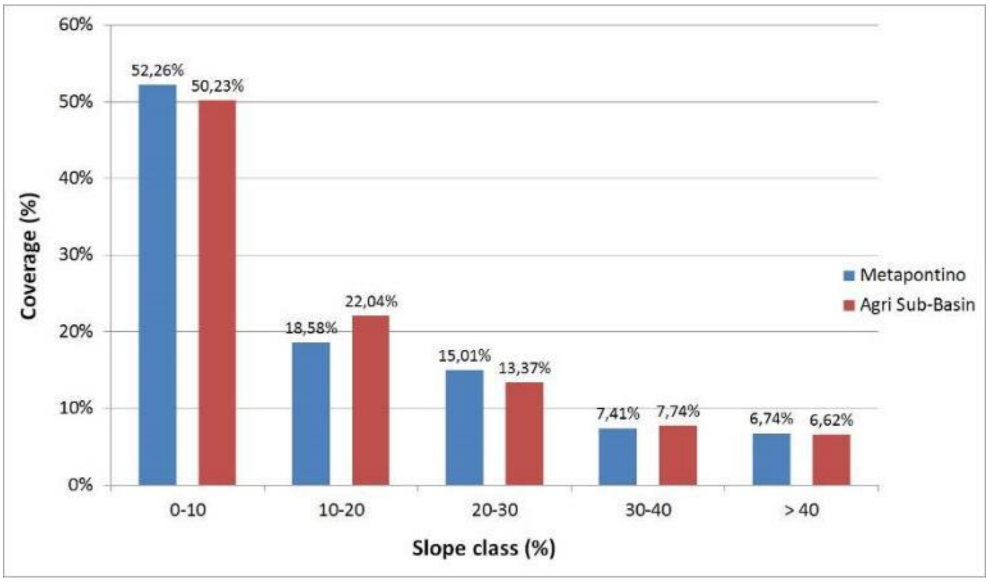


Fig. 28: Histogram depicting the slope classes of Metapontino area and Agri sub-basin

5. HYDROGRAPHY

Crete, according to National Law 1739/1987 (OJ 201A/1987) and specifically to the Decision 706/16-7-2010 (OJ 1383B/2010 as corrected with OJ 1572B/2010) is an autonomous River Basin District (GR13) that also includes the surrounding small islands (Fig. 29).

Fig. 29: Google Earth Map extract of Crete Island, depicting the municipal boundaries of Platanias and Agios Nikolaos (with pink colour) and the three River basins of GR13: GR39, GR40 & GR41

According to the recently approved River Basin Management Plan (Government Gazette 570B/08-04-2015) the River Basin District GR13 comprises three River Basins (also shown in Fig. 1), namely:

- Streams of Northern Part of Chania-Rethymno-Heraklion (GR39), total area 3.676,06 sq.km,
- Streams of Southern Part of Chania-Rethymno-Heraklion (GR40), total area 2.798,2 sq.km,
- Streams of Eastern Crete (GR41), total area 1.870,28 sq.km.

As shown in Fig. 29, the LIFE AgroClimaWater project's areas of interest are located in two different river basins, i.e. GR 39 (Municipality of Platanias) and GR41 (Municipality of Ag. Nikolaos) in accordance with the G13 River Basin Management Plan. It should be noted that a small part of Platanias falls into GR40, while a small part of Ag. Nikolaos, falls into GR39.

Regarding the project's pilot sub-basins Voukolies and Maleme in Platanias and Havgas – Milatos in Mirabello they are located in GR39 and GR 41, respectively.

5.1 Voukolies and Maleme sub-basins

The hydrographic network presents within the Tavronitis river basin is depicted at Fig. 30. Tavronitis is the largest river in western Crete, its basin covers an area of about 165 sq.km and notably contributes to the formation of water resources of the greater area of Chania prefecture. The hydrographic network of Tavronitis river starts from the White Mountains at an altitude of 1,400m and flows into the Chania Gulf and consists of three tributary rivers,

- of the tributary Sebroniotis, which starts from the village Sebronas.
- of the tributary Roumatianos, which starts from the village Old Roumata and
- of the tributary Derianos where the springs are located at the village Prasses.

The two (2) tributaries, Sebroniotis and Roumatianos, are joined together near the village Voukolies, where the main bed of the river Tavronitis is formed. The Derianos tributary discharges at the village Syrili, where it joins the main river bed of Tavronitis three (3) kilometers before the outflow into the sea.

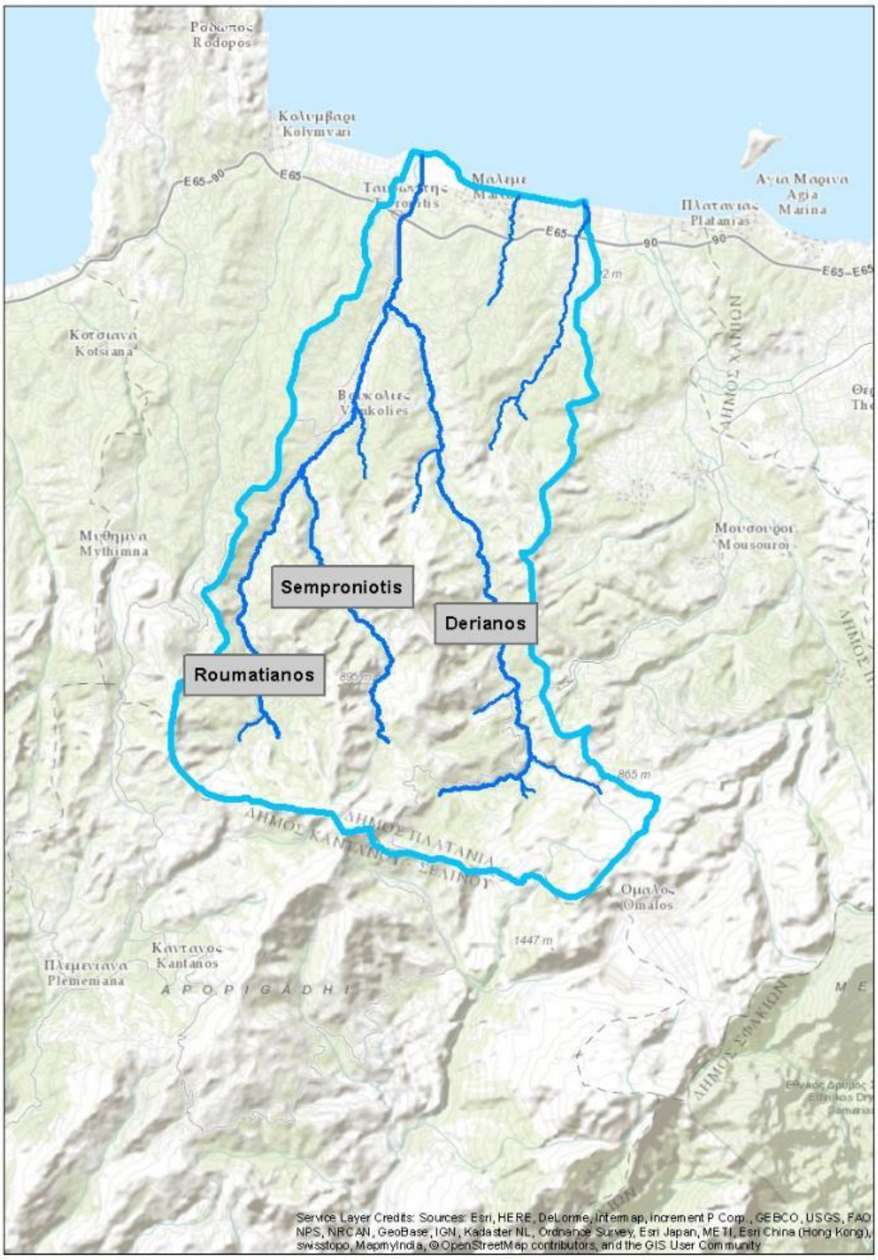


Fig. 30: Hydrographic network of Tavronitis Sub-basin

5.2 Havgas - Milatos sub-basin

For the determination of rivers within the Water District of Crete the System B was used. This system is based on the catchment area, the geology and the flow pattern of the surface river water systems. It is classified into 5 different types of water systems and includes only rivers with permanent flow and 2 out of 3 types of streams i) these with surface flow equal to 8-9 months and maintenance of peatland in stream's bed during the dry summer period and ii) these whose surface flow lasts for 6 to 8 months but they don't maintain peatlands in their beds during the summer period) (Special Secretariat for Water, 2015). Based on the approved River Basin Management Plan of Crete Water District (GR 13), no significant surface water bodies (according to the above categorization) were identified within Havgas – Milatos catchment area. The hydrographic network presented at Fig. 31 was extracted by the project's geodata base and it is referred mainly in the third category of streams which includes streams whose surface flow lasts only for a short time period (almost 3 months) and no peatlands are formed in their beds during the summer period.

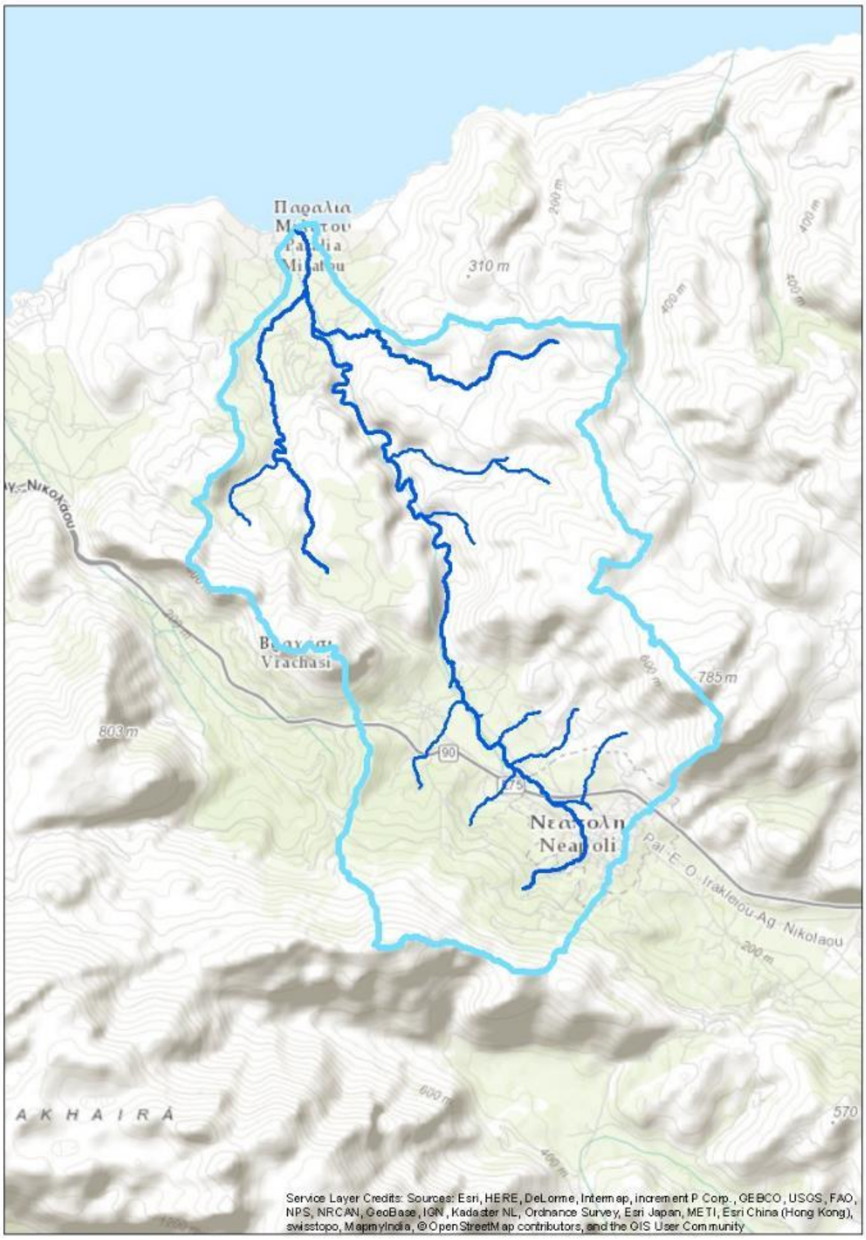


Fig. 31: Hydrographic network of Havgas - Milatos sub-basin

The basin of Havgas - Milatos covers an area of about 29 sq.km. The maximum altitude of the basin is 900m the minimum is 0m, and the basin abuts the Malion Culf in the Cretan Sea. According to the approved River Basin Management Plan of Crete Water District (GR 13), it should be mentioned that within Havgas – Milatos catchment area, none significant surface water body has been identified. Furthermore, in the generic maps of the Hellenic Military Geographical Service (HMGS) scaled 1:50,000 and in particular the map with title "Agios Nikolaos", there is no visible named river or stream.

5.3 Agri pilot sub-basin

In Metapontino area the Bradano river, the Basento river, the Cavone river, the Agri river and the Sinni river flow.

Fig. 32: Agri river Basin (Interregional River Basin Authority of Basilicata)

The Agri river, which includes the pilot Agri sub-basin, springs not far from the source of the Basento river. It flows in Western Basilicata, the Apennines to the Ionian coast, crossing the most fertile valley and with greater anthropic settlement. It is 136 km long (Fig. 32) and has a catchment area of 1770 sq.km and covers the 17% of the Basilicata Region and a small part (15 sq. km) in the neighbouring Campania Region.
The course of Agri can be divided into two sections. The mountainous section, goes from the mountain foot to the village of Marsiconuovo, presents significant slopes, and runs through a narrow valley of clay soils. However, the valley, up to the limit of the reservoir from Marsiconuovo Pertusillo, presents lower slopes, which are further reduced below the dam of Pertusillo, where the area is called Val d'Agri.

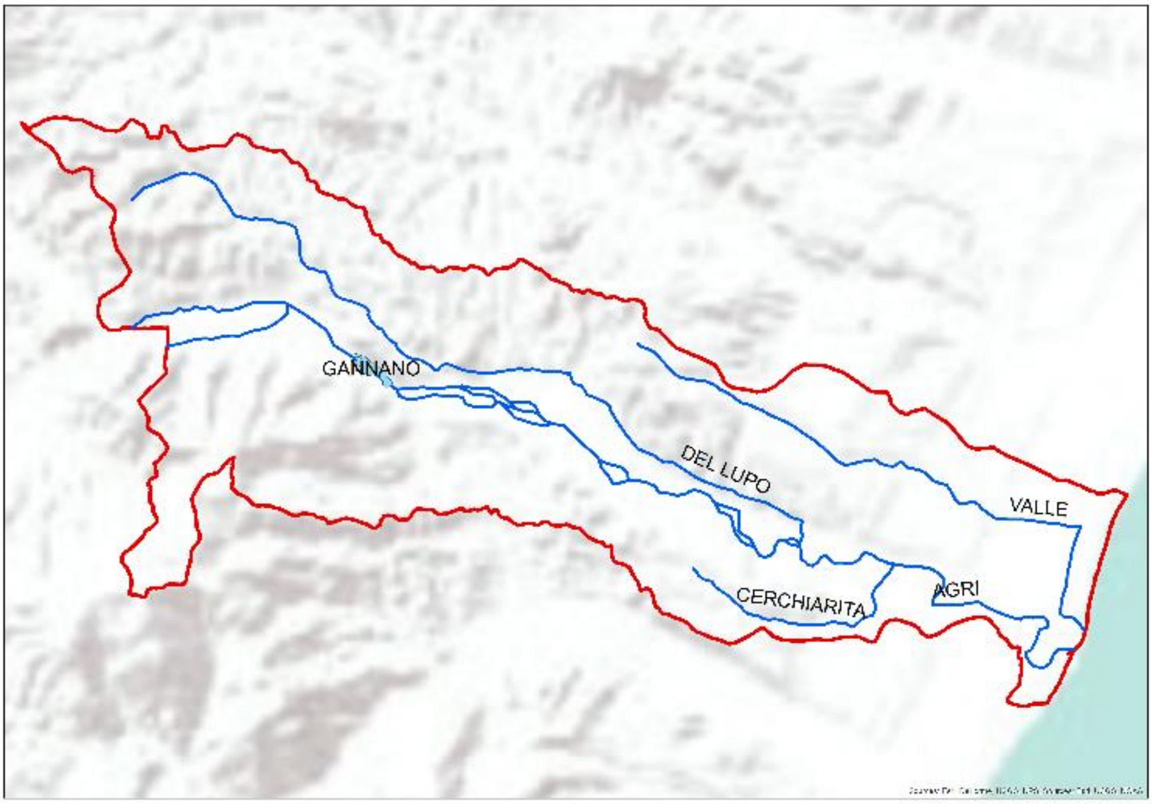


Fig. 33: Hydrographic network of Agri Sub-basin

Only Agri river and its tributaries flow within the pilot Agri sub-basin. The main tributary rivers of the Agri river within the Agri sub-basin are (Fig. 33):

- Fosso Valle ditch which starts from the village Montalbano Jonico;
- Fosso del Lupo ditch which starts from the Locality named Tempa del Muto;
- Fosso Cerchiarita ditch which starts from the village Tursi.

All the tributary rivers, join directly the Agri river before outflow into the Jonian sea.
The Sauro stream, the Racanello stream and the Armento stream are important tributary rivers for Agri river, however are out of the Agri Sub-basin.
In the Agri Sub-basin is present the Gannano weir that bars the course of the Agri River, near the Caprarico locality, in the village Tursi. Also, an important water reservoir built on the Agri river is the Pietra del Pertusillo dam, but it is out of the Agri Sub-basin.

6. METEREOLOGICAL DATA

6.1 Voukolies and Maleme sub-basins

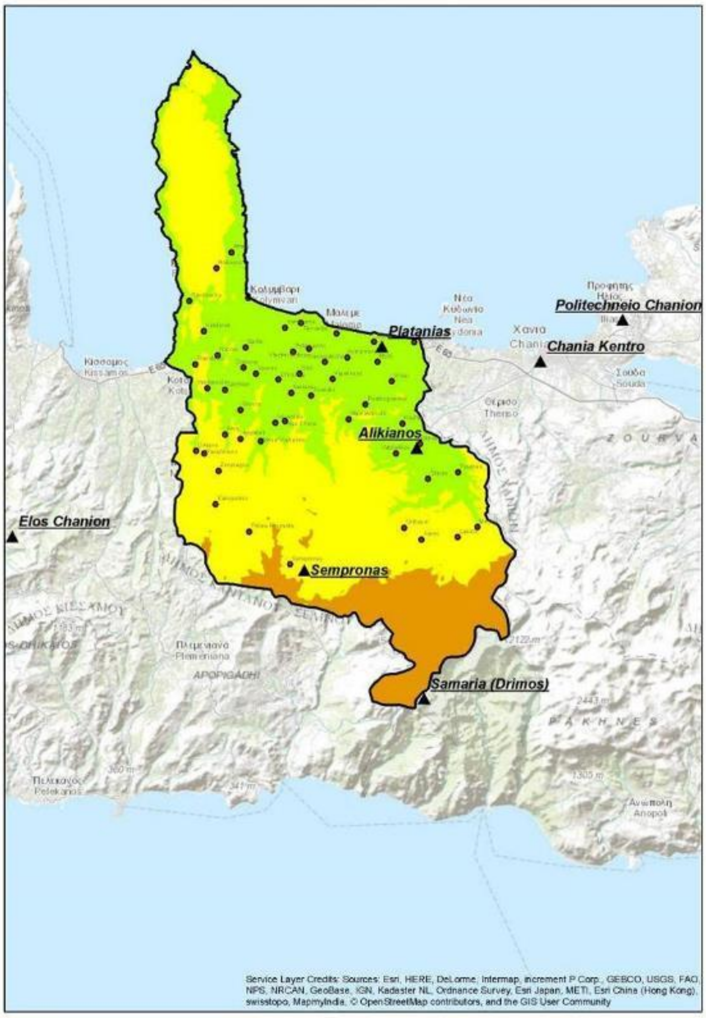


Fig. 34: Geodatabase Map Extract, depicting the boundaries of Platanias Municipality and the meteorological stations located in its greater area

Within the administrative boundaries of Platanias Municipality, there are three meteorological stations, namely Platanias, Alikianos and Sebronas (Fig. 34). Four more meterological stations are located in the greater area, i.e. Elos Chanion, Samaria Drimos, Chania Kentro and Politechneio Chanion.

The exact locations, the starting dates and the parameters monitored are presented on Table 11.

Table 11: Municipality of Platanias weather stations

Station Name	Location			Parameters Monitored	Data from
	Lat	Long	Elev		
Alikianos	35° 27' 10" N	23° 54' 59" E	70 m	Mean Temperature, Rain, Wind	2012-08-07
Elos Chanion	5° 24' 00" N	23° 36' 00" E	535 m	Mean Temperature, Rain, Wind	2014-12-01
Platanias	35° 31' 01" N	23° 53' 03" E	12 m	Mean Temperature, Rain, Wind	2015-06-25

Leandros Symeonidis (Politechneio)	35° 32' 00" N	24° 04' 09" E	137 m	Mean Temperature, Rain, Wind	2006-01-07
Samaria	35° 18' 00" N	23° 55' 00" E	1250 m	Mean Temperature, Rain, Wind	2008-07-04
Sebronas	35o 22' 45'' N	23o 49' 28'' E	640 m	Mean Temperature, Rain, Wind	2015-05-30
Chania Kentro	35o 30' 28'' N	24o 00' 22'' E	7m	Mean Temperature, Rain, Wind	2010-09-13

As shown on Table 12, two of the meteorological stations of the area, Platanias and Sebronas, have only recently started monitoring data. Thus, historic data from these stations are not available. Available historic data for temperature from the weather stations in Platanias Municipality are summarized on Table 13.

Table 12: Municipality of Platanias weather stations data

Station Name	T_{mean}	T_{min}	T_{max}	Average Wind speed (km/hr)
Alikianos	18,2	10,7	26,1	7,11
Elos Chanion	16,4	8,1	23,7	3,03
Platanias	-	-	-	-
Leandros Symeonidis (Politechneio)	18,9	9,3	28,0	7,79
Samaria	11,6	0,6	21,8	8,38
Sebronas	-	-	-	-
Chania Kentro	18,6	10,2	26,7	5,69

Table 13: Municipality of Platanias – available historic data for temperature

Station Name	Mean		Max		Min	
	Annual	Month	Annual	Month	Annual	Month
Alikianos	566,3	47,2	859,4	187	406,4	0,0
Elos Chanion	-	101,9	-	377,2	-	0,0
Platanias	-	-	-	-	-	-
Leandros Symeonidis (Politechneio)	626,7	52,2	924,8	216,6	455,9	0,0
Samaria	1631,4	135,9	2450,4	728,2	1096,2	0,0
Sebronas	-	-	-	-	-	-
Chania Kentro	605,3	50,4	730,0	208,0	483,2	0,0

Based on the data available, the Blanney – Criddle method has been utilized for the estimation of Evapotranspiration. Monthly evapotranspiration coefficients are summarized on Table 14.

Table 14: Municipality of Platanias - Monthly Evapotranspiration

Weather Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alikianos Chanion	94,96	94,35	120,55	138,37	171,23	183,41	196,28	186,02	158,24	134,11	108,25	92,83
Leandros Symeonidis (Politechneio)	94,15	93,64	119,45	138,33	171,07	188,39	204,00	193,19	162,31	138,83	111,17	94,28
Samaria	68,30	68,73	91,93	110,81	143,00	157,79	172,92	163,70	135,33	108,90	85,76	71,06
Chania Kentro	95,72	94,41	120,56	138,78	169,54	185,17	198,86	188,07	160,20	136,40	109,17	96,33

For the purposes of Agroclimawater project historic data from Alikianos Chanion and Chania Kentro will be utilized, owed to the proximity to the project's areas. Meteorological data from Platanias station can also be utilized during the project, though historic data from this station are not available, since it has only started functioning recently.

6.2 Havgas – Milatos Sub-basin

There are three weather stations within the administrative boundaries of Agios Nikolaos Municipality, namely Agios Nikolaos, Tzermiadon and Finokalia (Fig. 35).
The exact locations, the starting dates and the parameters monitored per weather station are presented on Table 15.

Table 15: Municipality of Agios Nikolaos weather stations

Station Name	Location			Parameters Monitored	Data from
	Lat	Long	Elev		
Agios Nikolaos	35° 11' 58" N	25° 42' 53" E	30 m	Mean Temperature, Rain, Wind, RH	2009-10-21
Tzermiadon	35° 12' 00" N	35° 30' 00" E	820 m	Mean Temperature, Rain, Wind, RH	2006-11-30
Finokalia	35° 18' 00" N	25° 42' 00" E	250 m	Mean Temperature, Rain, Wind, RH	2014-09-12

Finokalia weather station has only recently started monitoring data. Thus, historic data from this station are not available. Available historic data for temperature from the weather stations in Agios Nikolaos Municipality are summarized on Table 17.

Table 16: Municipality of Agios Nikolaos weather stations data

Station Name	T_{mean}	T_{min}	T_{max}	Average wind speed (km/hr)
Agios Nikolaos	20,0	11,1	28,9	12,43
Tzermiadon	13,2	4,2	21,0	2,75
Finokalia	18,0	11,0	25,3	25,6

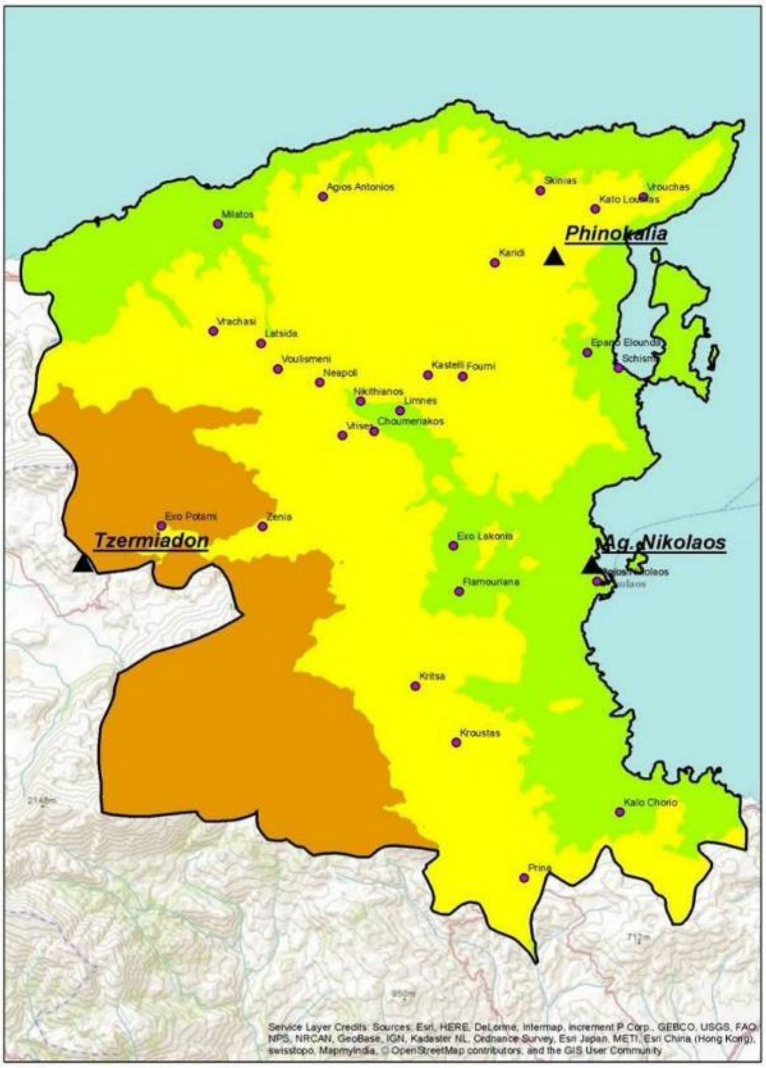


Fig. 35: Geodatabase Map Extract of the area of interest, depicting the boundaries of Agios Nikolaos Municipality and the meteorological stations located in its greater area

Table 17: Municipality of Agios Nikolaos – available historic data for temperature

Station Name	Mean		Max		Min	
	Annual	Month	Annual	Month	Annual	Month
Agios Nikolaos	454,2	37,8	635,0	280,2	358,0	0,0
Tzermiadon	1039,4	86,6	1.448,2	505,1	612,9	0,0
Finokalia	-	30,4	-	112,8	-	0,2

Based on the data available, the Blanney – Criddle method has been utilized for the estimation of Evapotranspiration. Monthly evapotranspiration coefficients are summarized on Table 18.

Table 18: Municipality of Agios Nikolaos - Monthly Evapotranspiration

Weather Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Agios Nikolaos	101,30	99,03	124,47	141,72	173,73	190,74	206,91	197,05	164,04	140,67	114,21	101,26
Tzermiadon	77,68	78,67	100,39	118,02	148,10	160,83	171,60	161,77	136,35	116,78	93,46	78,65
Finokalia	94,00	90,71	116,72	133,57	168,56	177,22	193,52	185,33	161,03	135,26	109,65	99,28

For the purposes of Agroclimawater project historic data from Agios Nikolaos and Tzermiadon Meteo Stations will be utilized, owed to the proximity to the project's areas. Meteorological data from Finokalia weather station can also be utilized during the project, though historic data from this station are not available, since it has only started functioning recently.

6.3 Agri pilot sub-basin

For the purposes of Agroclimawater project daily data values will be taken into account the municipalities and the related weather stations that fall into the Agri sub-basin's area. Basilicata weather stations are managed by ALSIA ("Agenzia Lucana di Sviluppo e di Innovazione in Agricoltura").

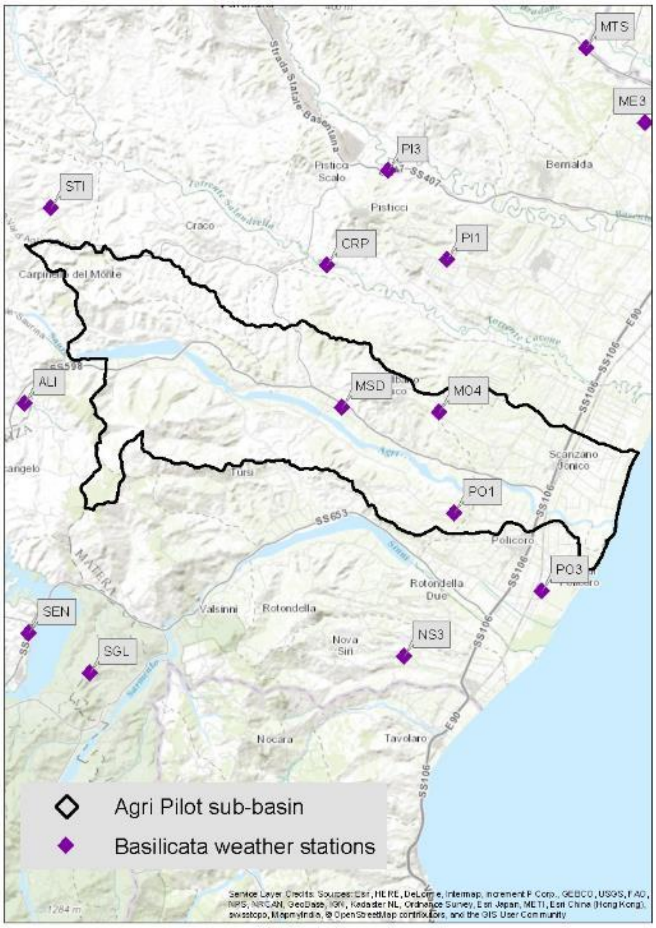


Fig. 36: Agri sub-basin weather stations (source: www.ssabasilicata.it)

Within Agri sub-basin area there are 5 weather stations (Fig. 6) from which their data were evaluated with the aim of getting an overview of the area's climatic data.

Table 19: Weather stations in the area of interest

W.S. code	n.	Location	Municipality	Y_lat	X_long	Elevation (m a.s.l.)
MO4	10	Cozzo del Fico	Montalbano J.	40.281331	16.61442	151
PO1	20	C.da Troyli	Policoro	40.225833	16.62556	115
PO3	22	Pantano Sottano	Policoro	40.183333	16.68806	4
STI	25	C.da Torre	Stigliano	40.392938	16.33595	285
MSD	43	S. Donato	Tursi	40.283692	16.54469	58

Table 20: Municipalities weather data (mean annually temperatures and relative humidity)

Municipality	T_{mean}	T_{min}	T_{max}	RH_{mean}	RH_{min}	RH_{max}
	(°C)			(%)		
Montalbano J.	15.49	10.73	21.45	52.62	32.52	70.05
Policoro/PO1	16.95	12.56	22.37	62.92	39.02	82.71
Policoro/PO3	16.95	11.02	23.12	72.74	50.14	91.56
Stigliano	16.22	11.60	21.91	57.56	39.95	72.89
Tursi	16.47	10.52	23.18	51.29	27.88	71.82
Mean	16.49	11.32	22.59	59.80	37.57	78.45

The mean annual temperature is 16.49°C, with minimum and maximum mean annual temperature 11.32°C and 22.59°C, respectively. The mean annual relative humidity is 59.80%.

Table 21: Municipalities weather data (mean annually rainfalls, ET_0, Direct radiation and wind speed)

Municipality	Rain (mm)	ETo (mm)	Direct Radiation (MJ m^{-2})	Wind Speed (km d^{-1})
Montalbano J.	593.82	3.61	67.31	128.15
Policoro/PO1	659.83	3.66	89.38	156.40
Policoro/PO3	520.20	3.32	64.65	97.74
Stigliano	618.03	3.74	12.62	120.91
Tursi	671.37	4.18	0.04	125.39
Mean	636.71	3.69	38.14	133.19

The mean annual rainfall is 636.71 mm; poorly distributed rainfall, concentrated and sometimes torrential noticeable summer dryness. The daily average annual evaporation is 3.69 mm.

Table 22: Municipalities weather data (mean minimum temperatures, mean maximum temperatures and relative humidity ever from 2010-2015)

Municipality	Tmin	Tmax	RH_{min}	RH_{max}
	(°C)		(%)	

Montalbano J.	-4.6	41.1	9	99.7
Policoro/PO1	-2.9	41.6	8	100
Policoro/PO3	-5	40.4	17	100
Stigliano	-4.4	41.6	10.4	97.2
Tursi	-4.5	41.6	10.8	100
Mean	-5.0	41.6	8.0	100

The mean maximum temperature is 41.6°C and the mean minimum temperature is -5.0°C.

The climate is a typical Mediterranean with mild and rainy winters and relatively warm and dry summers. However, unpredictable cold spells that usually occur during the first months of each year affect negatively the crops' productivity in the area. The presence of the rains in autumn - winter and the drought in spring-summer affects both agriculture productivity and the production techniques. The area, like all the Mediterranean countries, is affected by the climate change and especially the increase of the temperature.

7. LEGAL FRAMEWORK IN THE FIELD OF WATER POLICY

7.1 Greece

The legal framework in the fields of water policy in Greece is determined by Law 3199/09.12.2003 (OJ A′280) for the "Protection and management of water - harmonization with Directive 2000/60/EC" as amended and in force. Pursuant to the provisions of the Law 3199/2003, several decisions have been issued, the most important of which are:

- The Presidential Decree (PD) No. 51/08.03.2007 (OJ A′54) "Determination of measures and procedures for integrated protection and management of water in compliance with the provisions of Directive 2000/60/EC″
- The Decision 706/16.07.2010 of the National Water Commission (OJ B 1383) "Determination of the national river basins and definition of the competent regional authorities for their management and protection", pursuant to Article 3 of PD 51/2007.
- The Joint Ministerial Decision (JMD) 140384/19.08.2011 (OJ B′2017) "Determination of quality and quantity water monitoring National Network and of the measurements positions (stations) and responsible operators pursuant to Article 4, paragraph 4 of Law.3199/2003."
- The JMD 146896/2014 (OJ B'2878) "License for water use and exploitation. Procedures and conditions for licenses′ issuing, conditions and period of their validity and other relevant provisions", as amended and in force.
- The Decision 5656/18.09.2015 (OJ B'2055) «Restrictive, prohibitive and other regulatory measures related to the use of surface, groundwater and coastal water resources and the execution and operation of the exploitation works in order the water resources of the Water District of Crete to be protected and preserved.″

In addition, directly related to the implementation of WFD is the legal framework, which has incorporated the European legislation for the protection of water in the National law, as defined in Annex VI of the WFD (Part A):

- The JMD 8600/416/E103/23.02.2009 (OJ B′356) on the "Quality and management of bathing waters, in compliance with the provisions of Directive 2006/7/EC "
- The JMD Y2/2600/06.21.2001 (OJ B′892) on "The quality of water for human consumption" by which Directive 98/83/EC on drinking water is incorporated in the Greek acquis and its amendment the Decision ΔΥΓ2/ΓΠ.oik.38295/2007.
- The JMD 5673/400/03.05.1997 (OJ B′192) "Measures and conditions concerning urban wastewater treatment" and its amending Decisions 19661/1982/02.08.1999 (Official Gazette B′1811) and 48392/939/28.3.2002 (Official Gazette B′405) for the implementation of the provisions of Directive 91/271/EEC and its amending Directive 98/15/EC.
- The JMD 16190/1335/05.19.1997 (OJ B′519) "Measures and conditions concerning the protection of waters against pollution caused by nitrates from agricultural sources", for harmonization with Directive 91/676/EEC, as amended with JMD 19652/1906/05.09.1999 (OJ B′1575) and in force.
- The Law 4036/27.01.2012 (OJ A'8) on the "Approval, marketing and control of plant protection products″ to implement the Regulations (EC) 1107/2009 and 396/2005 and Directive 2009/128/EC.

- The JMD 37338/1807/E103/1.9.2010 (OJ B'1495) "Establishment of measures and procedures for the conservation of wild bird fauna and its habitat, in compliance with the provisions of Directive 79/409/EEC", as it was amended by the JMD 8353/276/E103/2012 (OJ B' 415) and is in force.
- The JMD 8197/90920/22-7-2013 (OJ B' 1883) "National Action Plan for the implementation of Directive 2009/128/EC and the protection of humans and the environment" and its amendment JMD 6669/79087/15-7-2015 (OJ B' 1971).
- The JMD 33318/3028/11.12.1998 (OJ B'1289) on "Definition of measures and procedures for the conservation of natural habitats and wild fauna and flora" and its amendment JMD 14849/853/E103/2008 (OJ B'645) in compliance with the provisions of Directive 92/43/EEC.
- The Decision 5656/2015 (OJ B'2055) of General Secretary of Decentralized Administration of CRETE "Restrictive, prohibitive and other regulatory measures related to the use of surface, underground and coastal water resources and to the implementation and operation of their exploitation works aiming at the protection and conservation of water resources in water district of Crete (GR13)"

Finally, also relevant to water legislation are the provisions referred to later or/and the "daughters" directives that supplement Directive 2000/60/EC:

- The JMD 39626/2208/E130/25.9.2009 (OJ B'2075) on "the protection of groundwater against pollution and deterioration", in which the daughter Directive 2006/118/EC has incorporated.
- The JMD 51354/2641/E103/24.11.2010 (OJ B'1909) "Determination of Environmental Quality Standards (EQS) for concentrations of certain pollutants and priority substances in surface water, in compliance with the provisions of Directive 2008/105/EC and the concentrations of specific pollutants in inland surface waters and other provisions", as amended by the JMD 170766/2016 (FEK B'69), in compliance with the provisions of Directive 2013/39/EC and applied.
- The Decision 1811/22.12.2011 (OJ B'3322) on "Definition of threshold values for the concentrations of certain pollutants, group of pollutants or indicators of pollution in underground waters."
- The JMD 145116/2011 (OJ B'354) on "Definition of measures, conditions and procedures for the wastewater reuse and other provisions", as amended by the JMD 191002/2013 (OJ B'2220) and in force.

7.2 Italy

In order to achieve a proper and sound management of water resources and to prevent situations of water deficit the Government of Basilicata Region, according to the duties and responsibilities delegated by the central Government to the local authorities on this matter (L.D. 112/98 e L. 3/2001), the Interregional River Basin Authority of Basilicata and Authority of Optimum Territorial Ambit of Basilicata have conceived, developed and enforced a water resources governance system based on the basic principles of the main E.U. Directives and Italian Laws focused on this topic (Directive 2000/60/CE, Royal Decree 1775/33, L. 183/89, L. 36/94, L.D. 152/99).

The Water Framework Directive 2000/60/EC (WFD) establishes a European framework for the protection and management of water resources. The WFD was adopted in Italy in 2006, with the legislative decree no. 152.

The Italian legislation had already foreseen the needs for planning activities at hydrographical basin scale. Several plans at both the hydrographical basin and sub-district level were the basis for the preparation of the RBMPs.

In the next paragraphs the main National and Regional legal specifications on water are presented:

<u>National legal specifications</u>

- D.Lgs. 3 aprile 2006, n.152 e s.m.i.. - "Norme in materia ambientale. Parte terza - Norme in materia di difesa del suolo e lotta alla desertificazione, di tutela delle acque dall'inquinamento e di gestione delle risorse idriche"

<u>Regional legal specifications</u>

- Legge Regionale 8 gennaio 2016, n. 1 - "Istituzione dell'ente di governo per i rifiuti e le risorse idriche della Basilicata (E.G.R.I.B.)"
- Legge Regionale 7 novembre 2015, n. 50 - "Disposizioni urgenti inerenti misure di salvaguardia ambientale in materia di concessione acqua pubblica ad uso idroelettrico"
- Regolamento Regionale n.833 del 23/06/2015 – "Disciplina dei procedimenti di concessione di derivazione di acqua pubblica"
- Regolamento Regionale n.31 del 15/01/2013 per "L'esercizio delle competenze in materia di scarichi di acque reflue urbane e/o industriali in pubblica fognatura dei comuni dell'ambito unico di Basilicata"
- Delib.G.R. 30 dicembre 2003, n. 2628 – "Regolamento per la disciplina delle procedure di rilascio delle concessioni di derivazione e delle licenze di attingimento delle acque pubbliche della Regione Basilicata"
- Legge Regionale N. 21 DEL 03-06-2002 - "Norme sull'esercizio delle funzioni regionali in materia di approvvigionamento idrico"
- Legge Regionale 23 dicembre 1996, n. 63 - Istituzione del Servizio Idrico Integrato. Delimitazione dell' unico ambito ottimale e disciplina delle forme e dei modi di cooperazione fra gli enti locali
- Legge Regionale N. 3 DEL 17-01-1994 – "Piano di risanamento delle acque tutela uso e risanamento delle risorse idriche"
- R.D. 11 dicembre 1933, n.1775 – "Testo unico delle disposizioni di legge sulle acque e impianti elettrici"

8. WATER TARIFFS PER WATER USE

8.1 Voukolies and Maleme sub-basins

Drinking water in all agglomerations of Platanias Municipality is provided by Intermunicipal Water & Sewage Company of the Northern Coast of the Prefecture of Chania (DEYAVA). According to the Decision 11/2009 of DEYAVA board of directors, water tariffs applied for drinking water in the area of project's pilot basins are presented in the following table.

Table 23: Water tariffs for drinking water and trimester water charge

Consumption (m^3/3-months)	Water charge (**€/** m^3)
0-30	0.38
31-60	0.45
61-120	0.60
121-240	0.72
>241	0.85

In addition irrigation water is supplied at the pilot sub-basins of Voukolies and Maleme by the Organization for the Development of Crete S.A. (OAK) and Regional Organization of Land Reclamation (TOEB) Agias Kolymvariou. The water charges per pilot sub-basin are presented in Table 24

Table 24: Water tariffs for irrigation water per pilot sub-basin *(source: communication with water providers)*

Pilot sub-basin	Water charge (**€/** m^3)
Platanias	0.22
Voukolies	0.17

8.2 Havgas - Milatos sub-basin

According to the Decision 29/2015 of the board of Municipal Enterprise of Agios Nikolaos Drinking water in all agglomerations of Agios Nikolaos Municipality is provided by Municipal Enterprise of Agios Nikolaos (DEYAAN). DEYAAN is also responsible for providing water for hotels, enterprises, public services, livestock farms and a number of other uses such as stadiums, fire hydrants, parks and public areas. It should be noted here that DEYAAN does not supply irrigation water to farmers. According to the same decision the water tariffs applied for several water uses in the settlements of Havgas – Milatos are presented in the following tables:

Table 25: Water tariffs for drinking water and annual water charge

Range of Consumption (m^3/year)	Water charge (**€/** m^3)	
	Neapoli	Voulismeni - Latsida
0-120	0.45	0.33
121-240	0.90	0.37
241-360	1.20	0.64

>361	1.65	0.97

Table 26: Water tariffs for drinking water and biannual water charge

Consumption (m^3/6-months)	€/ m^3	
	Neapoli	Vraxasi - Milatos - Sisi
0-60	0.45	0.4
61-120	0.90	0.5
121-180	1.20	0.6
>181	1.65	0.6

Table 27: Water tariffs per type of consumption

Agglomeration	Neapoli, Voulismeni, Latsida (Annual charge)				Vraxasi - Milatos - Sisi (Biannual charge)	
Type of consumption	Shops, Offices, Companies	Livestock farming	Public services and Municipalities		Shops, Offices, Companies	
m^3/year	€/m^3		m^3/year	€/m^3	m^3/6-months	€/m^3
0-120	0.48	1.12	0-60	0.55	0-75	0.50
121-240	0.74	1.47	61-120	0.74	76-150	0.92
241-360	0.92	1.81	121-180	0.92	>151	0.60
>361	1.21	1.81	>181	1.1		

Regarding irrigation water charges, since only private wells and boreholes are located in the pilot sub-basins there is no charge for the water used for irrigation. The cost of water use is undertaken by the individual owners and includes cost for operation and maintenance of the pumping and irrigation system.

8.3 Agri pilot sub-basin

According to the Regional law 08/2016 n. 1 Ente di Governo per I Rifiuti e le Risorse Idriche di Basilicata (EGRIB) has the function of coordinating, supervising and planning in the field of water and waste resources (EGRIB).

Moreover, Acquedotto Lucano is the body for the Integrated Water Service (IWS) in Basilicata and it is operating inside an area that comprises 131 Municipalities, with almost 610.000 inhabitants, 250.000 users and more than 4.000 Kilometres of network. Acquedotto Lucano (was established by Basilicata AATO with Deliberation 19/2002) is a public working capital company (made of the Municipalities and the Government of Region of Basilicata), in charge of the activities that are related with water uptake from the springs, transportation through the aqueducts and the hydraulic network, distribution to the houses, up to the depuration in the treatment plants and the commercial utilizations.

Basilicata water tariffs was determined with the Decree n.5/2016/comm dell'11.5.2016 – EGRIB. According to EGRIB an overview of the water tariffs per water use in Basilicata Region are presented at Table 28 to Table 31.

Table 28: Domestic water tariffs (2015)

Range of consumption (m^3/year)	Water charge **(€/m^3)**
0 - 100	0,59
101 - 150	0,74
151 - 250	1,21
> 250	1,95
Annual fixed charge: 24,07€	

Water tariffs for commercial user (Table 29) are classified based on the user's consumption:

- C1 tariff is for commercial user using water between a range 0 – 1000 m^3/year ("small commercial users")
- C2 tariff is for commercial user using water between a range 0 – 10.000 m^3/year ("medium commercial users")
- C3 is for commercial user using great quantity of water ("big commercial users").

For user's consumption that exceeds the basic block of consumption there are different costs for C1 and C2 tariffs (e.g. C1: >1000 m^3/year, and C2 >10.000 m^3/year). The above mentioned costs are presented in the following Table 29.

Table 29: Commercial water tariffs (2015)

C1 tariff		C2 tariff		C3 tariff	
Block of consumption (m^3/year)	Water charge **(€/m^3)**	Block of consumption (m^3/year)	Water charge **(€/m^3)**	Block of consumption (m^3/year)	Water charge **(€/m^3)**
0 - 1.000	1,05	0 - 10.000	1,10	Single cost	1,21
> 1.000	1,67	> 10.000	1,67	-	-
Annual fixed charge: 36,63€		Annual fixed charge: 36,63€		Annual fixed charge: 36,63€	

Table 30: Agricultural water tariffs (2015)

Block of consumption (m^3/year)	Water charge **(€/m^3)**
Single cost	0,73
Annual fixed charge:€ 36,63	

Table 31: Public water tariffs (2015)

Block of consumption (m^3/year)	Water charge **(€/m^3)**
0 - 1.000	0,90
> 1.000	1,11
Annual fixed charge: 36,63€	

9. WATER SOURCES UTILIZED FOR SEVERAL WATER USES AND THEIR STATUS

In the next paragraphs all the water sources used for abstraction of water in the project's pilot areas are presented.

9.1 Voukolies and Maleme sub-basins

In the pilot area of Platanias Municipality the groundwater is the source for all the water uses. As shown in Fig. 37, the selected pilot sub-basins of Voukolies and Maleme are situated in the area of the Porous of Kampos Chanion groundwater body (GR1300022).

Table 32: Groundwater body in Havgas - Milatos sub-basin

Code	Name	Aquifer Type	Area (sq.km)
GR1300022	Porous of Kampos Chanion	Porous	279.78

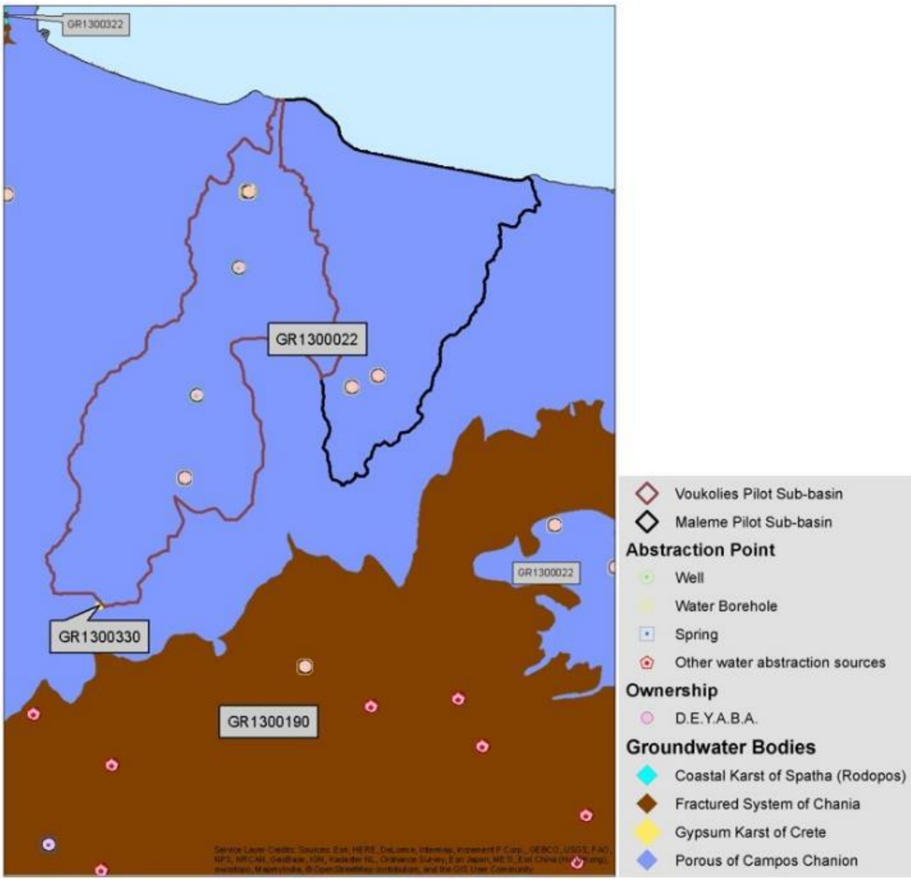


Fig. 37: Water aquifer utilized for abstraction of drinking water in Voukolies and Maleme Sub-basin

The aquifer is only intended for the abstraction of water for irrigation and not for the abstraction of water for human consumption as it is mentioned in the River basin Management plant of Water District of Crete. However, there are four boreholes, two in Voukolies and two in Maleme and two wells in the Voukolies sub-basin utilized for drinking water by DEYAVA that abstract water from the Porous of Kampos Chanion groundwater body (GR1300022).

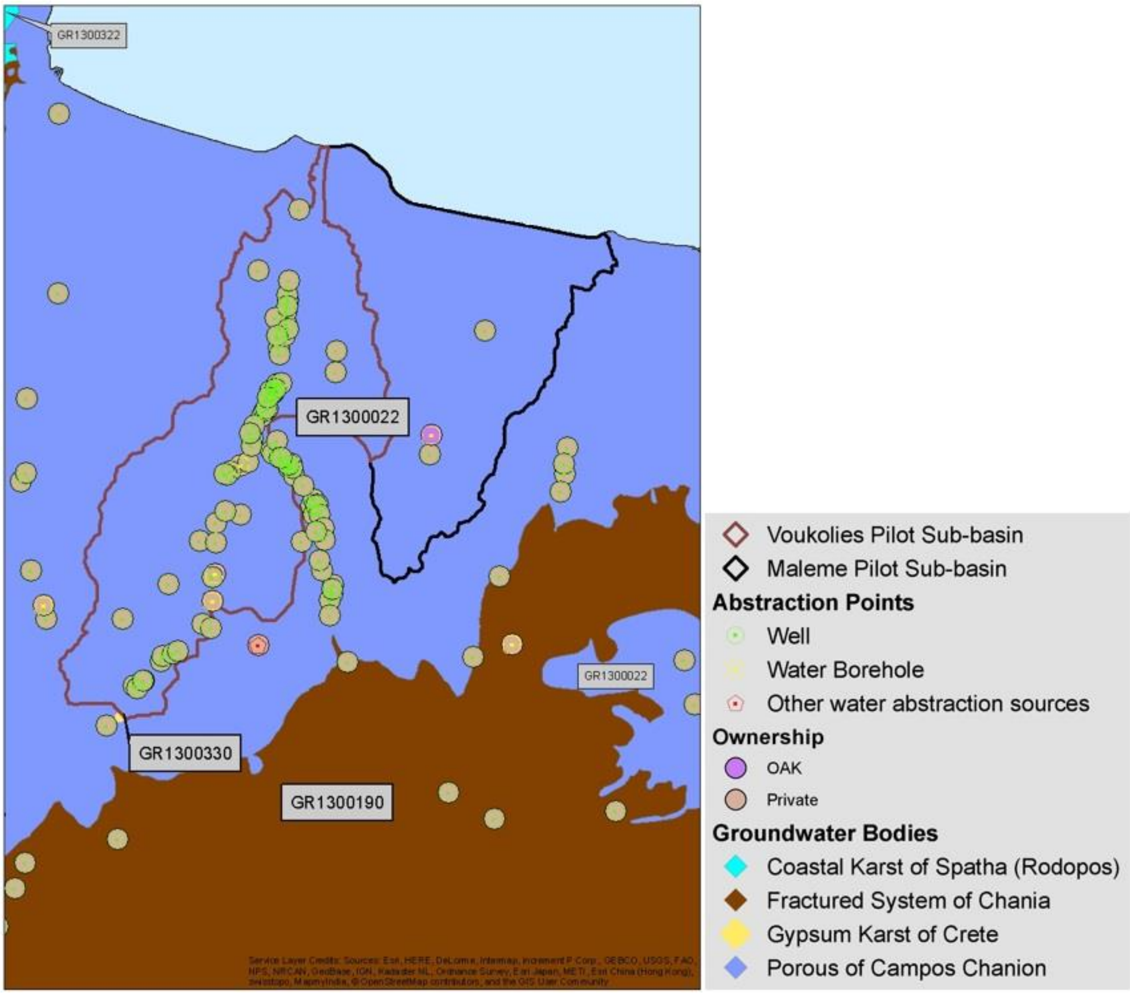


Fig. 38: Water aquifer utilized for abstraction of irrigation water in Voukolies and Maleme sub-basins

For the irrigation of the areas cultivated in the Voukolies pilot sub-basin private wells are mostly utilized, located alongside of Tavronitis River (Fig. 38). In particular, there are 55 wells, 13 of which group managed, allowing for a maximum annual water abstraction quantity of 247.930 m^3/yr. It is estimated that water abstracted from the above wells is utilized for the irrigation of about 44 ha of olive groves, 29 ha of citrus trees, 4.5 ha of avocado trees, 4 ha of vegetables and 3.6 ha of vineyards.
As far as water boreholes are concerned, there is only one group owned used for irrigation purposes. There is also one water borehole owned by OAK, with a maximum annual water abstraction quantity of 180.000 m^3/yr utilized for the irrigation of 2500 ha of olive groves, citrus trees, vineyards and vegetables via the irrigation network of Voukolies. The latter, is also supplied from a water borehole located at Kefala, Local Community of Voukolies with a maximum annual water abstraction quantity of 150.000 m^3/yr. The abstraction points used for irrigation purposes in the pilot sub-basins of Platanias Municipality are depicted in Fig. 38.
Finally, there is a private well for industrial use as depicted in Fig. 39

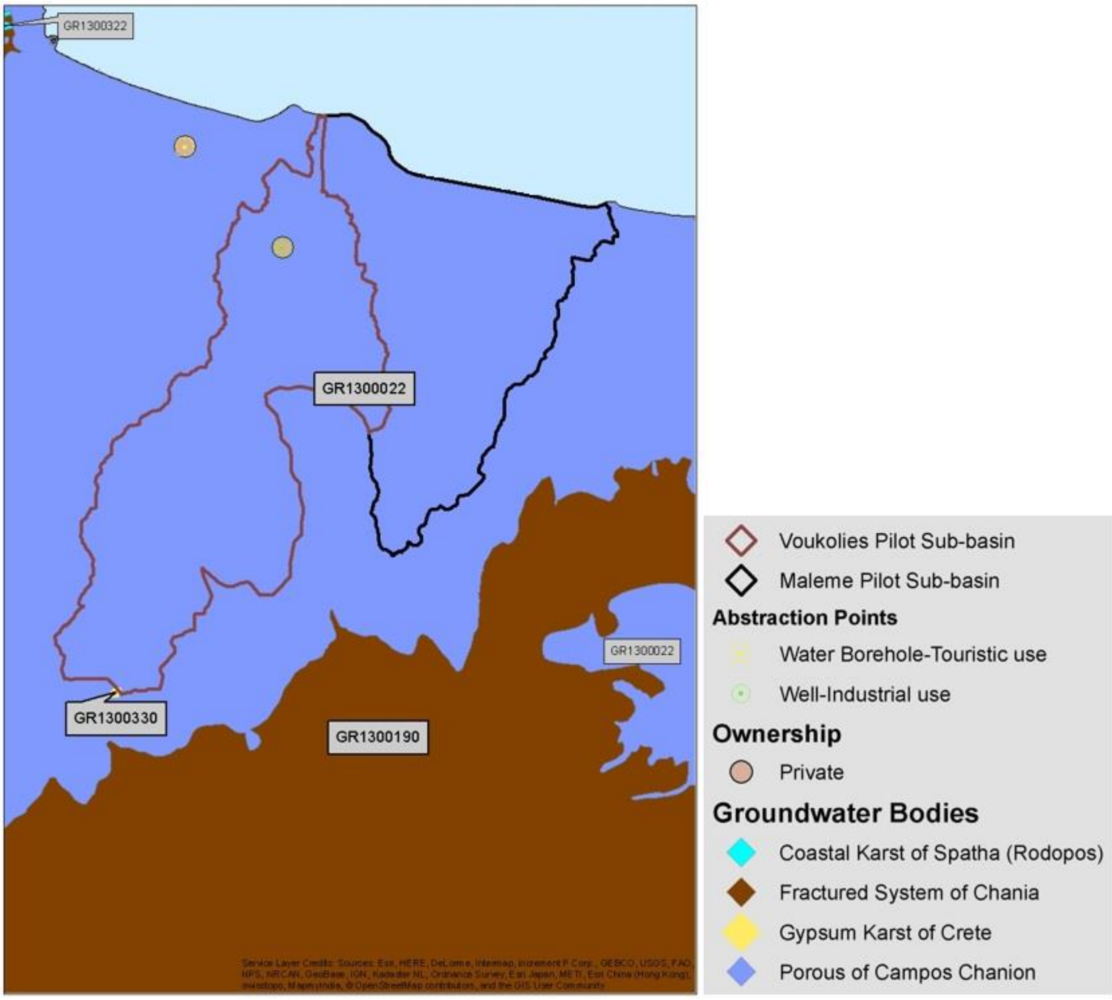


Fig. 39: Water aquifer utilized for abstraction of Industrial water in Voukolies and Maleme sub-basins

9.2 Havgas - Milatos sub-basin

Parts of 5 groundwater bodies are found within the boundaries of the Havgas - Milatos sub-basin (Fig. 40) in the area of Mirabello, four of which are intended for the abstraction of water. Groundwater bodies of the area are summarized on Table 33.

Table 33: Groundwater bodies in Havgas - Milatos sub-basin

Code	Name	Aquifer Type	Area (sq.km)
GR1300240	Fractured of Dikti	fractured	269.37
GR1300116	Coastal karst of Sisi-Milatos-Elounda	karstic	90.18
GR1300115	Karst of Fourni - Elounda	karstic	80.98
GR1300113	Karst of NE Mount Dikti	karstic	86.75
GR1300112	Karst of Malia - Selena	karstic	92.51

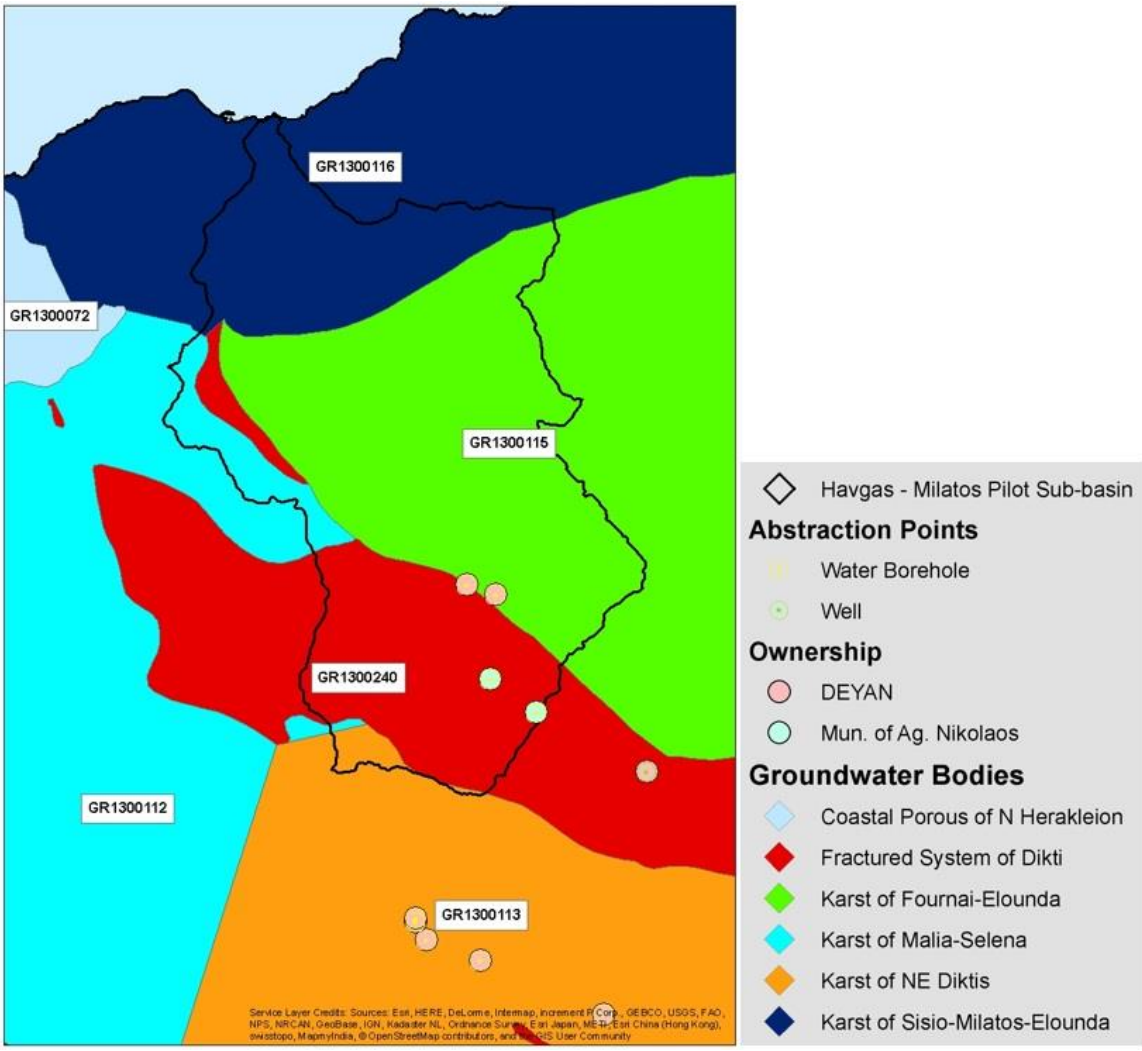


Fig. 40: Water aquifers utilized for abstraction of drinking water in Havgas - Milatos sub-basin

There are two boreholes utilized for drinking water by DEYAN that abstract water from the karst groundwater body of Fourni – Elounda (GR1300115) and one well owned by Municipality of Agios Nikolaos that abstract water from the fractures system of Dikti (GR1300240).

Twelve (12) boreholes, 9 of which private and 3 group owned, with a total annual maximum abstraction quantity of 57.425 m^3/yr are also presented. There are also 35 wells used for irrigation purposes in the selected sub-basin with a total annual maximum abstraction quantity of 118.638 m^3/yr. It is estimated that the abstracted water is utilized for the irrigation of about 54 ha of olive groves and 3 ha of vegetables. As shown in the map extract below (Fig. 41), most abstraction points are located at the northern part of the Havgas (Milatos) sub-basin, Northern of Milatos settlement and abstract water from the karstic aquifer of Sissio- Milatos- Elounda (GR1300116).

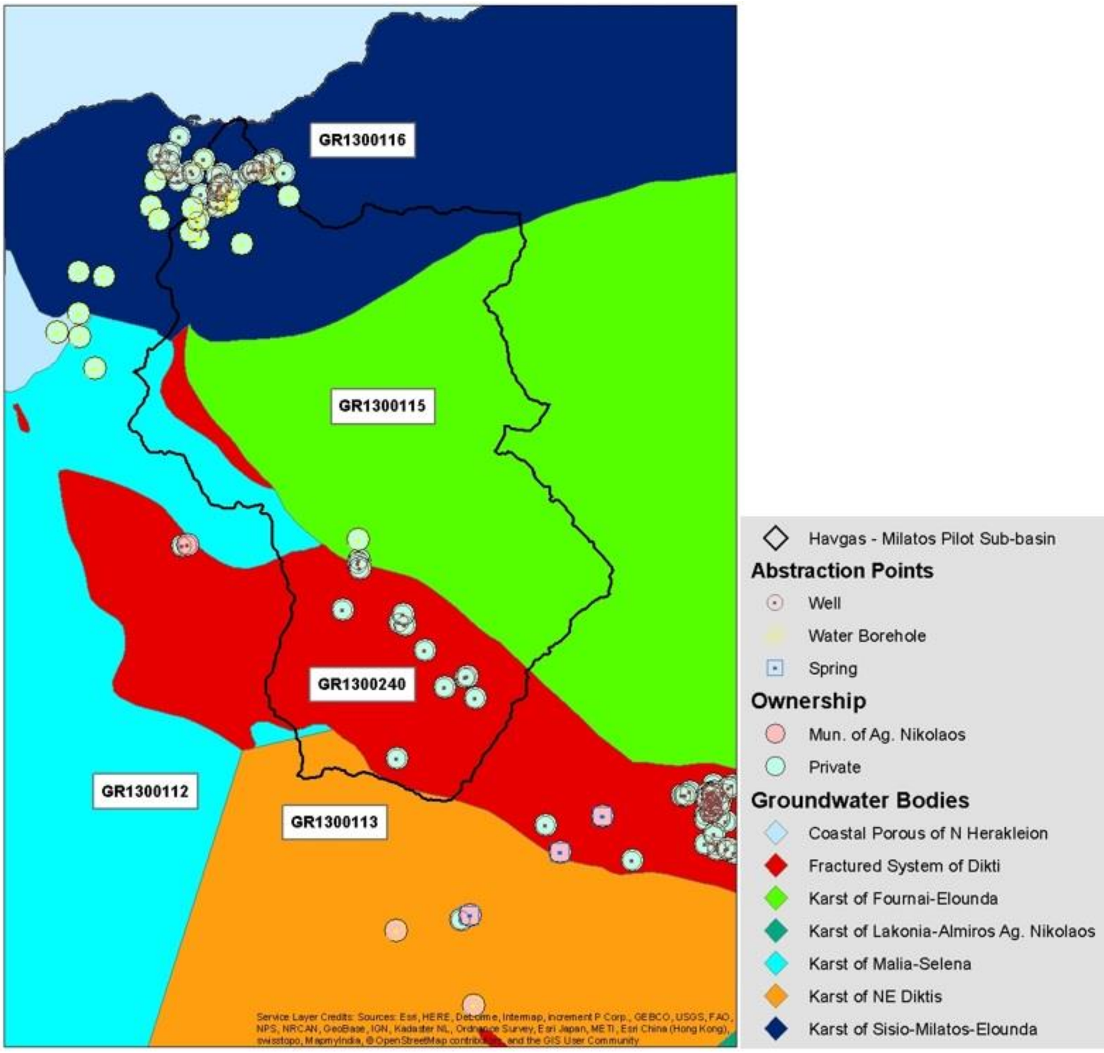


Fig. 41: Water aquifers utilized for abstraction of irrigation water in Havgas - Milatos sub-basin

9.3 Agri pilot sub-basin

The Sinni-Agri scheme is an interregional scheme for multiple use (drinking, irrigation and industrial), with reservoirs located in the Basilicata region. It covers a lot of territory, including the Ionic arc of Basilicata and Apulia Region, the "Salento" (a geographic region at the southern end of the administrative region of Apulia in Southern Italy) and a small part of the Calabrian Ionic area.

The scheme is composed by:

- Monte Cotugno dam, on the Sinni river, for drinking, irrigation and industrial purposes for both Basilicata and Apulia Region; the water capacity is 482 Mm^3;
- Pertusillo dam, on the Agri river, for irrigation, hydropower and drinking water. The water capacity is 155 Mm^3 and the regulation volume is 142 Mm^3;
- San Giuliano dam, on Bradano river, for irrigation purpose, with a water capacity of 107 Mm^3;
- From Agri weir to Missanello, which by means of a canal that provides water to Monte Cotugno dam;
- Marsico Nuovo dam, on Agri river. Water is used for irrigation purpose of the "Consorzio di Bonifica Alta Val d'Agri" areas;

- Gannano weir, on the Agri River, for irrigation purpose of the underlying consortia areas and fed by the Pertusillo dam that is located upstream;
- The pipe of Sinni that come from Monte Cotugno and carries water for irrigation, drinking and industrial purposes;
- The pipe that comes from Pertusillo dam to the "Parco del Marchese" tank.

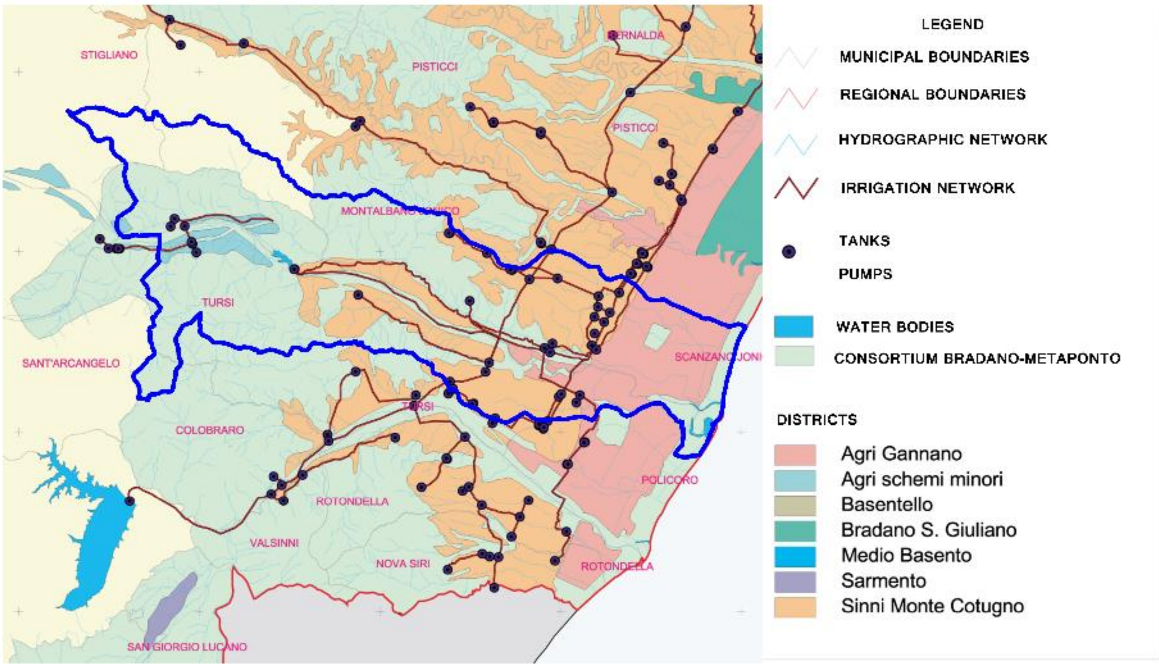


Fig. 42: The Sinni-Agri scheme in Agri sub-basin

In the Metapontino area dams and weirs are the main source for all the water uses. As it is shown in Table 34 and according to the River basin management plane of South Apennine 2015-2021 and the Authority of the interregional basin of Basilicata, the "Monte Cotugno" dam and the "Gannano" weir provide water for multiple uses (drinking, irrigation and industrial purposes) and irrigation, respectively, within the selected pilot sub-basins of Agri.

Table 34: Dams and weirs in Agri sub-basin (River basin management plane of South Apennine 2015-2021, www.adb.basilicata.it/adb/risorseidriche.asp)

Code	Name	Use	Municipality	River	Area (sq.km)
ME-4	Monte Cotugno	Multiple uses	Trivigno	Sinni	20.5
ME-2	Gannano	Irrigation	Grottole	Agri	0.81

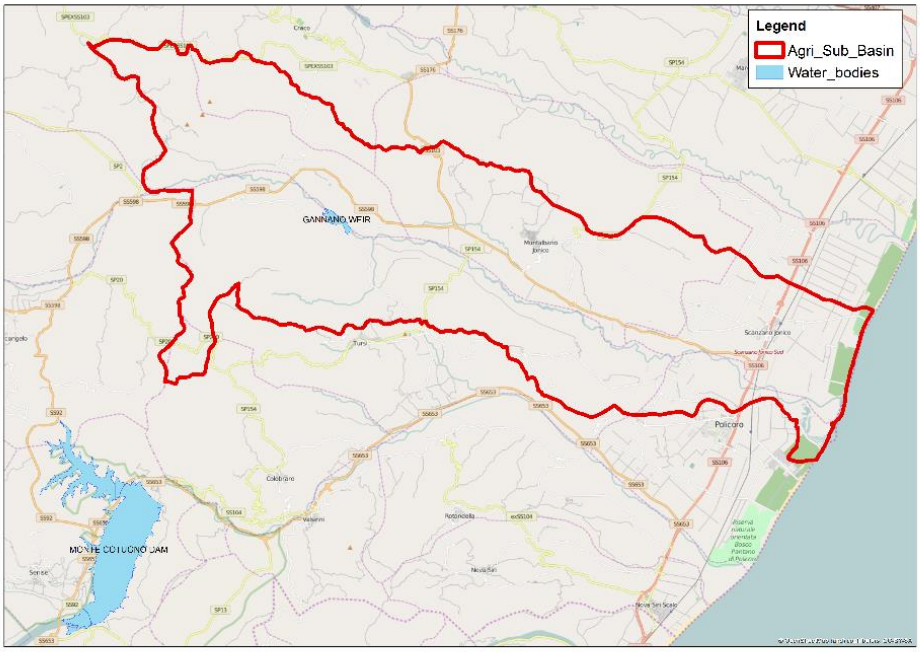


Fig. 43: Dams utilized for multiple use in Agri sub-basin

Monte Cotugno dam

The dam of Monte Cotugno, near the municipalty of Senise, is the biggest clay dam in Europe. This dam started working in 1983 (Table 35) and it stops the flow of the River Sinni right where its bed narrows. The water of the River collected and used for farming, industrial and drinking purposes. The wall that forms this dam, whose max capacity is 530 million cubic metres, is about 1,850 metres long, 60 metres high and 260 metres wide at its basis. Experts thought to channel in this lake also the water of the Sarmento Stream and of the Agri River in order to assure a higher filling frequency of the dam.

Gannano weir

The Gannano weir intercept the river Agri, already regulated by Pertusillo tank. The weir was built around 1951 by the "Consorzio di bonifica Bradano and Metaponto", is 18m high and has a capacity of 2.6 million cubic meters. The weir used mainly for irrigation purposes.

Table 35: Dams and weirs technical data in Agri sub-basin (www.adb.basilicata.it/adb/risorseidriche.asp)

Name	Completion year	Cachment Area (sq.km)	Capacity (Mm^3)	Max Regulation Volume (Mm^3)
Monte Cotugno	1983	890	530	482
Gannano	1959	1,490	2.6	2.62

Table 36**: Dams'** Italian and European Codes in Agri sub-basin (www.adb.basilicata.it/adb/risorseidriche.asp)

Kind of lake	Name	CD_NEW	HMWB*	EU CD LW
Dam	Monte Cotugno	ME-4	HMWB	ITF_017_LW-ME-4-Monte Cotugno
Dam	Gannano	ME-2	HMWB	ITF_017_LW-ME-2-Gannano

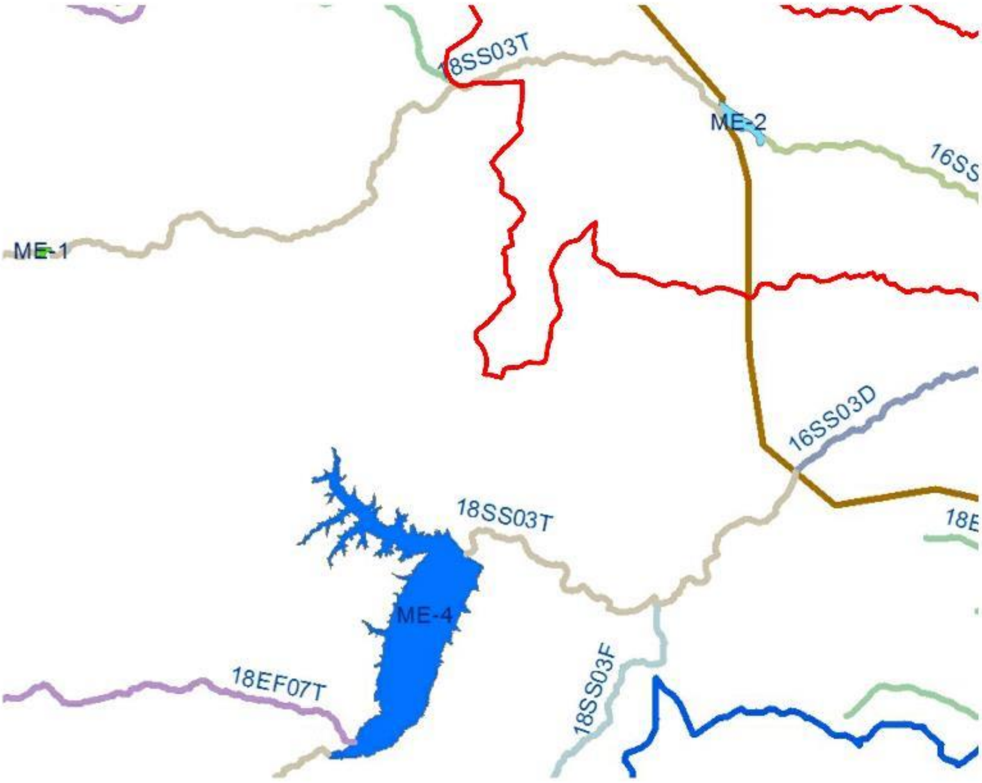


Fig. 44: Monte Cotugno dam (ME-4) and Gannano dam (ME-2) in Agri Sub-basin (source: River basin management plane of South Apennine 2015-2021)

National legislation (Article. 80 of N. 152/2006 - Surface water for the production of drinking water) provides that fresh surface water that is to be used for drinking water, is classified in three categories (A1, A2 and A3) according to the physical, chemical and microbiological characteristics of water (third part, Table 1/A, Annex 2). Depending on the category, fresh surface water to be utilized as potable is subjected to the following treatments:

- Category A1: simple physical treatment and disinfection;
- Category A2: normal physical and chemical treatment and disinfection;
- Category A3: physical and chemical treatment pushed, refining and disinfection.

Surface waters of Basilicata for the production of drinking water fall into category A2 and are depicted in Fig. 45 (http://www.arpab.it/risorse_idriche/index.asp).

Fig. 45: Basilicata water resources for drinking use

10. RECEPTOR WATERS AND THEIR STATUS

A receptor is a water body that may be adversely affected by contact with or by exposure to a contaminant of concern. A receptor could be:

- Surface water that means rivers and lakes, transitional waters and coastal waters,
- Groundwater that means all water, which is below the surface of ground in the saturation zone and in direct contact with ground or subsoil.

The receptors that could be potentially affected by pollutants discharged by the agricultural practices applied in the project's pilot areas are presented in the next paragraphs.

10.1 Pilot sub-basins in Crete, Greece

According to the River management plan of Water District (GR13) the surface water and the groundwater bodies that could be identified in the project's pilot areas are presented in the following paragraphs.

10.1.1 Surface water bodies

Rivers

Within the Tavronitis River catchment area the surface water bodies/rivers presented Fig. 46 are identified. On Table 1 their code, type and length as well as their classification as natural or Heavily modified water body are presented:

Table 37: Surface water bodies in Tavronitis river catchment area

Code	Type	Natural/HMWB[1]	Length (m)
GR1339R000301006N	RM1	Natural	4063
GR1339R000301007N	RM1	Natural	4098
GR1339R000303110N	RM1	Natural	1779
GR1339R000302009N	RM1a	Natural	9006
GR1339R000301057N	RM1a	Natural	1681
GR1339R000301008N	RM1a	Natural	6720

Typology of Tavronitis basin surface water bodies (2013/480/EU)

- RM1: Small Mediterranean streams with catchment < 100 sq.km, mixed (except silicious) geology and highly seasonal flow regime
- RM1a: Small Mediterranean streams with catchment < 10 sq.km,

In addition, the surface water body GR1339R000301006N is characterized as natural transitional water and in particular as River Delta.

[1] Heavily modified water body

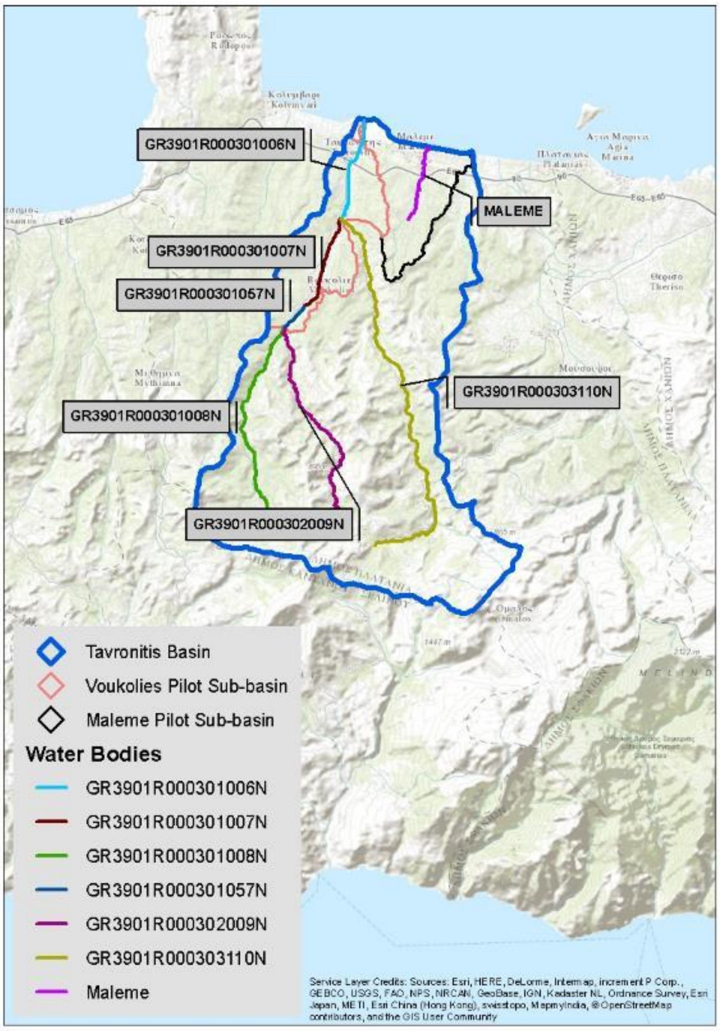


Fig. 46: Surface water bodies in Tavronitis catchment area

As it can be seen by the Fig. 46 in the selected pilot sub-basin of Voukolies the surface water bodies GR1339R000301006N, GR1339R000301007N and GR1339R000303110N are located. On the contrary, according to the River management plan of Water District (GR13) the there are no significant surface water bodies in the sub-basin of Maleme.

According to the approved River Basin Management Plan of Crete Water District (GR 13), Tavronitis chemical status is totally unknown, while Tavronitis' ecological status is largely unknown, with the exception of GR3901R000303110N, which is classified as good (Table 38). However, based on the analysis provided in the Water Management Plans of Tavronitis sub-basin (Nikolaidis et al., 2012) the chemical status of surface water in Tavronitis sub-basins is considered as good.

Table 38: Ecological and Chemical Status of Tavronitis surface water systems

Code	Name	Ecological Status	Chemical Status
GR3901R000301006N	TAVRONITIS	Unknown	Unknown
GR3901R000301007N	TAVRONITIS	Unknown	Unknown
GR3901R000303110N	TAVRONITIS	Good	Unknown
GR3901R000301057N	TAVRONITIS	Unknown	Unknown
GR3901R000302009N	TAVRONITIS	Unknown	Unknown
GR3901R000301008N	TAVRONITIS	Unknown	Unknown

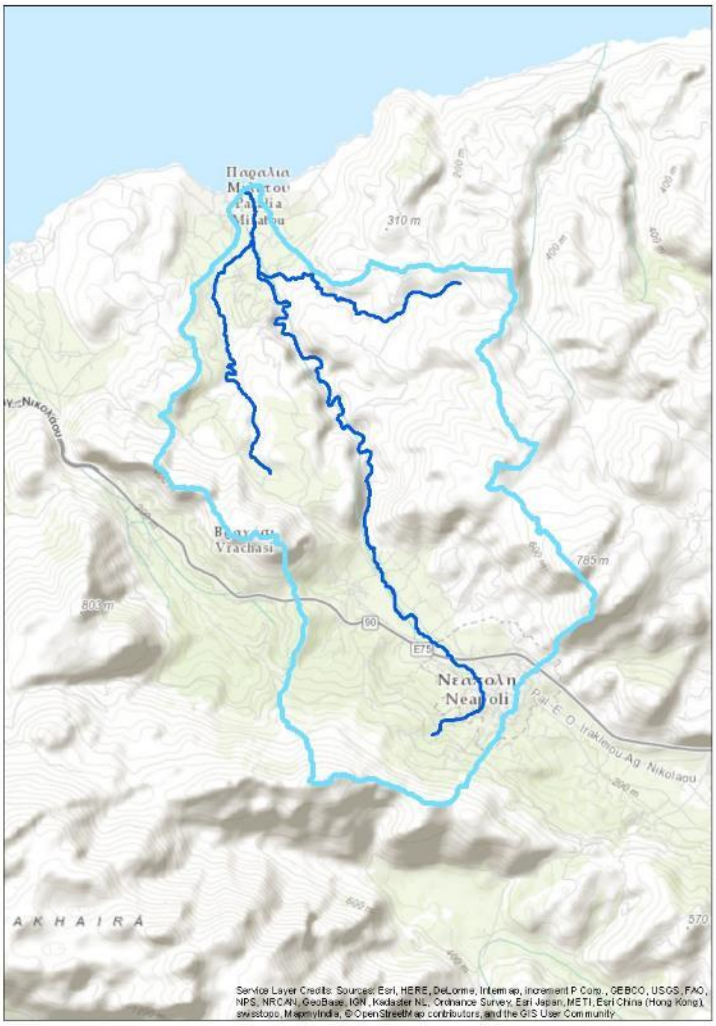


Fig. 47: Surface water bodies in Havgas - Milatos sub-basin

As far as the Havgas – Milatos catchment area, according to the approved River Basin Management Plan of Crete Water District (GR 13), none significant surface water body has been identified. The surface water bodies presented at Fig. 47 was extracted by the project's geodata base.

10.1.2 Coastal waters

The coastal water systems identified in the projects pilot areas are presented on Table 39 and depicted on Fig. 46.

Table 39: **Coastal water systems in the project's pilot areas (source: River** management plan of Water District (GR13), 2015)

Code	Name	Type	Length (km)
GR1339C0002N	Coast of Chania Gulf	Shallow with sedimentary substratum	45
GR1341C0009N	Coast of Malia Gulf		56.8

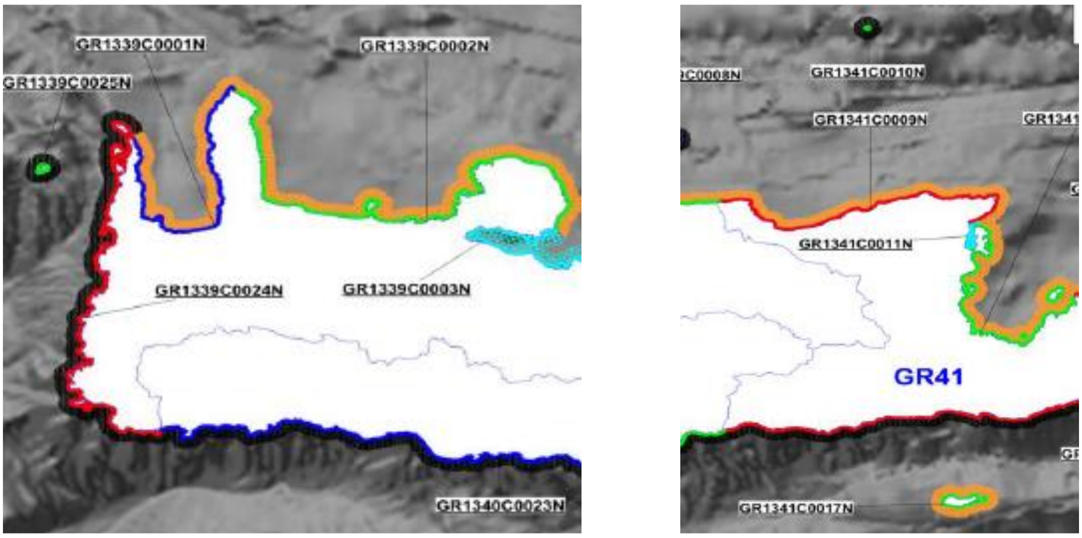


Fig. 48**: Coastal water systems in the project's pilot areas (source:** River management plan of Water District (GR13), 2015)

According to the approved River Basin Management Plan of Crete Water District (GR 13), the ecological status of the coastal water systems at the two project's pilot areas of Crete are Good. Regarding the chemical status, the coastal system of Chania gulf is characterized as good and of Malia gulf as unknown Table 40.

Table 40: Ecological and Chemical Status of Agroclimawater pilot areas coastal water systems (source: River management plan of Water District (GR13), 2015)

Code	Name	Ecological status	Chemical status
GR1339C0002N	Coast of Chania Gulf	Good	Good
GR1341C0009N	Coast of Malia Gulf	Good	Unknown

Recreational (bathing) waters in conformance with the requirements of the Bathing Waters Directive (2006/7/EC), which interrelated with the coastal water systems in the area of interest are presented in Table 41:

Table 41**: Bathing water at the project's pilot areas in Greece**

Name	Code	Interrelated coastal systems
Maleme	GRBW139323085	GR1339C0002N
Milatos	GRBW139310032	GR1341C0009N

Within the boundaries of the pilot sub-basin selected in Platanias area the Maleme beach is located (Fig. 49). Bathing waters of Maleme beach are of excellent quality based on the assessment of the previous 4 years. Maleme beach, situated at the coast of the Maleme, has a length of 4km and an average width of 35 m. The exact location, as well as the area included in the bathing waters inventory is shown in Fig. 49. In the western and eastern ends of the beach are the mouths of 3 intermittent streams, while right in the middle, the Sfakoryako estuary is located. The main land uses of the area are urban, including hotels, permanent and summer houses and agricultural, mainly olive groves and vineyards.

Fig. 49: Bathing waters of Maleme beach in Platanias

Within the boundaries of the selected sub-basin in Mirabello area, on the other hand, Milatos beach is located (Fig. 50), also included in the national bathing waters inventory. Milatos Beach, about 2 km northern of Milatos, is the coastal front of a 190 m gulf and has an average width of 15 m. The main land uses of the area are urban, with dispersed settlements and little vegetation.

Fig. 50: Bathing waters of Milatos Beach in Mirabello

10.1.3 Groundwater bodies

The groundwater bodies identified in the Voukolies and Maleme sub-basins are depicted in Fig. 51.

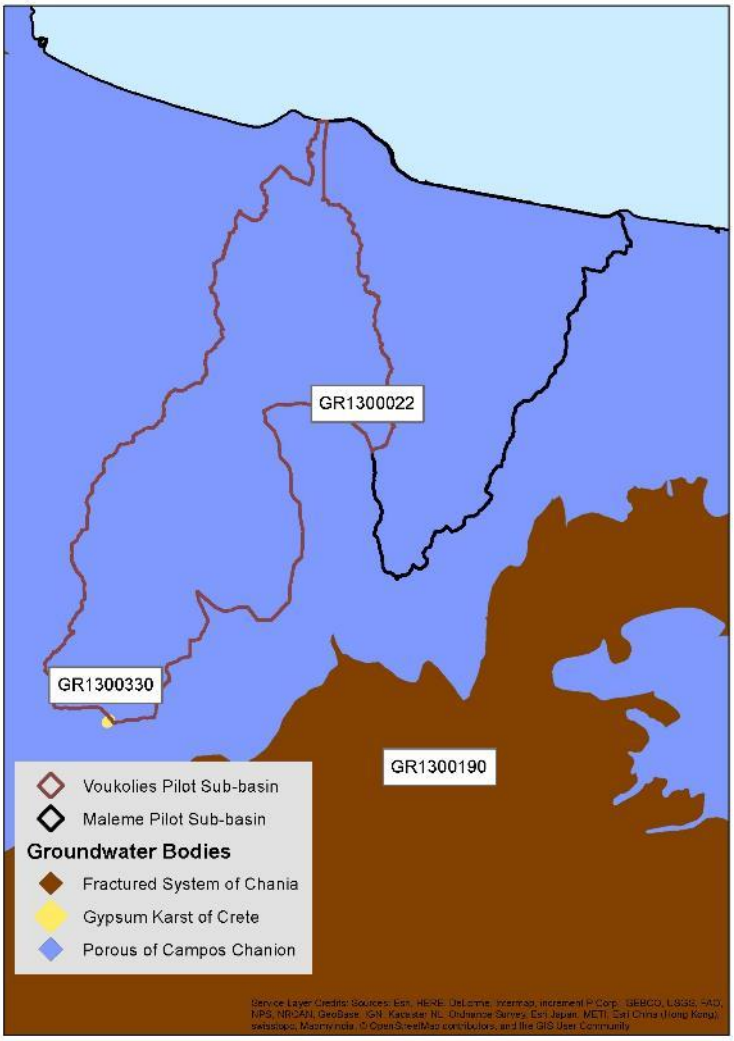


Fig. 51: Geodatabase Map Extract depicting the groundwater bodies in Voukolies and Maleme sub-basins

Table 42: Description of Groundwater bodies of Voukolies and Maleme sub-basins

Code	Name	Aquifer Type	Area (sq.km)
GR1300022	Porous aquifer of Campos Chanion	porous	279.78
GR1300330	Gypsum karst aquifer of Crete	karstic	17.87
GR1300190	Fractured Rock aquifer of Chania	fractured rock	582.04

Groundwater bodies, within the catchment area of pilot subasins, in general do not experience significant anthropogenic pressures, except for the Fractured Rock Aquifer of Chania (GR1300190) that is locally over- exploited Table 42.

Table 43: Pressure impacts on Groundwater bodies of Voukolies and Maleme sub-basins

Code	Name	Anthropogenic Pressures / Impacts	Natural Pressures/ impacts
GR1300022	Porous aquifer of Campos Chanion	No	-

Code	Name	Anthropogenic Pressures / Impacts	Natural Pressures/ impacts
GR1300330	Gypsum karst aquifer of Crete	No	Excess sulfate values due to layers of gypsum
GR1300190	Fractured Rock aquifer of Chania	Local over-exploitation	-

Within the boundaries of the Havgas - Milatos sub-basin (Fig. 40) in the area of Mirabello, parts of 5 groundwater bodies are found, four of which are intended for the abstraction of water for human consumption. Groundwater bodies of the area are summarized on Table 44 and depicted on Fig. 52.

Table 44: Groundwater bodies in Havgas - Milatos sub-basin

Code	Name	Aquifer Type	Area (sq.km)
GR1300240	Fractured of Dikti	fractured	269.37
GR1300116	Coastal karst of Sisi-Milatos-Elounda	karstic	90.18
GR1300115	Karst of Fourni - Elounda	karstic	80.98
GR1300113	Karst of NE Mount Dikti	karstic	86.75
GR1300112	Karst of Malia - Selena	karstic	92.51

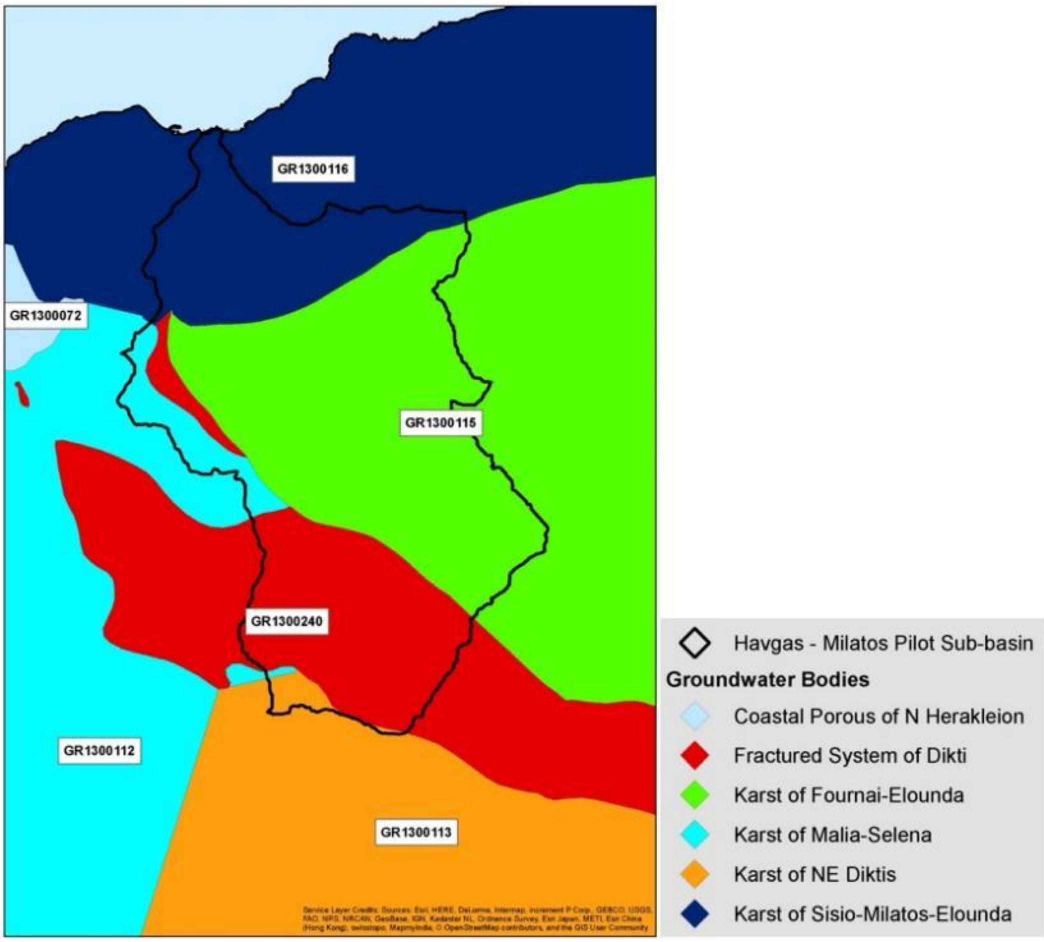


Fig. 52: Geodatabase Map Extract depicting the groundwater bodies in Havgas - Milatos sub-basin

Groundwater bodies in Havgas – Milatos catchment area are subjected to more pressures stemming from human activities that lead to local over – exploitation of the area's aquifers. Moreover, the coastal area experiences naturally driven salinization of the groundwater (Table 45).

Table 45: Pressure impacts on Groundwater bodies of Agios Nikolaos

Code	Name	Anthropogenic Pressures / Impacts	Natural Pressures/ impacts
GR1300240	Fractured rock aquifer of Mount Dikti	Local over- exploitation	-
GR1300116	Coastal karst of Sisi-Milatos-Elounda	No	Excess chloride values attributed to natural salinization (vicinity of the karst aquifer to the sea)
GR1300115	Karst of Fourni - Elounda	Marginal local over-exploitation	-
GR1300113	Karst of NE Mount Dikti	No	-
GR1300112	Karst of Malia - Selena	Local over-exploitation at the coastal zone	-

Overall, the quantitative and chemical status of the groundwater bodies located in pilot sub-basins according to the approved River Management Plan of Crete (GR13) is presented in the following tables.

Table 46: Quantitative and Qualitative Status of ground water bodies in Voukolies and Maleme sub-basins

Code	Name	Quantitative Status	Qualitative Status	Comments	Increasing trend of pollutant
GR1300022	Porous aquifer of Kampos Chanion	Good	Good	-	No
GR1300330	Gypsum karst aquifer of Crete	Good	Good	Increased background values due to layers of gypsum	No
GR1300190	Fractured Rock aquifer of Chania	Good	Good	Local over - exploitation of low water capacity aquifers	No

Table 47: Quantitative and Qualitative Status of groundwater bodies in Havgas - Milatos sub-basin

Code	Name	Quantitative Status	Qualitative Status	Comments	Increasing trend of pollutant
GR1300240	Fractured rock aquifer of Mount Dikti	Good	Good	Local over-exploitation of low water capacity aquifers	No
GR1300116	Coastal karst of Sisi-Milatos-Elounda	Good	Good	Naturally driven salinization effects	No

Code	Name	Quantitative Status	Qualitative Status	Comments	Increasing trend of pollutant
GR1300115	Karst of Fourni - Elounda	Good	Good	Marginal local over - exploitation	No
GR1300113	Karst of NE Mount Dikti	Good	Good	-	No
GR1300112	Karst of Malia - Selena	Good	Good	Local over-exploitation of the coastal zone during summer	No

According to the River management plan of Water District (GR13), the status of the ground water bodies located in the project's pilot areas and could be affected by human activities, including agriculture, are characterized as good. Although local over exploitation is the main pressure, during summer, the trend is not increasing.

10.2 Pilot sub-basin of Agri River, Italy

According to the River Basin Management Plan (RBMP) of South Apennine the surface water and the groundwater bodies that could be identified in the pilot area are presented in the following paragraphs (Source: "Relazione sullo Stato dell'Ambiente della Regione Basilicata" – 2013)

10.2.1 Surface Water Bodies

Rivers

In the Agri Sub-basin flows only the Agri river and its tributaries. The Agri river springs not far from the source of the Basento river, it flows in Western Basilicata, the Apennines to the Ionian coast, crossing the most fertile valley and with greater anthropic settlement; It is 136 km long and has a catchment area of 1770 sq.km (of which 15 sq.km are located in Campania region).

The main tributary rivers of the Agri river is:

- Fosso Valle ditch which springs from the village Montalbano Jonico;

All the tributary rivers, join directly the Agri river before outflow into the Jonian sea.

The Alli, Sauro, Sciaura, Racanello, Cavolo and Maglia streams are important tributary rivers for Agri river, however are out of the Agri sub-basin.

Within the Agri Sub-basin is located the Gannano weir that bars the course of the Agri River, near the Caprarico locality, in the village Tursi. Also, an important water reservoir built on the Agri river is the Pietra del Pertusillo dam, but is out of the Agri sub-basin.

Within the Agri River catchment area (Agri sub-basin boundaries) the surface water bodies/rivers/ditch presented in Fig. 46 are identified. On Table 48 their code, type, name, rank and length, as well as their classification whether they are heavily modified water body or not are presented:

Table 48: River Water Bodies in Agri river catchment area

EU_CD_RW	Short Name	Type	HMWB*	Length (m)
ITF_017_RW-16SS03T-AGRI 1	AGRI 1	16SS03T	HMWB	46.060

ITF_017_RW-18SS03T-AGRI 2	AGRI 2	18SS03T	HMWB	13.290
ITF_017_RW-16EF07T-F.SO VALLE[2]	F.SO VALLE	16EF07T	-	30.290
*Heavily Modified Water Body				

Table 49: Typology of Agri basin's surface water bodies

Ecohydro Region	Perennial rivers (rivers presenting always water in the river bed, every year)	Source		Size of the basin / Distance from the source		Influence of the upstream basin	
16-18		SS	Surface runoff	01	Very small (<5km)	T	Nothing or negligible
		GL	Great Lakes	02	Small (5- 25 km)	D	Weak
		SR	Sources	03	Medium (25-75 km)	F	Strong
		AS	Groundwater	04	Big (75 – 150 km)	N	Not applicable
		GH	Glaciers	05	Very big (> 150 km)		
				06	Dist. Source <10 km		
	Temporary rivers (rivers that cease to flow every year or at least twice every five years)	Persistence		River morphology			
		IN	Discontinuous/ intermittent	07	Meandering river, sinuous or confined		
		EF	Ephemeral	08	Semi confined river, transitional, braided channel, strongly anastomosed		
		EP	Episodic				

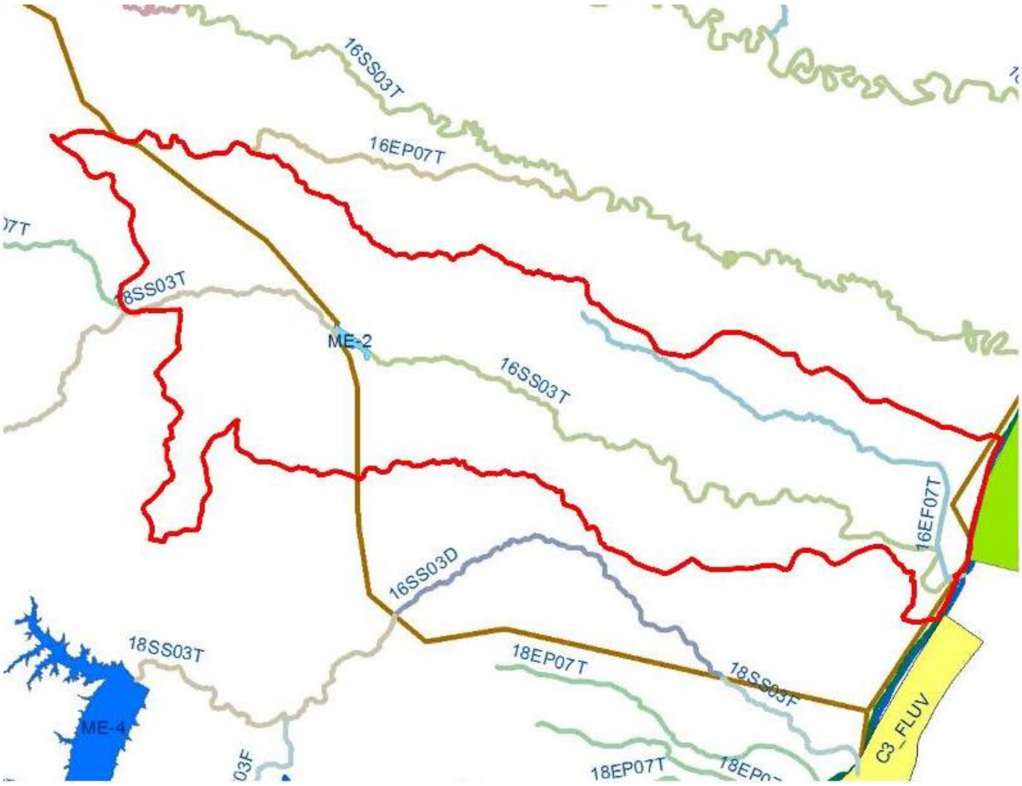


Fig. 53: River Water Bodies and lakes in Agri catchment area

[2] Fosso del Lupo ditch is not mentioned in the River Basin Management Plan of South Apennine and as a result there isn't any available information in reference to if it is a heavily modified water body or not.

Also, as it is shown in Fig. 46 and Table 50, within the Agri River catchment area there are two lakes "Monte Cotugno" and "Gannano". On Table 50 their code, name, type, as well as their classification whether they are heavily modified water body or not are presented:

Table 50: Lakes in Agri river catchment area

EU_CD_LW	Name	Type	HMWB*
ITF_017_LW-ME-4-Monte Cotugno	Monte Cotugno	Dam	HMWB
ITF_017_LW-ME-2-Gannano	Gannano	Dam	HMWB
*Heavily Modified Water Body			

The available data for the river qualitative status were provided dall'ARPAB ("Agenzia Regionale per la Protezione dell' Ambiente della Basilicata") and are related to surfaces water of the first order/rank (those that discharge directly into the sea) with a catchment basin area greater than 200 km2; those bodies of water corresponding to the main rivers: Bradano, Basento, Cavone, Agri and Sinni.

The classification of the environmental quality status of surface water courses of first order/rank is defined on the basis of chemical status and the ecological one of the water bodies and are presented in the following Table 51. According to the approved River Basin Management Plan of South Apennine 2015-2021, the ecological status of AGRI1 (ITF_017_RW-16SS03T-AGRI 1) and AGRI2 (ITF_017_RW-18SS03T-AGRI 2) are considered as "sufficient" (Fig. 54 and Fig. 55), the chemical status of AGRI1 (ITF_017_RW-16SS03T-AGRI 1) and AGRI2 (ITF_017_RW-18SS03T-AGRI 2) are totally unknow, while in reference to the Fosso Valle ditch (ITF_017_RW-16EF07T-F.SO VALLE) both ecological and chemical status are totally unknown.

Table 51: Ecological and Chemical Status of Agri surface water systems

EU_CD_RW	Short Name	Type	Ecological Status	Chemical Status
ITF_017_RW-16SS03T-AGRI 1	AGRI 1	16SS03T	Sufficient	Unknown
ITF_017_RW-18SS03T-AGRI 2	AGRI 2	18SS03T	Sufficient	Unknown
ITF_017_RW-16EF07T-F.SO VALLE	F.SO VALLE	16EF07T	Unknown	Unknown

As far as environmental quality status of the two lakes is concerned (Table 52), both the ecological status and the chemical status of Monte Cotugno (ITF_017_LW-ME-4-Monte Cotugno) and Gannano (ITF_017_LW-ME-2-Gannano) are totally Unknown (Fig. 54).

Table 52: Ecological and Chemical Status of lakes in Agri sub-basin

EU_CD_LW	Name	Type	Ecological Status	Chemical Status
ITF_017_LW-ME-4-Monte Cotugno	Monte Cotugno	Dam (ME-4)	Unknown	Unknown
ITF_017_LW-ME-2-Gannano	Gannano	Dam (ME-2)	Unknown	Unknown

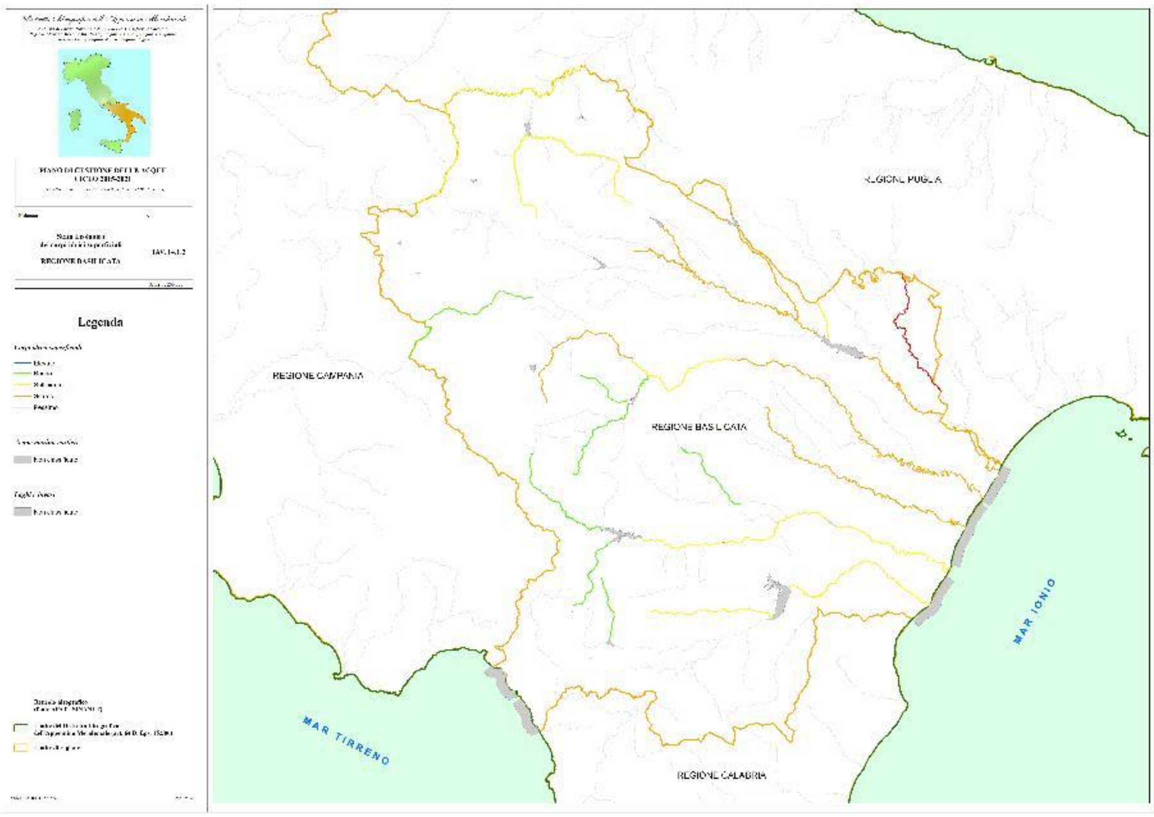


Fig. 54: Ecological status of Basilicata surface water bodies

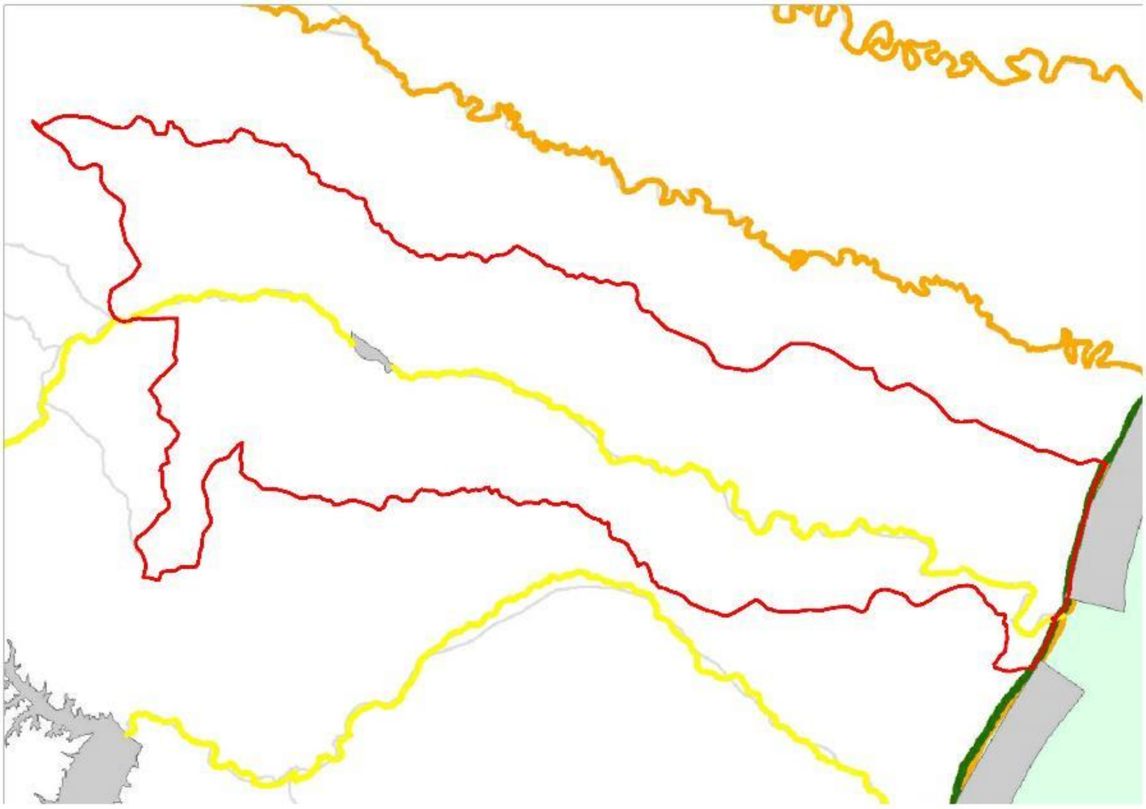


Fig. 55: Ecological status (sufficient) of surface water bodies within Agri sub-basin

10.2.2 Coastal waters

The coastal water systems is defined as the area within the bathymetry of 50 meters and, in the case of shallow sea, those within the distance of 3000 meters from the line of coast.

The classification of coastal water is made on the basis of natural geomorphological and hydrodynamic characteristics that identify the type of coastline, using macrodescriptors according to the B system of Annex II of Directive 2000/60/EC.

According to the point A.3.1.1 of D.M. 131/08 the Italian coast can be divided into six categories (A, B, C, D, E, F), also described in the publication produced by ISPRA "Criteri e metodi per la tipizzazione costiera" (Brondi et al., 2003). Within the Agri sub-basin area there are two categories:

- Coastal plain (C) when the coast, relatively flat little pendant, has a maximum width from a few hundred meters to several kilometers.
- Plain of dunes (F) when there are well developed dune systems.

The coastal water systems identified in the Agri River catchment area are presented on Table 53 and depicted on Fig. 56.

Table 53: Coastal water systems in the project's pilot area (River basin management plan of South Apennine 2015 - 2021)

EU CD CW	Sea name	Water Body	Short Name	HMWB*
ITF_017_CW-C3_FLUV-Policoro	Ionian sea	Piana di Policoro	C3_FLUV	
ITF_017_CW-F3_FLUV-Cavone	Ionian sea	Piana del Cavone	F3_FLUV	
*Heavily Modified Water Body				

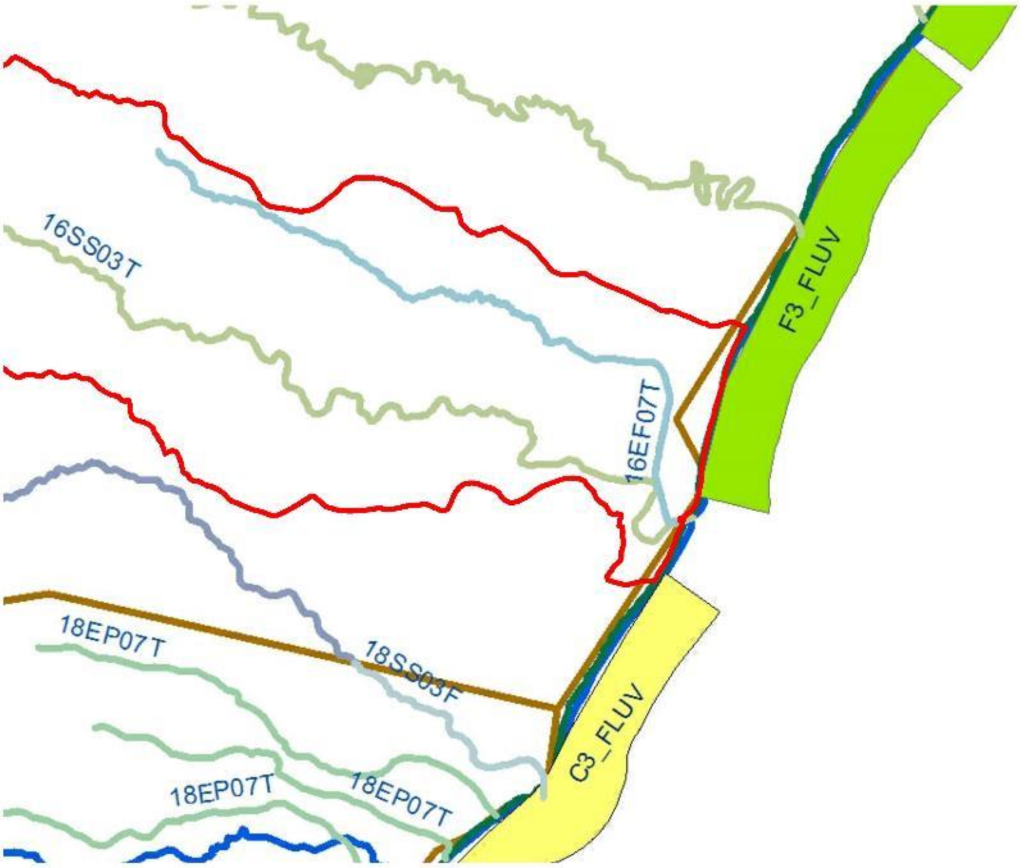


Fig. 56: Coastal water systems in the project's pilot area (source: River basin management plan of South Apennine 2015 - 2021)

Bathing waters

Within the boundaries of the Agri sub-basin area selected are located 9 bathing waters. Agri sub-basin bathing waters are located on the Ionian Sea and the length coast is nearly 9,5 Km. All the bathing waters are of excellent quality, for the season 2015, based according to the new Bathing Water Directive (2006/7/EC).

The bathing water identified in the area of Agri basin are depicted in Fig. 57. Further information is provided on Table 54.

Table 54: **Bathing waters in the project's pilot area** (www.eea.europa.eu/themes/water/interactive/bathing/state-of-bathing-waters)

Code	Name	Quality status
IT017077031002	CANALE BUFALORIA - 100 MT. MARGINE NORD	2015: Excellent quality*
IT017077031003	CANALE BUFALORIA - 100 MT. MARGINE SUD	2015: Excellent quality*
IT017077021006	FOCE AGRI - 1500 MT. MARGINE SUD	2015: Excellent quality*
IT017077031004	FOCE AGRI - 250 MT. MARGINE NORD	2015: Excellent quality*
IT017077021003	FOCE AGRI - 250 MT. MARGINE SUD	2015: Excellent quality*
IT017077031006	IDROVORA SCANZANO ION.-100 MT.MARG. NORD	2015: Excellent quality*
IT017077031007	IDROVORA SCANZANO ION.-100 MT.MARG. SUD	2015: Excellent quality*

IT017077021005	IDROVORA TORRE MOZZA-150 MT. MARGINE SUD	2015: Excellent quality*
IT017077021004	IDROVORA TORRE MOZZA-150 MT.MARGINE NORD	2015: Excellent quality*
**Bathing water sites with sampling frequency satisfied: These bathing water sites have been monitored according to revised Bathing Water Directive provisions (monitoring frequency satisfied and pre-season sample taken), are not new, have no changes and were not closed in 2015. Such bathing water sites have been quality-classified (excellent, good, sufficient, poor).*		

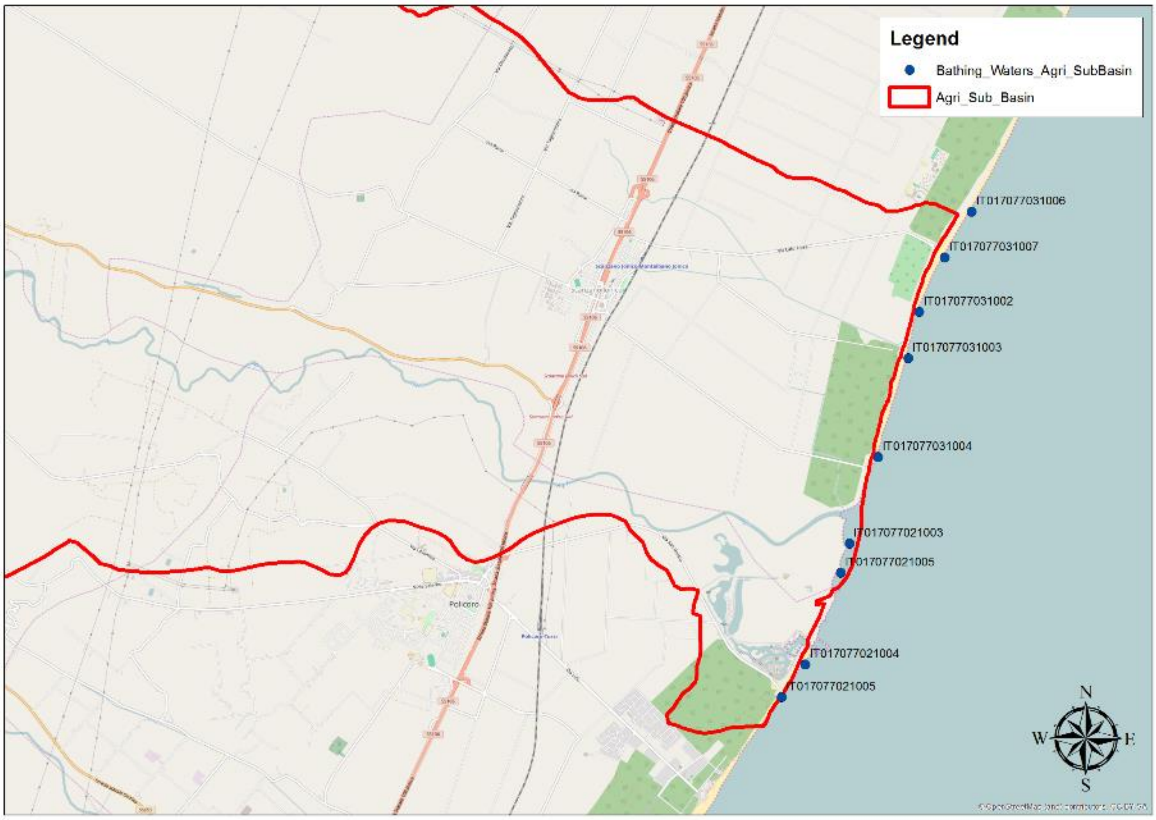


Fig. 57**: Bathing waters in the project's pilot area**

10.2.3 Groundwater bodies

The aquifers identified within the district (South Appenine), has a water floating potential as a function of the physical characteristics such as the extension, the lithology, permeability, supply, etc.. They can be grouped into "aquifer systems", mainly on the basis of the lithology and the type of aquifer.

The groundwater bodies identified in the area of Agri basin are depicted in Fig. 58. Further information is provided on Table 55. Within the Agri sub-basin there is just the Type D.

Table 55: Description of groundwater bodies of Agri pilot sub-basin (source: River basin management plan of South Apennine 2015-2021)

Code	Short Name	Name	Aquifer type	Area (sq.km)
IT17DPAGR	P-AGR	Acquifero alluvionale del fiume Agri	Type D*: clastic systems of the floodplain and fluvial-lacustrine basins	79,21

IT17DPMET	P-MET	Piana del Metaponto	Type D: clastic systems of the floodplain and fluvial-lacustrine basins	179,31
**Type D - Clastic systems of alluvial and fluvial-lacustrine basins: It consists on lithological complex of gravels, sands and alluvial clays and fluvial-lacustrine; places are also detrital complex. The permeability is mainly for porosity and the degree is extremely variable from low to high in relation to the granulometric characteristics, the state of densification and/or cementation of the deposit; water outflow takes place at the levels with higher permeability. These systems include aquifers flat with "potential medium-low water."*				

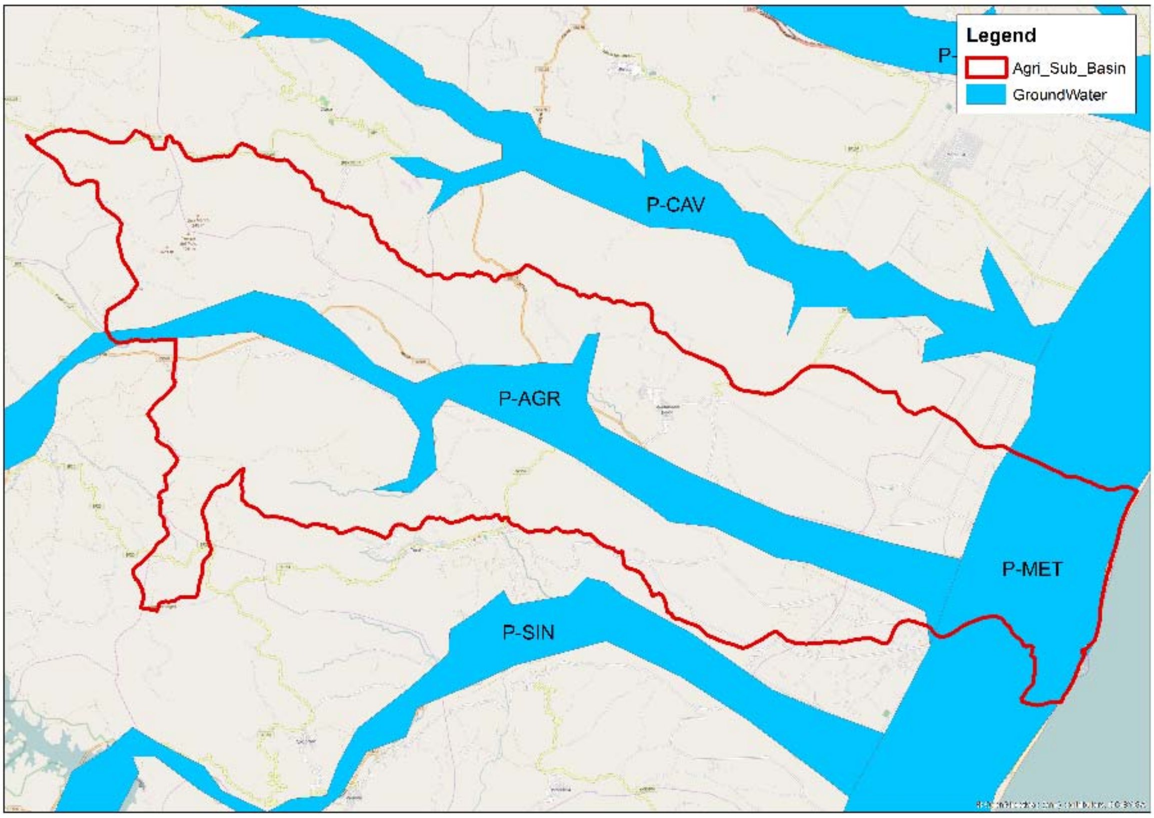


Fig. 58**: Groundwater bodies identified in the project's pilot area**

According to the river basin management plans of South Apennine, the groundwater bodies within the catchment area of Agri sub-basin, in general do not experience anthropogenic pressures (Table 56). In fact the surveys conducted in the Piana del Metaponto have shown that there is a widespread concentration of nitrates in excess of 50 mg/l. the alluvial basins of Cavone, Basento, Agri and Sinni rivers are interested only along the areas of the Piana del Metaponto, by high values of nitrate concentration.

Table 56: Pressure impacts on Groundwater bodies of Agri sub-basin (River basin management plan of South Apennine 2010, River basin management plan of South Apennine 2015-2021)

Code	Short Name	Name	Anthropogenic Pressures / Impacts	Natural Pressures/ impacts
IT17DPAGR	P-AGR	Acquifero alluvionale del fiume Agri	No	-
IT17DPMET	P-MET	Piana del Metaponto	No	-

Within the boundaries of Agri sub-basin none of the groundwater bodies are used for the abstraction of water for human consumption.

Overall, the quantitative and chemical status of the groundwater bodies located in the Agri sub-basin according to the river basin management plans of South Apennine (data was gathered in the three-year period 2010-2012) is presented in the following table.

Table 57: Quantitative and Qualitative Status of Agri sub-basin (River basin management plan of South Apennine 2015-2021)

Code	Short Name	Name	Quantitative Status	Qualitative Status	Pollutants that exceed the threshold	Increasing trend of pollutant
IT17DPAGR	P-AGR	Acquifero alluvionale del fiume Agri	Not Good	Not Good	Nitrates	No
IT17DPMET	P-MET	Piana del Metaponto	Not Good	Not Good	Chlorides and nitrates	No

According to the river basin management plans of South Apennine 2015-2021 the status of the ground water bodies located in the project's pilot area are characterized as not good and they could be affected by human activities, including agriculture.

11. HCV AREAS BASED ON 2ND AWMS FORM

According to the EWS Standard and particular the Principle 2: Restore and preserve water-cycle related High Conservation Value (HCV) Areas. The HCV Areas in a 25 km radius around the production sites have been identified and described. In this frame, the 2nd Agricultural Water Management System (AWMS) form has been developed and completed for the three project pilot areas and it is attached in Appendix II. More in particular, in order to complete the 2nd AWMS form, a zone of equidistance (25 km) around each pilot area had to be created using ArcGIS ESRI, so as to identify and select all the High Conservation Value Areas (HCVAs). HCV areas are areas that are, or whose management has a critical influence on:

a) Globally, regionally or nationally significant concentrations of rare, threatened or endangered species.

b) Rare, threatened or endangered ecosystems.

c) The provision of basic services of nature in critical situations (e.g. watershed protection, erosion control).

d) Meeting the basic needs of local communities (e.g. subsistence, health).

e) Critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities) *(*EWS Standard - Glossary, 2013*)*.

In our case the HCV areas that were identified concerned the followings:

1. Natura 2000 Sites
2. Nationally Designated Areas
3. Wetlands of International Importance (Ramsar Sites)
4. Small island and other wetlands
5. Recreation waters (including bathing waters)
6. Water Bodies used for potable water
7. Water Bodies to support fish life and shellfish
8. Riparian zones
9. Nitrate Vulnerable Zones
10. Archaeological sites
11. Other important areas (for cultural, religious, ecological, socio- economic reasons)

More details on the designation, protection status and the protection goal of each High Conservation Value Area are presented in the completed form in Appendix I.

11.1 Municipality of Platanias

In the Municipality of Platanias the target areas were Voukolies and Maleme pilot sub-basins. The 25 km buffer created gave the following results pertaining to the HCVAs.

11.1.1 Natura 2000 Sites

The Natura 2000 Sites are divided in three categories, which are the Special Protection Areas, the Sites of Community Importance and the Special Areas of Conservation. After having studied the regions, the following results were extracted.

Special Protection Areas (SPA) (Fig. 59)

- Chersonisos Rodopou - GR4340021
- Chersonisos Gramvoussas kai Nisides Imeri kai Agria Gramvoussa, Pontikonisi - GR4340017
- Nisida Agioi Theodoroi - GR4340018
- Limni Agias (Chania) - GR4340020
- Meterizia Agios Dikaios – Tsounara – Vitsilia Lefkon Oreon - GR4340016
- Ethnikos Drymos Samarias – Farangi Trypitis – Psilafi – Koustogerako - GR4340014

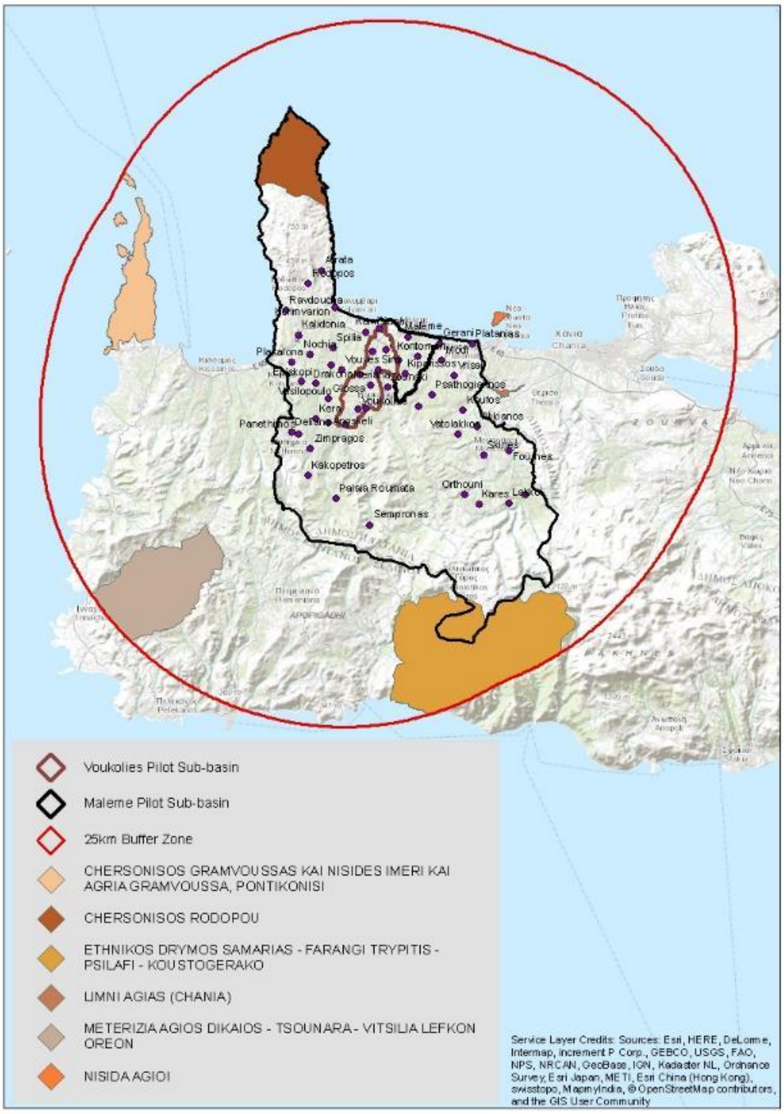


Fig. 59: Geodatabase Map extract of the area of interest, depicting the Special Protection Areas

Sites of Community Importance (SIC) (Fig. 60)

- Imeri kai Agria Gramvoussa – Tigani kai Falasarna – Pontikonisi, Ormos Livadi – Viglia - GR4340001
- Chersonisos Rodopou – Paralia Maleme - GR4340003
- Elos – Topolia – Sasalos – Agios Dikaios - GR4340004
- Ormos Sougias – Vardia – Farangi Lissou mechri Anydrous kai Paraktia Zoni - GR4340005
- Limni Agias – Platanias – Rema kai Ekvoli Keriti – Koilada Fasa - GR4340006
- Farangi Therissou - GR4340007
- Lefka Ori kai Paraktia Zoni - GR4340008

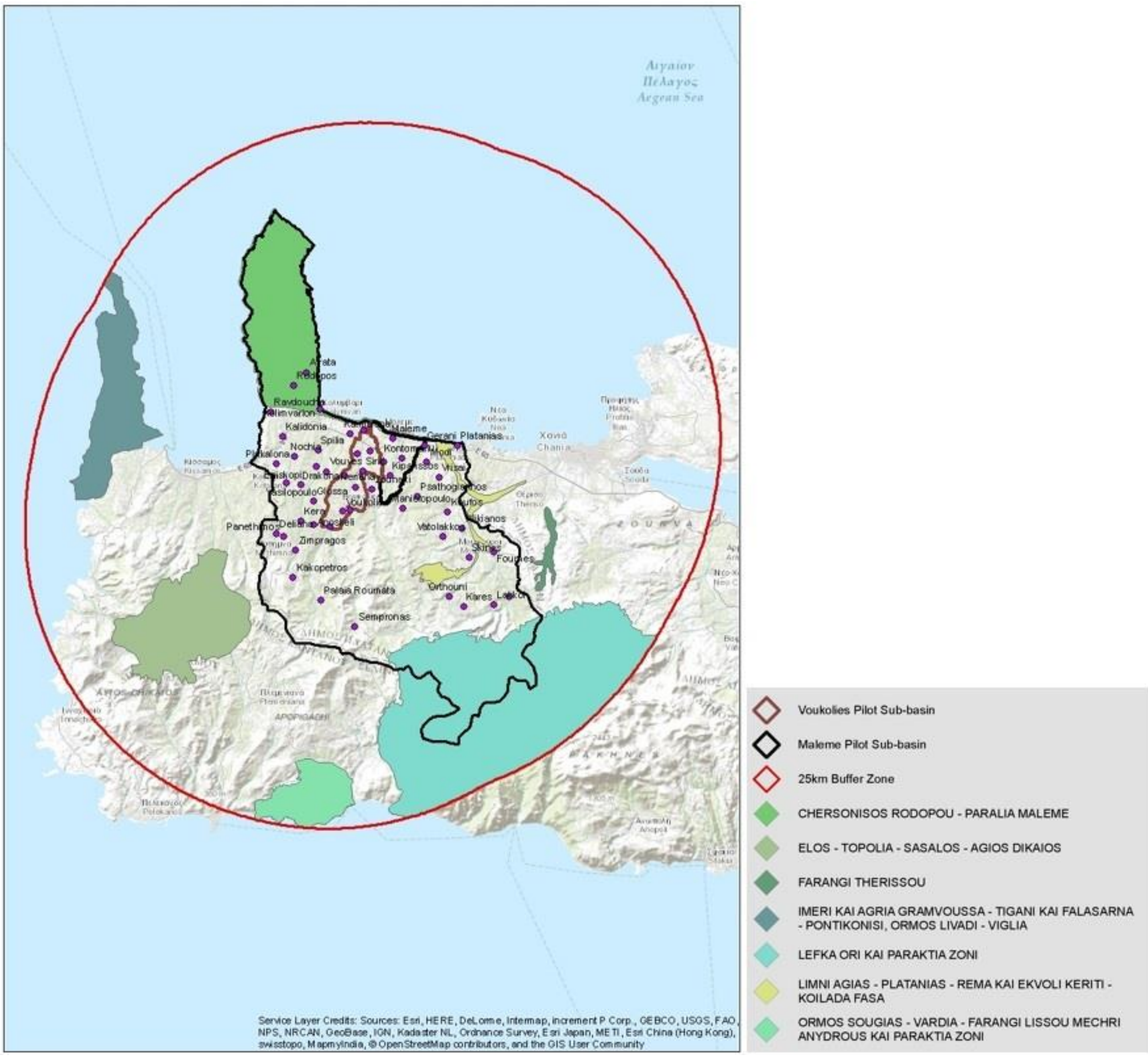


Fig. 60: Geodatabase Map extract of the area of interest, depicting both the Sites of Community Importance and the Special Areas of Conservation

Special Areas of Conservation (SAC) (Fig. 60)

- Imeri kai Agria Gramvoussa – Tigani kai Falasarna – Pontikonisi, Ormos Livadi – Viglia - GR4340001

- Chersonisos Rodopou – Paralia Maleme - GR4340003
- Elos – Topolia – Sasalos – Agios Dikaios - GR4340004
- Ormos Sougias – Vardia – Farangi Lissou mechri Anydrous kai Paraktia Zoni - GR4340005
- Limni Agias – Platanias – Rema kai Ekvoli Keriti – Koilada Fasa - GR4340006
- Farangi Therissou - GR4340007
- Lefka Ori kai Paraktia Zoni - GR4340008

11.1.2 Nationally Designated Areas

Strict Nature Reserves

There are no Strict Nature Reserves located in the area of interest.

National Parks

There is one National Park in the buffer zone that is Samaria - GR0516378 (Fig. 61)

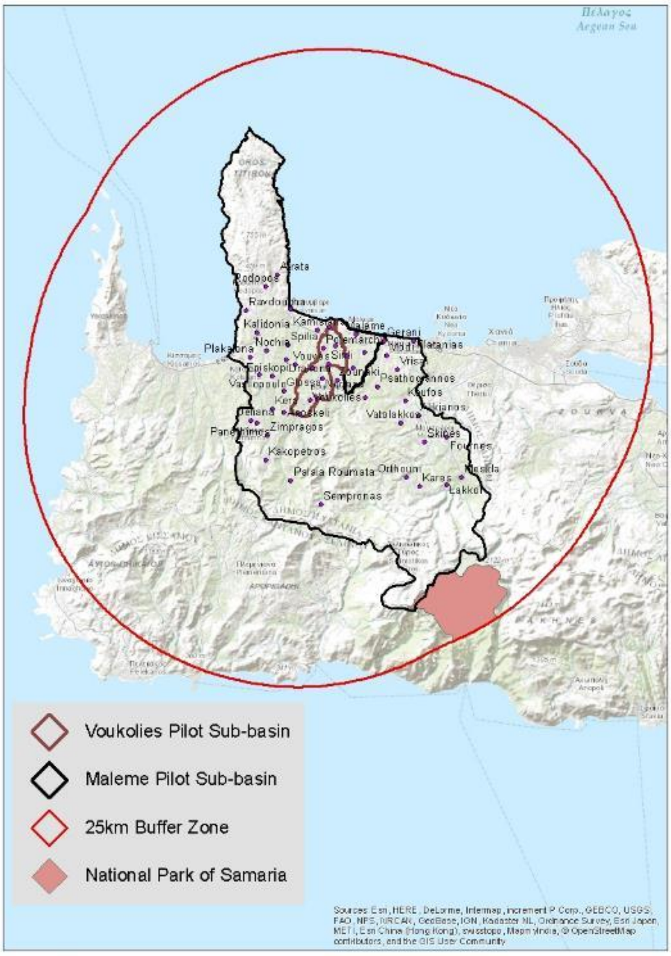


Fig. 61: Geodatabase Map extract of the area of interest, depicting the Samaria National Park

Natural Monuments

The target area has no Natural Monuments.

Habitat- Species Management Areas

In the area of interest only *Wildlife Refugees* were found (Fig. 62)

- Agiou Dikaiou – Vitsinias kai Elafonisou Dimon Inachoriou kai Pelekanon - GR95341331
- Voreio Tmima Chersonisou Rodopou Dimou Kolymvariou - GR95341332
- Stavro Chordaki Dimou Akrotiriou - GR95341333
- Stylou – Katochoriou Dimou Armenon kai Kerameion - GR95341340
- Lefka Ori Anatolikou Selinou kai Sfakion - GR95341497

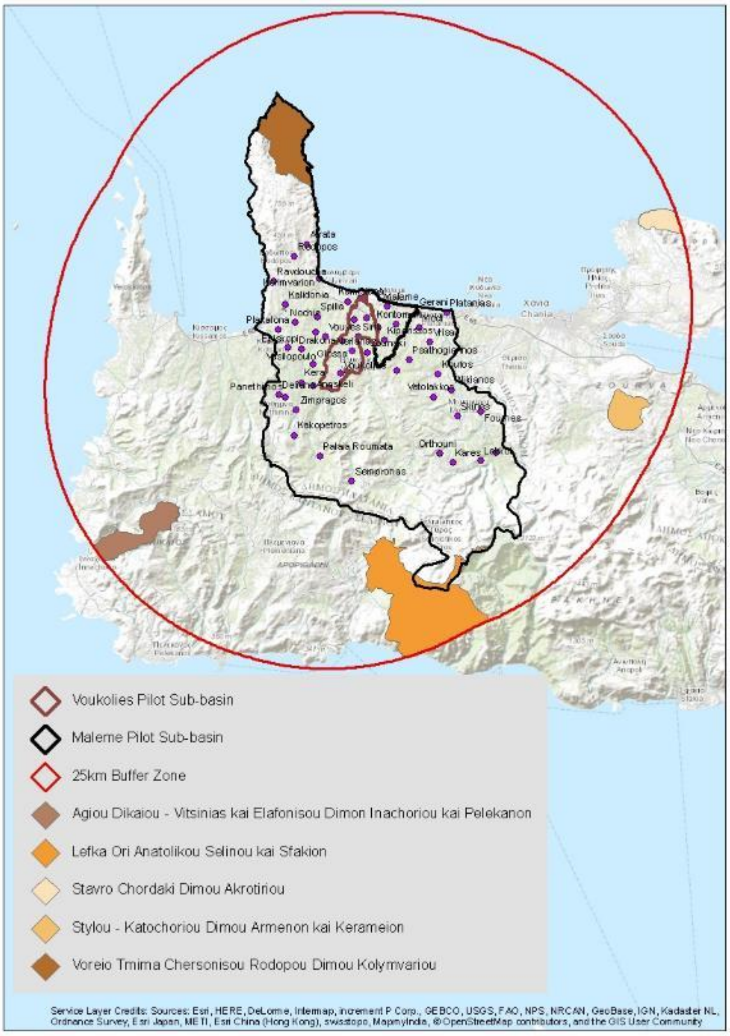


Fig. 62: Geodatabase Map extract of the area of interest, depicting the Wildlife Refugees

Protected Landscape –Seascape

No protected Landscape – Seascape areas were found.

Managed Resource Protected Areas

Two *Protected Forests* were located in the area of interest (Fig. 63).

- Prostateftiko dasos oreinou ogkou Lefkon Oreon Nomou Chanion - GR24341920
- Prostateftiko dasos oreinou ogkou Apopigadi Selinou Nomou Chanion - GR24341941

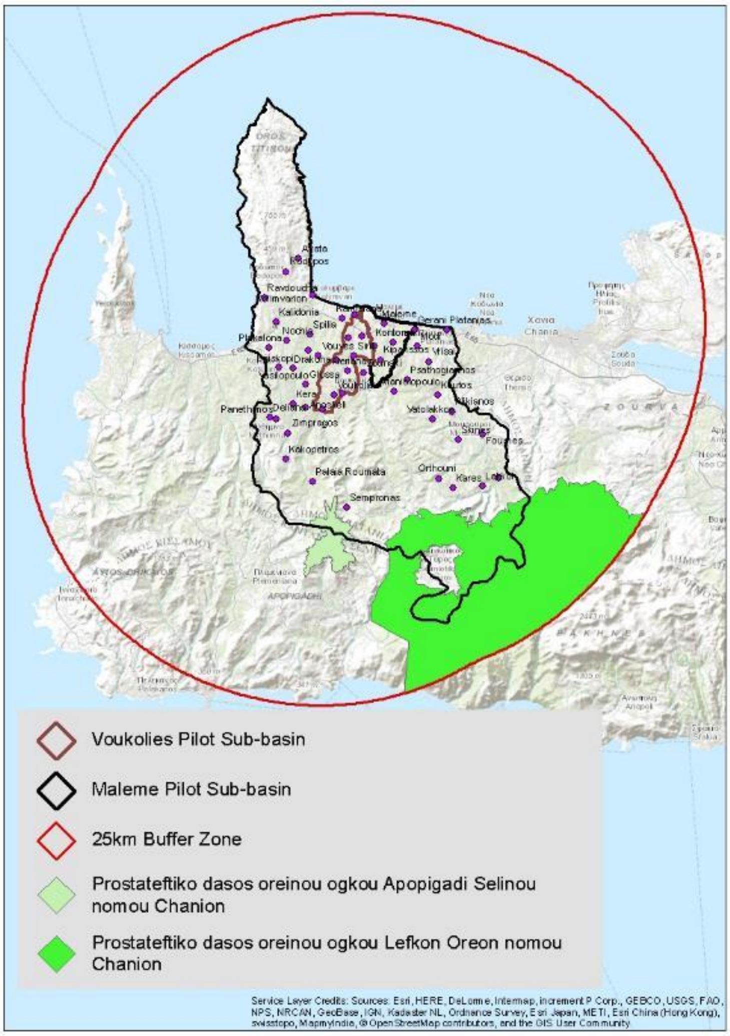


Fig. 63: Geodatabase Map extract of the area of interest, depicting the Protected Forests

Others

A Game breeding station is located in this area (Thodorou Chanion - GR2192572). (Fig. 64)

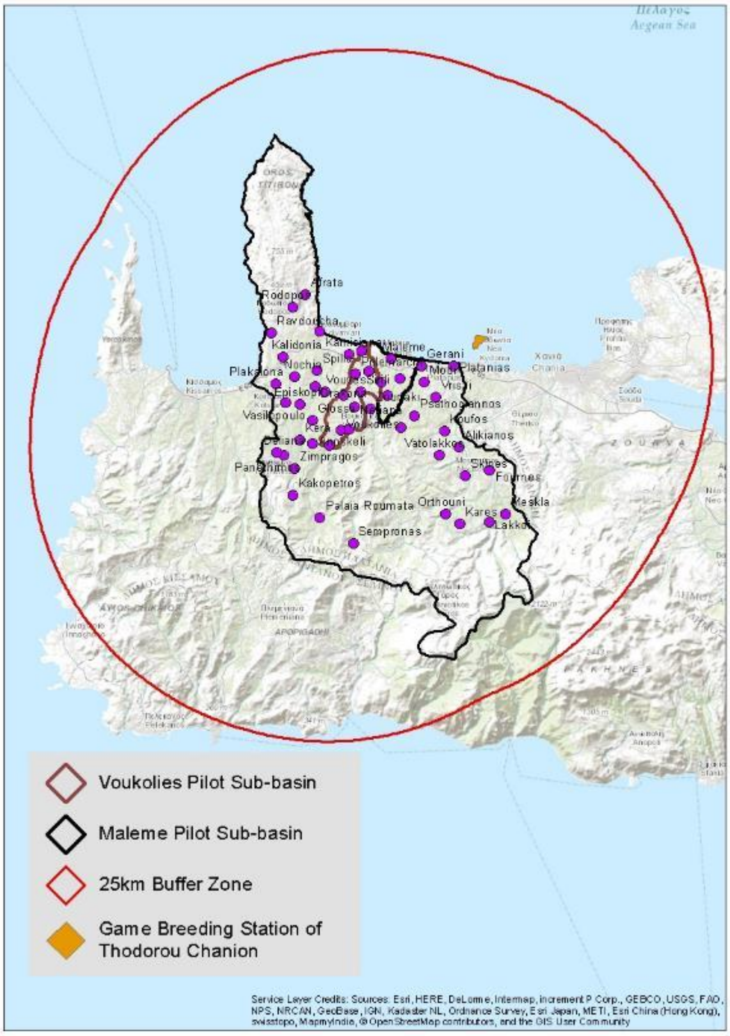


Fig. 64: Geodatabase Map extract of the area of interest, depicting the Game Breeding Station

11.1.3 Wetlands of International Importance (Ramsar Sites)

There were no Ramsar Sites in the wider area of the pilot areas.

11.1.4 Small island and other wetlands

In this buffer zone, 17 small wetlands were found, as shown in Fig. 65.

- Stavros - Y434KRI182
- Tersana Lake - Y434KRI184
- Kalathorema Estuary - Y434KRI187
- Kladissos Estuary - Y434KRI188
- Omalos Chanion Temporary pond - Y434KRI196
- Platanias Estuary (Iardanos River) - Y434KRI200
- Estuary of Gerani Beach - Y434KRI201
- Sfakoryako Estuary - Y434KRI202
- Tavronitis Estuary and Marsh - Y434KRI203
- Estuary of Rapaniana Beach - Y434KRI204

- Spilianos Estuary - Y434KRI205
- Limni - Y434KRI218
- Arapis Estuary - Y434KRI219
- Vathyrema Estuary - Y434KRI220
- Milias Estuary - Y434KRI221
- Kamarianos Estuary - Y434KRI222
- Falasarna - Y434KRI225

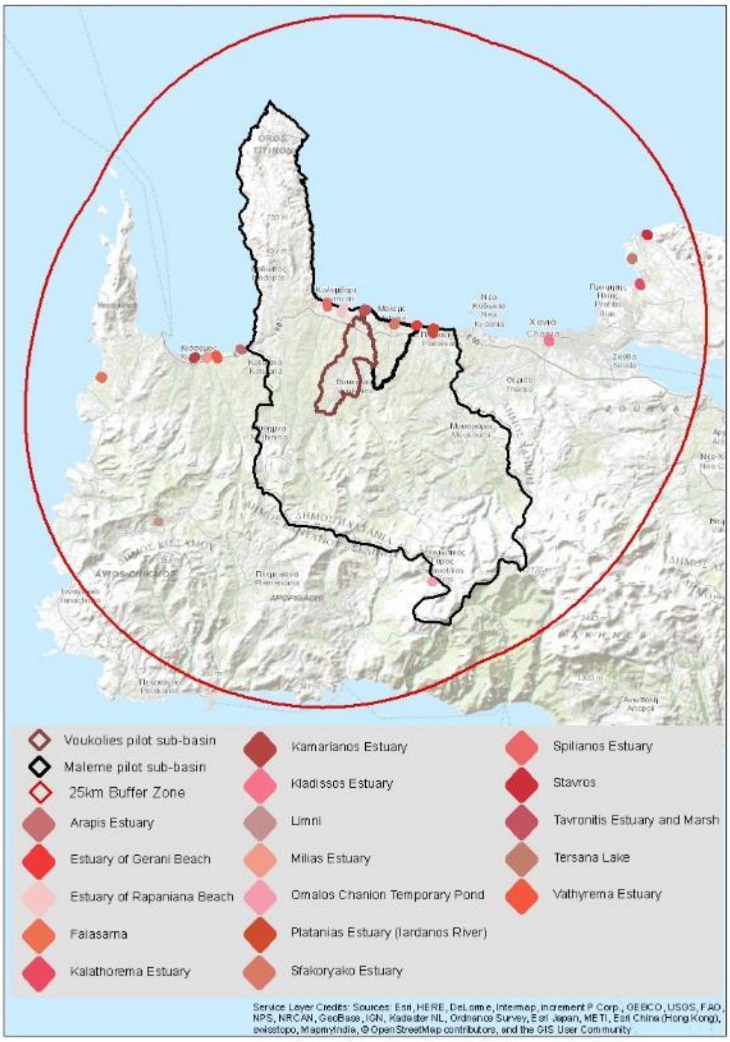


Fig. 65: Geodatabase Map extract of the area of interest, depicting the Small Wetlands

11.1.5 Recreation waters (including bathing waters)

According to the Special Secretariat of Water and specifically the Greek Bathing Waters Registry, the Recreation waters are (Fig. 66):

- Agia Marina – Stalos - GRBW139325110
- Agioi Apostoloi – EOT Anatolika - GRBW139325118
- Agioi Apostoloi – EOT Dytika - GRBW139325109
- Agios Onouphrios - GRBW139325111
- Vlites - GRBW139325120
- Gerani – Platanias - GRBW139323083

- Kalathas - GRBW139325113
- Kalamaki - GRBW139325116
- Kastelli Kissamou Anatolika - GRBW139322066
- Kastelli Kissamou Dytika - GRBW139322067
- Kolymparia – Rapaniana - GRBW139323084
- Koum Kapi - GRBW139325117
- Limanaki Platania - GRBW139325119
- Maleme - GRBW139306073
- Nea Chora - GRBW139325112
- Sougia - GRBW139321061
- Stavros - GRBW139325114
- Falasarna - GRBW139322068
- Chrysi Akti - GRBW139325108

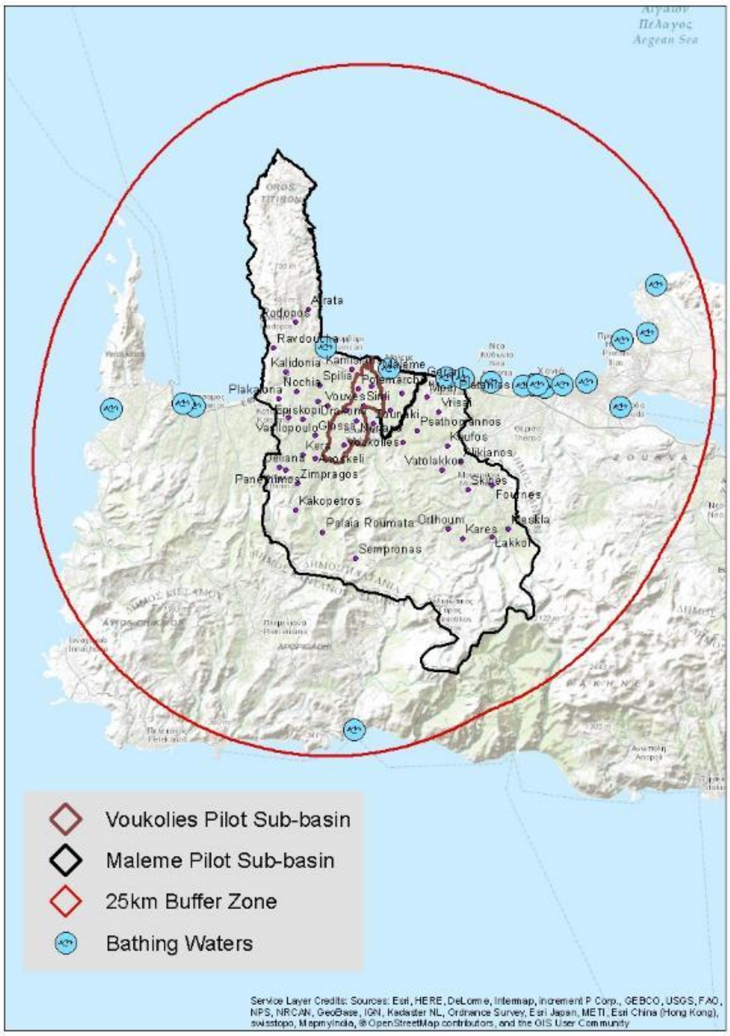


Fig. 66: Geodatabase Map extract of the area of interest, depicting the Bathing Waters

11.1.6 Water Bodies used for the abstraction of potable water

In relation to the River Basin Management Plan of G13 the Water Bodies used for potable Water are depicted in Fig. 67.

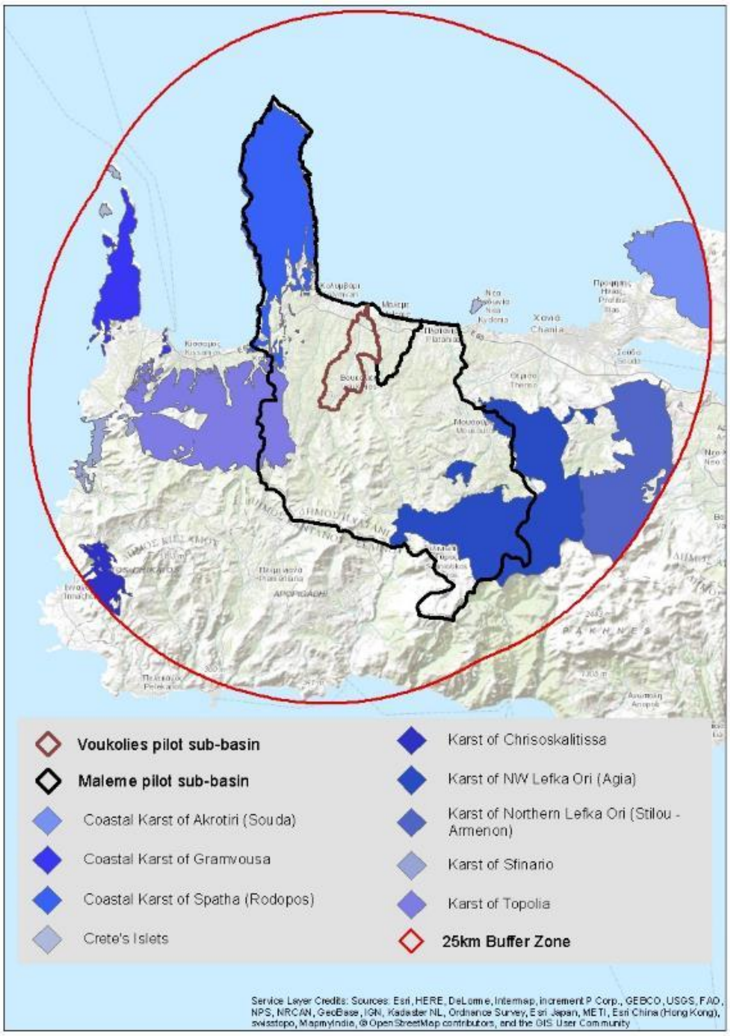


Fig. 67: Geodatabase Map extract of the area of interest, depicting the Water Bodies used for Potable Water

11.1.7 Water Bodies to support fish life and shellfish

There are no recorded water bodies to support Fish Life and Shellfish.

11.1.8 Riparian zones

No Riparian Zones are found.

11.1.9 Nitrate Vulnerable Zones

The European Commission (EC) nitrates directive (91/676/EEC) requires areas of land that drain into waters polluted by nitrates to be designated as Nitrate Vulnerable Zones (NVZs). Farmers with land in NVZs have to follow mandatory rules to tackle nitrate loss from agriculture. At the project's pilot areas in Crete there isn't land areas designated as NVZs.

11.1.10 Archaeological sites

In the greater area of the produced buffer zone, there are many archaeological sites, 333 in particular that are categorized in the following types of monuments:

- Rural Economy
- Burial Sites and Monuments
- Christian Holy Temple
- Water Systems
- Archaelogical Site
- Tower
- Manors
- Standpipes
- Craft/Industrial Sector
- Castle / Fortress
- Ecclesiastical Administration
- Bathing facilities
- Areas for ancillary use
- Historic Sites
- Building of General Interest
- Monastery
- Residential Complex
- Port Facilities
- Bridge
- Road System
- Mill
- Infrastructure / production facility
- Extraction installations
- Military Facilities
- Garden/Park
- Urban Buildings
- Trade
- Synagogues
- Part of Building
- Centres for Administration
- Underwater Sites
- Lighthouse
- Citadel
- Ancient Sanctuary
- Theatre / Conservatory
- Natural Sites
- Form of Defence
- Religious Sites
- Mosques
- Cave

There is an Archaeological Cadastre in Greece, although it is still in its raw form and it is estimated to be completed after 2017. Therefore, it was not possible to produce maps for the archaeological sites, because there are no available coordinates for the corresponding monuments.

Archaeological sites pertaining to water are Underwater Sites, Water Systems, Standpipes, Water Mills and Caves. In particular, these areas in this area of interest are as shown in the following Table 58.

Table 58: Archaeological Sites pertaining to water in the greater area of the buffer zone

Monument	Prefecture	Municipality	Mun. Units	Monument	Prefecture	Municipality	Mun. Units
"Ellinospilio" Cave	CHANIA	PLATANIAS	KOLYMVARI	*Water Mill*	CHANIA	KANTANOS - SELINO	PELEKANOS
Water Mill Of Spilia	CHANIA	PLATANIAS	KOLYMVARI	*Bay of Kriou Chalikia Chania. Authorized diving area*	CHANIA	KANTANOS - SELINO	PELEKANOS
Ellinotrypa Cave	CHANIA	PLATANIAS	MOUSOURES	*Plakaki Chania Islet. Authorized diving area*	CHANIA	KANTANOS - SELINO	PELEKANOS
Holy Church of St. George and the Water Tank	CHANIA	PLATANIAS	MOUSOURES	*Tigani Chania Area. Authorized diving area*	CHANIA	KANTANOS - SELINO	PELEKANOS
Water Mill in Meskla Kydonia Chania	CHANIA	PLATANIAS	MOUSOURES	*Ancient town and port*	CHANIA	KANTANOS - SELINO	PELEKANOS
Water Mill	CHANIA	PLATANIAS	PLATANIAS	*"Lera" Cave*	CHANIA	KANTANOS - SELINO	PELEKANOS
Keraspiliotissa Cave	CHANIA	PLATANIAS	PLATANIAS	*Nerospilios Cave*	CHANIA	KANTANOS - SELINO	PELEKANOS
Holy Church of St John and a aqueduct	CHANIA	KISSAMOS	INACHORIO	*Release of the marine region in the Bay of Kalathas Chania for underwater activities*	CHANIA	CHANIA	AKROTIRI
Release of the marine region in the Bay of Kissamos Chania for underwater activities	CHANIA	KISSAMOS	KISSAMOS	*"Koumarospilio" Cave*	CHANIA	CHANIA	AKROTIRI
Two Water Mills owned by Katsikandarakis and Vestakis	CHANIA	KISSAMOS	KISSAMOS	*Panagia Arkoudiotissa Cave*	CHANIA	CHANIA	AKROTIRI
Agia Sofia Cave	CHANIA	KISSAMOS	MYTHIMNA	*St. Georgios Cave*	CHANIA	CHANIA	AKROTIRI
Achyrospilios Cave	CHANIA	CHANIA	AKROTIRI	*West of Chania Port. Authorized diving area*	CHANIA	CHANIA	CHANIA

Monument	Prefecture	Municipality	Mun. Units	Monument	Prefecture	Municipality	Mun. Units
Cave and Holy Church of St Ioannis Erimitou	CHANIA	CHANIA	AKROTIRI	*Old Aqueduct (Water Tank)*	CHANIA	CHANIA	CHANIA
Kato Sarakina Cave or Elliniko in Therisos	CHANIA	CHANIA	THERISOS	*Turkish mosque with standpipe*	CHANIA	CHANIA	CHANIA
"Mameloukou trypa" Cave. Establishment of Protection Zone A..	CHANIA	CHANIA	THERISOS	*Ag. Roumeli (Tarra) Marine region*	CHANIA	SFAKIA	
Venetian Standpipes	CHANIA	CHANIA	THERISOS	*Release of the marine region in the Bay of Megalou Sfakou up to the Bay of Afrata Chania.*	CHANIA	SFAKIA	
Cave with Neolithic finds	CHANIA	CHANIA	KERAMION	*Bay of Sfakia Chania. Authorized diving area*	CHANIA	SFAKIA	
Agia Marina Chania. Authorized diving area	CHANIA	CHANIA	NEAS KYDONIAS	*Marine area of Loutrou Bay*	CHANIA	SFAKIA	
Theodoropoula Chania. Authorized diving area.	CHANIA	CHANIA	NEAS KYDONIAS	*Venetian Standpipe*	CHANIA	KISSAMOS	MYTHIMNA
Itzedin Turkish Fortress and Standpipe	CHANIA	CHANIA	SOUDAS	*Turkish Mansion with a Standpipe*	CHANIA	CHANIA	CHANIA
Community Standpipe – Water Tank	CHANIA	CHANIA	SOUDAS	*Turkish Standpipe in the West of **"Plaza"** Hotel*	CHANIA	CHANIA	CHANIA
"Korakia" Cave	CHANIA	CHANIA	SOUDAS				

11.1.11 Other important areas (for cultural, religious, ecological, socio- economic reasons)

In this category the Important Bird Areas (IBAs) were included (Fig. 68):

- Gramvousa peninsula and Gramvouses and Pontikonisi islets – GR175
- Rodopos peninsula – GR176
- Agioi Theodori islet – GR177
- Mount Koutroulis, Mount Ag. Dikaios and Modia plateau – GR178
- Lefka Ori – GR179

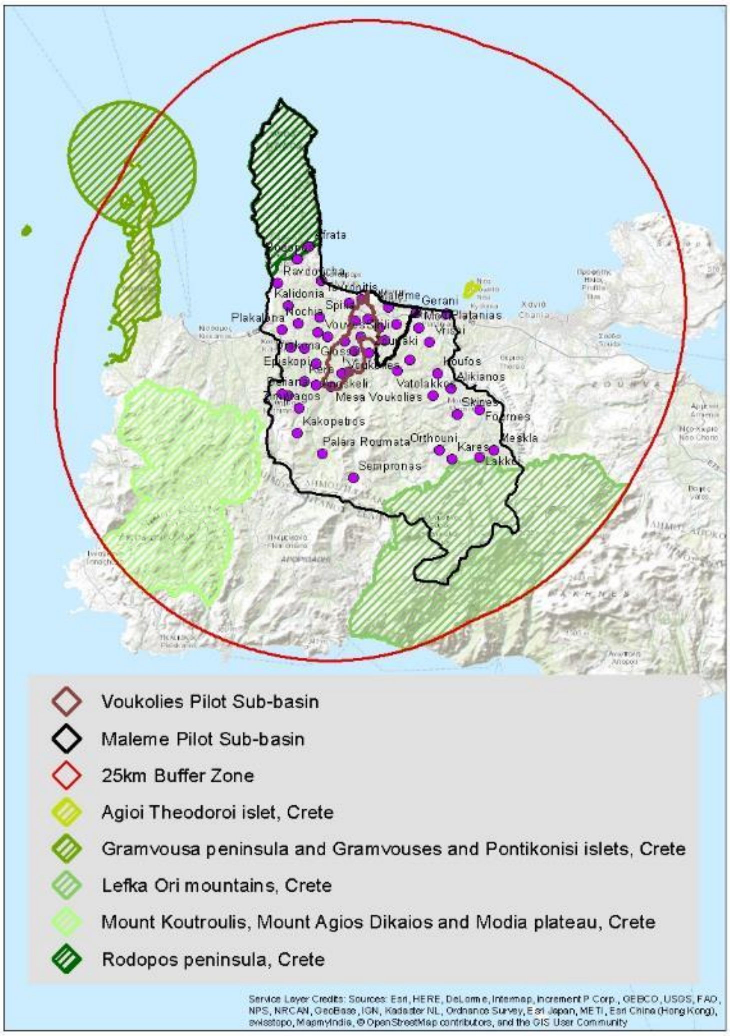


Fig. 68: Geodatabase Map extract of the area of interest, depicting the Important Bird Areas – Source: Hellenic Ornithological Society (2016) Greek IBAs Database

11.2 Municipality of Agios Nikolaos

In the Municipality of Agios Nikolaos the target area is the Havgas – Milatos pilot sub-basin. The 25 km buffer created gave the following results concerning the HCVAs.

11.2.1 Natura 2000 Sites

The Natura 2000 Sites are divided in three categories, as mentioned in Chapter 11.1, which are the Special Protection Areas, the Sites of Community Importance and the Special Areas of Conservation. After having studied the regions, the following results were extracted.

Special Protection Areas (SPA) (Fig. 69)

- Farangi Selinari – Vrachasi - GR4320013
- Lazaros Koryfi – Madara Diktis - GR4320010
- Koryfi Koupa (Dytiki Kriti) - GR4310011

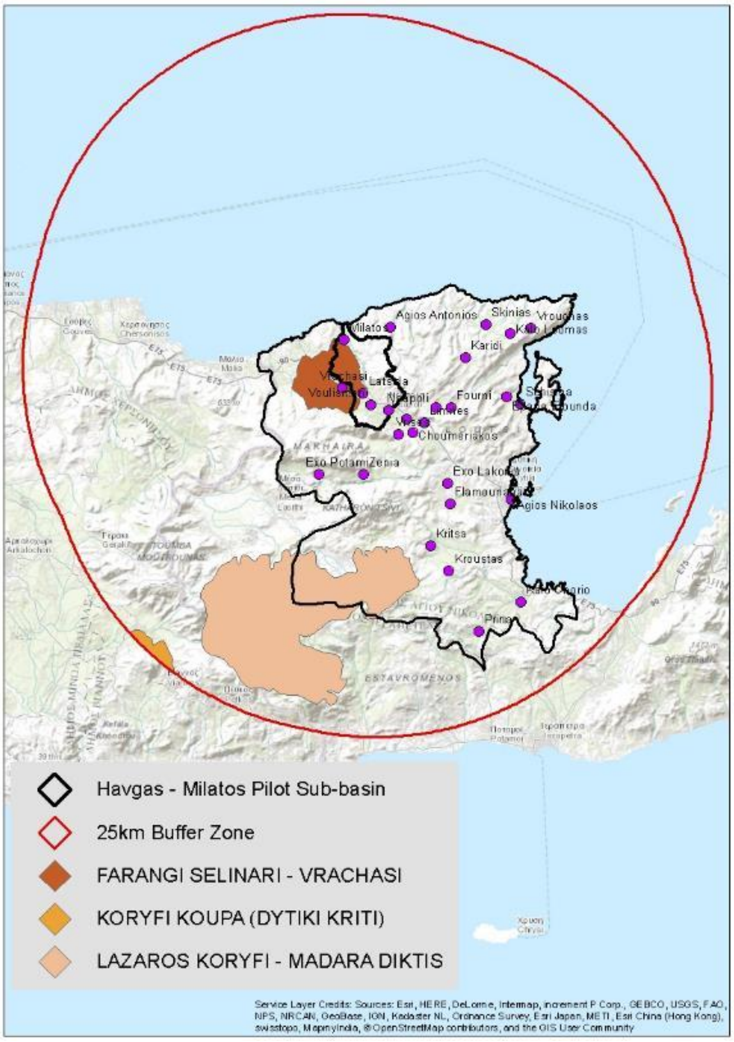


Fig. 69: Geodatabase Map extract of the area of interest, depicting the Special Protection Areas

Sites of Community Importance (SIC) (Fig. 70)

- Dikti: Omalos Viannou (Symi – Omalos) - GR4310006
- Dikti: Oropedio Lasithiou, Katharo, Selena, Krasi, Selakano, Chalasmeni Koryfi - GR4320002
- Oros Thryptis kai gyro periochi - GR4320005

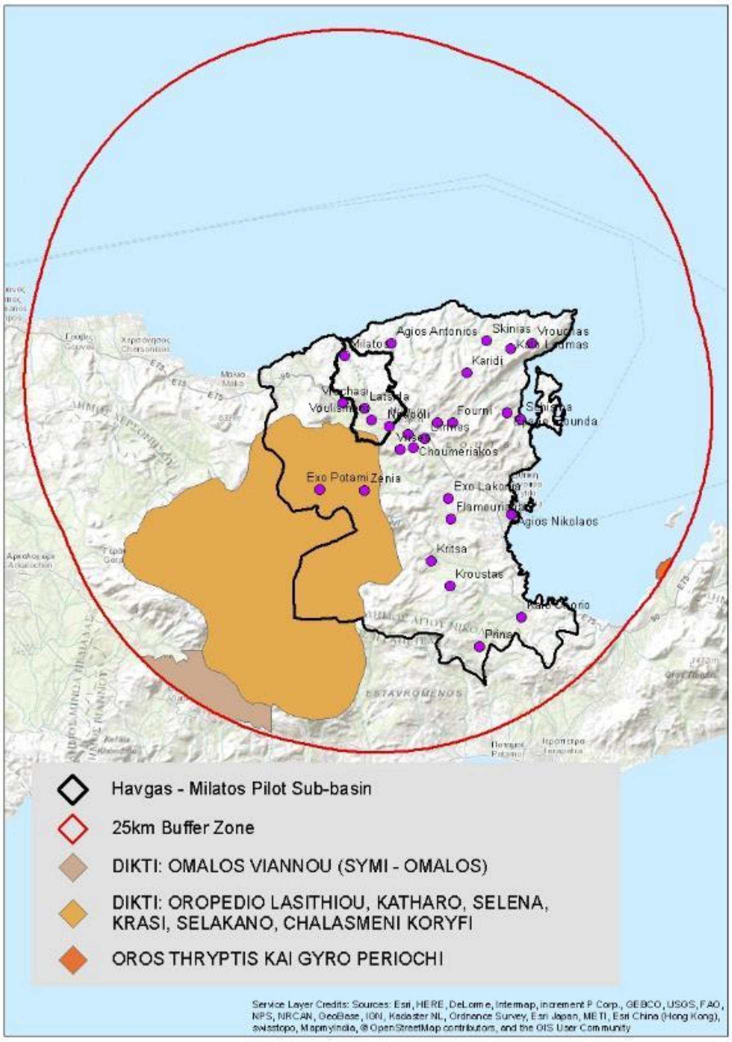


Fig. 70: Geodatabase Map extract of the area of interest, depicting both the Sites of Community Importance and the Special Areas of Conservation

Special Areas of Conservation (SAC) (Fig. 70)

- Dikti: Omalos Viannou (Symi – Omalos) - GR4310006
- Dikti: Oropedio Lasithiou, Katharo, Selena, Krasi, Selakano, Chalasmeni Koryfi - GR4320002
- Oros Thryptis kai gyro periochi - GR4320005

11.2.2 Nationally Designated Areas

Strict Nature Reserves

There are no Strict Nature Reserves located in the area of interest.

National Parks

No National Parks are found in this buffer zone.

Natural Monuments

The target area has no Natural Monuments.

Habitat- Species Management Areas

In the area of interest only *Wildlife Refugees* were found as shown in Fig. 71.

- Gianna Koryfi Dimou Agiou Nikolaou - GR95341338
- Latsidiani Kefala Dimou Neapolis - GR95341355
- Selekano Dimou Ierapetras - GR95341357
- Vathy – Almyros Dimou Agiou Nikolaou - GR95341366
- Bramiana Dimou Ierapetras - GR95341367
- Katselio Dimou Agiou Nikolaou - GR95341369
- Amiron, Kefalovrysiou Dimou Viannou - GR95341374
- Aposelemi Dimou Chersonisou - GR95341441
- Plathiani Lagkada Dimou Oropediou - GR95341457
- Ano Limnion Dimou Mallion - GR95341460
- Thylakas (Agiou Nikolaou Kritsa) - GR95341540
- Chalasia (Zenion – Exo Potamon – Mesa Lasithiou) - GR95341541
- Oxya (Agiou Nikalaou Eloundas) - GR95341543
- Anavlocho (Vrachasiou) - GR95341544

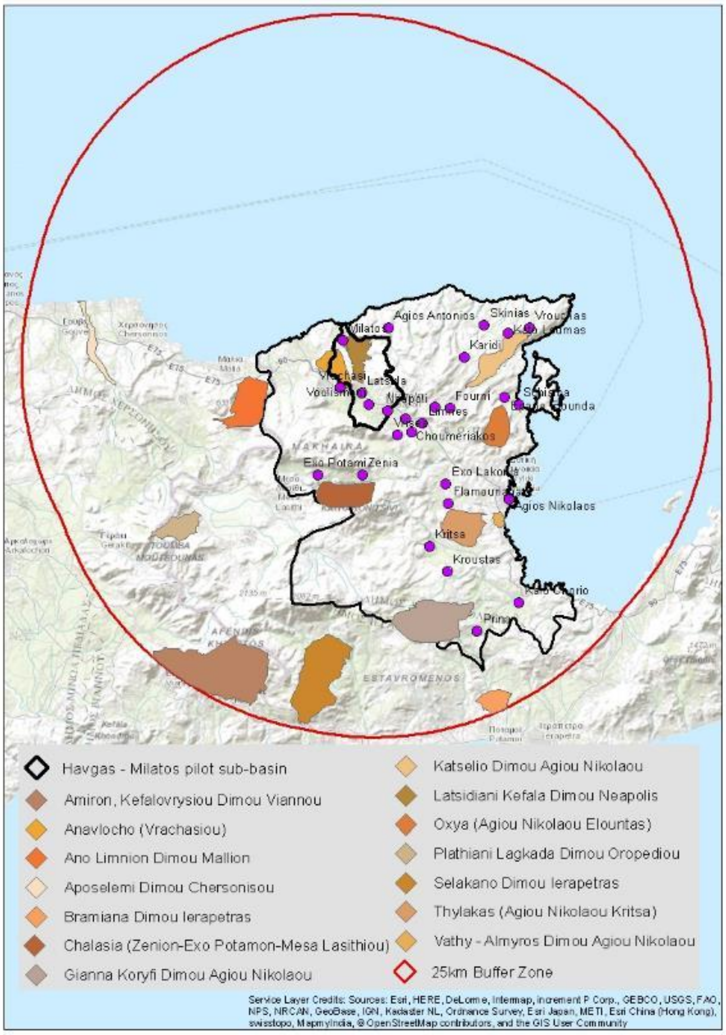


Fig. 71: Geodatabase Map extract of the area of interest, depicting the Wildlife Refugees

Protected Landscape –Seascape

No protected Landscape – Seascape areas were found.

Managed Resource Protected Areas

No Managed Resource Protected Areas are located in this buffer zone.

Others

A Game breeding station is located in this area (Agioi Pantes Lasithiou - GR2192560). (Fig. 72)

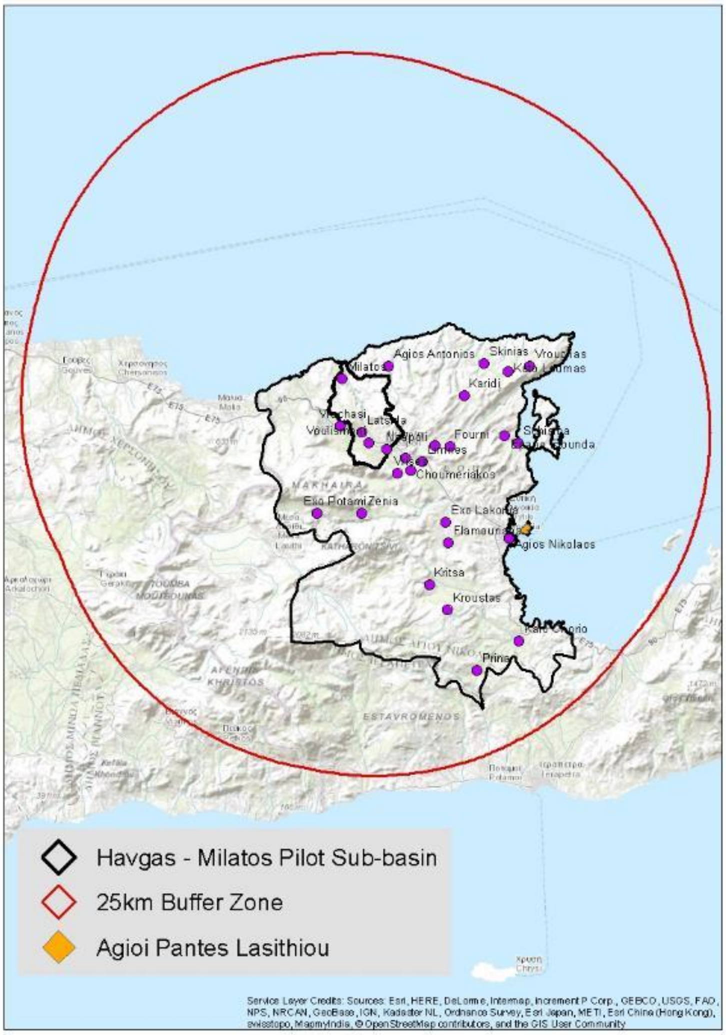


Fig. 72: Geodatabase Map extract of the area of interest, depicting the Game Breeding Station

11.2.3 Wetlands of International Importance (Ramsar Sites)

There were no Ramsar Sites in the wider area of the pilot area.

11.2.4 Small island and other wetlands

In this buffer zone, 5 small wetlands were found, as shown in Fig. 73.

- Kalos Potamos Estuary - Y432KRI055
- Almyros Spring and Marsh (Agios Nikolaos) - Y432KRI056
- Lygeri of Kritsa - Y432KRI058

- Livadi Temporary Pond - Y432KRI063
- Driros Temporary Pond - Y432KRI069

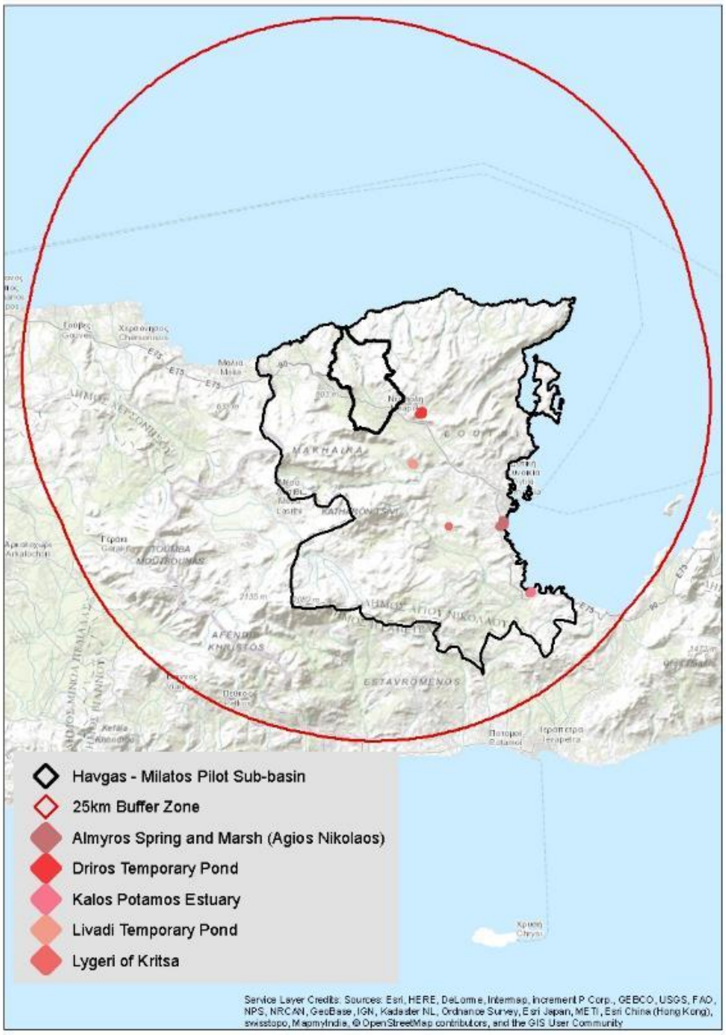


Fig. 73: Geodatabase Map extract of the area of interest, depicting the Small Wetlands

11.2.5 Recreation waters (including bathing waters)

According to the Special Secretariat of Water and specifically the Greek Bathing Waters Registry, the Recreation waters are (Fig. 74):

- Agia Varvara - GRBW139310010
- Agia Pelagia - GRBW139309127
- Agios Georgios - GRBW139309141
- Agios Dimitrios - GRBW139309133
- Agios Nikolaos 1 - GRBW139310009
- Agios Nikolaos 2 - GRBW139310026
- Agios Nikolaos 3 - GRBW139310022
- Agios Panteleimon - GRBW139310029
- Akti Navarchou Nearchou - GRBW139309124
- Almyros - GRBW139310021
- Elounda - GRBW139310019
- Elounda - GRBW139310027
- Kalo Chorio - GRBW139310030
- Karavostasi - GRBW139310034
- Kato Gouves - GRBW139309139
- Kitroplateia - GRBW139310017
- Klontzani - GRBW139309131
- Limanaki Analipsis - GRBW139309122
- Limini Chersonisou 1 - GRBW139309125
- Limin Chersonisou 2 - GRBW139309130

- Ammos - GRBW139310012
- Ammos (Marina) - GRBW139310008
- Ammoudara - GRBW139310015
- Ammoudi - GRBW139310014
- Analipsi - GRBW139309132
- Vlichada - GRBW139309134
- Voulisma - GRBW139310018
- Gargadoros - GRBW139310031
- Gouves 1 - GRBW139309140
- Gouves 2 - GRBW139309136
- Gouves 3 - GRBW139309129
- Dimotiki Akti Chavania - GRBW139310035
- Dimotiki Akti Chavania Boreia - GRBW139310013
- Drapanos - GRBW139309137
- Driros - GRBW139310011
- Milatos - GRBW139310032
- Mirabello - GRBW139310007
- Mpoufos - GRBW139310033
- Pachia Ammos - GRBW139311057
- Pigadakia Elounda - GRBW139310020
- Plaka - GRBW139310024
- Poros - GRBW139310036
- Poros Voreia - GRBW139310028
- Potamos - GRBW139309126
- Potamos 1 - GRBW139309135
- Sisi – Limani - GRBW139310016
- Stalida - GRBW139309143
- Schisma - GRBW139310025
- Chersonisos - GRBW139309138
- Chiona - GRBW139310023

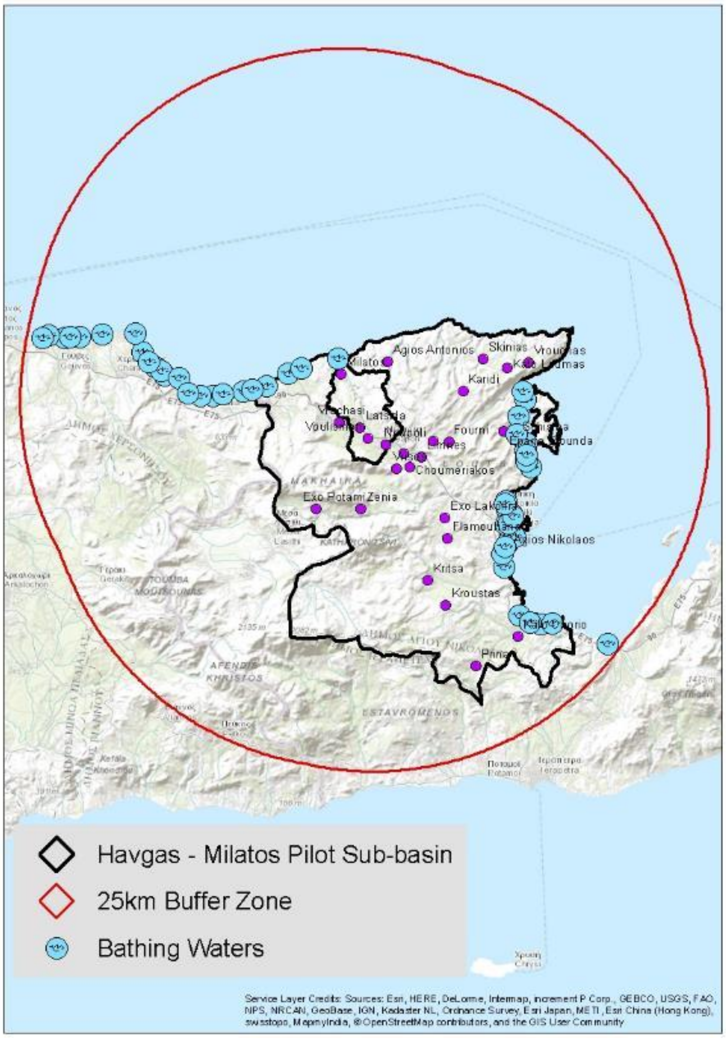


Fig. 74: Geodatabase Map extract of the area of interest, depicting the Recreation Waters

11.2.6 Water Bodies used for the abstraction of potable water

In relation to the River Basin Management Plan of G13, the Water Bodies used for potable water are depicting in Fig. 75.

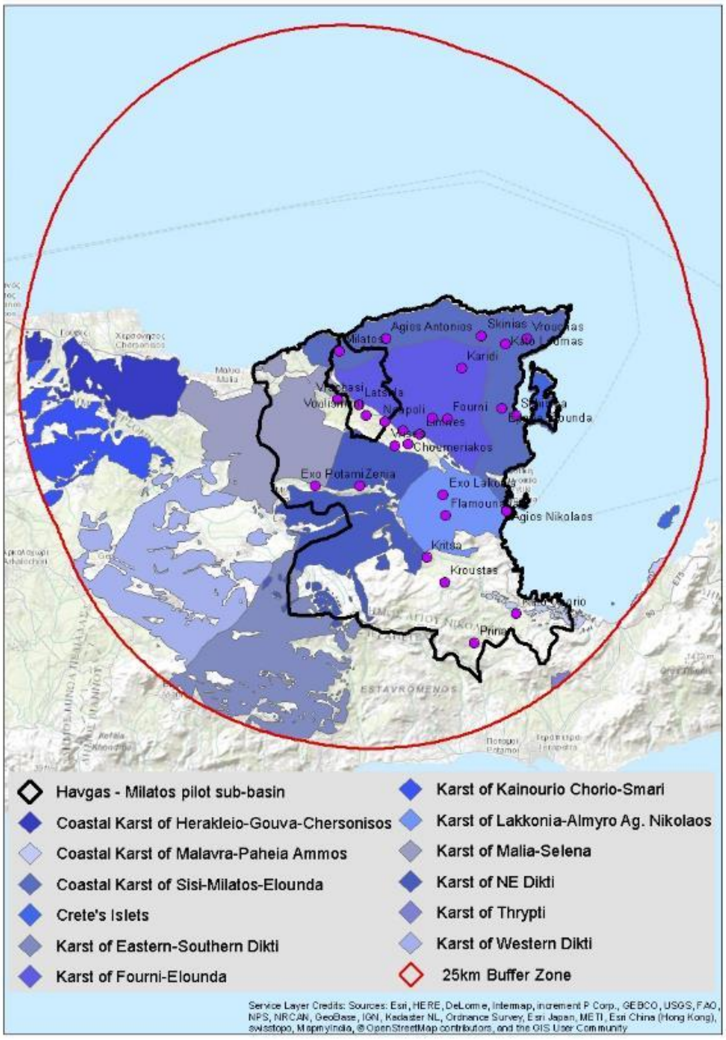


Fig. 75: Geodatabase Map extract of the area of interest, depicting the Water Bodies used for Potable Water

11.2.7 Water Bodies to support fish life and shellfish

There are no recorded water bodies to support Fish Life and Shellfish.

11.2.8 Riparian zones

No Riparian Zones are found.

11.2.9 Nitrate Vulnerable Zones

Within the boundaries of 25km buffer zone around Havgas - Milatos sub-basin there aren’t land areas designated as NVZs. However, the area of porous aquifer of Ierapetra – Kentri - GR1300121 is proposed to be characterized as NVZ in future according to the

River Basin Management Plan of Crete District (GR13). Fig. 76 shows the proposed Nitrate Vulnerable Zone of the area of interest.

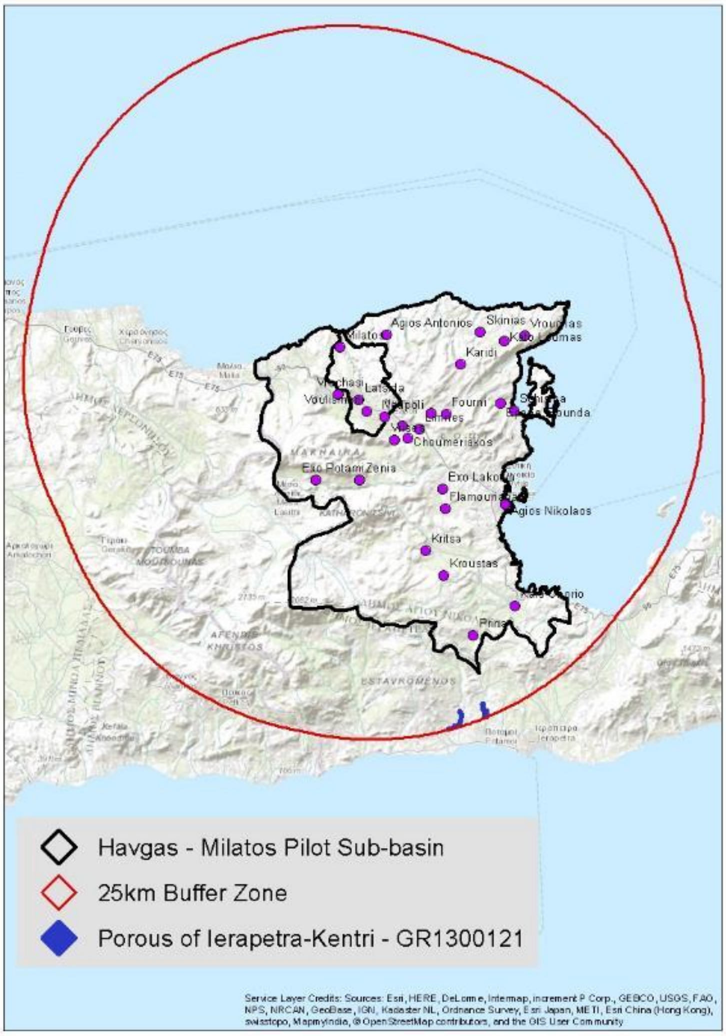


Fig. 76: Geodatabase Map extract of the area of interest, depicting the proposed Nitrate Vulnerable Zone

11.2.10 Archaeological sites

In the greater area of the produced buffer zone, there are many archaeological sites, 304 in particular that are categorized in the following types of monuments:

- Rural Economy
- Castle / Fortress
- Ecclesiastical Administration
- Water Systems
- Archaelogical Site
- Burial Sites and Monuments
- Building of General Interest
- Natural Sites
- Craft/Industrial Sector
- Tower
- Bridge
- Extraction installations
- Mill
- Ancient Sanctuary
- Underwater Sites
- Port Facilities
- Citadel
- Religious Sites
- Mosques
- Cave
- Form of Defence

- Christian Holy Temple
- Historic Sites
- Residential Complex
- Urban Buildings
- Standpipes
- Infrastructure / production facility
- Centres for Administration
- Monastery

There is an Archaeological Cadastre in Greece, although it is still in its raw form and it is estimated to be completed after 2017. Therefore, it was not possible to produce maps for the archaeological sites, because there are no available coordinates for the corresponding monuments.

Archaeological sites pertaining to water are Underwater Sites, Water Systems, Standpipes, Water Mills and Caves. In particular, these areas in this area of interest are as shown in the following Table 59.

Table 59: Archaeological Sites pertaining to water in the greater area of the buffer zone

Monument	Prefecture	Municipality	Mun. Units	Monument	Prefecture	Municipality	Mun. Units
Neolithic Cave	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	*Psathi Holy Cave**i***	LASITHI	IERAPETRA	IERAPETRA
Three Standpipes and paving	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	*Release of marine region east of the Bay of Ierapetra of Lasithi*	LASITHI	IERAPETRA	IERAPETRA
Water Mill in St Varvara	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	*Release of marine region south of Agia Foteini in Ierapetra*	LASITHI	IERAPETRA	IERAPETRA
Water Mill in "Marmara"	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	*Release of marine region southwest of Agia Fotia in Lasithi*	LASITHI	IERAPETRA	IERAPETRA
Release of marine region in the East coastline of Kolokytha Island up to the SW akras Vagi Lasithi for underwater activities	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	***"**Kato Vrysi**"** Community Standpipe in Anatoli Village of the Mun. of Ierapetra.*	LASITHI	IERAPETRA	IERAPETRA
"Trypa" Cave	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	***"Kleisidi"*** *Neolithic Cave*	LASITHI	IERAPETRA	IERAPETRA
Water Tank owened by George Archvlakis and Foteini Chalkiadaki	LASITHI	AGIOS NIKOLAOS	AGIOS NIKOLAOS	*Neolithic Cave*	LASITHI	IERAPETRA	IERAPETRA
Peristera Cave (Malia Holy Cave)	LASITHI	AGIOS NIKOLAOS	VRACHASI	*Neolithic Cave*	LASITHI	IERAPETRA	MAKRY GIALOU
Mena Cave	LASITHI	AGIOS NIKOLAOS	VRACHASI	*Argoulia Cave*	LASITHI	OROPEDIOU LASITHI	
Release of marine region NE of the Bay of Charkoma up to akra Ponta for underwater activities	LASITHI	AGIOS NIKOLAOS	VRACHASI	*Release of marine region east of the Bay of Ierapetra Lasithi*	LASITHI	IERAPETRA	IERAPETRA
Standpipe in the community of Choumeriakos	LASITHI	AGIOS NIKOLAOS	NEAPOLI	*Release of marine region south of Agia Fotia of Ierapetra*	LASITHI	IERAPETRA	IERAPETRA

Monument	Prefecture	Municipality	Mun. Units	Monument	Prefecture	Municipality	Mun. Units
Skafidia Cave	LASITHI	OROPEDIOU LASITHI		*Panagia - Community Standpipe*	HERAKLEION	MINOA PEDIADA	ARKALOCHORI
Trapeza Cave	LASITHI	OROPEDIOU LASITHI		*Water Mill in Skinias owned by Karamanolakis*	HERAKLEION	MINOA PEDIADA	ARKALOCHORI
Archaeological site of the Eileithias Cave in Amnisos of Herakleion Perfecture	HERAKLEION	CHERSONISOS	GOUVES	***Archaeological site of "Tsoutsouros"*** *area (anc. Inatos)*	HERAKLEION	MINOA PEDIADA	ARKALOCHORI
Water Mill in "Kakia Rahi" area in the Mun. of Episkopi of the prefecture of Heraklion (Crete)	HERAKLEION	CHERSONISOS	EPISKOPI	*Archaeological site of Skoteinos Cave*	HERAKLEION	MINOA PEDIADA	KASTELLI
Standpipe – Water tank - Mohos	HERAKLEION	CHERSONISOS	MALIA	***Archaeological site and "Korifi Profiti Ilia" Cave"***	HERAKLEION	MINOA PEDIADA	KASTELLI
Krasi. Aqueduct "Megali Vrysi".	HERAKLEION	CHERSONISOS	MALIA	*Amariano – Community Standpipe*	HERAKLEION	MINOA PEDIADA	KASTELLI
Release of marine region south of the Chersonisos port for underwater activities..	HERAKLEION	CHERSONISOS	CHERSONISOS	*Chondros – Community Standpipe*	HERAKLEION	VIANNOS	
Gonies. Water Mill owned by Emm. Kotsifos.	HERAKLEION	CHERSONISOS	CHERSONISOS	*Water Mill in the* ***Νερόμυλος*** *Spiliotissas Monastery*	HERAKLEION	VIANNOS	
Chersonisos Herakleion. Release of marine region in Chersonisos Cape.	HERAKLEION	CHERSONISOS	CHERSONISOS	*"Spartovrysi" Standpipe in a rural road*	HERAKLEION	VIANNOS	

Monument	Prefecture	Municipality	Mun. Units	Monument	Prefecture	Municipality	Mun. Units
Karavado. Community Standpipe.	HERAKLEION	MINOA PEDIADA	ΑΡΚΑΛΟΧΩΡΙΟΥ	***"**Anavallousa**"** Standpipe in the Mouri Community in the Mun. of Viannos*	HERAKLEION	VIANNOS	
Kato Viannos. Community Standpipe.	HERAKLEION	VIANNOS		***Standpipe "of Pitropou"***	HERAKLEION	VIANNOS	
"the Chani" Standpipe	HERAKLEION	VIANNOS		***Standpipe of "Miliaradon"**"*	HERAKLEION	VIANNOS	

11.2.11 Other important areas (for cultural, religious, ecological, socio- economic reasons)

In this category the Important Bird Areas (IBAs) were included. In this buffer zone only one IBA is found as shown in Fig. 77:

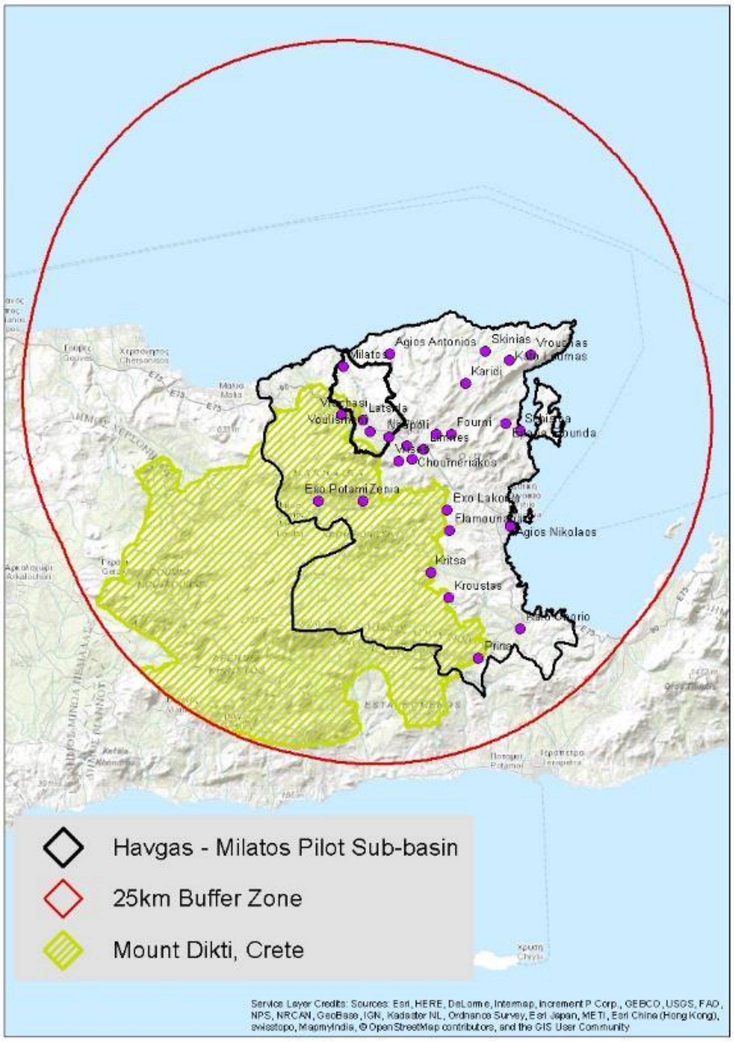


Fig. 77: Geodatabase Map extract of the area of interest, depicting the Important Bird Areas – Source: Hellenic Ornithological Society (2016) Greek IBAs Database

11.3 Metapontino area, Basilicata, Italy

11.3.1 Natura 2000 Sites

Natura 2000 is a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types which are protected in their own right. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive and the Habitats Directive.

Special Protection Areas (SPA)

Special Protection Areas (SPAs) (Fig. 78) are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive, which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.

Table 60: Special Protection Areas (SPA) within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Bosco Pantano di Policoro e Costa Ionica Foce Sinni • Massiccio del Monte Pollino e Monte Alpi • Appennino Lucano, Valle Agri, Monte Sirino, Monte Raparo • Dolomiti di Pietrapertosa • Foresta Gallipoli – Cognato • Valle Basento Grassano Scalo – Grottole • Valle Basento – Ferrandina Scalo	• IT9220055 • IT9210275 • IT9210271 • IT9210105 • IT9220130 • IT9220260 • IT9220255	• Birds Directive (2009/147/EC) • DM 08/08/2014 (OJ n. 217 del 18/09/2014)

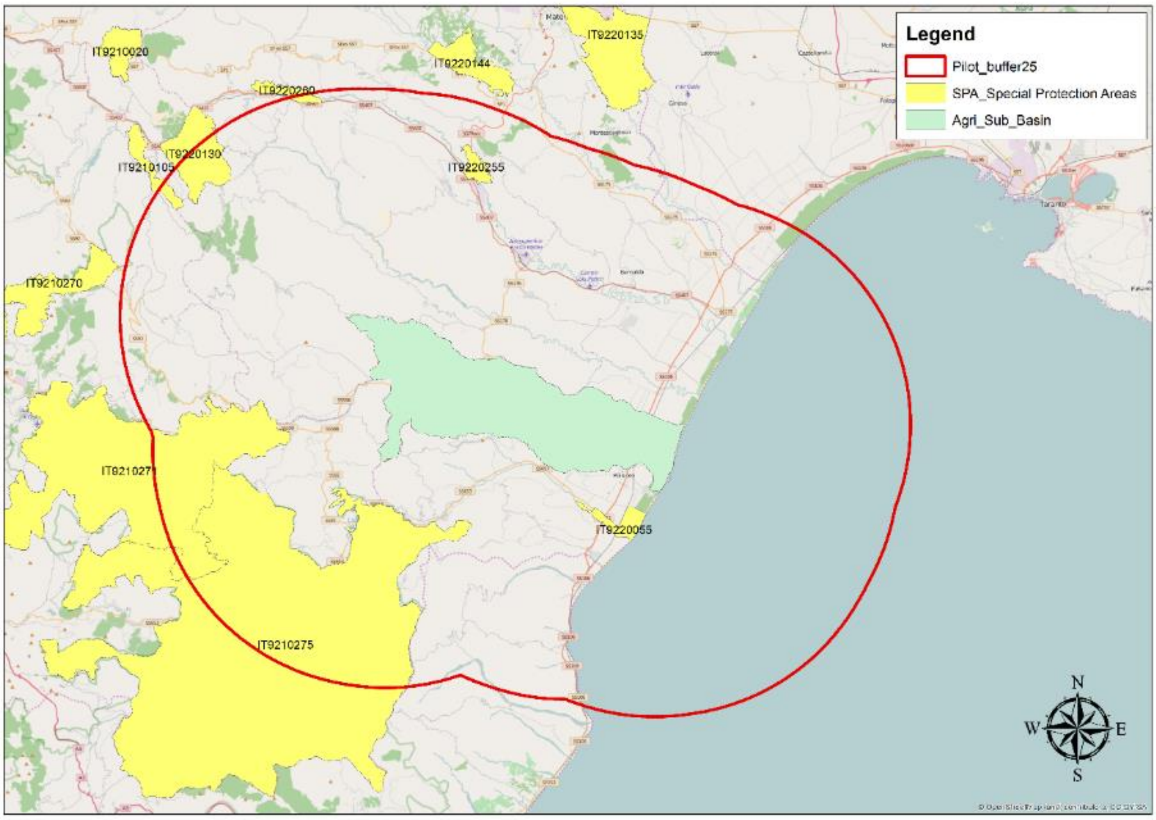


Fig. 78: Agri pilot sub-basin Special Protection Areas (SPA).

Sites of Community Importance (SIC) (Fig. 79)

Table 61: Sites of Community Importance (SIC) within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Bosco della Farneta • Bosco Pantano di Policoro e Costa Ionica Foce Sinni • Costa Ionica Foce Agri • Costa Ionica Foce Cavone • Costa Ionica Foce Basento • Costa Ionica Foce Bradano • Valle Basento Ferrandina Scalo • Valle Basento Grassano Scalo	• IT9210025 • IT9220055 • IT9220080 • IT9220095 • IT9220085 • IT9220090 • IT9220255 • IT9220260	• Habitats Directive (EEC/92/43) • 2015/2374/UE • DM 02/02/2014 (OJ n. 94 del 23/04/2014)

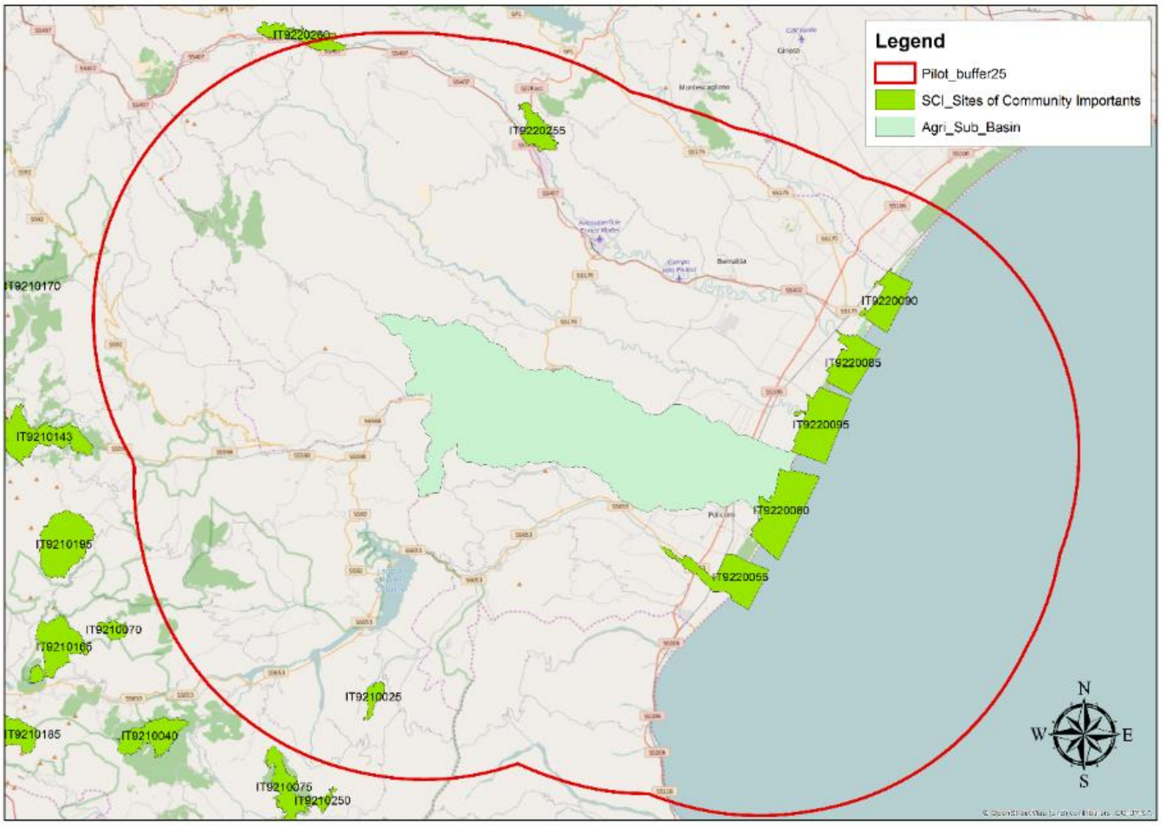


Fig. 79: Agri pilot sub-basin Sites of Community Importance (SIC).

Special Areas of Conservation (SAC)

Table 62: Special Areas of Conservation (SAC) within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Murge di S. Oronzio • Bosco di Montepiano • Dolomiti di Pietrapertosa • Foresta Gallipoli – Cognato	• IT 9210220 • IT 9220030 • IT 9210105 • IT 9220130	• Habitats Directive (EEC/92/43) • DPR n. 357 del 08/09/1997 • DM 20/01/1999 • DPR n. 120 del 12/03/2003 • DM 16/09/2013

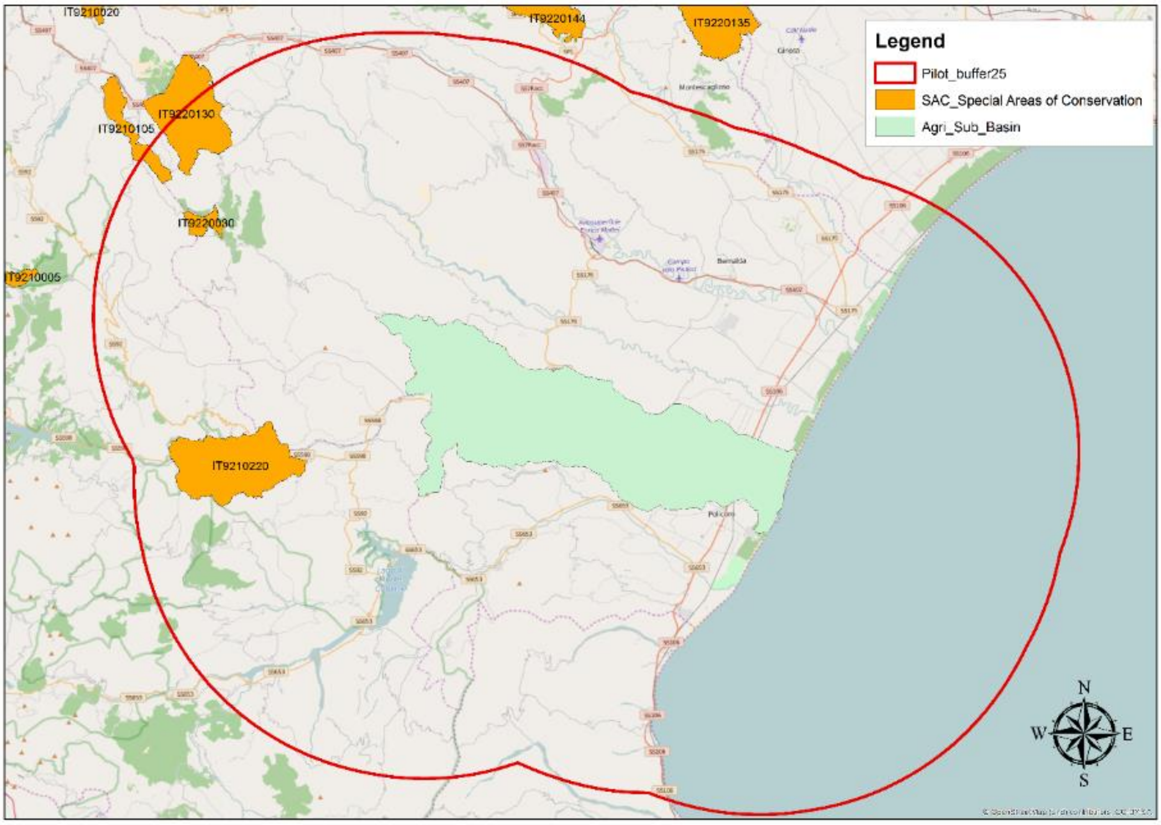


Fig. 80: Agri pilot sub-basin Special Areas of Conservation (SAC).

11.3.2 Nationally Designated Areas

Strict Nature Reserves

Table 63: Strict Nature Reserves within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Riserva Naturale Metaponto (State Nature Reserve) - EUAP0037 • Riserva naturale Marinella Stornara - EUAP0105	• EUAP0037 • EUAP0105	• DD.MM. 29.03.72/02.03.77 (Provvedimenti istitutivi) • DM 13/07/77 • DM/OJ 125/31-05-2010 Supplemento Ordinario

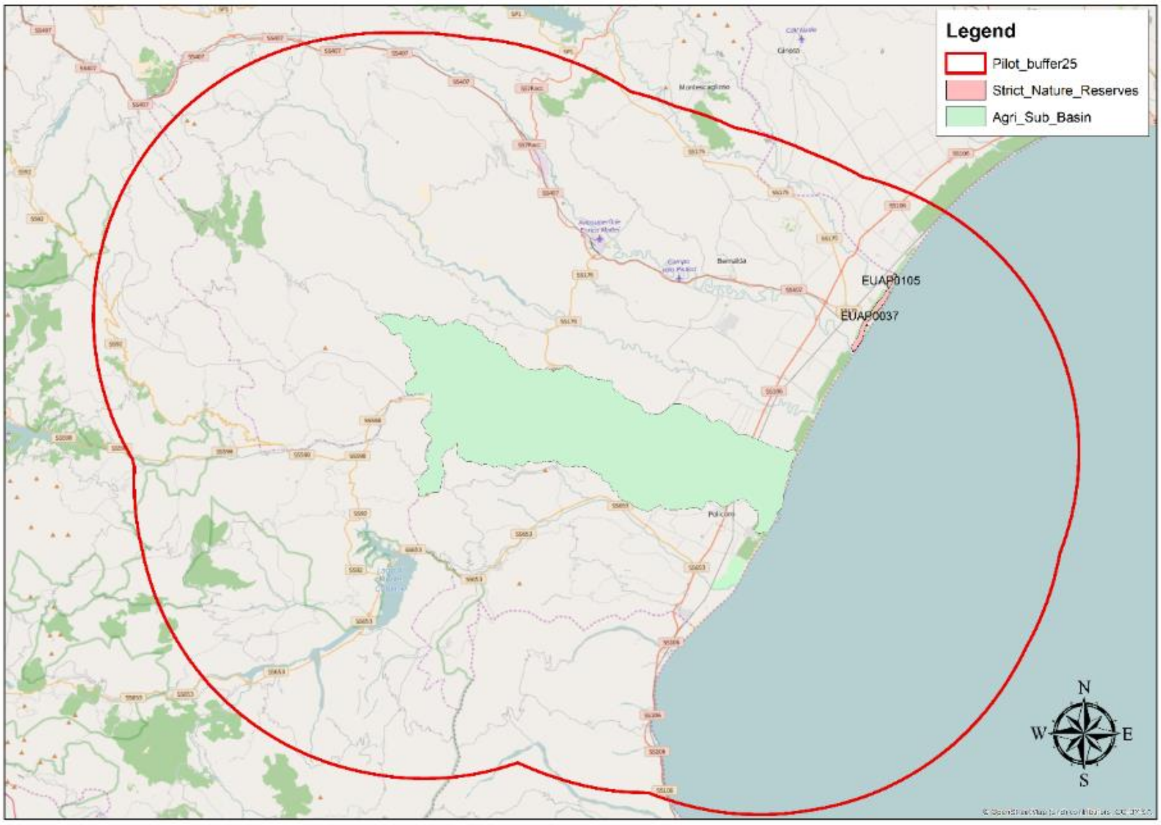


Fig. 81: Agri pilot sub-basin Strict Nature Reserves.

National Parks

Table 64: National Parks within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Parco Nazionale del Pollino - EUAP0008 • Parco nazionale dell'Appennino Lucano - Val d'Agri - Lagonegrese - EUAP0851	• EUAP0008 • EUAP0851	• L. 67, 11.03.88 - L. 305, 28.08.89 - D.M. 31.12.90 - D.P.R. 15.11.93 - D.P.R. 02.12.97 • D.P.R. 8.12.07 • DM/OJ 125/31-05-2010 Supplemento Ordinario

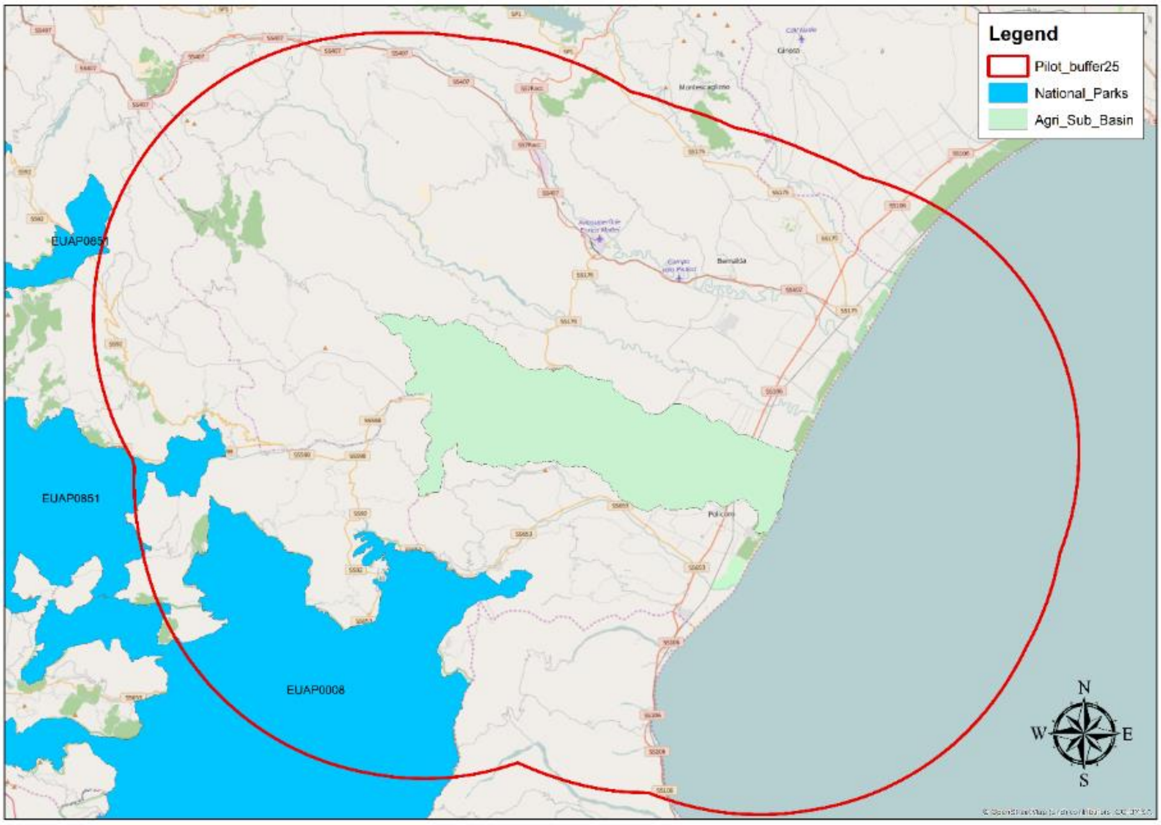


Fig. 82: Agri pilot sub-basin National Parks.

Habitat- Species Management Areas

Table 65: Habitat- Species Management Areas within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Riserva naturale orientata Bosco Pantano di Policoro	• EUAP0547	• L.R. 28, 08.09.99 • DM/OJ 125/31-05-2010 Supplemento Ordinario

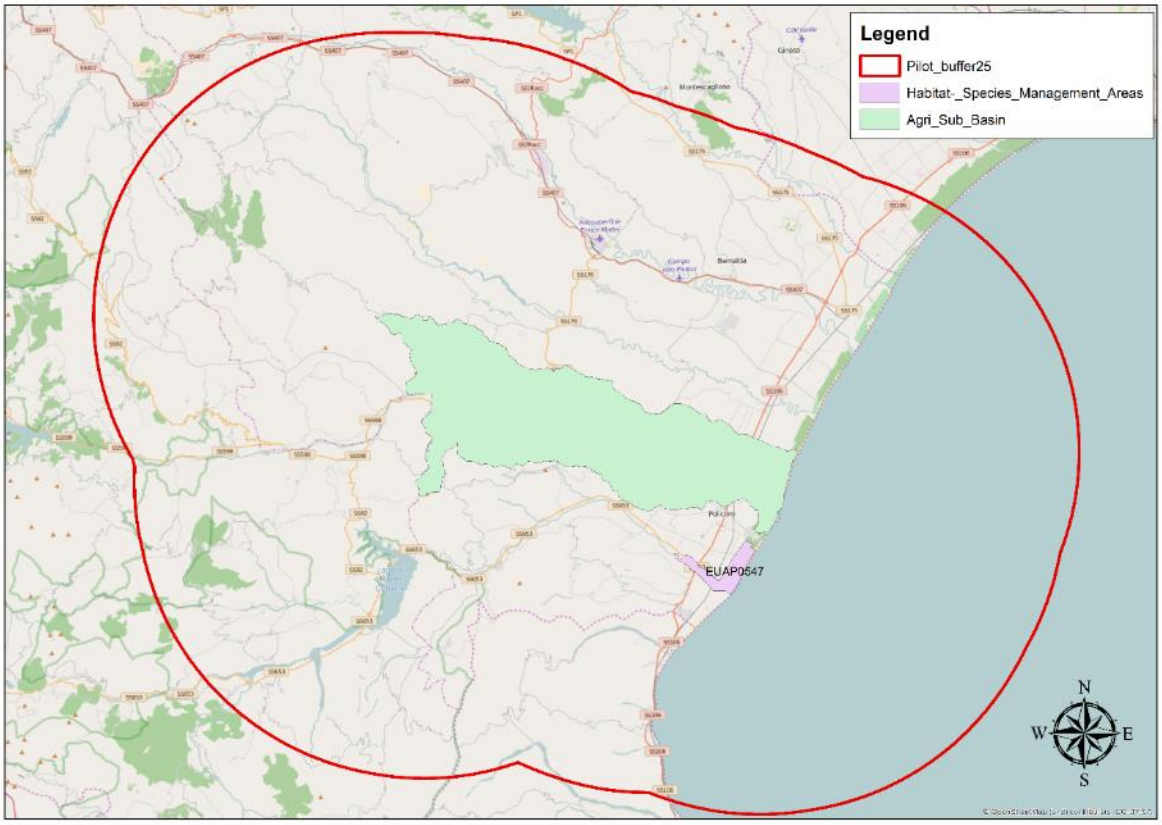


Fig. 83: Agri pilot sub-basin Habitat- Species Management Areas.

Protected Landscape –Seascape

Table 66: Protected Landscape –Seascape within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Parco Naturale di Gallipoli Cognato – Piccole Dolomiti Lucane	• EUAP1053	•L.R. 47, 24.11.97 • DM/OJ 125/31-05-2010 Supplemento Ordinario

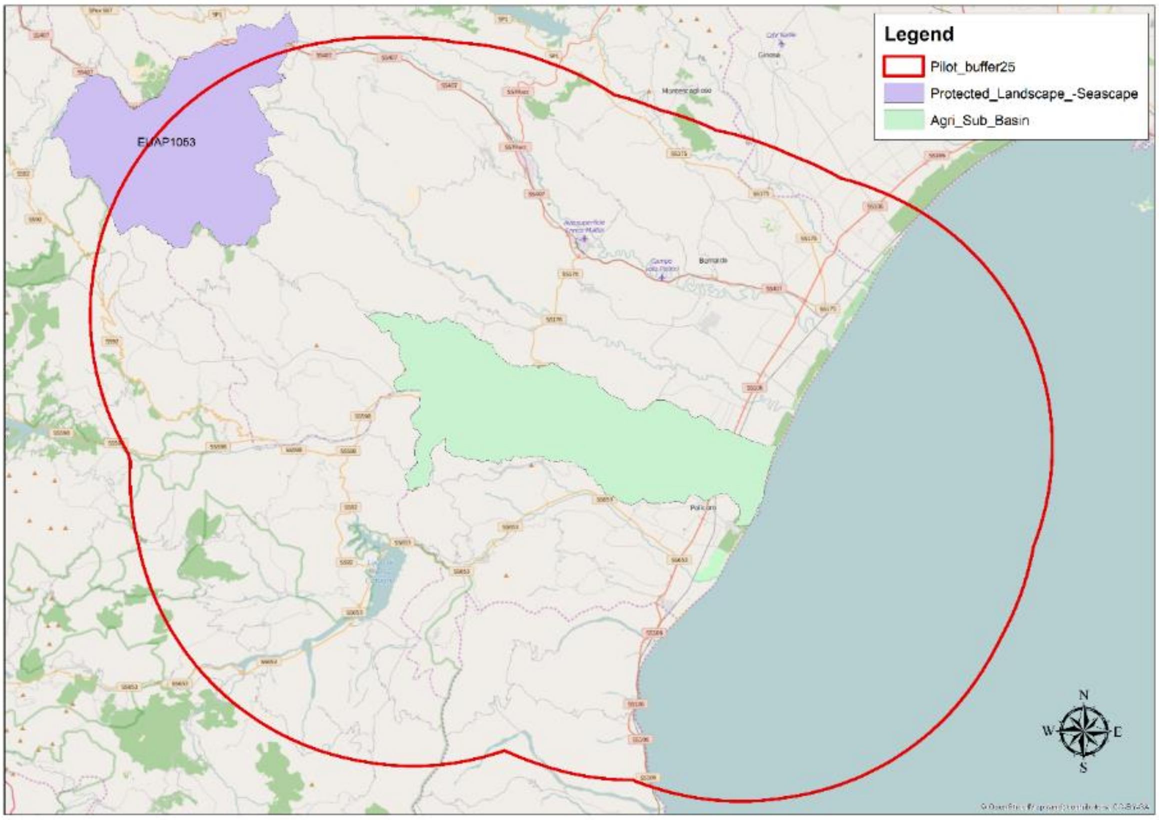


Fig. 84: Agri pilot sub-basin Protected Landscape –Seascape.

11.3.3 Wetlands of International Importance (Ramsar Sites)

No wetlands of international importance are found within the boundaries of 25 km buffer zone around the Agri pilot sub-basin.

11.3.4 Small island and other wetlands

No Small Islands and other wetlands are found within the boundaries of 25 km buffer zone around the Agri pilot sub-basin.

11.3.5 Recreation waters (including bathing waters)

Table 67: Recreation waters (including bathing waters) within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• CANALE BUFALORIA - 100 MT. MARGINE NORD • CANALE BUFALORIA - 100 MT. MARGINE SUD • CANALE SCOLMATORE - 50 MT. MARGINE NORD • CANALE SCOLMATORE - 50 MT. MARGINE SUD • CASELLO 48 LIDO	• I922000031077031040 • I922000031077031041 • I922000021077021057 • I922000021077021058 • I922000020077020008	• EU Bathing Water Directive 2006/7/EC • D. Lgs 30/05/ 2008 n. 116 • DM del 30/03/2010

• FOCE AGRI - 1500 MT. MARGINE SUD	• I922000021077021054	
• FOCE AGRI - 250 MT. MARGINE NORD	• I922000031077031042	
• FOCE AGRI - 250 MT. MARGINE SUD	• I922000021077021043	
• FOCE BASENTO - 2000 MT. - MARGINE NORD	• I922000003077003049	
• FOCE BASENTO - 300 MT. MARGINE NORD	• I922000003077003034	
• FOCE BASENTO - 450 MT. MARGINE SUD	• I922000020077020050	
• FOCE BRADANO - 1000 MT. MARGINE NORD	• I922000003077003064	
• FOCE BRADANO - 150 MT. MARGINE SUD	• I922000003077003033	
• FOCE BRADANO - 15O MT. MARGINE NORD	• I922000003077003065	
• FOCE BRADANO 1800 MT. - MARGINE SUD	• I922000003077003048	
• FOCE CAVONE - 150 MT. MARGINE NORD	• I922000020077020038	
• FOCE CAVONE - 150 MT. MARGINE SUD	• I922000031077031039	
• FOCE CAVONE - 2000 MT. MARGINE SUD	• I922000031077031051	
• FOCE SINNI - 250 MT. MARGINE NORD	• I922000021077021059	
• FOCE SINNI - 250 MT. MARGINE SUD	• I922000023077023060	
• FOCE SINNI - 800 MT. MARGINE SUD	• I922000023077023061	
• FOSSO DELLA RIVOLTA-50 MT. MARGINE NORD	• I922000023077023062	
• FOSSO DELLA RIVOLTA-50 MT. MARGINE SUD	• I922000023077023063	
• IDROVORA CASELLO 48-50 MT. MARGINE NORD	• I922000020077020036	
• IDROVORA CASELLO 48-50 MT. MARGINE SUD	• I922000020077020037	
• IDROVORA DEL CONCIO-50 MT. MARGINE NORD	• I922000021077021055	
• IDROVORA DEL CONCIO-50 MT. MARGINE SUD	• I922000021077021056	
• IDROVORA METAPONTO - 50 MT. MARGINE NORD	• I922000003077003002	
• IDROVORA METAPONTO - 50 MT. MARGINE SUD	• I922000003077003003	
• IDROVORA NOVA SIRI-150 MT. MARGINE NORD	• I922000018077018046	
• IDROVORA NOVA SIRI-150 MT. MARGINE SUD	• I922000018077018047	
• IDROVORA SCANZANO ION.-100 MT. MARG. SUD	• I922000031077031053	
• IDROVORA SCANZANO ION.-100 MT.MARG. NORD	• I922000031077031052	
• IDROVORA TORRE MOZZA-150 MT. MARGINE SUD	• I922000021077021045	
• IDROVORA TORRE MOZZA-150 MT.MARGINE NORD	• I922000021077021044	
• METAPONTO LIDO	• I922000003077003004	
• NOVA SIRI LIDO	• I922000018077018031	

• POLICORO LIDO - LATO NORD • POLICORO LIDO - LATO SUD • ROTONDELLA LIDO • SAN BASILIO LIDO	• I922000021077021022 • I922000021077021024 • I922000023077023026 • I922000020077020010	

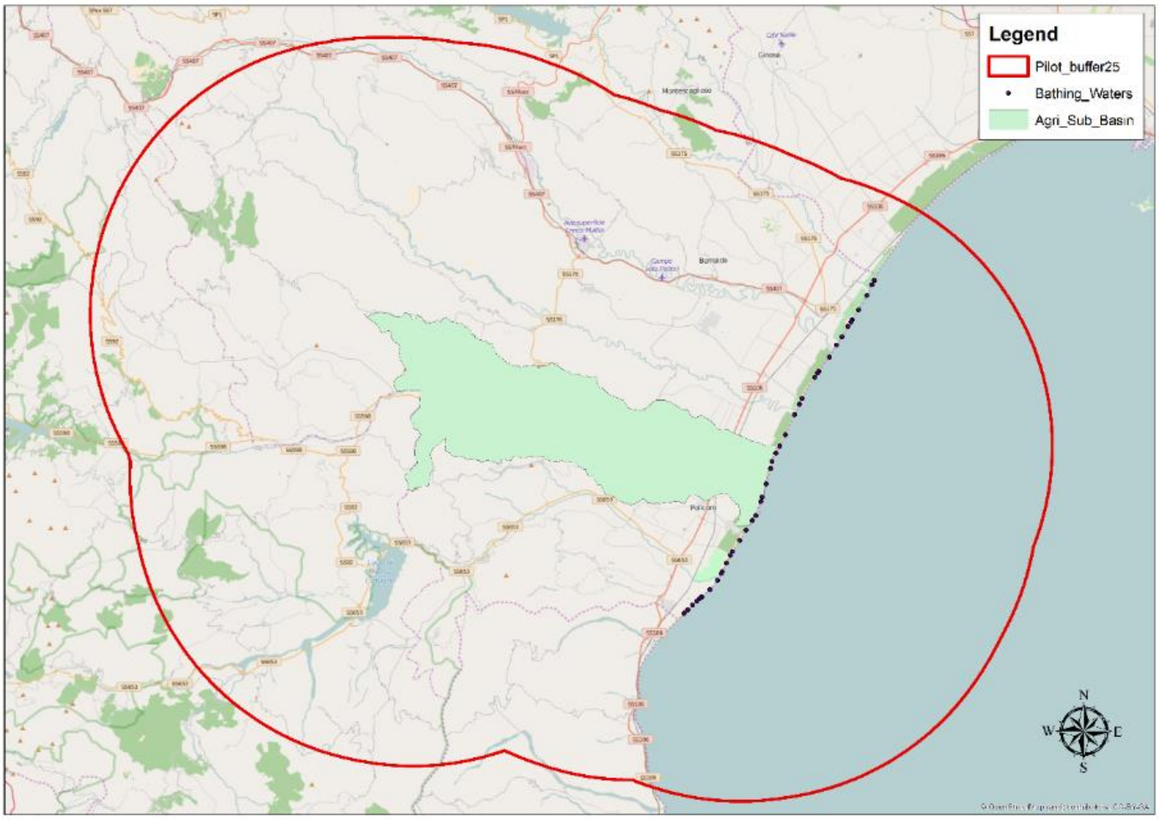


Fig. 85: Agri pilot sub-basin recreation waters (including bathing waters).

11.3.6 Water Bodies used for potable water

Table 68: Water Bodies used for potable water within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Invaso Monte Cotugno (Monte cotugno Dam)	• 1327	• Water Framework Directive (2000/60/EC), Art. 7 • D.Lgs. n. 152/2006, art. 80

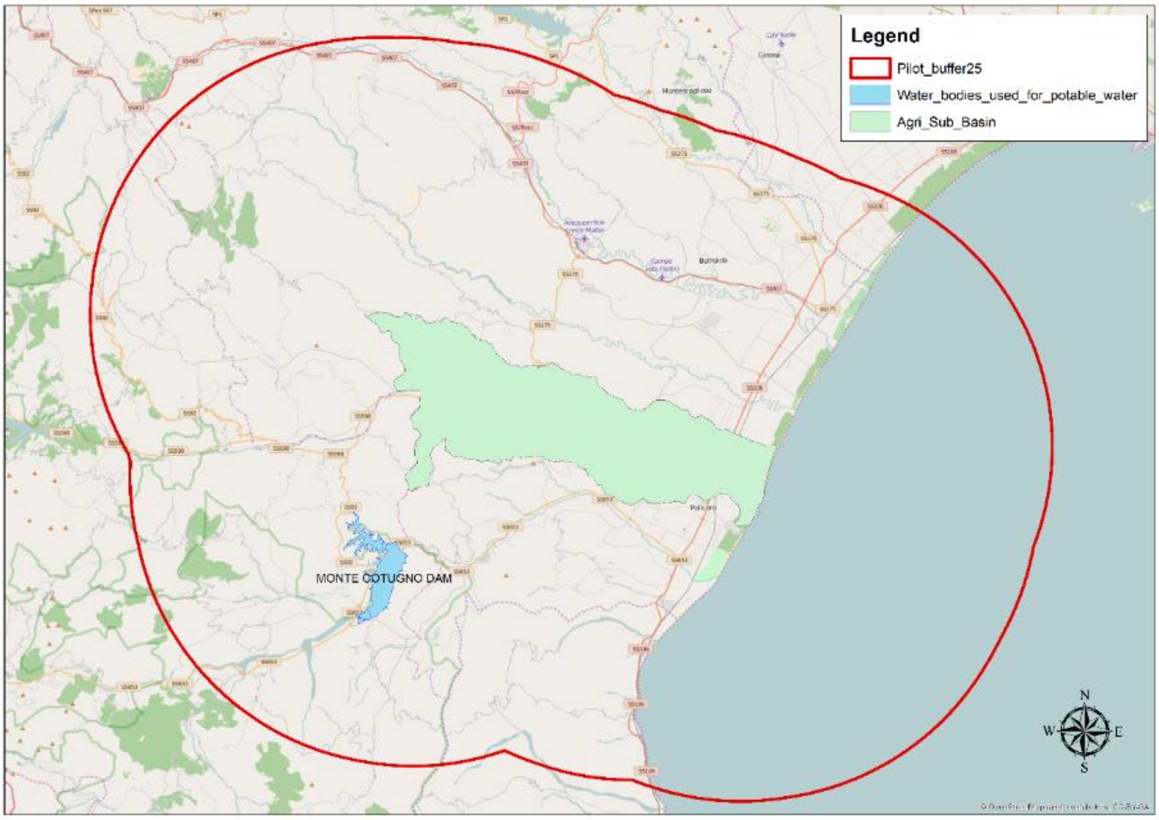


Fig. 86: Agri pilot sub-basin water bodies used for potable water.

11.3.7 Water Bodies to support fish life and shellfish

Table 69: Water Bodies to support fish life and shellfish within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
• Fiume Frido da sorgente a confluenza • Fiume Sinni da sorgente a invaso Monte Cotugno • Fiume Agri da intermedio alla foce	• 50902 • 46043 • 46037	• 2000/60/EC • D.Lgs. n. 152/2006, artt. 76 e 79 • D.G.R. n. 1814 del 07.10.2003 • D.C.R. n. 813 del 11.05.04

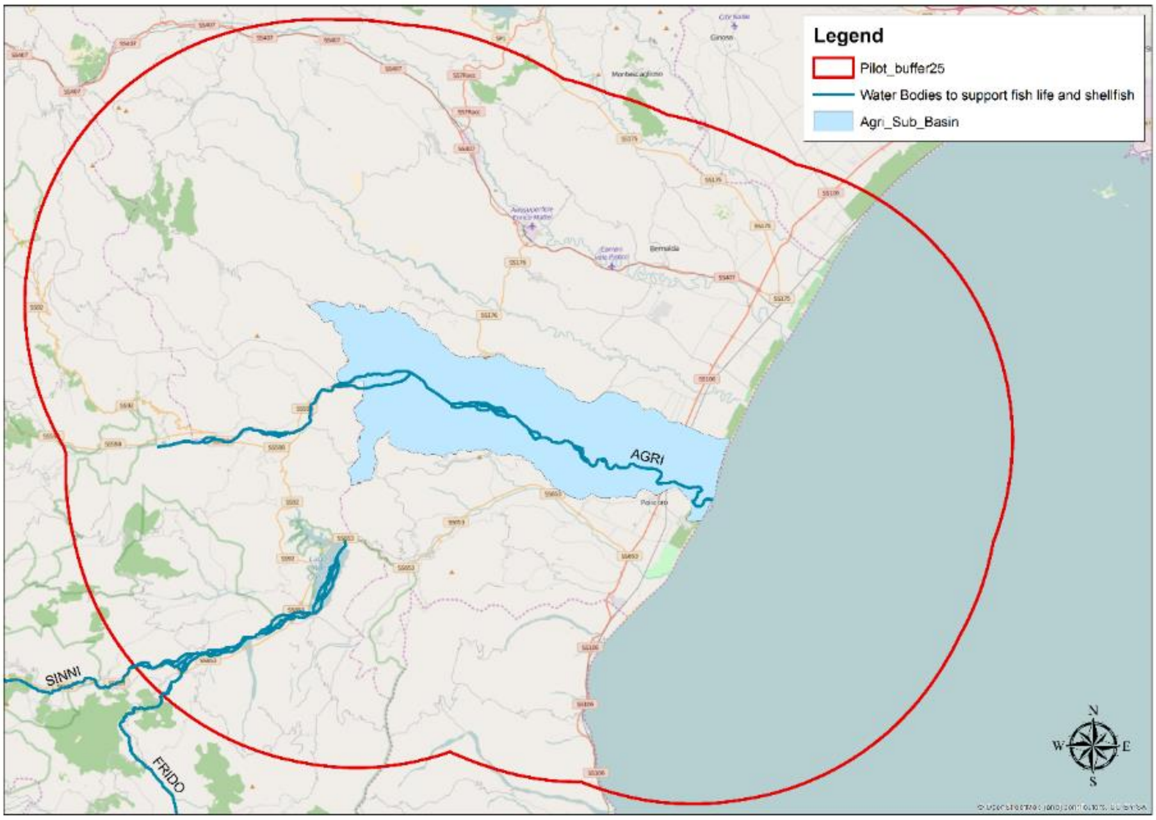


Fig. 87: Agri pilot sub-basin water bodies to support fish life and shellfish.

11.3.8 Riparian zones

No Riparian Zones are found are found within the boundaries of 25 km buffer zone around the Agri pilot sub-basin.

11.3.9 Nitrate Vulnerable Zones

Table 70: Nitrate Vulnerable Zones within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Designation
• Vulnerable zones • Agricultural not vulnerable zones • Other not vulnerable zones (forest and natural areas, lakes) • Urban and industrial areas	• 91/676/EEC • 91/271/EEC • D.Lgs. n. 152/2006, art. 92 • D.M. 07/04/2006 • Delibera n. 508 del 25-03-02 • Deliberazione del Consiglio Regionale 6 giugno 2006 n. 119 "art. 19 del Decreto Legislativo n. 152/99 – Programma d'azione della Basilicata per le zone vulnerabili ai nitrati di origine agricola" (B.U.R. n. 34 del 10-07-2006) • Deliberazione G.R. n.156 del 14 febbraio 2013 " Conferma zone vulnerabili ai nitrati di origine agricola in attuazione dell'art. 36 comma 7-ter del Decreto legge 18 ottobre 2012 n.179 , convertito in legge n.221 del 17/12/2012.

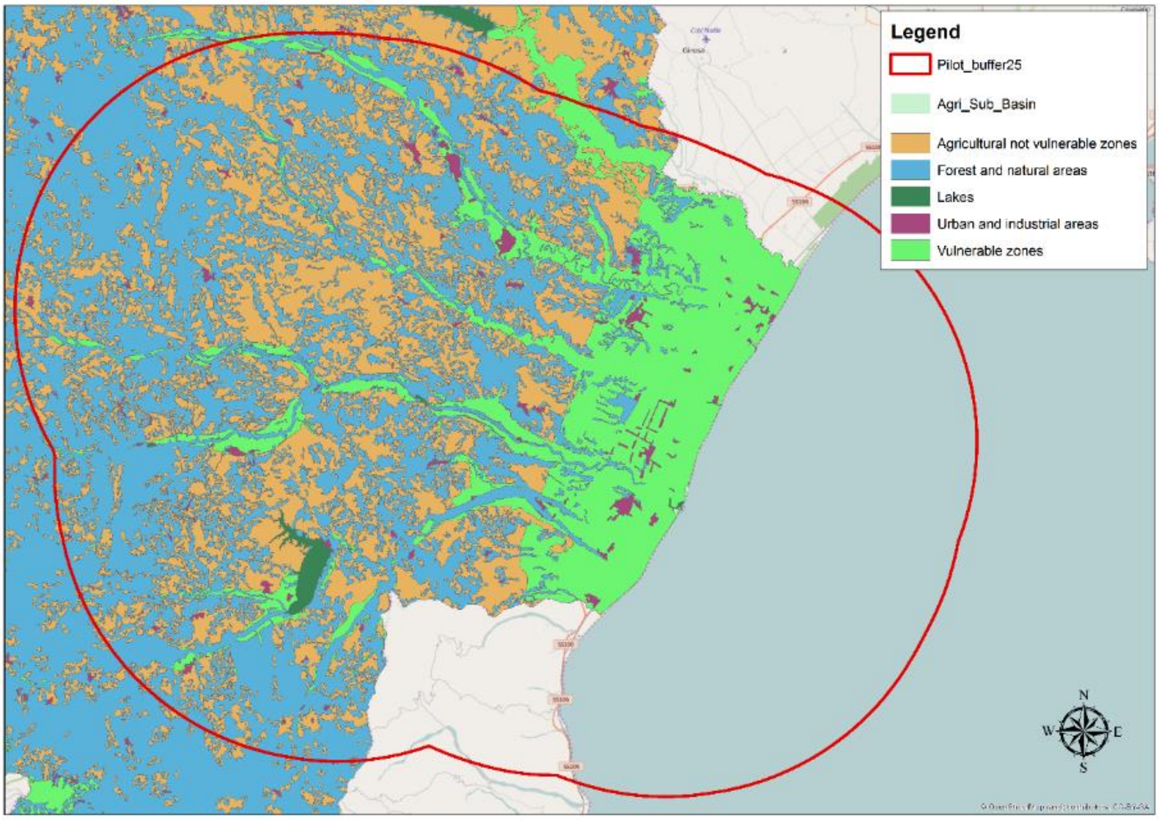


Fig. 88: Agri pilot sub-basin Nitrate Vulnerable Zones.

11.3.10 Archaeological sites

Table 71: Archaeological sites within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Designation
• Archaeological area of Metaponto ("Tavole Palatine"),located in Bernalda • Archaeological area Herakleia, located in Policoro	• D. Lgs. 42/2004, "Codice dei beni culturali e del paesaggio" • L.R. 11 agosto 2015 n. 27

Fig. 89: Agri pilot sub-basin Archaeological sites.

11.3.11 Other important areas (for cultural, religious, ecological, socio- economic reasons)

Table 72: Other important areas within a 25 km buffer zone around the Agri pilot sub-basin.

Areas Names	Areas Codes	Designation
Important Bird Areas • Calanchi della Basilicata • Pollino e Orsomarso • Dolomiti di Pietrapertosa • Bosco della Manferrara • Val d' Agri • Alto Ionio Cosentino	• IBA 196 • IBA 195 • IBA 137 • IBA 138 • IBA 141 • IBA 144	• Birds Directive (2009/147/EC) • DM 06/11/2012

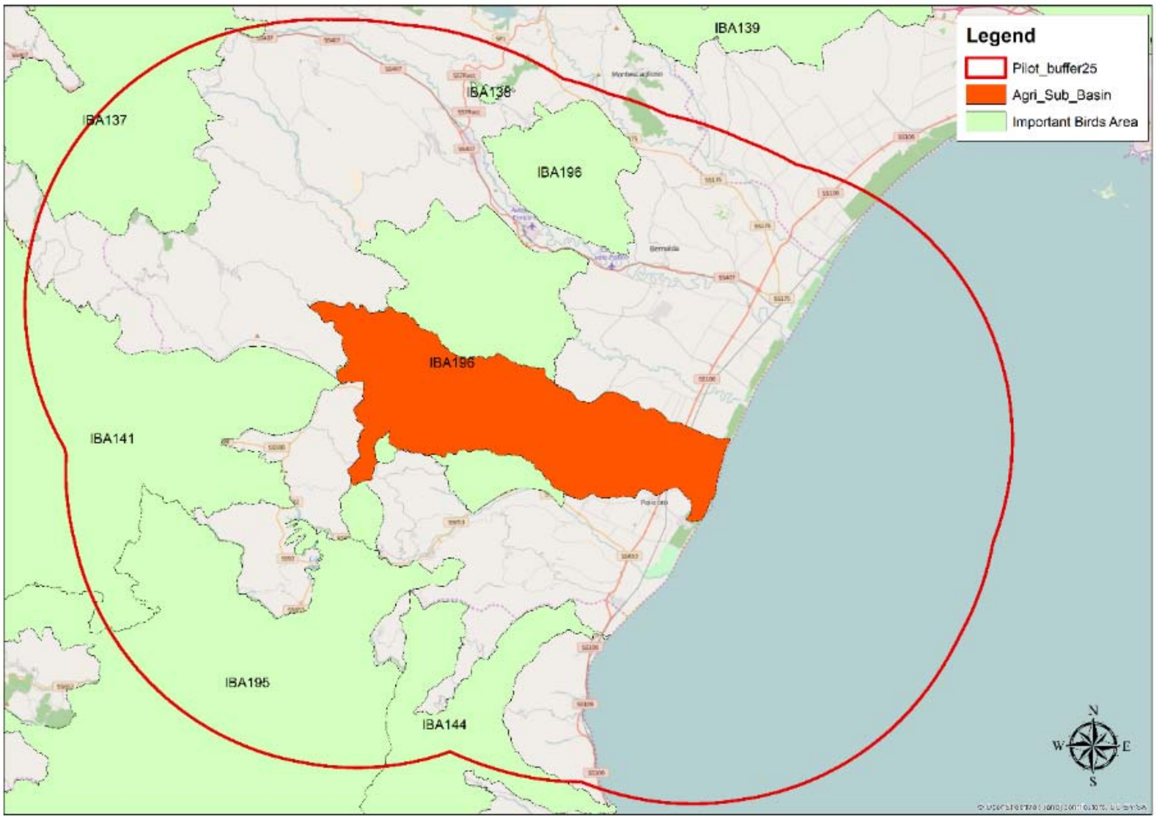


Fig. 90: Agri pilot sub-basin - Other important areas.

PART B – DESCRIPTION OF THE AGRICULTURAL SECTOR IN THE TARGETED AREAS

1. THE PILOT BASINS WITHIN THE GREATER TARGETED AREA: CROPS AND SOILS

1.1. Cretan Areas - Greece

1.1.1. Municipality of Platanias

As already described extensively in the deliverable of Action 1.1., tree crops is the dominant use in agricultural land within the Municipality of Platanias, a fact which is equally true within the selected sub-basin (Table 73). In numbers, tree crops (including almost exclusively olives, citrus and avocado) occupy about 34% of total land within the municipality of Platanias and 37% within the Tavronitis river basin, since both areas extend to the southern, mountainous part of the Municipality, which includes significant part of non-cultivated land. In contrast, the percentage of land dedicated to tree crops within the selected sub-basins corresponds to more than 80% of total land. This is representative for the northern zone of the Municipality, where most of the agricultural activity is concentrated and also includes the largest (almost exclusively) part of the irrigated agricultural land.

Table 73: Tree crop cultivation within the area of Platanias Municipality

Area	Total area (km^2)	Olive Groves (km^2)	Other fruit trees (km^2)
Municipality of Platanias	492	141	27
Tavronitis Basin	165	53	7,8
Pilot sub-basins	*33*	*23*	*4,0*

Olive tree is by far the dominant tree crop in the pilot area at a ratio of 5.7:1 as compared to the rest of fruit trees, which is representative of the ratio of 5.2:1 for the total area of Platanias. Based on data from the olive fruit fly control program within the Municipality, the total number of olive trees in the area is estimated to be around 3.3 million, which seems to be in accordance with the estimated use of 141 km^2 (14,100 ha) for olive cultivation in the area. Based on data presented on Table 73, the selected sub-basin includes about 16% of the total area cultivated with olives within the Municipality.

The second most important tree crop within the Municipality of Platanias, in terms of cultivated acreage, is citrus, which mostly include traditional orange orchards and to a much lesser degree mandarin and lemon tree. Orange cultivation is not as profitable for local farmers as compared to other crops, however, the total consumption in the Greek market remains at least 10 times higher than that of mandarin or lemons, a fact that indicates that despite the marketing problems, the long-awaited re-structuring of the citrus sector in the area should include orange as the main citrus product. Another important tree crop for the area, in terms mostly of exclusiveness rather than total acreage, is avocado. Chania Prefecture is the one where avocado cultivation was first established in Greece and, currently, remains the main producer of avocados in Greece, with most production concentrated in the Municipalities of Chania and Platanias. However, avocado cultivation is limited by the soil type, high quality water availability and climatic conditions (no frost tolerance), factors which are similar to those limiting the available areas for citrus cultivation. Therefore, the potential areas which are favorable for avocado growing within the pilot sub-basin are similar to those where citrus are grown, remaining at percentages close to 10% of the total agricultural land, limiting the impact potential of this crop at a larger scale as compared to olive trees. Despite its importance for local economy, avocado cultivation does not have currently the potential to be as important at island level as olives and citrus.

As already mentioned, the irrigated land within the area of Platanias is concentrated to the Northern part of the Municipality. This is equally true for the selected Voukolies and Maleme sub-basins and is the factor that limits the cultivation of tree crops other than olives in the Southern parts of both areas. This creates seasonal antagonism for water use with other sectors, like tourism, along the coastal front (Northern part) of the Municipality, a fact which is also true for both the broader (Platanias) and pilot (selected sub-basins) areas. Citrus trees are exclusively cultivated on irrigated land, while olive tree is cultivated under all possible irrigation schemes (fully irrigated, partially irrigated and rainfed), depending on water availability. The water availability, along with landscape are also critical factors for determining the intensity of olive tree cultivation, with orchards in the Northern part being more densely planted with cv. 'Koroneiki' and more productive, while towards the Southern part, in areas with higher slope, the typical orchards include larger trees of cv. 'Mastoidis' planted in lower density and cultivated in a low-input management scheme, which corresponds to lower yields too. All the above mentioned typical olive orchard management schemes for the area of Platanias, are also included within the selected sub-basin.

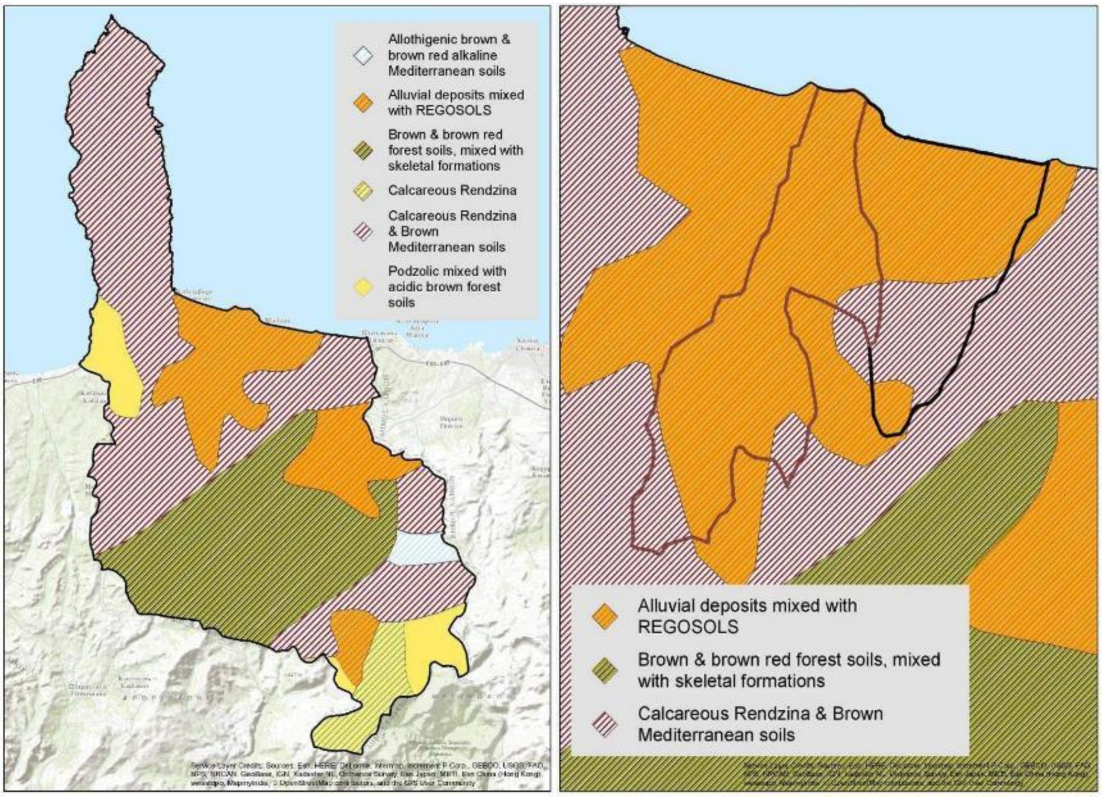
A.  B.

Fig. 91: Soil map of Platanias area (A) and the pilot basins (B).

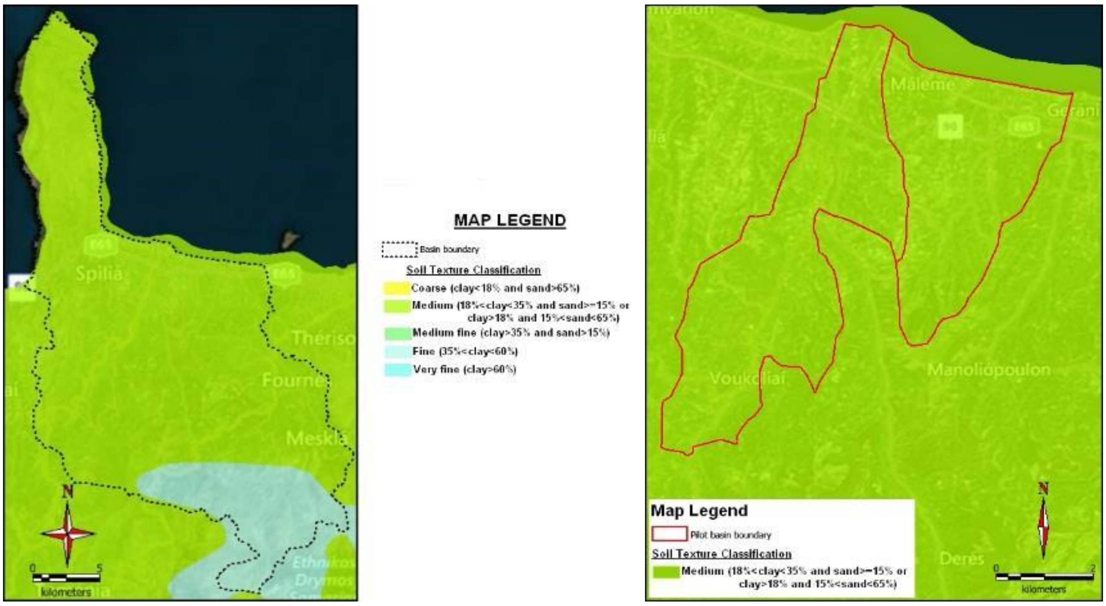
A.  B.

Fig. 92: Spatial distribution of the dominant textural class at the surface soil horizons for Platanias area (A) and the pilot basins (B).

As compared to typical soil classes and soil texture for the area, the pilot area is not significantly differentiated from the typical for Platanias Municipality, as already reported in the deliverable of Action 1.1. and indicatively presented in Fig. 91 and Fig. 92. The pilot area includes both calcareous Rendzina and alluvial deposits, which are the dominant soil classes in the agricultural land of Platanias Municipality (brown and brown-red forest soils mostly represent the forest and semi-natural areas). Accordingly, medium texture is the dominant category for surface soil texture, as in the largest part of Platanias area.

Based on the above mentioned, the pilot area is considered to be a typical example in terms of agricultural activity, as compared to the larger target area of the Platanias Municipality.

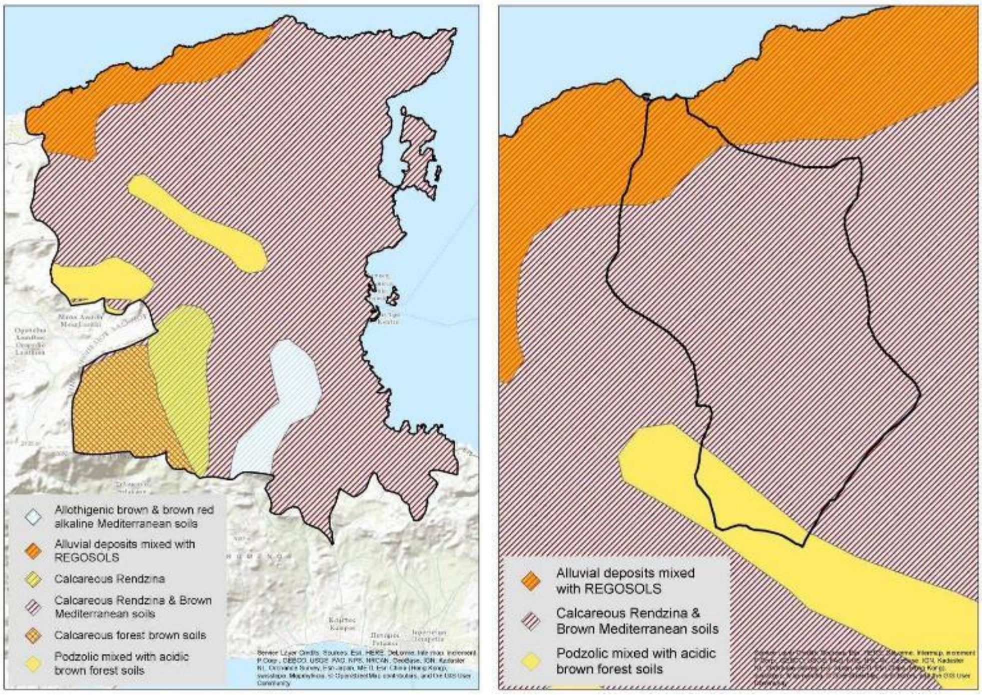
1.1.2. Municipality of Ag. Nikolaos (Mirabello)

Although tree crops are still the main plant growing agricultural activity in Mirabello, in contrast to Platanias area, olive tree is almost exclusively cultivated here, with no other tree crops representing a worth-mentioning percentage. The percentage of cultivated land in Mirabello is lower as compared to Platanias, with olive tree representing 16.6% of total land area. However, within the pilot sub-basin of Havgas - Milatos, olive tree cultivation represents a more significant percentage as a land use, reaching 37.4% of total land area.

The availability of water for irrigation is in general lower in the Eastern part of Crete and this is also true for Mirabello area. Moreover, the quality of the available water is lower due to increased salinity levels. Therefore, olive trees are mostly cultivated under rainfed conditions. This is in general also true within the pilot basin of Hafgas-Milatos, where irrigated orchards are concentrated in certain spots within the basin. The lack of irrigation water is a limiting factor for reaching typical high yields for the cv. Koroneiki, with biennial yield fluctuation being more intense. Planting densities are often lower as compared to the western part of Crete, while tree size is retained smaller, all due to the lower water availability and/or the less fertile (rocky) soils. These typical situations for the Eastern part of Crete Island are also true within the selected basin.

In terms of soil units identified within the Havgas - Milatos sub-basin, the dominant class in olive orchards is calcareous Rendzina soil, which is also the dominant class within the greater Mirabello area (Fig. 93). Soils are also typically medium-textured in the upper layer (soil layer explored by plant roots), again in accordance to the typical for Mirabello area (Fig. 94).

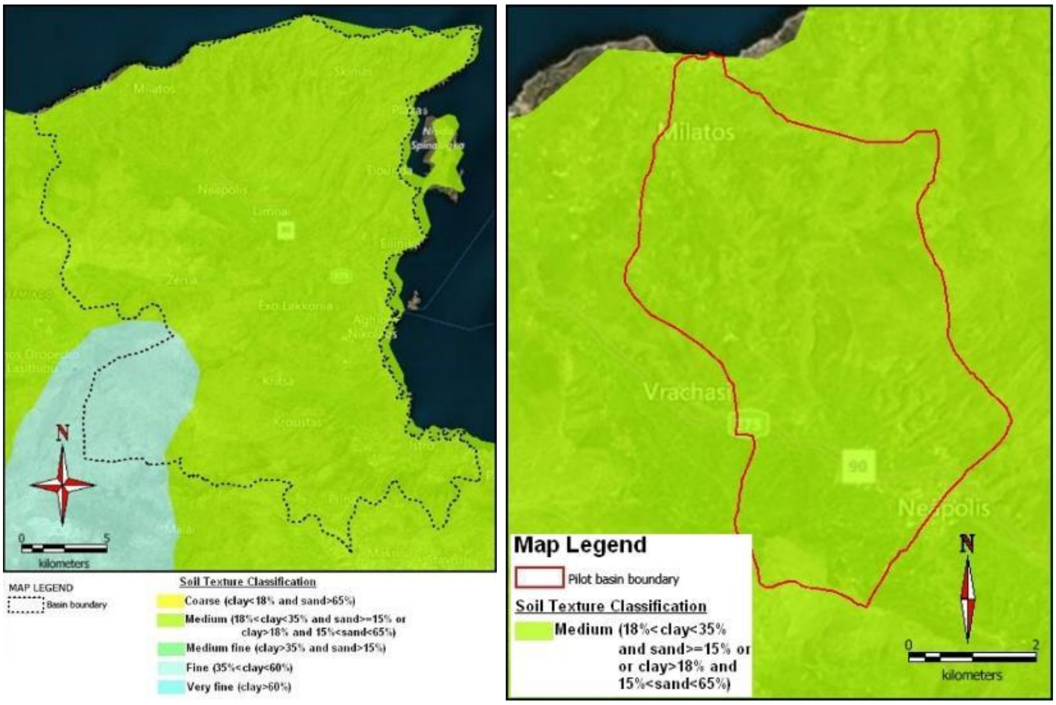
A.



B.

Fig. 93: Soil map of Mirabello area (A) and Havgas - Milatos sub-basin (B).

A.



B.

Fig. 94: Spatial distribution of dominant particle size distribution class at the surface soil for Mirabello area (A) and Havgas - Milatos pilot sub-basin (B).

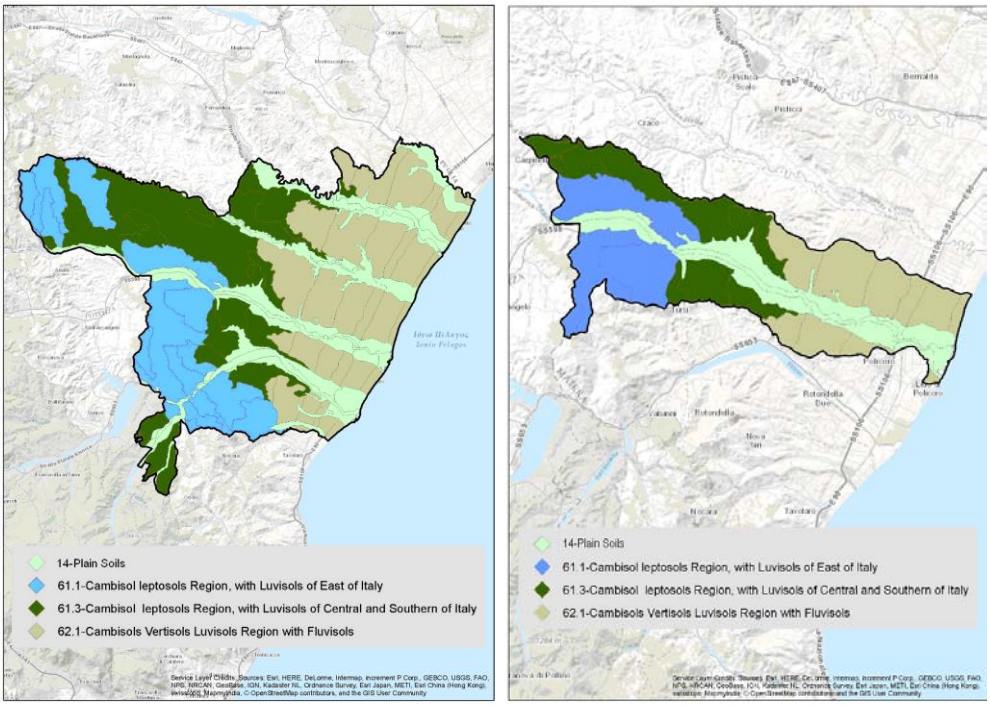
1.2. Metapontino Area - Italy

Agriculture is the main land use in Metapontino area, while main agricultural activities include fruit and vegetable crops, occupying an area of 28.000 ha. Tree crops are equally important in the pilot sub-basin of Agri, occupying 6,326 ha (Table 74), with apricot and peaches occupying about 2,653 out of the 3,701 ha dedicated to fruit trees other than citrus and olives. Therefore, these two stone-fruit crops are the most important in terms of land use acreage, followed by olives and citrus. This is in accordance to the general trends in the area of Metapontino, as well as the broader Basilicata area, as already extensively discussed in the deliverable (report) of Action A.1.1.

Table 74: Agri sub-basin crops

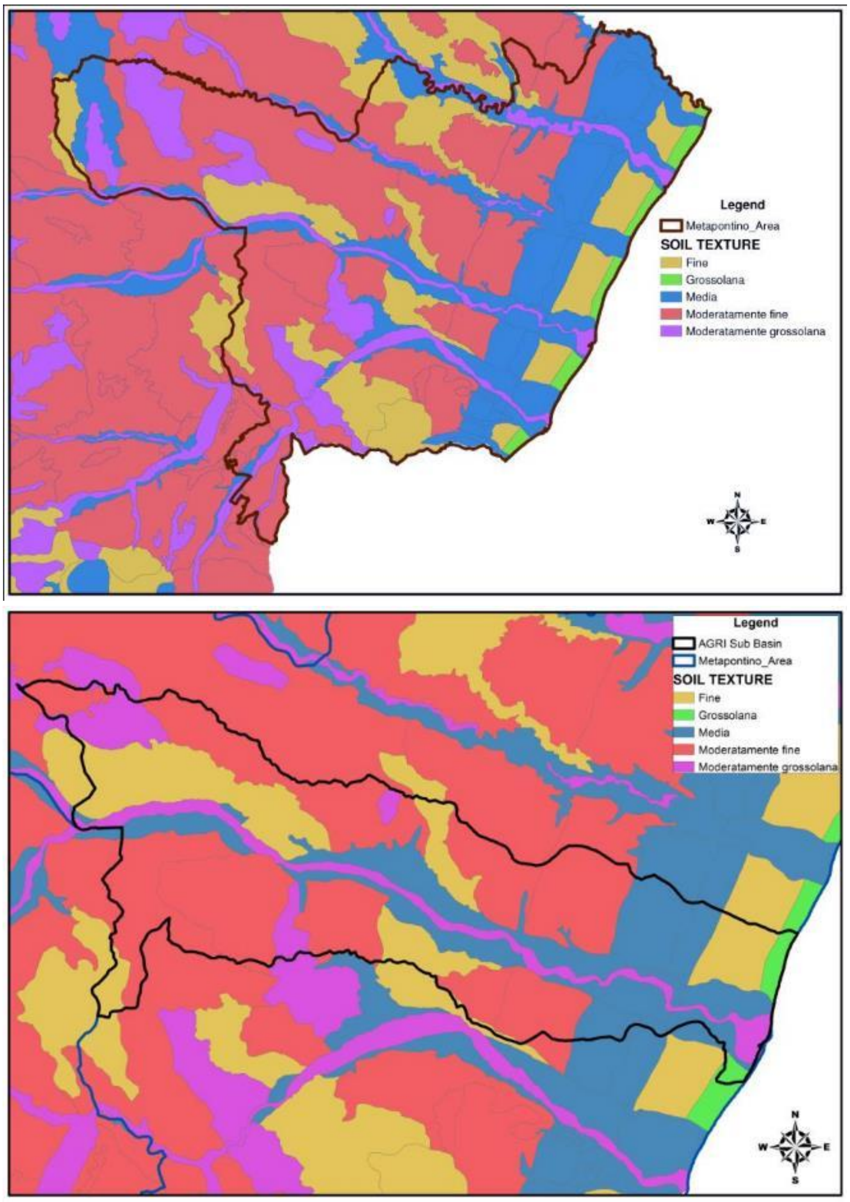
Sub basin	Olive (Ha)	Orchards (Ha)	Citrus (Ha)	Total
Agri Sub Basin	1,778.79	3,701.50	845.92	6,326.21

Based on data presented on Table 2, the selected sub-basin includes about 28% of olive trees, 59% of fruit trees and 13% of citrus of the total area cultivated. 71% of fruit trees are represented by stone-fruit trees, in particular 40% of peach and 32% of apricot.
Stone-fruit trees and citrus are usually irrigated within the pilot sub-basin, while olive trees are cultivated under irrigated or rainfed conditions. This is also in accordance to typical trends within the Metapontino area.
In general, major soil units and soil textures in the area are differentiated in a parallel axis within the different river basins (Fig. 95 & Fig. 96). Therefore, both parameters within the Agri sub-basin can be considered as typical, compared to the broader Metapontino area.



A. B.

Fig. 95: Pedological maps of Metapontino (A) and Agri sub-basin (B) areas.



A.

B.

Fig. 96: Soil texture mapping for Metapontino (A) and Agri sub-basin (B) areas.

2. THE CURRENT STATUS IN THE PILOT SUB-BASINS, AS OUTLINED BY FARMER INTERVIEWS

The collection of data on agricultural practices through the AWMS forms developed in the frame of the Agricultural Water Management System in Action A.2 that local farmers apply in the approximately 100 farms per pilot area, is analyzed for the description of the present status and the identification of possible direct and indirect environmental risks. In the present Chapter, a brief description of the outcomes from the analysis of data emerging from the 1st AWMS form are presented for each pilot sub-basin and discussed based on how typical they are considered for the whole target area.

2.1. Voukolies and Maleme sub-basins

2.1.1. Crops and applied practices

Data collected from the pilot sub-basins of Voukolies and Maleme, referred to 100 orchards in total, including 91 olive orchards, 8 citrus orchards and 1 avocado orchard. Based on data provided by the farmer, the single avocado orchard could not be considered as representative, given that it was not irrigated and fertilized. Due to its origin from tropical environments, avocado tree has the highest irrigation water requirements among the local tree crops and its cultivation with no irrigation is not commercially viable under the Cretan climatic conditions. Therefore, supported by the fact that avocado was not included in the original plan of studying crops in the pilot sub-basins, the single avocado orchard was not considered as typical for further evaluation and draw of conclusions for the current status of the agricultural sector in the area.
The ratio of 11.4:1 among the olive and citrus orchards included in the data collection procedure is higher than the typical ratio of 5.7:1 for the pilot area. This is something that should be considered and be ameliorated during the final selection of the 10 pilot farms. However, given that: a) typical crop requirements are less variable for citrus, as compared to olive trees (which include several possible cases of planting density and irrigation water usage) and b) the fact that citrus cultivation is limited to a less variable farm environment than olives, including low-slope areas and specific soil properties, we assume that the lower number of citrus farms included will not significantly affect the evaluation procedure.

Olive orchards

Considering the data collected for the olive orchards, key data discussed below are presented on Table 75. From the 91 olive orchards included, 16 were organic (17.6%), while the percentages of fully or partially irrigated vs rainfed orchards were almost equally distributed (47 irrigated orchards, or 51.6% and 44 rainfed orchards, or 48.4%). The vast majority of the orchards were fully productive, with only 5 of them including trees less than 15-years-old and none of them with trees less than 5-years-old. The mean reported annual productivity of the orchards was 7,85 tn of fruit per ha, which is considered reasonable. Irrigated orchards had a mean annual yield of 8,25 tn/ha, which, as expected, was higher than that of rainfed orchards (7,41 tn/ha), but not as high (in average values) as the typical productivity of an irrigated orchard, for reasons that will be discussed later on. The mean reported density was 210 trees/ha, which is also considered as typical for the area, although there was not an expected differentiation on planting densities among irrigated and non-irrigated orchards.

Table 75: Indicative data collected through the 1st AWMS form, for 91 olive orchards in the pilot sub-basins of Voukolies and Maleme

Parameter	All orchards	Conven-tional	Organic	Irrigated	Rainfed
Number of orchards	91	75	16	47	44
Tree age (years) Mean Max Min	35 96 7	34 96 7	38 18 96	37 7 96	32 7 96
Productivity (tn/ha) Mean	7.85 16.7	7.79 16.7	8.14 15.0	8.26 16.0	7.41 16.7

Max Min	1.00	1.00	5.00	3.00	1.00
Density (trees/ha) Mean Max Min	210 400 110	210 400 110	220 380 140	210 400 110	210 300 130
Soil cultivation applied (number of cases)	17	14	3	9	8
Weed mowing (number of cases)	50	34	16	21	29
Use of cover crops (number of cases)	0	0	0	0	0
Grazing (number of cases)	0	0	0	0	0
Pruning applied (number of cases)	91	75	16	47	44
Summer pruning (number of cases)	0	0	0	0	0
Burning of prunings (number of cases)	79	69	10	41	38
Shredding of prunings (number of cases)	12	6	6	6	6
Application of organic material from external sources (number of cases)	11	5	6	1	10

Soil cultivation was applied once per year to 17 orchards (18.7%), a practice that, depending on the slope of the area, may have a negative impact on soil erosion and soil fertility. Weed mowing was applied once or twice per year in 50 orchards (54.9%), while cover crops were not grown during winter in none of the orchards. Although the status of the orchard floor during the winter months cannot be judged by the existing set of data, the non-application of cover crops, in combination with chemical control of weeds in 38.4% of the orchards, implies that there is bare soil during winter in a significant percentage of the orchards, reducing the potential for water storage in the soil during the rainy season. Based on farmer interview data, intentional grazing by livestock is not a typical practice in the area (0% of the orchards), in contrast with other areas in Crete. Pruning is a typical practice applied in all orchards once per year (winter time), although its efficiency could not be judged by the data collected through the AWMS forms. No summer pruning is applied in the area, in contrast to other olive growing areas in Greece. Estimates on mean weight of prunings are not available, since it is a parameter not recorded by farmers. Considering the management of pruning wood, burning is the practice applied by the vast majority of farmers, with 82.4% burning it at the orchard and 4.4% use it for heating (fireplace). Shredding of prunings and dispersion to the orchard is limited to 13.1% of the orchards. Therefore, a potential source of organic material that could be used for mulching and increasing of soil organic matter is wasted in 86.9% of the orchards. Considering the application of organic material from external sources, this is also quite low in olive orchards, with manure applied in only 8 orchards

(8.8%) and compost in 3 (3.3%) of them. Manure application rates could be considered as adequate, with mean application rates per year ranging from 5 to 7.5 tn/ha, in 5 out of 8 orchards (62.5%), while application of compost is considered as limited, at rates around 0.6 tn/ha in the 3 orchards. It is worth mentioning that manure and compost application is at low percentages even in organic orchards, with 3 cases in 16 orchards for each material, i.e. a percentage of 18.7%.

Citrus orchards

Considering the data collected for the citrus orchards, key data discussed below are presented on Table 76. From the 8 citrus orchards included, 1 was organic, while all orchards were irrigated, as it is the typical practice in citrus orchards in the pilot area. From the 8 orchards, a single one was a lemon tree orchards, while the rest were orange tree orchards. Moreover, the single lemon tree orchard was the only one which included non-productive trees with an age of 3 years-old. Another orange tree orchard was 5-years-old but reported with an adequate fruit productivity, while the remaining 6 were fully productive at ages ranging from 21 to 36-years-old. Mean annual productivity of the fully productive orchards ranged from 17.5 to 40.0 tn of fruit per ha, which is considered within the typical range for the area. The organic orchard was the one with the minimum yield (17.5 tn/ha), which again could be considered as an expected outcome, given its lower input in nutrients and less efficient control of pests. Reported planting densities ranged from 240-400 trees/ha, which corresponds to planting distances ranging from 5 to 6.4 meters, considered as typical for the area.
Soil cultivation was applied in 2 orchards (25%), a practice that, depending on the slope of the area, may have a negative impact on soil erosion and soil fertility. Weed mowing was applied once or twice per year in 6 orchards (75%), while cover crops were not grown during winter in none of the orchards. Chemical control of weeds was applied in 2 orchards (25%).

Table 76: Indicative data collected through the 1st AWMS form, for 8 citrus orchards in the pilot sub-basins of Voukolies and Maleme

Parameter	All orchards	Conventional	Organic
Number of orchards Orange trees Lemon trees	8 7 1	7 6 1	1 1 0
Irrigation applied (number of cases)	8	7	1
Average tree age (years) Range	24 (3-36)	23 (3-36)	31
Productivity range (tn/ha)	17.5-40.0	20.0-40.0	17.5
Density range (trees/ha)	240-400	240-400	380
Soil cultivation applied (number of cases)	2	2	0
Weed mowing (number of cases)	6	5	1
Use of cover crops (number of cases)	0	0	0
Grazing (number of cases)	0	0	0
Pruning applied (number of cases)	8	7	1

Summer pruning (number of cases)	0	0	0
Burning of prunings (number of cases)	8	7	1
Shredding of prunings (number of cases)	0	0	0
Application of organic material from external sources (number of cases)	1	1	0

Pruning is a typical practice applied in all orchards once per year (winter time), although its efficiency could not be judged by the data collected through the AWMS forms. In general, pruning of citrus trees is not as intense as in olive orchards. No summer pruning was applied, which is typical for the area. Estimates on mean weight of prunings are not available, since it is a parameter not recorded by farmers. Considering the management of pruning wood, burning in the orchard was the common practice applied in all 8 orchards. Shredding of prunings and dispersion to the orchard was not applied in any orchard. In general, use of organic material from external sources (manure, compost, etc.) was minimal and was not practiced at all in any of the fully productive orchards. The only orchard where a low amount of compost (750 kg/ha) was applied was the young lemon tree orchard.

2.1.2. Use of water and agrochemicals

A. Use of irrigation water

Data on the use of irrigation water, as they derived from the completion of the AWMS forms, are summarized on Table 77. As already mentioned, the data refer to 47 irrigated olive orchards and the 8 citrus orchards.

Concerning the irrigation of olive orchards, the provided data present a significant deviation from what is considered as typical irrigation water requirements for olive trees in the area. Depending on climatic factors, full irrigation of olive orchards in North-Western Crete typically requires 228-270 mm of water (BEWARE project, 2005; Doupis et al., 2013), while the relevant limits on water use for irrigating olive trees, as set by the Decentralized Administration of Crete (DAC) in relevant local legislation (Decision published at FEK 2055B/2015) are 250-300 mm. However, according to farmers' interview data, the average annual application of irrigation water was only 63 mm, ranging from 17 to 334 mm. The distribution of reported values was skewed towards the lower end, with 40 out of 47 orchards (85%) reporting an average application of less than 100 mm of water per year. In the same percentage of orchards, the average number of irrigations per year was reported to be 1 or 2. Based on the reported values, the vast majority of irrigated olive orchards could not be characterized as receiving adequate amounts of water, while for several of them (45%) it was reported as receiving up to 25 mm per year, a value which is close to 10% of actual requirements and it is questionable if it can actually be beneficial in reducing water stress and increasing orchard productivity. Moreover, the recorded status is considered to be non-representative for irrigated orchards in the Prefecture of Chania, based on data provided by previous reports (BEWARE project, 2005).

Table 77: Data on irrigation water use in orchards within the pilot sub-basins of Voukolies and Maleme, as derived by the 1st AWMS Form

Parameter	Average value	Maximum value	Minimum value
Olive orchards			
Water use (mm/year)	63	334	17
Number of irrigation events per year	2	10	1
Mean water application per event (mm)	28	167	8
Citrus orchards			
Water use (mm/year)	325	800	75
Number of irrigation events per year	14	8	40
Mean water application per event (mm)	27	80	8

Possible factors contributing to this deviation of recorded data from the typical situation for the area, could be the following:

Farmers apply water empirically, without actually knowing the exact amount they use for irrigation, nor the actual requirements of their crop. The lack of a strict recording schedule of applied water further contributes to this lack of knowledge. An example that verifies the above mentioned statement is a single orchard where the farmer reported the application of 167 mm of water per irrigation event, a number which is extremely high and definitely far away from truth. Moreover, the lack of knowledge is highlighted by the fact that they report to apply a minimal number of irrigations with an average application of 28 mm of water per event, which is beyond the suggested dosage per irrigation event for an orchard on a medium texture soil (BEWARE project, 2005). Applying the same amount of water in two instead of one application would increase the irrigation efficiency and reduce the loss of water through deep percolation.

Water availability is limited and thus, farmers cannot apply the amount of irrigation water they need. This fact is actually true in certain areas, but for the typical availability of irrigation water within the existing irrigation network of the Municipality of Platanias, the high percentages of minimal water application are not justified.

Farmers have changed their irrigation strategy in recent years, as compared to surveys performed in the previous decade. This fact is also true. The low market price for bulk olive oil in the beginning of the present decade lead farmers to reduce all kinds of inputs, in an attempt to reduce the production cost. Concerning the use of irrigation water, they have applied a significant number of wrong practices, including the non-irrigation of olive orchards during their low-cropping year. Therefore, if the mean annual value reported for the last five years include "irrigated" and "non-irrigated" years, then it is not typical for none of the two cases.

With the existing information, it is not possible to judge the contribution of each of the above mentioned factors in collecting data that cannot be considered as representative of the present status. However, more intense data gathering during the following years for the same orchards will contribute in identifying the source of error.

Concerning the water use in citrus orchards, provided data are much closer to reality, although they also present a significant variation, for reasons similar to those reported for olive orchards. The average annual water use reported was 325 mm, with typical requirements for citrus trees in the area estimated to be around 500 mm (BEWARE project, 2005) and the limits set by the DAC being 400-500mm. However, extreme values included two orchards representing the minimum (75 mm/year) and maximum (800 mm/year) values reported. Number of irrigation events per year ranged from 10 to 15 in most cases, although there was an extreme case of 40 irrigations per year, which is justified by the fact that it referred to the young trees of the lemon orchard, which had to be irrigated more frequently than mature trees. The calculated mean application dose per irrigation event was higher than the estimated soil water holding capacity of a medium texture soil, in 4 out of 8 orchards (50%).

B. Use of fertilizers

The types and the mineral composition of fertilizers applied in the pilot sub-basins of Platanias are summarized on Table 78. As already mentioned in section 2.1.1. of the present report, there were also a few orchards where fertilizing was supported by the application of organic material (manure, compost, etc.). There were 20 distinct types of fertilizers recorded. Three of them were composite organic fertilizers. Given their low content in mineral elements and their organic nature, the environmental risk from the use organic fertilizers is usually low. Another group of 5 fertilizers contained chemical forms with high concentrations (usually 20% or more) of 1 key macronutrient (typically N, P or K). In their case, risks of environmental pollution is mostly linked to N-containing fertilizers, since wrong timing and/or unfavorable climatic conditions may lead to increased losses of nitrates to deeper soil layers and/or ammonia losses to the atmosphere. However, their use is preferred against "composite" fertilizers which contain several mineral elements (at least 3), since optimized timing of application and dosage is better controlled for each nutrient. Borax was the only fertilizer used for the application of a micronutrient in high quantities, due to the importance of B in olive tree nutrition. Despite the possible environmental risks linked to the use of borax, typical application dosage of up to 500 g of fertilizer per tree (approx. 105 kg/ha) every 3 years is relatively low. Borax was applied in 15 out of 91 olive orchards (16.5%). Finally, a large group of 10 composite fertilizers were used in the area. As already mentioned, the use of composite fertilizers with a fixed ratio among nutrients may lead to higher application rates of certain nutrients, which in the case of olive and citrus orchards is usually linked to higher application rates of P, as compared to actual crop requirements.

Table 78: Type and mineral composition of fertilizers used in the pilot sub-basins of Voukolies and Maleme, based on the 1st AWMS form

Fertilizer	Mineral elements (%)							
	N	P_2O_5	K_2O	CaO	MgO	S/SO_3	Na_2O	B
Organic fertilizer 1	5	5	5					
Organic fertilizer 2	9	5	4					
Organic fertilizer 3	6	6	6					
Calcium ammonium nitrate	26	0	0	8				
Ammonium sulphate	21	0	0			24		
Potassium Sulphate	0	0	50			18		
Potassium Nitrate	13	0	46					
Urea	46	0	0					
Ammonium phosphate – sulphate	16	20	0			13		

Borax ($Na_2B_4O_7.10H_2O$)						15	16.5	11.5
Fertilizer 11-15-15 (indicative: YARA 11-15-15 15SO3)	11	15	15					
Fertilizer 20-10-10 (indicative: ELFE 20-10-10 9SO3)	20	10	10			9		
OLIFERT 19-6-15	19	6	15			4		0.5
SOLINUR 20-20-20 (fertigation)	20	20	20					
Fertilizer 21-7-14	21	7	14					
COMPLESAL 12-12-17	12	12	17		2			
COMPLESAL 12-8-16	12	8	16		3	10		0.02
COMPLESAL 18-6-12	18	6	12		2			0.25
HAIFA 18-8-18	18	8	18		2			
Fertilizer 15-15-15	15	15	15					

Data on the annual application rates of key macronutrients (N, P, K) in olive orchards are presented on Table 79. It is important to mention that no chemical fertilizers containing N, P and K were applied in 21, 38 and 30 orchards respectively for each nutrient. Given the low percentages in the application of organic materials in the orchards, non-application of N and K for a long period of time is usually linked to severe effects on orchard productivity and despite the limited environmental risks, it cannot be considered as an efficient agricultural practice.

Table 79: Overview of N, P and K application in olive orchards in the pilot sub-basins of Voukolies and Maleme

Parameter	All orchards	Conven-tional	Organic	Irrigated	Rainfed
Number of orchards	91	75	16	47	44
Nitrogen					
Number of non-fertilized orchards	21	15	6	10	11
N application in fertilized orchards (kg of N/ha) Mean Max Min	104 283 1.0	113 283 1.0	49.5 98.2 1.1	110 283 1.0	97.3 230 1.1
Application rate related to fruit yield (kg of N / tn of fruit) Mean Max Min	14.8 76.0 0.1	16.2 32.0 0.2	6.1 12.9 0.1	14.7 40.3 0.2	14.8 76.0 0.1
Phosphorus					

Number of non-fertilized orchards	38	32	6	20	18
P application in fertilized orchards (kg of P_2O_5/ha) Mean Max Min	 48.1 150 1.0	 50.7 150 1.0	 37.1 60.0 1.0	 51.7 150 1.0	 44.4 100 15.0
Application rate related to fruit yield (kg of P_2O_5 / tn of fruit) Mean Max Min	 7.0 24.0 0.1	 7.6 24.0 0.2	 4.6 7.1 0.1	 7.1 18.7 0.2	 6.9 24.0 0.1
Potassium					
Number of non-fertilized orchards	30	24	6	11	19
K application in fertilized orchards (kg of K_2O/ha) Mean Max Min	 97.5 560 0.4	 88.6 250 0.4	 143 560 1.0	 116 560 0.4	 70.3 250 0.5
Application rate related to fruit yield (kg of K_2O / tn of fruit) Mean Max Min	 12.6 42.0 0.1	 12.1 32.0 0.1	 14.7 42.0 0.1	 14.6 42.0 0.1	 9.6 27.4 0.1

The nutrient requirements of an olive orchard are quite variable, depending mostly upon its productivity and water availability. Therefore, a better evaluation of the reported amounts of nutrient application could be performed by relating the reported application dosage to the reported mean annual yield. Estimates of amount of nutrients applied per tn of olive fruit produced are also presented on Table 79. Rough estimates of typical requirements in N, P_2O and K_2O are about 12, 4.6, and 12 kg per tn of olive fruit produced, respectively. The corresponding mean values in the fertilized olive orchards were 14.8, 7.0 and 12.6 kg of N, P_2O and K_2O respectively, per tn of fruit. Therefore, in all cases mean values were slightly or significantly higher than the estimated actual requirements. However, as it is shown by the reported minimum and maximum values in all parameters presented on Table 79, there were a few cases (about 5) were non-realistic high or low values were reported by farmers, probably due to miscalculations or improper recording of applied practices, while linking of fruit yield to fertilizer application is not applicable to a single orchard with 7-year-old trees, which gave unrealistic, high values. However, over-fertilizing in a significant number of orchard is actually true, if we consider the following:

- In 46 out of 70 orchards (65.7%) fertilized with N, the application rate exceeded 12 kg of N per tn of fruit.

- In 37 out of 53 orchards (69.8%) fertilized with P, the application rate exceeded 4.5 kg of P_2O_5 per tn of fruit.
- In 22 out of 61 orchards (36.1%) fertilized with K, the application rate exceeded 12 kg of K_2O per tn of fruit.

Finally, fertigation, a practice that could increase nutrient use efficiency and minimize losses, was not applied in any of the irrigated olive orchards.

Table 80: Overview of N, P and K application in citrus orchards in the pilot sub-basins of Voukolies and Maleme

Parameter	Mean value	Maximum value	Minimum value
Nitrogen (kg of N/ha)	105.5	192	5.0
Phosphorus (kg of P_2O_5/ha)	80.4	210	5.0
Potassium (kg of K_2O/ha)	167.3	420	5.0

Data on the annual application rates of key macronutrients (N, P, K) in citrus orchards are presented on Table 80. All orchards were reported as fertilized, while 2 out of 8 orchards reported the use of fertigation. We have to remind that values presented on Table 80 do not include the use of other organic sources (manure and compost), which was minimal in citrus orchards, as already reported in section 2.1.1. Minimal values refer to the young lemon tree orchard. In all orchards, the application rates for N ranged from reasonable to less than adequate. In contrast, the application rates of P could be considered as high in 3 out of 8 orchards, although no conclusions can be drawn without data of soil analyses. Potassium was the nutrient applied in the highest rates, but again, with the exception of a single farm, the application rates could not be considered as high. Therefore, in general, citrus orchards seem to be either adequately or under-fertilized in most cases.

C. Use of Plant Protection Products

A list of plant protection Products (PPPs) used in the sub-basins of Voukolies and Maleme is presented on Table 81. In general, use of PPPs in olive orchards could be considered as limited as compared to other tree crop. However, it has to be mentioned that farmer's did not report the chemicals used in bait sprays for control of olive fruit fly, since they are applied by the State and they don't have exact knowledge of the chemicals used. It has to be mentioned though, that bait sprays, due to their nature, pose a minimal threat to the environment, if properly applied. On the contrary, cover sprays, mostly with dimethoate or deltamethrin have been reported to be applied in 57 out of 75 conventional farm, up to 4 times per year. In all cases, the chemicals that have been reported as used in the orchards are allowed for use in olive orchards, while the reported dosage is in accordance with the guidelines. Similarly, use of pesticides in citrus orchards was in accordance to guidelines, with chemicals that are allowed to be used in citrus trees. The appropriate timing of application, could not be judged, since this type of data were not collected.

Chemical control of weeds was applied in 35 out of 75 conventional olive orchards and 2 out of 7 conventional citrus orchards. Chemical control was in all cases performed using glyphosate. This active ingredient is still allowed for use in orchards, despite the recent debate at international level related to possible toxicity effects on living organisms.

Table 81: List of PPPs used in the pilot sub-basins of Voukolies and Maleme, based on the 1st AWMS form

Commercial name	1st Active Ingredient (a.i.)	2nd Active Ingredient (a.i.)	1st a.i (%)	2nd a.i (%)
Herbicides				
ROUNDUP or similar	glyphosate		36 % w.v.*	
Pesticides and fungicides				
SUCCESS 0.24 CB	spinosad		0.024% w/v	
Cu containing fungicides	Indicatively: Copper oxychloride Copper hydroxide Bordeaux mixture		variable	
Decis	deltamethrin		2.5 EC 25 WG 1.5 EW 10 EC	
Dursban 48 EC	chlorpyrifos		48% w/w	
Proteus 110 OD	deltamethrin	thiacloprid	1% w/v	10% w/v
ROGOR L 40 EC	dimethoate		40% w/v	
Pyrethron 5 SC - 100 cc	Natural pyrethrins		5% w/v	
PYRINEX	Chlorpyrifos		48% w/v	
PARAFFINIC OIL	PARAFFINIC MINERAL OIL		98,5%	

*Composition may vary depending on manufacturer.

2.2. Havgas – Milatos sub-basin

2.2.1. Crops and applied practices

Data were collected from 101 olive orchards within the pilot sub-basin of Havgas - Milatos. The data related to crop characteristics and agricultural practices not involving the use of water and agrochemicals are summarized on Table 82.

Table 82: Indicative data collected through the 1st AWMS form, for 95 olive orchards in the pilot sub-basin of Havgas - Milatos

Parameter	All orchards	Conven-tional	Organic	Irrigated	Rainfed
Number of orchards	101	90	11	13	88
Tree age (years)					
Mean	82	84	68	58	87
Max	100+	100+	100+	100+	100+
Min	13	16	13	31	13
Productivity (tn/ha)					
Mean	4.6	4.7	3.6	5.6	4.5
Max	16.7	16.7	5.6	12.5	16.7
Min	0	0	1.7	2.0	0
Density (trees/ha)					
Mean	203	219	182	225	197

Max Min	419 3.8	419 3.8	244 76	368 130	419 3.8
Soil cultivation applied (number of cases)	12	11	1	0	12
Weed mowing (number of cases)	46	39	7	10	36
Use of cover crops (number of cases)	6	5	1	0	6
Grazing (number of cases)	23	19	4	3	20
Pruning applied (number of cases)	74	65	9	10	64
Summer pruning (number of cases)	0	0	0	0	0
Burning of prunings (number of cases)	67	64	3	10	57
Shredding of prunings (number of cases)	2	1	1	0	2
Application of organic material from external sources (number of cases)	3	3	0	1	2

From the 101 olive orchards included, 11 were organic (10.9%), while 13 were irrigated (12.8%). The vast majority of the orchards were fully productive, with 49 of them being more than 50-years-old, therefore increasing the average tree age for the area to 82 years. The mean reported annual productivity of the orchards was 4.6 tn of fruit per ha, which is significantly lower than that of Platanias, but reasonable given the low water availability and the drier climatic conditions of Eastern Crete. This is highlighted by the fact that irrigated orchards had a higher mean annual yield (5.6 tn/ha), as compared to rainfed orchards (4.5 tn/ha). The mean reported density was 203 trees/ha, which can be considered as typical, although there was significant variation with several orchards (7) having planting densities of less than 11 trees per ha.

Soil cultivation was applied once per year or every 2 to 3 years to 12 orchards (11.9%). Apart from the fact that soil cultivation may have a negative impact on soil erosion and soil fertility, the periodical application may destroy the active part of the root system increasing tree water stress. Weed mowing was applied once per year in 46 orchards (45.5%), while the use of cover crops during winter was only applied in 6 orchards (5.9%). A positive fact is that chemical control of weeds was limited to 2 orchards (2%), while grazing by livestock was applied in a significant percentage of orchards (22.7%), in contrast with the typical situation in Western Crete.

A significant differentiation, as compared to Platanias area, is that pruning is only applied to 73.3% of the orchards, while in 39.6% of them pruning is applied periodically and not on an annual basis. In all cases, no summer pruning was applied in the area. Estimate of mean weight of prunings was at 2.83 tn/ha, which in the majority of cases (67 out of 74 orchards, or more than 90%) was burned in the field. Shredding of pruned wood was reported in only 2 orchards (2%). Therefore, a potential source of organic material that could be used for mulching and increasing of soil organic matter is wasted in the vast majority of the orchards. Considering the application of organic material from external sources, this is also quite low, with manure applied in only 3 orchards. It is worth mentioning that manure was not applied in organic olive orchards.

2.2.2. Use of water and agrochemicals

A. Use of irrigation water

Data on the use of irrigation water, as they derived from the completion of the AWMS forms, are summarized on Table 83. As already mentioned, the data refer to 11 irrigated olive orchards.

Table 83: Data on water use in irrigated olive orchards within the pilot sub-basin of Havgas - Milatos, as derived by the 1st AWMS Form

Parameter	Average value	Maximum value	Minimum value
Water use (mm/year)	271	625	60
Number of irrigation events per year	5.6	8	3
Mean water application per event (mm)	115	300	47

As compared to the data reported by farmers in the area of Platanias, the Mirabello data are definitely more realistic and seem more reliable. Actual irrigation water requirements are higher in Eastern Crete due to significantly lower precipitation as compared to the North-Western part of the island. A rough estimate, since there is no availability of experimental data, would be 300-330 mm of water, depending on climatic conditions, although there is a legislative limit of 300 mm per year set by the Decentralized Administration of Crete. According to farmers' interviews, the average annual application of irrigation water was 271 mm, but ranging from 60 to 625 mm. Application rates above 600 mm are definitely beyond the actual crop requirements. The application rate per irrigation event is considerably high (115 mm) and definitely beyond the water holding capacity of any type of soil, but the validity of this parameter should be further investigated. At high application rates, it is expected that a significant amount of water is lost to soil layers beyond the root zone of the trees and therefore not utilized by the crop. Based on the above, it seems that there is a significant potential for improving irrigation water use efficiency.

B. Use of fertilizers

The types and the mineral composition of fertilizers applied in the pilot sub-basin of Havgas - Milatos are summarized on Table 84.

Table 84: Type and mineral composition of fertilizers used in the pilot sub-basin of Havgas - Milatos, based on the 1st AWMS form

Fertilizer	Mineral elements (%)							
	N	P_2O_5	K_2O	CaO	MgO	S/SO_3	Na_2O	B
Organic fertilizer	5	5	5					
Organic fertilizer	7	0	0					10
Calcium ammonium nitrate	26	0	0	8				

Ammonium sulphate	21	0	0			24		
Ammonium sulphate +B Indicative: Novatec Solub Olivo	21	0	0					0.2
Borax ($Na_2B_4O_7.10H_2O$)						15	16.5	11.5
Fertilizer 11-15-15 Indicative: YARA 11-15-15 $15SO_3$	11	15	15					
Fertilizer 15-5-12 Indicative: 15-5-12 2MgO, 0.2B)	15	5	12		2			0.2
Fetilizer 40-0-0 Indicative: NUTRIMORE WINNER 40-0-0 14,5 SO_3	40	0	0			14.5		
Fertilizer 20-10-10 Indicative: ELFE 20-10-10 $9SO_3$	20	10	10			9		
Fertilizer 11-0-43 IIndicative: FERTIPLANT 11-0-43	11	0	43					
ENTEC perfect 14-7-17	14	7	17		2	9		0.02

As already mentioned, there were also a minimal number of orchards where fertilizing was supported by the application of organic material (manure, compost, etc.). There were 12 distinct types of fertilizers recorded. Two of them were composite organic fertilizers, which were preferred to the application of other organic material in organic orchards. Given their low content in mineral elements and their organic nature, the environmental risk from the use organic fertilizers is usually low. Another group of 3 fertilizers contained chemical forms with high concentrations (>20%) of N. The environmental risks for N-containing fertilizers I linked to wrong timing and/or unfavorable climatic conditions, which may lead to increased losses to deeper soil layers and/or the atmosphere. However, their use is preferred against "composite" fertilizers which contain other mineral elements (at least 3), since optimized timing of application and dosage is better controlled for each nutrient. Borax was the only fertilizer used for the application of a micronutrient in high quantities, due to the importance of B in olive tree nutrition. However, despite its importance, borax was applied to only 1 orchard. The largest group of fertilizers used in the area were composite fertilizers (6 different types). As already mentioned, the use of composite fertilizers with a fixed ratio among nutrients may lead to higher application rates of certain nutrients, which in the case of olive orchards is usually linked to higher application rates of P, as compared to actual crop requirements.

Data on the annual application rates of key macronutrients (N, P, K) in olive orchards are presented on Table 85. It is important to mention that no chemical fertilizers containing N, P and K were applied in 66, 87 and 86 orchards respectively for each nutrient. Given that no organic materials were applied in the orchards, not applying fertilizers for a long period of time, in combination with the rainfed conditions in the majority of the orchards, is usually linked to severe effects on orchard productivity and despite the limited environmental risks, it cannot be considered as an efficient agricultural practice. In any case, the actual nutritional status of the orchards will be verified by leaf and soil analysis that will be performed during the project.

The nutrient requirements of an olive orchard are quite variable, depending mostly upon its productivity and water availability. Therefore, a better evaluation of the reported amounts of nutrient application could be performed by relating the reported application dosage to the reported mean annual yield. Estimates of amount of nutrients applied per tn of olive fruit produced are also presented on Table 85. Rough estimates of typical requirements in N, P_2O and K_2O are about 12, 4.6, and 12 kg per tn of olive fruit produced, respectively. The corresponding mean values in the fertilized olive orchards were 22.1, 13.0 and 17.3 kg of N, P_2O and K_2O respectively, per tn of fruit. Therefore, in all cases mean values were significantly higher than the estimated actual requirements. However, as it is shown by the reported maximum values in all parameters presented on Table 85, there were a few cases where non-realistic high or low values were reported by farmers, probably due to miscalculations, or improper recording of applied practices, while linking of fruit yield to fertilizer application is not applicable to young olive orchards, which can give unrealistic, high values. However, over-fertilizing in a significant number of the fertilized orchard is actually true, if we consider the following:

- In 10 out of 36 orchards (27.%) fertilized with N, the application rate exceeded 12 kg of N per tn of fruit.
- In 10 out of 15 orchards (66.7%) fertilized with P, the application rate exceeded 4.5 kg of P_2O_5 per tn of fruit.
- In 3 out of 16 orchards (18.7%) fertilized with K, the application rate exceeded 12 kg of K_2O per tn of fruit.

Finally, fertigation, a practice that could increase nutrient use efficiency and minimize losses, was not applied in any of the irrigated olive orchards. Based on the above mentioned, there is a potential in improving the efficiency of mineral nutrient use within the olive orchards of the area.

Table 85: Overview of N, P and K application in olive orchards in the pilot sub-basin of Havgas - Milatos

Parameter	All orchards	Conven-tional	Organic	Irrigated	Rainfed
Number of orchards	101	90	11	13	88
Nitrogen					
Number of non-fertilized orchards	66	57	9	9	56
N application in fertilized orchards (kg of N/ha)					
Mean	91.2	96.5	0.2	74.7	93.2
Max	314.5	314.5	0.3	186.7	314.5
Min	0.0	0.0	0.0	0.0	0.0

Application rate related to fruit yield (kg of N / tn of fruit) Mean Max Min	 22.1 73.6 0	 23.5 73.6 0	 0.04 0.07 0.0	 23.4 52.0 0.0	 22.0 73.6 0.0
Phosphorus					
Number of non-fertilized orchards	87	78	9	13	73
P application in fertilized orchards (kg of P_2O_5/ha) Mean Max Min	 61.8 112.5 0	 71.3 112.5 0	 0.2 0.3 0.0	 -- -- --	 61.8 112.5 0
Application rate related to fruit yield (kg of P_2O_5 / tn of fruit) Mean Max Min	 13.0 37.5 0	 15.0 37.5 0	 0.04 0.07 0.0	 -- -- --	 13.0 37.5 0.0
Potassium					
Number of non-fertilized orchards	86	77	9	13	72
K application in fertilized orchards (kg of K_2O/ha) Mean Max Min	 91.6 251.6 0	 104.7 251.6 0	 0.2 0.3 0.1	 -- -- --	 91.6 251.6 0
Application rate related to fruit yield (kg of K_2O / tn of fruit) Mean Max Min	 17.3 39.0 0	 19.8 39.0 0	 0.04 0.07 0.0	 -- -- --	 17.3 39.0 0.0

C. Use of Plant Protection Products

A list of Plant Protection Products (PPPs) used in the sub-basin of Havgas - Milatos is presented on Table 86. In general, use of PPPs in olive orchards could be considered as limited as compared to other tree crop. However, it has to be mentioned that farmer's did not report the chemicals used in bait sprays for control of olive fruit fly, since they are applied by the State and they don't have exact knowledge of the chemicals used. It has to be mentioned though, that bait sprays, due to their nature, pose a minimal threat to the environment, if properly applied. Cover sprays with chemical insecticides were reported in a lower percentage of orchards as compared to Platanias (28 out of 88 conventional olive orchards, while the number of plant protection applications was up to 1 per year in the majority of the orchards. In all cases, the chemicals that have been reported as used in the orchards are allowed for use in olive orchards, while the reported dosage is in accordance with the guidelines.

Chemical control of weeds was quite limited, applied in only 2 out of 88 conventional olive orchards. Chemical control was in all cases performed using glyphosate. This active ingredient is still allowed for use in orchards, despite the recent debate at international level related to possible toxicity effects on living organisms.

Table 86: List of PPPs used in the pilot sub-basin of Havgas - Milatos, based on the 1st AWMS form

Commercial name	1st Active Ingredient (a.i.)	2nd Active Ingredient (a.i.)	1st a.i (%)	2nd a.i (%)
Pesticides and fungicides				
SUCCESS 0.24 CB	spinosad		0.024% w/v	
BULLDOCK 2.5 SC	Beta-cyfluthrin		2.5 % w/v	
Cu containing fungicides	Indicatively: Copper oxychloride Copper hydroxide Bordeaux mixture		variable	
ROGOR L 40 EC	dimethoate		40% w/v	
SURROUND WP	aluminum silicate (kaolin)		95 %	
RELDAN 225 EC	chlorpyrifos methyl		22.5 % w/v	

*Composition may vary depending on manufacturer.

2.3. Agri sub-basin

2.3.1. Crops and applied practices

Data collected from the Agri sub-basin referred referred to 15 olive, 19 citrus, 48 peach and 18 apricot orchards. Therefore, stone fruits (peach and apricot) was the majority of individual cases, due to the importance of these crops for the Metapontino area, as compared to olive and citrus trees. Analytical data for each crop are given in the following paragraphs.

Olive Trees

Considering the data collected for the 15 olive orchards, key data discussed below are presented on Table 87. From the 15 olive orchards included, 8 were organic (53.3%), while 12 were irrigated (80%). All orchards are considered fully productive, being more than 15-years-old. The mean reported annual productivity of the orchards was 7,1 tn of fruit per ha, which is considered as typical for the area, as well as the mean planting density of 255 trees/ha.

Table 87: Indicative data for olive orchards in the pilot Agri sub-basin

Parameter	Value
Number of orchards (total) Organic Irrigated	15 8 12
Tree age (years) Mean Max	 63 100+

Min	18
Productivity (tn/ha) Mean Max Min	 7.1 18.0 1.9
Density (trees/ha) Mean Max Min	 255 556 63
Soil cultivation applied (number of cases)	11
Weed mowing (number of cases)	4
Use of cover crops (number of cases)	12
Pruning applied (number of cases)	15
Shredding of prunings (number of cases)	15
Application of organic material from external sources (number of cases)	3

Considering the basic orchard management practices, Soil cultivation is applied thrice per year to 5 orchards (33.3%), twice per year to 3 orchards (20%) and once per year to 3 orchards (20%) a practice that, depending on the slope of the area. In addition, one pruning intervention per year is performed in the 70 % of the farms, while the remaining perform pruning every two or three years. Weed control is practiced by tillage in 80% of the farms, increasing the potential of soil erosion while weed mowing is practiced in only 26,6% of the farms with a number of mowing interventions per year that range from 2 to 3. In all farms in which pruning is applied, the thinnest pruned wood is shredded and spread on the soil surface, while the greater pruned wood is used for heating. Except for three farms in which manure is applied, there is no use of organic materials like manure and compost, therefore the pollution risk from the use of chemical fertilizers is high.

Citrus Trees

Considering the data collected for the 19 citrus orchards, key data discussed below are presented on Table 88. From the 19 citrus orchards included, 2 were organic (11%), while 18 were irrigated (95%). About half of the orchards (47%) were at fully productive age of 6 years or more. The mean reported annual productivity of the orchards was 14.6 tn of fruit per ha, which is considered low as compared to typical for the area, although it is reasonable due to the fact that about half of the orchards were not at their fully productive age. Concerning planting density mean value was 489 trees/ha, although orchards of high density were also included (up to 800 trees/ha).

Table 88: Indicative data for citrus orchards in the pilot Agri sub-basin

Parameter	Value
Number of orchards (total) Organic Irrigated	19 2 18
Tree age (years) Mean	 13

Max Min	36 1
Productivity (tn/ha) Mean Max Min	 14.6 37.5 0.7
Density (trees/ha) Mean Max Min	 489 800 400
Soil cultivation applied (number of cases)	17
Weed mowing (number of cases)	17
Use of cover crops (number of cases)	0
Pruning applied (number of cases)	11
Shredding of prunings (number of cases)	19
Application of organic material from external sources (number of cases)	0

Considering the basic orchard management practices, two pruning interventions (winter and summer pruning) per year are performed in 58 % of the farms. Weed control is practiced by tillage in 89% of the farms, increasing the potential of soil erosion, while weed mowing is practiced in most of the farms with a number of mowing interventions per year that range from 3 to 4. In all farms in which pruning is applied, pruned wood is shredded and spread on the soil surface, increasing the soil organic matter (SOM). No farm of citrus applies organic materials like manure and compost; therefore the pollution risk from the use of chemical fertilizers is high.

Peach Trees

Considering the data collected for the 48 peach orchards, key data discussed below are presented on Table 89. From the 48 orchards, 7 were organic (13%), while all of them were irrigated. Average tree age was 8.4 years-old, while 75% of them was older than 4 years-old. The mean reported annual productivity of the orchards was 20.8 tn of fruit per ha, which is considered as typical for the area (20-30 tn/ha). Concerning planting density mean value was 523 trees/ha, ranging from low densities of 200 trees/ha to high densities of 1000 trees/ha.

Table 89: Indicative data for peach orchards in the pilot Agri sub-basin

Parameter	Value
Number of orchards (total) Organic Irrigated	48 7 48
Tree age (years) Mean Max Min	 8.4 18 1
Productivity (tn/ha) Mean Max Min	 20.6 80.0 0.25

Density (trees/ha) Mean Max Min	 518 1000 200
Soil cultivation applied (number of cases)	46
Weed mowing (number of cases)	46
Use of cover crops (number of cases)	0
Pruning applied (number of cases)	45
Shredding of prunings (number of cases)	45
Application of organic material from external sources (number of cases)	1

Considering the basic orchard management practices, two pruning interventions (winter and summer pruning) per year are performed in the 94 % of the farms. Weed control is practiced by tillage in 96% of the farms, increasing the potential of soil erosion and in the same percentage, weed mowing is practiced with a number of mowing interventions per year that range from 3 to 4. In all farms pruned wood is shredded and spread on the soil surface, increasing the soil organic matter (SOM). Except for one farm, there is no use of organic materials (manure and compost), therefore the pollution risk from the use of chemical fertilizers is high.

Apricot Trees

Considering the data collected for the 18 apricot orchards, key data discussed below are presented on Table 90. From the 18 orchards, none was organic, while all of them were irrigated. Average tree age was 6.5 years-old, while 60% of them were older than 4 years-old. The mean reported annual productivity of the orchards was 12.7 tn of fruit per ha, which is considered as typical for the area (10-16 tn/ha). Concerning planting density mean value was 614 trees/ha, ranging from densities of 400 trees/ha to high densities of 1000 trees/ha.

Table 90: Indicative data for apricot orchards in the pilot Agri sub-basin

Parameter	Value
Number of orchards (total) Organic Irrigated	18 0 18
Tree age (years) Mean Max Min	 6.5 16 1
Productivity (tn/ha) Mean Max Min	 11.7 40.0 3.7
Density (trees/ha) Mean Max Min	 634 1000 400

Soil cultivation applied (number of cases)	14
Weed mowing (number of cases)	14
Use of cover crops (number of cases)	0
Pruning applied (number of cases)	11
Shredding of prunings (number of cases)	11
Application of organic material from external sources (number of cases)	0

Considering the basic orchard management practices, two pruning interventions (winter and summer pruning) per year are performed in 61% of the farms. Weed control is practiced by tillage in 78% of the farms, increasing the potential of soil erosion and in the same farms is applied also weed mowing. Pruned wood is shredded and spread on the soil surface in 61% of the farms. No application of organic materials (manure and compost) is performed in the apricot farms evaluated, causing an increase of the pollution risk from the use of chemical fertilizers.

2.3.2. Use of water and PPPs

A. Use of irrigation water

Olive trees: The mean volume of irrigation water used per year in the last 5 years for each olive parcel is 2,458 m^3/ha, with a minimum value of 900 and a maximum value of 4,500 m^3/ha. According to the production regulation "Disciplinare di produzione integrata" of Basilicata Region, in our case, almost 47% of the olive groves seem to be overirrigated, as compared to the typical olive water requirements (1000-2500 m^3/ha per year), while in no farms deficit irrigation is applied.

Citrus trees: The mean volume of irrigation water used per year in the last 5 years for each citrus parcel is 3,678 m^3/ha, with a minimum value of 2,333 and a maximum value of 5,833 m^3/ha. According to the production regulation "Disciplinare di produzione integrata" of Basilicata Region, in our case, almost 5% of the citrus farms seem to be overirrigated, as compared to the typical citrus water requirements (3000-5000 m^3/ha per year), while in no farms deficit irrigation is applied.

Peach trees: The mean volume of irrigation water used per year in the last 5 years for each peach parcel is 4,036 m^3/ha, with a minimum value of 1,000 and a maximum value of 10,000 m^3/ha. According to the production regulation "Disciplinare di produzione integrata" of Basilicata Region, in our case, almost 17% of the peach farm seem to be overirrigated, as compared to the typical peach water requirements (3500-4500 m^3/ha per year), while in almost 38% of the farms deficit irrigation is applied. Based on these results, there is a medium potential risk for nutrient leaching in peach farms of Metapontino. In addition, irrigation is not carried out by means of the water taken from wells, for this reason there is no phenomena of water table drawdown and no risk of water salinization, even if the area is close to the sea.

Apricot trees: The mean volume of irrigation water used per year in the last 5 years for each apricot parcel is 3,300 m^3/ha, with a minimum value of 1000 and a maximum value of 5,000 m^3/ha. According to the production regulation "Disciplinare di produzione integrata" of Basilicata Region, in our case, only 4 farms seem to be overirrigated, as compared to the typical apricot water requirements (3000-3500 m^3/ha per year), while in almost 45% of the farms deficit irrigation is applied. Based on that fact, there is a medium/low potential risk for nutrient leaching in apricot farms of Metapontino.

B. Use of fertilizers and Plant Protection Products

A list of fertilizers and PPPs used in Agri sub-basin is summarized on Table 95 at the end of this section. All agrochemicals used are allowed for use in each crop, moreover the doses applied are in accordance to national legislation. Concerning the agrochemicals that are used, the following elements contained in fertilizers are known as having a high risk of pollution for surface and ground water: N, P and K. In particular, the Metapontino area is considered as a nitrate vulnerable zone (NVZ) and, for this reason, it has specific allowed amount of nitrogen (that concerns mainly the spreading of organic manure and slurry in a specific period of the year).
Comments on risk assessment are analyzed per crop in the following paragraphs.

Olive trees: According to the collected data, 60% of the olive farms used fertilization, in 93% no fertigation interventions are applied and no foliar applications are used. Thresholds on nutrient application are presented on Table 91. Plant protection products are applied in all the olive groves except two, with an average of 4 times per year. Herbicides applications are used in about 20% of olive groves with 2 applications per year. Therefore, the risk of pollution by agrochemicals in the area of Metapontino is considered as moderate.

Table 91: Thresholds of elements (N, P, K) according to the production **regulation "Disciplinare di produzione integrata" of Basilicata Region and** values related to the Agri sub-basin for olive orchards (mean, max and min)

		Agri sub basin (olive)		
Elements	threshold (Kg/ha)	mean	max	min
N	120	100	200	100
K	120	12	25	20
P	50	17,5	50	5
Ca				

Citrus trees: According to the collected data, all the citrus farms used fertilization, in particular 37% of them performed 3 fertilization interventions per year from March to July; fertigation is practiced by 58% and foliar application by 11% of the farmers. Thresholds on nutrient applications are presented on Table 92. Plant protection products are applied in an average of more than 5 times per year in all the citrus farms. Herbicides application is used in about 50% of citrus farm with 2 applications per year. Therefore, the risk of pollution by agrochemicals in the area of Metapontino is considered as moderate.

Table 92: Thresholds of elements (N, P, K) according to the production **regulation "Disciplinare di produzione integrata" of Basilicata Region and** values related to the Agri sub-basin for citrus orchards (mean, max and min).

		Agri sub basin (citrus)		
Elements	threshold (Kg/ha)	mean	max	min

N	120	74	229	15
K	100	32	100	5
P	60	46	146	8
Ca		14	39	13

Peach trees: According to the collected data, 74% of peach farms performed 3 fertilization interventions per year from March to May; fertigation is used by 96% and no foliar application is supplied. In the majority of peach farms amounts of mineral elements below the allowed threshold are applied (Table 93), while there are only few cases in which it exceeds the standard threshold. In addition, the majority of the farmers apply both herbicide and pesticide but all the products are in accordance to national legislation. Therefore, the risk of pollution by agrochemicals in the area of Metapontino is considered as moderate.

Table 93: Thresholds of elements (N, P, K) according to the production **regulation "Disciplinare di produzione integrata" of Basilicata Region and** values related to the Agri sub-basin for peach orchards (mean, max and min)

		Agri sub basin pilot (peach)		
Elements	threshold (Kg/ha)	mean	max	min
N	100	58	132	8
K	90	41	116	5
P	40	60	156	6
Ca		13	26	7

Apricot trees: According to the collected data, 45% of apricot farms performed 4 fertilization interventions per year from March to May; fertigation is used by 100% and no foliar application is supplied. Thresholds on nutrient applications are presented on Table 94. In 25% of the apricot farms herbicides are not applied, while in all the farms plant protection products (PPPs) are applied in an average for 5 times per year.

Table 94: Thresholds of elements (N, P, K) according to the production **regulation "Disciplinare di produzione integrata" of Basilicata Region and** values related to the Agri sub-basin for apricot orchards (mean, max and min)

		Agri sub basin (apricot)		
Elements	threshold (Kg/ha)	mean	max	min
N	75	47	140	9
K	90	32	84	2
P	30	48	153	4
Ca		13	27	5

Table 95: Agrochemicals used in Metapontino area (Agri sub basin pilot): Fertilizers, Herbicides and Pesticides (Plant Protection Products, PPPs)

Agrochemicals	Elements (%)					
Fertilizers	N	P	K	CaO	B	S
NITROPHOSKA GOLD	15	9	15			
20-20-20	20	20	20			
CALCIUM NITRATE	16	0	0	26		
12-12-17	12	12	17			

20-10-10	20	10	10			
AMMONIUM SULFATE	21	0	0			
GREEN GO	12	8	24	10		
NOVA GR						
UREA SULFATE	29					
STALLATICO	2	2	2			21
UREA PHOSPHATE	18	44				21
POTASSIUM NITRATE	13	0	46			21
NITROPHOSKA PERFECT	15	5	20			
GREEN GO	12	20	30			
STALLATICO	3	3	3			21
AZOCOR 105	10.5	1.2	1			21
BOROPLUS					11	21
Herbicides	**1° p.a** (%)					
Gliphosate	30.8					
Spotlait						

PPPs	1st Active Ingredient (a.i.)	2nd Active Ingredient (a.i.)	1st a.i (%) - **1° p.a (%)**	2nd a.i (%) - **2° p.a. (%)**
VERTIMEC	abamectina		1.84	
EPIK	acetamiprid		5.00	
CONFIDOR 200 O-TEQ	imidacloprid		19.42	
LASER	spinosad		44.20	
DELAN 70 WG	dithianon		70.00	
MOVENTO 48 SC	spirotetrammato		48.00	
TOPAS 10 EC	penconazolo		10.15	
RELDAN 22	clorpirifos-metile		21.40	
NIMROD 250 EW	bupirimate		23.80	
SIGNUM	boscalid	pyraclostrobin	26.70	6.7
CUPRAVIT 35 WG	Copper oxychloride		35.00	
POMARSOL 80	tiram		80.00	
KARATE ZEON	lambda-cialotrina		9.40	
MEZENE WG	ziram		76.00	
ZELIG 480	clorpirifos-ethyl		45.00	
TREBON UP	etofenprox		30.00	
CALYPSO	thiacloprid		40.40	
CHORUS	ciprodynil		50.00	
Bordeaux Mix	Copper sulphate		20.00	
TIOVIT JET	sulfur		80.00	
OLIOCIN	White oil		96.00	
PROTIL EC	propiconazolo		23.10	

CORAGEN[3]	clorantranilipolo		18.40	
STEWARD[3]	indoxacarb		30.00	
COBRE NORDOX	Copper oxide		75.00	
NEEMIK	azadiractina		0.80	
NATURAL PYRETHRUM	pyrethrin		2.00	

[3] These two PPPs were not used during 2016 in the 100 registerd parcels of Agri sub-basin, but it is possible to be used during the next years if it will be necessary. This in combination with the fact that they are listed in the "Disciplinare di Produzione" of Basilicata Region it was decided to be recorded in the list of PPPs

3. CONCLUSIONS

3.1. Voukolies and Maleme sub-basins

Data collected referred to 100 orchards in total, including 91 olive orchards, 8 citrus orchards and 1 avocado orchard. The avocado orchard was excluded from the analysis since it was not irrigated and will not be assumed that is representative for the area. The percentage of land dedicated to tree crops within the selected sub-basins corresponds to more than 80% of total land use.

Olive orchards

From the 91 olive orchards included, 16 were organic (17.6%) and the rest are conventional. The vast majority of the orchards were fully productive, with only 5 of them including trees less than 15-years-old and none of them with trees less than 5-years-old. The mean reported annual productivity of the orchards was 7,85 tn of fruit per ha, which is considered reasonable. The variation of productivity of organic orchards is almost the same with the conventional orchards.

As far as the Agricultural practices applied in the registered orchards the following is summarized:

Soil cultivation is applied once per year to 17 orchards (18.7%), a practice that, depending on the slope of the area, may have a negative impact on soil erosion and soil fertility. In addition, the periodical application may destroy the active part of the root system increasing tree water stress.

Weed mowing is applied once or twice per year in 50 orchards (54.9%) while cover crops are not grown during winter in none of the orchards. In addition, chemical control of weeds is applied in 38.4% of the orchards. The particular practices imply that there is bare soil during winter in a significant percentage of the orchards, reducing the potential for water storage in the soil during the rainy season

Pruning is a typical practice applied in all orchards once per year (winter time). No summer pruning is applied in the area. Burning of pruning is the practice applied by the vast majority of farmers, with 82.4% burning it at the orchard and 4.4% use it for heating (fireplace). Shredding of pruning and dispersion to the orchard is limited to 13.1% of the orchards. Therefore, a potential source of organic material that could be used for mulching and increasing of soil organic matter is available.

Organic material spreading from external sources, is also quite low in olive orchards, with manure applied in only 8 orchards (8.8%) and compost in 3 (3.3%) of them.

Use of irrigation water: The 47 out of 91 olive orchards (51.6%) are fully or partially irrigated. According to farmers' interview data, the average annual application of irrigation water was only 63 mm, ranging from 17 to 334 mm. The provided data present a significant deviation from what is considered as typical irrigation water requirements for olive trees in the area. Depending on climatic factors, full irrigation of olive orchards in North-Western Crete typically requires 228-270 mm of water (BEWARE project, 2005; Doupis et al., 2013), while the relevant limits on water use for irrigating olive trees in the Decision published at FEK 2055B/2015, are 250-300 mm. Thus, based on the reported values, the vast majority of irrigated olive orchards could not be characterized as receiving adequate amounts of water and it is questionable if it can actually be beneficial in reducing water stress and increasing orchard productivity. The application rate per irrigation event is high (28 mm) which is beyond the suggested dosage per irrigation event for an orchard on a medium texture soil (BEWARE project, 2005). Thus, it seems that there is a significant potential for improving irrigation water use efficiency.

Use of fertilizers: The 78 out of 91 registered olive orchards (85.7%) are fertilized. Estimates of the amount of nutrients applied per tn of olive fruit produced revealed that in all cases mean values were slightly or significantly higher than the estimated actual requirements, meaning that orchards are over-fertilized. Finally, fertigation, a practice that could increase nutrient use efficiency and minimize losses, is not applied in any of the irrigated olive orchards.

Use of Plant Protection Products: PPPs are used in 75 out of 91 registered olive orchards (82.4%). In all cases, the chemicals that have been reported as used in the orchards are allowed for use in olive orchards, while the reported dosage is in accordance with the guidelines.

Citrus orchards

From the 8 citrus orchards included, 1 was organic and the rest conventional. From the 8 orchards, one was a lemon tree orchards, while the rest were orange tree orchards. Moreover, the lemon tree orchard was the only one which included non-productive trees with an age of 3 years-old. Another orange tree orchard was 5-years-old but reported with adequate fruit productivity, while the remaining 6 were fully productive at ages ranging from 21 to 36-years-old. Mean annual productivity of the fully productive orchards ranged from 17.5 to 40.0 tn of fruit per ha, which is considered within the typical range for the area. The organic orchard was the one with the minimum yield (17.5 tn/ha).

As far as the Agricultural practices applied in orchards the following results are derived:

Soil cultivation is applied in 2 orchards (25%).

Weed mowing is applied once or twice per year in 6 orchards (75%), while cover crops were not grown during winter in none of the orchards. In additon, chemical control of weeds is applied in 2 orchards (25%).

Pruning is a typical practice applied in all orchards once per year (winter time). In general, pruning of citrus trees is not as intense as in olive orchards. Burning of pruning in the orchard is the common practice applied in all 8 orchards. Shredding of prunings and dispersion to the orchard was not applied in any orchard.

Organic material spreading from external sources (manure, compost, etc.) is minimal. The only orchard where a low amount of compost (750 kg/ha) is applied was the young lemon tree orchard.

Use of irrigation water: All citrus orchards are irrigated, as it is the typical practice in citrus orchards in the pilot area. The average annual water use reported was 325 mm, with the typical requirements for citrus trees in the area estimated to be around 500 mm (BEWARE project, 2005) and the limits set by the DAC being 400-500mm. However, extreme values included two orchards representing the minimum (75 mm/year) and maximum (800 mm/year) values reported.

Use of fertilizers: Fertilizers are applied in all the 8 citrus orchards. Citrus orchards seem to be either adequately or under-fertilized in most cases.

Use of Plant Protection Products: PPPs are applied in all the 8 citrus orchards. The dosage of PPPs used in citrus orchards was in accordance to guidelines, containing substances that are allowed to be used in citrus trees.

3.2. Havgas - Milatos sub-basin

Data were collected from 101 olive orchards within the pilot sub-basin of Havgas - Milatos. Olive tree is almost exclusively cultivated in the area, with no other tree crops representing a worth-mentioning percentage. Within the pilot sub-basin of Havgas - Milatos, olive tree cultivation represents a significant percentage as a land use, reaching 37.4% of total land area.

From the 101 olive orchards included, 11 were organic (10.9%) and the rest conventional. The vast majority of the orchards were fully productive, with 49 of them being more than 50-years-old, therefore increasing the average tree age for the area to 82 years. The mean reported annual productivity of the orchards was 4.6 tn of fruit per ha, which is significantly lower than that of Platanias, but reasonable given the low water availability and the drier climatic conditions of Eastern Crete.

As far as the Agricultural practices applied in orchards the following results are derived:

Soil cultivation is applied once per year or every 2 to 3 years to 12 orchards (11.9%).

Weed mowing is applied once per year in 46 orchards (45.5%), while the use of cover crops during winter was only applied in 6 orchards (5.9%). A positive fact is that chemical control of weeds was limited to 2 orchards (2%), while grazing by livestock was applied in a significant percentage of orchards (22.7%), in contrast with the typical situation in Western Crete.

Pruning is only applied to 73.3% of the orchards, while in 39.6% of them pruning is applied periodically and not on an annual basis. In the majority of cases (67 out of 74 orchards, or more than 90%) pruning is burned in the field. Shredding of pruned wood was reported in only 2 orchards (2%)

Organic material spreading from external sources is quite low, with manure applied in only 3 orchards. It is worth mentioning that manure was not applied in organic olive orchards.

Use of irrigation water: Only the 11% of orchards are irrigated in the pilot area. According to farmers' interviews, the average annual application of irrigation water was 271 mm, but ranging from 60 to 625 mm. The legislative limit set by the Decentralized Administration of Crete is 300 mm per year while a rough estimate, since there is no availability of experimental data, would be 300-330 mm of water, depending on climatic conditions. The application rate per irrigation event is considerably high (115 mm) and definitely beyond the water holding capacity of any type of soil.

Use of fertilizers: The 40 out of 101 registered orchards (39,6%) are fertilized. Estimates of the amount of nutrients applied per tn of olive fruit produced revealed that in all cases mean values were slightly or significantly higher than the estimated actual requirements, meaning that orchards are over-fertilized. Finally, fertigation is not applied in any of the irrigated olive orchards.

Use of Plant Protection Products: In the 33 out of 101 (32,7%) PPPs are used. The dosage of PPPs used in orchards was in accordance to guidelines, containing substances that are allowed to be used.

3.3. Agri Sub-basin

Data collected referred to 100 orchards in total, including 15 olive orchards, 19 citrus orchards, 48 peach orchards and 18 apricot orchards. The vast majority of these orchards are irrigated (95%), fertilized (92%) and using PPPs (94%). Peach and apricot orchards are considered to be as stone fruits, due to their importance for Metapontino area.

Olive orchards

From the 15 olive orchards included, 8 are organic (53.3%) and the rest are conventional. All orchards were fully productive being more than 15-years-old. The mean reported annual productivity of the orchards was 7,1 tn of fruit per ha, which is considered typical for the area.

As far as the Agricultural practices applied in the registered orchards the following is summarized:

Soil cultivation is applied thrice to none per year in 11 orchards (73.3%).

Weed mowing is applied twice or thrice per year in 4 orchards (26.6%) while cover crops was applied during autumn-winter in 12 orchards (80%). In addition, chemical control of weeds is applied in 80% of the orchards.

Pruning is a typical practice applied in 70% orchards once per year, while the remaining orchards perform pruning every two or three years. Burning of pruning is applied by all farmers, where they use a small percentage of them for heating (fireplace). Shredding of pruning and dispersion to the orchard is applied to all orchards, where the rest of the above mentioned pruning is used for mulching and increasing of soil organic matter.

Organic material spreading from external sources is quite low in olive orchards, with manure applied in only 3 orchards (20%).

Use of irrigation water: The 12 out of 15 olive orchards (80%) are fully or partially irrigated. According to farmers' interview data, the average annual volume of irrigation water used per year in the last 5 years was 2458 m^3/ha, ranging from 900 to 4500 m^3/ha. However, in line with the production regulation "Disciplinare di produzione integrata" of Basilicata Region, where it is stated that the typical water requirements per year for olive orchards are 1000-2500 m^3/ha, 47% of these orchards are over-irrigated.

Use of fertilizers: The 60% of registered olive orchards are fertilized. Estimates of the amount of nutrients applied per tn of olive fruit produced revealed that in all cases mean values were in line with the national legislation requirements. Finally, fertigation, a practice that could increase nutrient use efficiency and minimize losses, is not applied in 93% of the olive orchards.

Use of Plant Protection Products: PPPs are used approximately four times per year in 13 of the registered olive orchards (86.6%) and herbicides are used twice per year in about 20% of the orchards. In all cases, the chemicals that have been reported as used in the orchards are allowed for use in olive orchards, while the reported dosage is in accordance with the guidelines.

Citrus orchards

From the 19 citrus orchards included, 2 were organic and the rest conventional. The 47% of these orchards were at fully productive age of 6-years-old or more. Mean annual productivity of the fully productive orchards was 14.6 tn of fruit per ha, which is considered within low as compared to the typical. Although, this is considered to be reasonable due to the fact that almost half of the orchards were not at their fully productive age.

As far as the Agricultural practices applied in orchards the following results are derived:

Soil cultivation is applied in 17 orchards (89.47%).

Weed mowing is applied thrice per year in 15 orchards (79%) and four times per year in 2 orchards (10.5%), increasing the potential of soil erosion. In addition, cover crops were not applied during winter in none of the orchards. Furthermore, chemical control of weeds is applied 89%.

Pruning is a typical practice applied in 58% of orchards twice a year (summer and winter time). In general, pruning of citrus trees is not as intense as in citrus orchards. Burning of pruning in the orchard is not applied in any orchard. Shredding of pruning and dispersion to the orchard was applied in all orchards, increasing the soil organic matter.

Organic material spreading from external sources (manure, compost, etc.) is not used by any of the citrus orchards.

Use of irrigation water: The 18 out of 19 citrus orchards (95%) are irrigated. According to farmers' interview data, the average annual volume of irrigation water used per year in the last 5 years was 3678 m^3/ha, ranging from 2333 to 5833 m^3/ha. However, in line with the production regulation "Disciplinare di produzione integrata" of Basilicata Region, where it is stated that the typical water requirements per year for citrus orchards are 3000-5000 m^3/ha, 5% of these orchards are over-irrigated. Thus, it seems that there is a potential for improving irrigation water use efficiency.

Use of fertilizers: Fertilizers are applied in all the 19 citrus orchards, where 37% of them use fertilizers thrice per year. Finally, fertigation is applied in 58% of the citrus orchards and foliar applications in 11% of them.

Use of Plant Protection Products: PPPs are applied in all the 19 citrus orchards more than five times per year. Herbicides are used in about 50% of the orchards twice per year.

Peach orchards

From the 48 peach orchards included, 7 are organic (53.3%) and the rest are conventional. All orchards were fully productive with an average tree age of 8.4 years-old. The mean reported annual productivity of the orchards was 20.8 tn of fruit per ha, which is considered typical for the area.

As far as the Agricultural practices applied in the registered orchards the following is summarized:

Soil cultivation is applied once per year to 46 orchards (95.8%).

Weed mowing is applied thrice per year in 39 orchards (81%) and four times per year to 7 orchards (14.6%), while cover crops were not applied in any of the orchards. In addition, chemical control of weeds is applied in 96% of the orchards.

Pruning is a typical practice applied in 94% of orchards twice per year (winter and summer time). Burning of pruning is not applied. Shredding of pruning and dispersion to the orchard is applied to all orchards, increasing the soil organic matter.

Organic material spreading from external sources is not used, except for one farm.

Use of irrigation water: All 48 peach orchards are fully or partially irrigated. According to farmers' interview data, the average annual volume of irrigation water used per year in the last 5 years was 3678 m^3/ha, ranging from 2333 to 5833 m^3/ha. However, in line with the production regulation "Disciplinare di produzione integrata" of Basilicata Region, where it is stated that the typical water requirements per year for peach orchards are 3000-5000 m^3/ha, 5% of these orchards are over-irrigated. Thus, it seems that there is a potential for improving irrigation water use efficiency.

Use of fertilizers: The 74% of registered peach orchards are fertilized thrice per year. In the majority of peach farms amounts of mineral elements below the allowed threshold are applied, while there are only few cases in which it exceeds the standard threshold. Finally, fertigation is used in 96% of the peach orchards.

Use of Plant Protection Products: PPPs and herbicides are used by the majority of the orchards. In all cases, the chemicals that have been reported as used in the orchards are allowed for use in peach orchards, while the reported dosage is in accordance with the guidelines.

Apricot orchards

From the 18 apricot orchards included, none was organic. All orchards were fully productive with an average tree age of 6.5 years-old, where 60% of them were older than 4 years-old. Mean annual productivity of the fully productive orchards was 12.7 tn of fruit per ha, which is considered typical for the area.

As far as the Agricultural practices applied in orchards the following results are derived:

Soil cultivation is applied once per year in 14 orchards (78%).

Weed mowing is applied thrice per year in 14 orchards (78%), increasing the potential of soil erosion. In addition, cover crops were not applied during winter in none of the orchards. Furthermore, chemical control of weeds is 78% of the orchards.

Pruning is a typical practice applied in 61% of orchards twice a year (summer and winter time). Burning of pruning in the orchard is not applied in any orchard. Shredding of pruning and dispersion to the orchard was applied in 61% of the orchards, increasing the soil organic matter.

Organic material spreading from external sources (manure, compost, etc.) is not used by any of the apricot orchards.

Use of irrigation water: All of the apricot orchards are irrigated. According to farmers' interview data, the average annual volume of irrigation water used per year in the last 5 years was 3300 m^3/ha, ranging from 1000 to 5000 m^3/ha. However, in line with the production regulation "Disciplinare di produzione integrata" of Basilicata Region, where it is stated that the typical water requirements per year for apricot orchards are 3000-5000 m^3/ha, only four of these orchards are over-irrigated, while in 45% of them deficit irrigation is applied. Thus, it seems that there is a potential for improving irrigation water use efficiency.

Use of fertilizers: Fertilizers are applied in 45% of the apricot orchards four times per year. Finally, fertigation is applied in 100% of the apricot orchards and there are no foliar applications.

Use of Plant Protection Products: PPPs are applied in all the 18 apricot orchards in an average of five times per year. Herbicides are used in about 75% of the orchards twice per year.

PART C – ESTIMATION AND ASSESSMENT OF THE IMPACTS OF CURRENT AGRICULTURAL PRACTICES CONSIDERING THE CLIMATE CHANGE

1. IMPACTS ON WATER QUANTITY

According to AWMS guidelines, based on EWS standard, established in Action A2 and particularly to Principle 1, Sustainable water abstraction in terms of water quantity should be achieved and maintained for all water sources used for abstraction.

Towards this goal, the methodology proposed for the implementation of the 1st principle, the data collected or estimated by the partnership for the pilot sub-basins in terms of water consumption, water bodies' and HCV areas status and their protection goals as they are presented in the relevant studies were evaluated and impacts were identified in order to be utilized in the formation of the Adaptation Water Management Strategy for the three FORs participated in the project.

1.1 Estimation of annual water consumption per water use

1.1.1 Voukolies and Maleme sub-basins (Platanias)

1.1.1.1 Potable water

According to the data provided by the Intermunicipal Water & Sewage Company of the Northern Coast of the Prefecture of Chania (DEYAVA), the water consumption per water use for the Municipal units of Platanias and Voukolies (Law 3852/2010, OJ 87A/7-6-2010), are presented in Table 96.

Table 96: Potable water consumption per water use in Platanias and Voukolies Municipal units (m3/year) (Source: DEYAVA 2016)

Municipal Unit	*Water Use*	YEAR					Average
		2011	2012	2013	2014	2015	
PLATANIAS	Domestic	431.953	406.839	378.748	395.062	382.343	398.989
	Proffesional	147.983	141.581	127.229	151.052	139.159	141.401
	Touristic	265.399	284.392	295.183	327.903	317.715	298.118
	Other uses	0	0	0	0	9.819	1.964
	Sub - total	847.346	832.812	801.160	874.017	849.036	840.472
VOUKOLIES	Domestic	212.027	254.789	244.764	262.135	245.439	243.831
	Proffesional	54.929	40.379	44.689	49.570	54.637	48.841
	Touristic	8.569	13.433	13.282	12.788	14.077	12.430
	Other uses	0	0	0	0	0	0
	Sub - total	275.525	308.601	302.736	324.493	314.153	305.102
	Total	1.120.860	1.141.413	1.103.896	1.198.510	1.163.189	1.145.574

In order to calculate the potable water consumption in the settlements of Voukolies and Maleme Sub-basins, the average water consumption per administrative unit for the period from 2011 to 2015 and the population of the settlements (ELSAT 2011) located in the pilot catchment areas were considered (Fig. 97). The results are presented in Table 97. The water sources that are utilized for the abstraction of potable water for the network of DEYAVA and they are located within the catchment area of pilot basins are presented in Fig. 98.

Table 97: The average potable water consumption per water use in Settlements of Voukolies and Maleme sub-basins (m^3/year) (Source: DEYAVA 2016)

Municipal Unit	*Local Community*	*Settlement*	*Popu-lation*	*Domestic*	Enterprises	*Touristic*	*Other uses*
PLATANIAS *(Population 5.275)*	*Vlacheronitissa*	*Vlacheronitissa*	152	11.497	4.074	8.590	57
	Kontomari	*Koilada*	35	2.647	938	1.978	13
		Kontomari	285	21.557	7.640	16.107	106
		Xirokampion	62	4.690	1.662	3.504	23
	Kiparissos	*Kiparissos*	126	9.530	3.378	7.121	47
		Marouliahiana	45	3.404	1.206	2.543	17
	Maleme	*Maleme*	710	53.703	19.032	40.126	264
	Xamoudochori	*Xamoudochori*	163	12.329	4.369	9.212	61
	Sirili	*Metohi Siriliou*	32	2.420	858	1.808	12
		Sirili	139	10.514	3.726	7.856	52
	SUB-TOTAL PER WATER USE			*132.291*	*46.883*	*98.845*	*652*
	SUB-TOTAL CONSUMPTION						*278.671*
VOUKOLIES *(Population 3.116)*	*Voukolies*	Voukolies	733	57.358	11.489	2.924	0
		Gavalomouri	83	6.495	1.301	331	0
		Koulkouthiana	49	3.834	768	195	0
		Mesa Voukolies	29	2.269	455	116	0
	Neo Chorio Kidonias	Petres	5	391	78	20	0
	Neriana	Neriana	68	5.321	1.066	271	0
	Polemarchi	Polemarchi	170	13.303	2.665	678	0
	Tavronitis	Dempla	85	6.651	1.332	339	0
		Tavronitis	888	69.487	13.919	3.542	0
	Chrisavgi	Neratzia	20	1.565	313	80	0
		Chrisavgi	116	9.077	1.818	463	0
	SUB-TOTAL PER WATER USE			*175.751*	*35.204*	*8.959*	*0*
	SUB-TOTAL CONSUMPTION						*219.914*
VOUKOLIES & MALEME Sub-basins	*TOTAL PER WATER USE*			308.042	82.087	107.804	652
	TOTAL CONSUMPTION						498.585

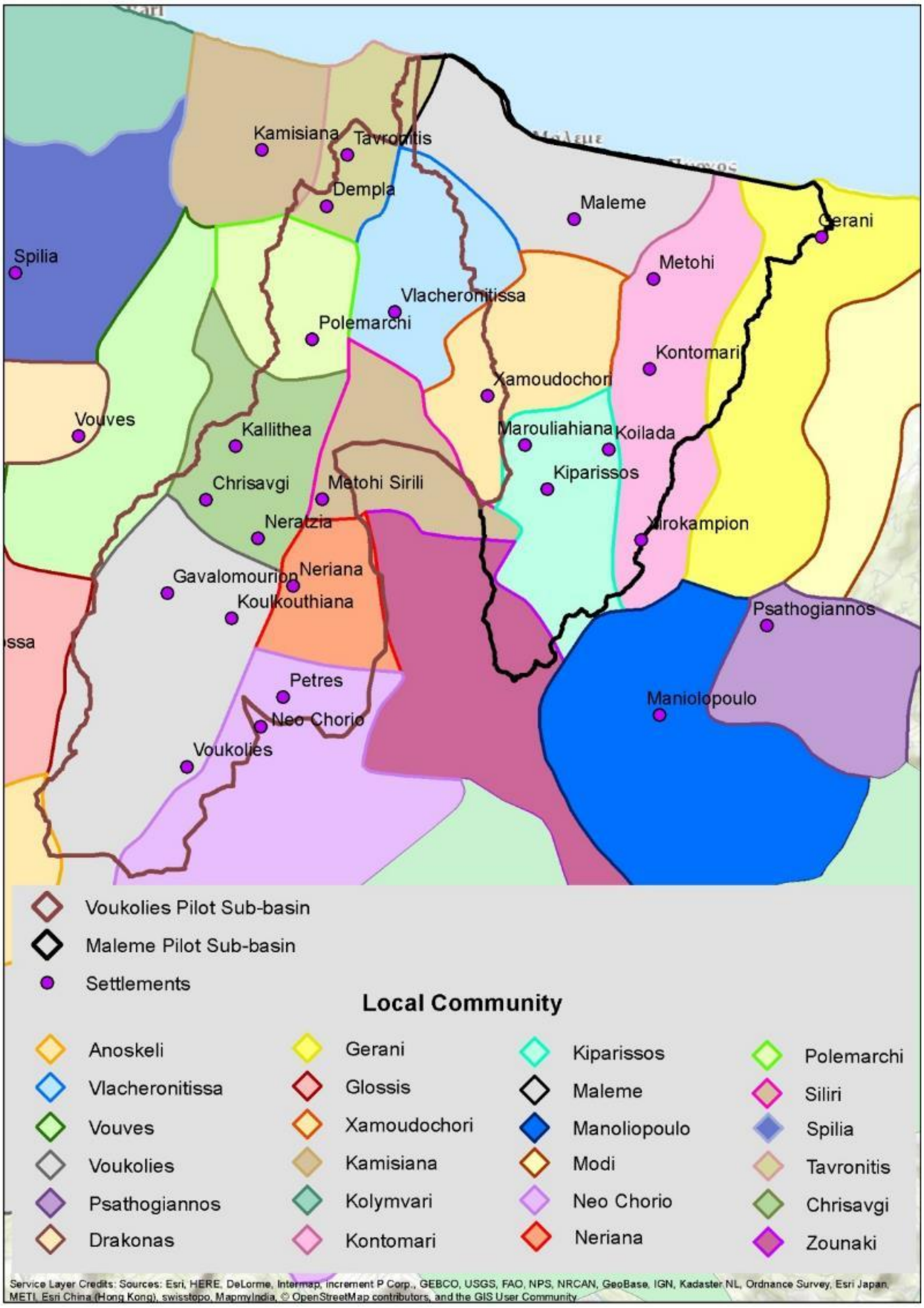


Fig. 97: Geodatabase Map Extract, depicting the settlements of Platanias and Voukolies municipal units located within the pilot basins

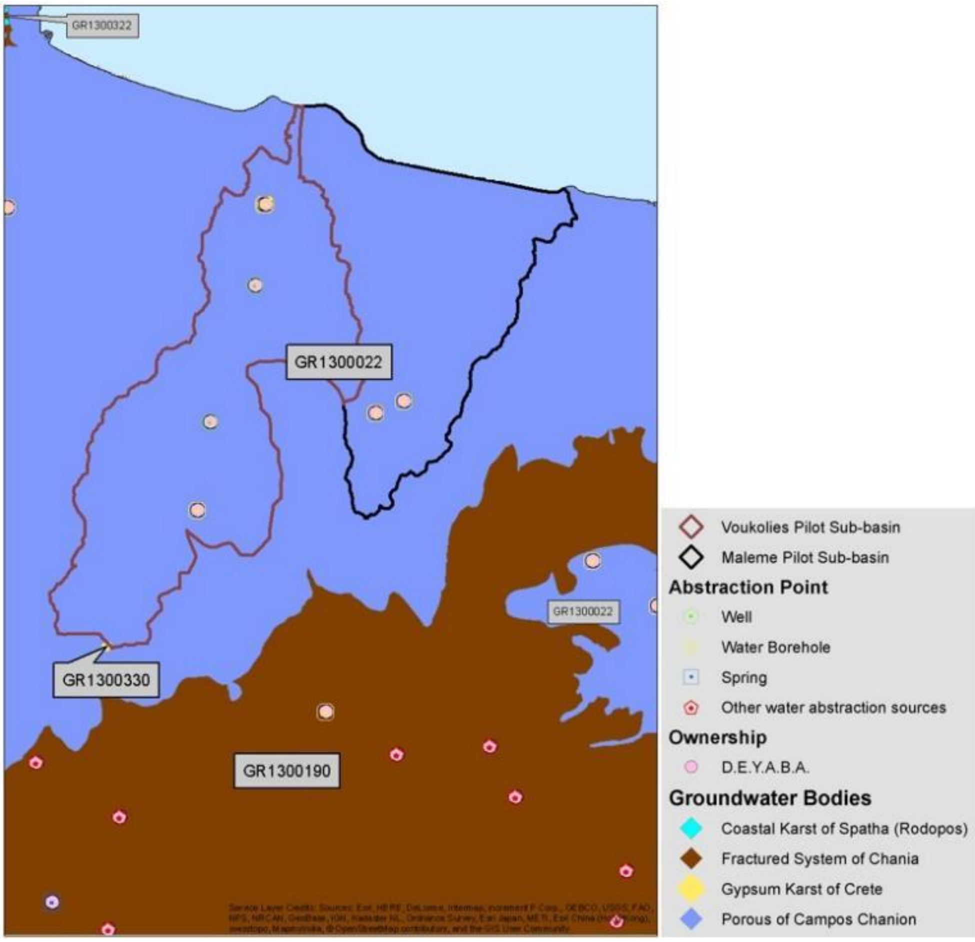


Fig. 98: Geodatabase Map Extract, depicting the abstraction points for potable use in Voukolies and Maleme sub-basins based on the water usage legal permits

1.1.1.2 *Irrigation water*

Irrigation water in Voukolies and Maleme sub-basins is supplied by collective irrigation networks as well as by private wells and boreholds.

Regarding the collective irrigation networks water is supplied by a number of legal entities among which Municipality of Platanias, OAK, as well as the respective TOEB located in the area of Platanias municipality. Based on information provided by KEDHP, the volume of irrigation water provided by the irrigation networks in the Municipal Units of Platanias and Voukolies are presented in Table 98

Table 98: Annual irrigation water consumption of Voukolies and Maleme sub-basins (m^3/year) (Source: KEDHP 2016)

MUNICIPAL UNIT	*2011*	*2012*	*2013*	*2014*	*Average*
PLATANIAS	287.719	328.366	299.519	213.277	282.220
VOUKOLIES	162.507	284.871	206.310	235.631	222.330
TOTAL	450.226	613.237	505.829	448.908	504.550

The figures of water consumption in the previous table represent the total consumption of irrigation water within the administrative borders of Municipal units of Platanias and

Voukolies. Due to the lack of data per settlement, the consumption of irrigation water within the catchment area of Voukolies and Maleme will be based on the ratio between the cultivation areas that are presented in Table 99: Irrigation Water consumed in Voukolies and Maleme sub-basins (m3/year). The amount of irrigation water consumed from the collective irrigation networks is estimated to be equal to 166.194,4 m^3/year.

Table 99: Irrigation Water consumed in Voukolies and Maleme sub-basins (m^3/year)

MUNICIPAL UNIT	*Cultivated area (Km2)*	*WATER CONSUMPTION*
PLATANIAS	53,01	282.220,3
VOUKOLIES	41,73	222.329,7
SUM	94,74	504.550,0
PILOT SUB - BASINS		
VOUKOLIES	*18,55*	*98.773,9*
MALEME	*12,66*	*67.420,5*
SUM	*31,21*	*166.194,4*

Regarding water provided by private boreholes or wells, in Voukolies and Maleme pilot sub-basins private wells are mostly utilized, located alongside of Tavronitis River (Fig. 99). In particular, there are 65 wells, 17 of which group managed, allowing for a maximum annual water abstraction quantity of 282.907,5 m^3/yr and one borehole 8.790 m^3/yr. It is estimated that water abstracted from the above wells is utilized for the irrigation of about 53,3 ha of olive groves, 35 ha of citrus trees, 4,5 ha of avocado trees, 4,2 ha of vegetables and 3,8 ha of vineyards. It should be mentioned that since the actual water quantities abstracted are not registered by the farmers it is assumed that the total allowed water abstraction quantity allowed by the water permits is utilized for the irrigation by the farmers.

1.1.1.3 Total water consumption

Summing up, the water consumed by all the water uses within the catchment area of the pilot sub-basins of Voukolies and Maleme is presented in Table 100. The total volume of water consumed per year is 956.476 m^3. This quantity is equally allocated to potable (52,13%) and irrigation use (47,87%).

Table 100: Water consumption in Voukolies and Maleme sub-basins

POTABLE WATER	*Domestic*	*Enterprises*	*Touristic*	*Other uses*	*Sub-total*
Quantity (m^3/year)	308.042	82.087	107.804	651	*498.584*
Percentage (%)	61,78	16,46	21,62	0,13	*100,00*
IRRIGATION WATER	*Networks*		*Wells/Boreholes*		*Sub-total*
Quantity (m^3/year)	166.194		291.698		*457.892*
Percentage (%)	36,30		63,70		*100,00*
TOTAL WATER CONSUMPTION	*Potable Water*		*Irrigation Water*		*Total*
Quantity (m^3/year)	498.584		457.892		956.476

Percentage (%)	52,13	47,87	100,00

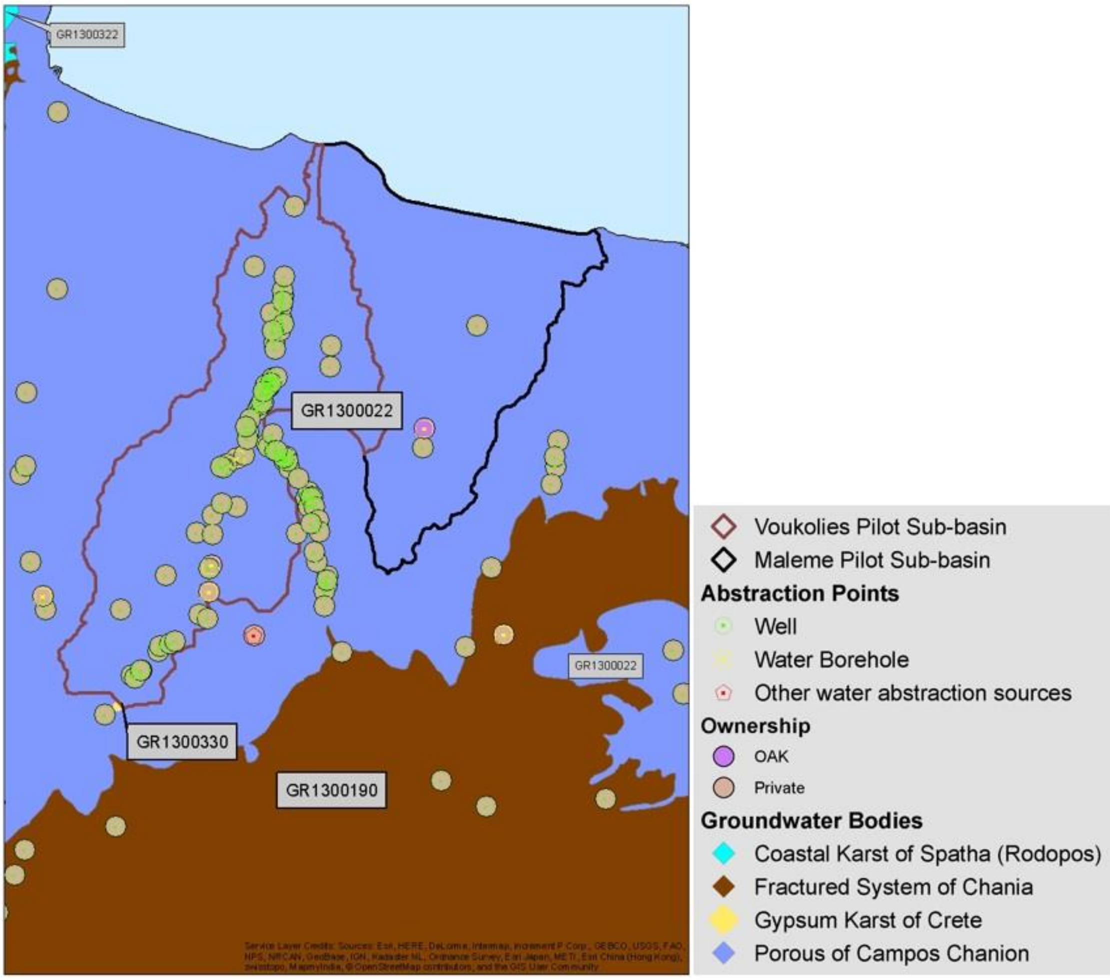


Fig. 99: Geodatabase Map Extract, depicting the abstraction points for irrigation use in Voukolies and Maleme sub-basins based on the water usage legal permits

1.1.2 Havgas – Milatos sub-basin (Mirabello)

1.1.2.1 Potable water

Potable water in Municipality of Ag. Nikolaos is provided to water users by Municipal Enterprise of Agios Nikolaos (DEYAN). Data for water consumption per Local Community were provided by DEYAN for the period from 2013 to 2015 and they are presented in Table 101.

Table 101: Potable water consumption in Vrachassi and Neapoli Municipal units (m^3/year) (Source: DEYAN Agiou Nikolaou 2016)

Municipal Unit	*Local Community*	YEAR			Average
		2013	2014	2015	
VRACHASSI (Population 1.932)	*Vrachassi*	418.543	373.508	341.368	377.806
	Neapoli	163.450	185.713	177.238	175.467
	Agios Antonios	13.415	12.171	10.369	11.985

NEAPOLI (Population 4.463)	*Voulismeni*	19.695	17.873	14.385	17.318
	Latsida	19.880	18.055	14.059	17.331
	SUB-TOTAL	216.440	233.812	216.051	222.101
TOTAL CONSUMPTION		634.983	607.320	559.419	599.907

Moreover, the potable water consumption in Agios Nikolaos Municipality, as it is allocated in the main water uses is presented in Table 102.

Table 102: Allocation of potable water to the main water uses in Ag. Nikolaos Municipality (DEYAN Agiou Nikolaou 2013)

Water Uses	Total Consumption (%)
Domestic	58,50%
Enterprises	16,50%
Touristic	23,00%
Other Uses	2,00%

In order to calculate the average potable water consumption in the settlements of Havgas - Milatos sub-basin, the average consumption for the period 2013 - 2015 presented in Table 101, the percentages in Table 102 and the population of the settlements (ELSAT 2011) located in the pilot catchment area are considered (Fig. 100). The results are presented in Table 103.

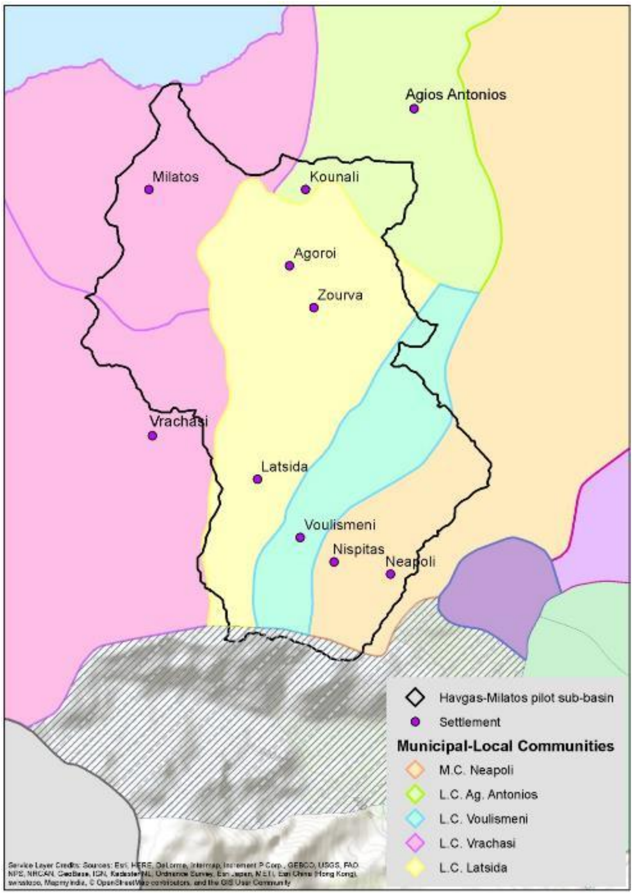


Fig. 100: Geodatabase Map Extract, depicting the settlements of Vrachasi and Neapoli municipal units located within the pilot basin

Table 103: The average potable water consumption per water use in settlements of Havgas - Milatos sub-basin (m^3/year)

Municipal Unit	*Local/Municipal Community*	*Settlement*	*Popu-lation*	*Domestic*	Enterprises	*Touristic*	*Other uses*
VRACHASSI (Population 1.932)	*Vrachassi*	*Milatos*	178	20.363	5.743	8.006	696
		Paralia Milatos	157	17.960	5.066	7.061	614
SUB-TOTAL PER WATER USE				*38.323*	*10.809*	*15.067*	*1.310*
SUB-TOTAL CONSUMPTION				65.509			
NEAPOLI (Population 4.463)	*Neapoli (Municipal Community)*	*Neapoli*	2683	97.042	27.371	38.153	3.318
		Nispitas	25	904	255	356	31
	Agios Antonios	*Kounali*	21	3.272	923	1.286	112
	Voulismeni	*Voulismeni*	337	9.811	2.767	3.857	335
	Latsida	*Agoroi*	2	81	23	32	3
		Latsida	247	10.057	2.837	3.954	344
SUB-TOTAL PER WATER USE				*121.167*	*34.176*	*47.639*	*4.143*
SUB-TOTAL CONSUMPTION				*207.124*			
Havgas - Milatos sub-basin	TOTAL PER WATER USE			159.490	44.985	62.706	5.453
	TOTAL CONSUMPTION			272.633			

The water sources (boreholes) utilized for the abstraction of potable water located within the pilot river basin are presented in Fig. 101.

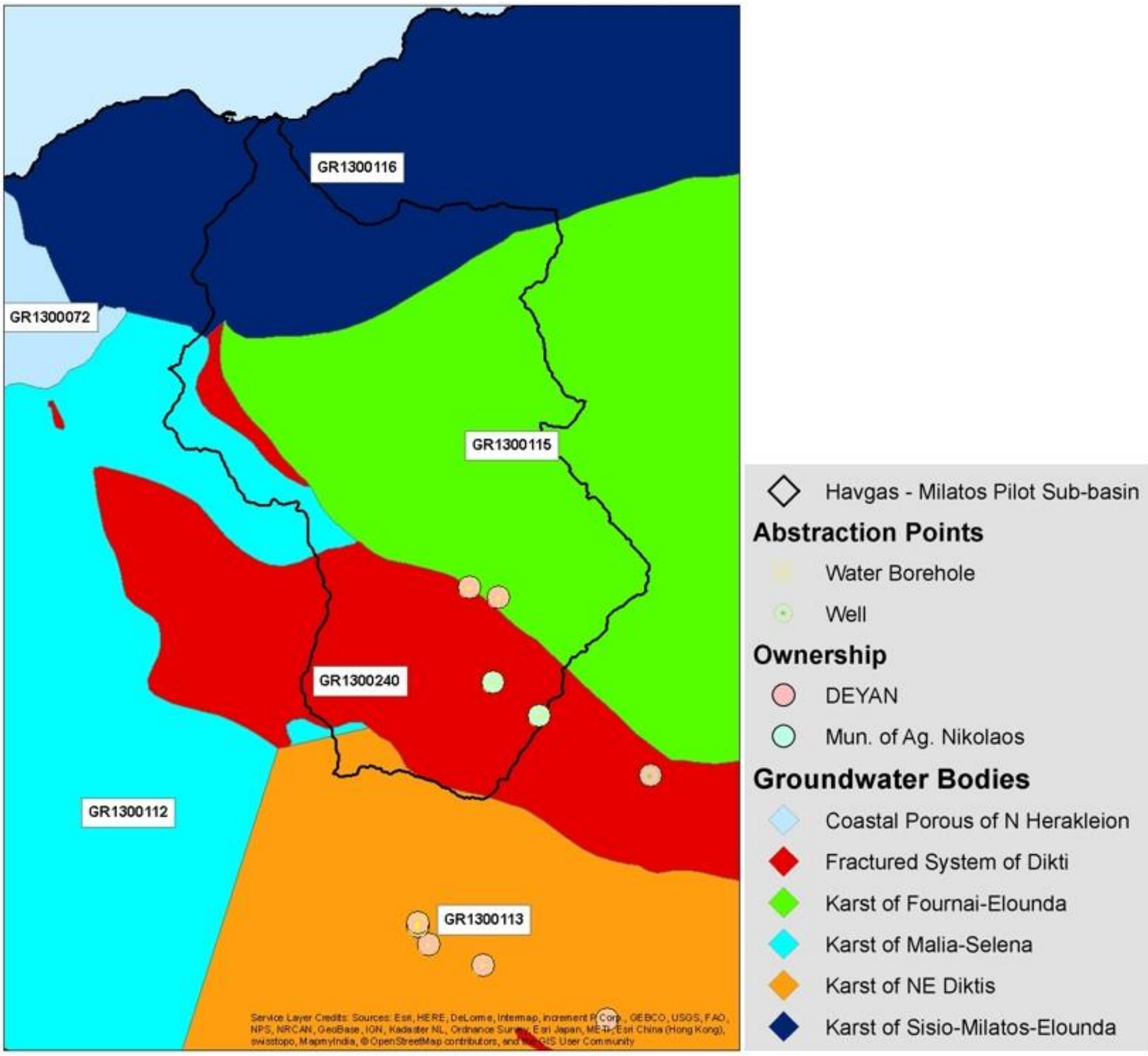


Fig. 101: Geodatabase Map Extract, depicting the abstraction points for potable use in Havgas – Milatos sub-basin based on the water usage legal permits

1.1.2.2 Irrigation water

In Havgas - Milatos sub-basin, where the cultivations are mostly rainfed, the area is not covered neither by TOEB's nor the municipal irrigation network. For the irrigation of the few irrigated olive groves of the area, water is abstracted from private or group owned boreholes.

There are 10 boreholes, 7 of which private and 3 group owned, with a total annual maximum abstraction quantity of 54.565 m^3/yr. There are also 27 wells used for irrigation purposes in the selected sub-basin with a total annual maximum abstraction quantity of 86.848 m^3/yr. In addition, it is estimated that the abstracted water is utilized for the irrigation of about 43,8 ha of olive groves, 1,7 ha of vegetables and 0,4 ha of citrus trees. The abstraction points are presented in Fig. 102

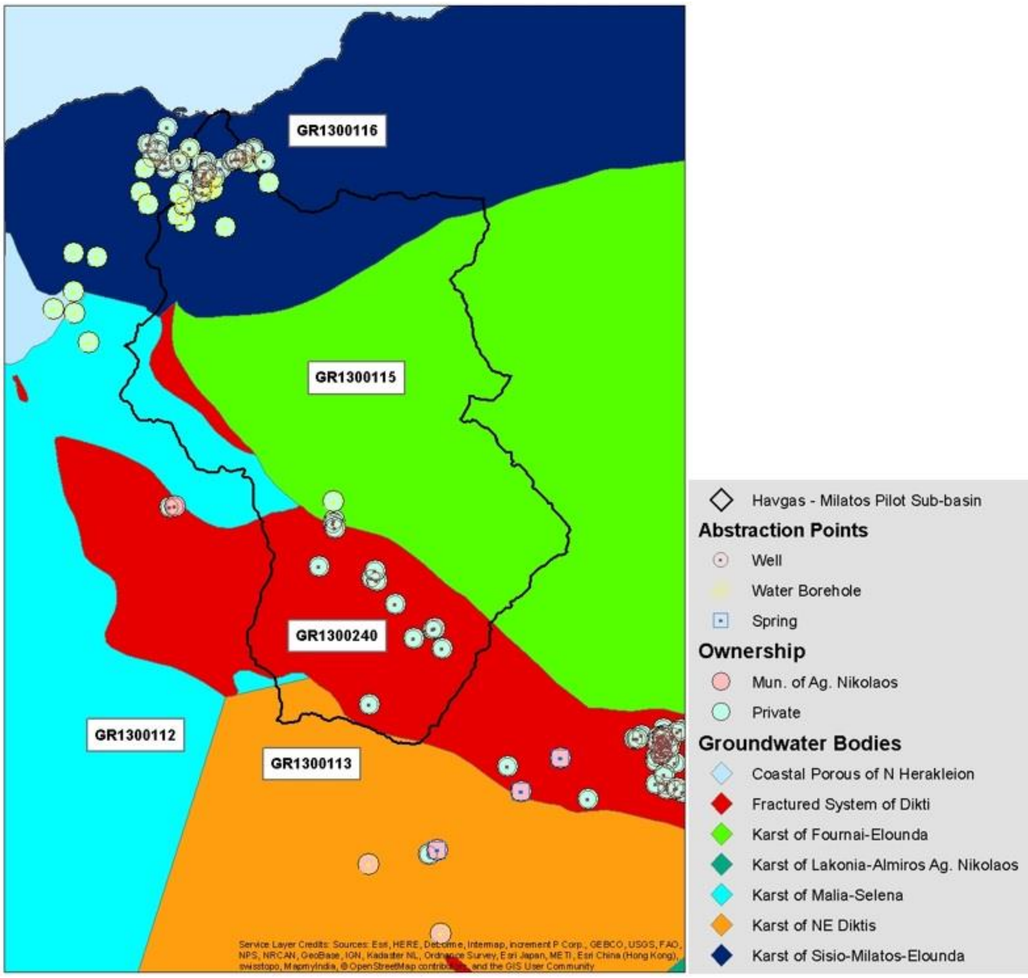


Fig. 102: Geodatabase Map Extract, depicting the abstraction points for irrigation use in Havgas – Milatos sub-basin based on the water usage legal permits

1.1.2.3 Total water consumption

Summing up, the water consumed for all the water uses within the catchment area of the pilot basin of Havgas - Milatos is presented in Table 104. The total volume of water consumed per year is 414.047 m^3, out of which the 65,85% is used for irrigation and the rest for other uses.

Table 104: The average water consumption per water use in settlements of Havgas - Milatos sub-basin (m^3/year)

POTABLE WATER	*Domestic*	*Enterprises*	*Touristic*	*Other uses*	*Sub-total*
Quantity (m^3/year)	159.491	44.985	62.706	5.453	*272.635*
Percentage (%)	58,50	16,50	23,00	2,00	*100,00*
IRRIGATION WATER	*Networks*		*Borehold/Wells*		*Sub-total*
Quantity (m^3/year)	0		141.413		*141.413*
Percentage (%)	0		100		*100*
TOTAL WATER CONSUMPTION	*Potable Water*		*Irrigation Water*		*Total*

Quantity (m³/year)	272.635	141.413	*414.048*
Percentage (%)	65,85	34,15	*100*

1.1.3 Agri pilot sub-basin (Metapontino)

In the Metapontino area dams and weirs are the main sources for all the water uses. Particularly, in the Agri pilot sub-basin, the "Monte Cotugno" dam provide water for multiple uses (drinking, irrigation and industrial purposes) to Basilicata and Puglia regions and the "Gannano" weir for irrigation (Fig. 103) to Basilicata.

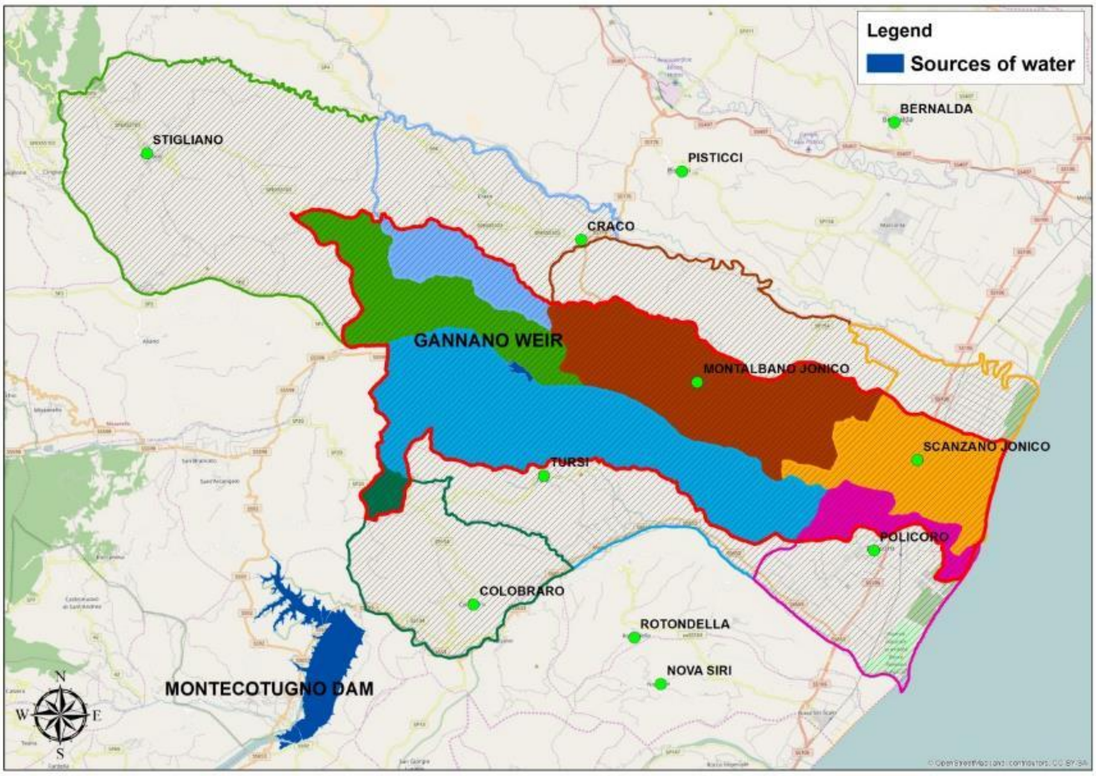


Fig. 103: Geodatabase Map Extract, depicting the sources of water for multiple uses in Agri sub-basin

1.1.3.1 Water consumption from Monte Cotugno dam

In Table 105 the total volume of water consumed by the Monte Cotugno (ITF_017_LW-ME-4-Monte Cotugno) in both regions are presented. The data was provided by the Development Institute of Irrigation and land reclamation in Puglia, Lucania and Irpinia, (Ente per lo sviluppo dell'Irrigazione e la trasformazione fondiaria in Puglia, Lucania e Irpinia - EIPLI)

Table 105: Annual volume of consumed water from Monte Cotugno dam (source: EIPLI 2016)

Year	Water Use (Million m³)			Total Consumption/ Outflows (Million m³)
	Potable	Irrigation	Industrial	
2011	119.16	157.00	8.95	285.11
2012	132.79	152.41	8.53	293.73

2013	113.99	154.39	7.26	275.64
2014	114.03	149.46	6.69	270.80
2015	116.16	147.65	6.11	269.92
Average	119.23	152.18	7.51	278.92
Consumption (%)	42,75	54,56	2,69	100.00

The allocation of water volume provided by the Monte Catugno dam among the two regions and the water users is estimated using the average water consumption presented in Table 105 and the respective percentages presented in Table 106.

Table 106: Allocation of average water consumption provided by Monte Catugno dam to water uses

Region	BASILICATA	PUGLIA
Water use	Potable	
% allocation*	6.77%	93.23%
Volume (Million m3)	8.08	111.15
SUB TOTAL (Million m3)		119.23
Water use	Irrigation	
% allocation*	82.11%	17.89%
Volume (Million m^3)	124.96	27.22
SUB TOTAL (Million m^3)		152.18
Water use	Industrial	
% allocation*	0.00%	100.00%
Volume (Million m3)	0.00	7.51
SUB TOTAL (Million m3)		7.51
TOTAL (Million m3)	133.04	145.88

* 1992-2002, source:
http://www.adb.basilicata.it/adb/risorseidriche/invaso.asp?invaso=MCotugno

In the municipalities located within the Agri river pilot sub-basin the water provided and consumed for drinking purposes are presented in Table 107.

Table 107: Potable water per municipalities in Agri sub-basin (source: http://basilicatadati.regione.basilicata.it/xwiki/bin/view/annuario_statistico_2012/Ambiente_tav8)

Municipality	Potable water introduced into the network (m^3/year)	Potable water supplied by the network (m^3/year)	Water supplied to water introduced (%)
Colobraro	178,585	111,096	62.2
Craco	135,696	69,023	50.9
Montalbano Jonico	1,058,985	829,699	78.3
Policoro	2,025,684	1,784,126	88.1
Stigliano	887,569	469,858	52.9
Tursi	520,102	439,951	84.6
Scanzano Jonico	1,510,589	957,471	63.4
TOTAL	6,317,210	4,661,224	73.79

The quantities in Table 107 is referred to the total population of the municipalities. However, some settlements are located outside the catchment area. Thus, in order to calculate the potable water consumption in the settlements of Agri sub-basin, the figures presented in Table 107 and the ratio of population of the settlements located in the pilot catchment areas to the total population (ISTAT, 2016) is considered (Fig. 104). The results are presented in Table 108.

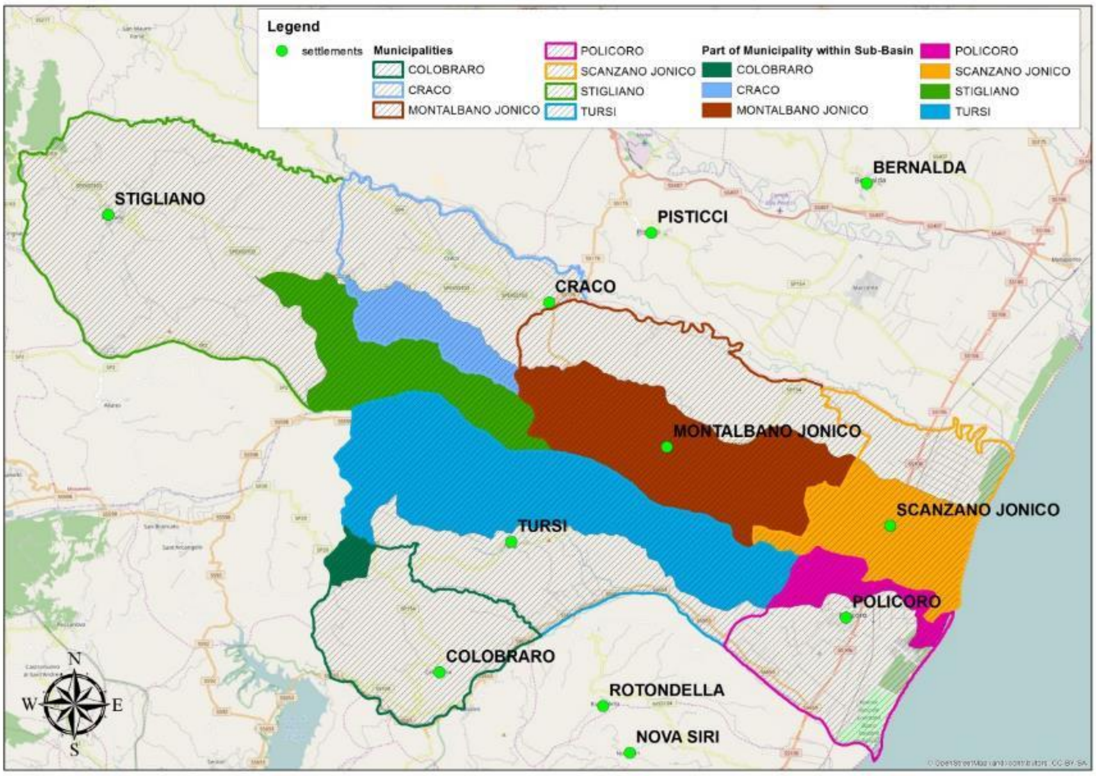


Fig. 104: Geodatabase Map Extract, depicting the settlement of Agri sub-basin municipal units located within the pilot basins

Table 108: The average potable water consumption in settlements of Agri sub-basin (m^3/year)

Municipality	Population*	Settlements/population within the sub-basin**	Potable water (m^3/year)
Colobraro	1,266	20	2,821
Craco	745	35	6,375
Montalbano Jonico	7,357	7,157	1,030,196
Policoro	17,313	7,270	850,616
Stigliano	7,564	315	36,962
Tursi	4,361	3,820	455,581
Scanzano Jonico	5,037	4,950	1,484,498
TOTAL	43,643	23,567	3,867,051
*ISTAT data, 2016			
**DiCEM elaboration from ISTAT data (2011)			

The volume of irrigation water provided by the Monte Catugno dam to the cultivations of the entire region of Basilicata is equal to 124.96 million m^3/year (Table 106). Thus, in order to calculate the irrigation water allocated within the Agri River basin catchment area the ratio of cultivation area of the pilot sub-basin irrigated from Monte Catugno to the entire cultivated area must be calculated. In Table 109 the cultivation areas and the respective consumption of irrigation water are presented.

Table 109: Irrigated area and irrigation water consumption from Monte Cotugno dam

Area	Irrigated area by Monte Cotugno dam - area of Hydraulic Sinni sub scheme (Km^2)	WATER CONSUMPTION (Million m^3)
Basilicata/Metapontino area*	400.96	124.96
Agri sub-basin**	74.97	23.36
*DiCEM elaboration from INEA data ** DiCEM elaboration from INEA data		

1.1.3.2 Water consumption from Gannano weir

Gannano weir (ITF_017_LW-ME-2-Gannano) provides water for irrigation purposes only, within Metapontino area, via the hydraulic Agri sub schemes. The volume of irrigation water provided by the Gannano weir to the cultivations of a small part of Metapontino area is 66.33 million m^3 (average data provided by Consorzio di bonifica Bradano e Metaponto). Thus, in order to calculate the irrigation water allocated within the Agri River basin catchment area the ratio of cultivation area of the pilot sub-basin irrigated from Gannano weir to the entire area is calculated. In Table 110 the cultivation areas as well as the water consumption per irrigated area are presented.

Table 110: Irrigated area and irrigation water consumption from Gannano weir

Area	Irrigated area by Gannano weir - area of Hydraulic Agri sub scheme (Km^2)	WATER CONSUMPTION (Million m^3)
Agri scheme*	118.28	66.33
Agri sub-basin**	39.07	21.91
*DiCEM elaboration from INEA data ** DiCEM elaboration from INEA data		

1.1.3.3 Total water consumption

Summing up, the water consumed by all the water users within the catchment area of Agri pilot sub-basin is presented in Table 111. It is obvious that agriculture is the major water user since it utilizes the 92.13% of the total water consumed in the Agri river sub-basin.

Table 111: The average water consumption per water use in Agri sub-basin (m^3/year)

WATER USE	*POTABLE*	*IRRIGATION*	*INDUSTRIAL*	*Total*
Monte Cotugno dam				
Quantity (Mm^3/year)	3.87	23.36	0	27.23
Percentage (%)	14.21	85.79	0	
Gannano weir				
Quantity (Mm^3/year)	0	21.91	0	21.91
SUM	3.87	45.27	0	49.14
Percentage (%)	7.87	92.13	0	100.00%

1.2 Water balance, water availability and water stress periods

1.2.1 Cretan Pilot areas

1.2.1.1 Methodology for estimation of water balance

The renewable water volume (water availability) of the groundwater sources used for several uses in the Cretan pilot sub-basins is not available in the database of the competent authority.

Thus, the renewable water resources of the pilot areas of LIFE AgroClimaWater project in Crete, Greece (Tavronitis river basin in the Municipality of Platanias and Havgas - Milatos river basin in the Municipality of Agios Nikolaos) in dry, medium and wet conditions were estimated and they are analytically presented in the sub-deliverable C2.1[4] "Water Availability in LIFE AgroClimaWater Pilot basins conducted" by HYETOS.

The renewable water resources in the areas of interest are assumed to be equal to the infiltrated/percolated water since only the groundwater is exploited for several water uses within these areas. The infiltrated water in wet, medium and dry conditions was estimated through the calculation of the parameters of water balance in the respective hydrological conditions.

The general equation of the water balance represents the balance between the inputs (precipitation) and the outputs (surface runoff, evapotranspiration and infiltration) within an area over a long period of time, as shown in the following equation:

$$P = E + R + \Delta Sa \qquad \text{(Eq. 1)}$$

where:

P : is the amount of precipitation (rainfall, show etc),

E : is the evapotranspiration,

R : is the surface runoff,

ΔSa : is the shift of the groundwater during the same period of time. This change is usually equal to the infiltration of water into the ground.

ΔS is the storage in the soil, *aquifers* or reservoirs (SSWM).

[4] All data that are presented in this deliverable and they are related with the estimation of water balance are described in more details in the sub-deliverable C2.1.

Calculation of inputs (precipitation): The volume of water that precipitates in the pilot areas is calculated by using the rainfall data derived from the meteorological stations presented in paragraphs 2.1.1 and 2.1.2 of sub-deliverable C2.1 and the total area of the targeted catchment area.

Calculation of outputs: Evapotranspiration, runoff and infiltration are the components that comprise the outputs.

Evapotranspiration: It is calculated from the classical empirical method of Turc (1954). Moreover, taking into account that Turc method is a simplified – generalised method, which uses just the precipitation and temperature, we assume that the evapotranspiration that is calculated by the Turc method incorporates the infiltration (component ΔSa of Eq. 1). Thus, the evapotranspiration hereafter is called "flow deficit" since except for the net evapotranspiration we assume that it includes the shift of ground water (ΔSa).

Infiltration: It is estimated by the "flow deficit" that is calculated according to Turc method minus the net evapotranspiration that is calculated according to Hargreaves – Samani (1985) method, as proposed by the "ASCE Standardized Reference Evapotranspiration Task Committee Appendix A", combined with the crop factor method. By the latter method, the net evapotranspiration is calculated taking into account not only the temperature and precipitation but also the incident ray at the boundary of the atmosphere (extraterrestrial radiation), the type of crops and the crop coefficient. Therefore, the crop factor method is more accurate for the estimation of net evapotranspiration than Turc Method.

Having calculated the "flow deficit" for dry, mean and wet hydrological conditions and the net evapotranspiration according to Turc and Hargreaves – Samani methods, respectively, the difference between them (Turc "flow deficit" minus Hargreaves – Samani evapotranspiration) gives the estimated quantity of the water volume that is infiltrated in the aquifers annually in dry, mean and wet hydrological conditions.

In the next paragraphs the main results provided by the previous methodology are presented.

1.2.1.2 Water balance

Table 112 presents the results for the water balance calculation in mean, dry and wet conditions for the entire Tavronitis basin utilizing the Turk Method. According the methodology described the evapotranspiration represents the sum of net evapotranspiration and infiltration and is named as "flow deficit".

Table 112: Annual water balance for mean, dry and wet conditions for Tavronitis basin.

Annual Water balance	HYDROLOGICAL CONDITIONS		
	DRY	MEAN	WET
Basin area (Km^2)=	145,87	145,87	145,87
Average precipitation (mm)=	771,33	1.344,33	2.169,48
Average Temperature ºC =	17,38	17,38	17,38
L coefficient=	996,99	996,99	996,99
Evapotranspiration according to Turc (mm)=	630,09	815,40	913,92
Flow deficit (mm)=	630,09	815,40	913,92

Runoff (mm)=	141,23	528.93	1.255,57
Runoff coefficient=	18,31%	39,35%	57,87%
Non-runoff coefficient=	81,69%	60,65%	42,13%
Non-runoff volume (m^3)=	91.911.154,43	118,941,555.28	133.312.115,45
Runoff volume (m^3)=	20.601.736,58	77,154,710.57	183.148.651,23

In order to calculate the non-runoff volume in mean, wet and dry hydrological conditions in the pilot area of Voukolies and Maleme sub-basins the "non-runoff volume" values that are presented in Table 113 are multiplied with 22.79%, which is the ration of the pilot area to the total area of Tavronitis.

Table 113 Non-runoff volume in Voukolies and Maleme sub-basins

Hydrological conditions	Non-runoff volume (m^3)
Mean	27.106.780,45
Dry	20.946.552,10
Wet	30.381.831,11

Respectively, Table 114 represents the results of the calculated water balance calculated for Havgas – Milatos sub-basins.

Table 114: Annual water balance for mean, dry and wet conditions for Havgas – Milatos sub-basins

Annual Water balance	HYDROLOGICAL CONDITIONS		
	DRY	MEAN	WET
Basin area (Km^2)=	29,09	29,09	29,09
Average precipitation (mm)=	647,22	336,65	1.045,20
Average Temperature ºC =	18,32	18,32	18,32
L coefficient=	1.065,43	1.065,43	1.065,43
Evapotranspiration according to Turc (mm)=	574,54	336,68	765,89
Flow deficit (mm)=	574,54	336,68	765,89
Runoff (mm)=	72,69	-0,03	279,31
Runoff coefficient=	11,23%	0,00%	26,72%
Non-runoff coefficient=	88,77%	100,00%	73,28%
Non-runoff volume (m^3)=	16.715.364,91	9.794.354,89	22.282.395,66
Runoff volume (m^3)=	2.114.677,90	0,00	8.126.217,84

Except for the non-runoff volume the net evaportranspiration is calculated in order to estimate the infiltration of water. In the crop factor approach the crop evapotranspiration, ETc, is calculated by multiplying the reference crop evapotranspiration, ET_0, by a crop coefficient, K_c. In our case the reference crop evapotranspiration, ET_0, is calculated by the Hargreaves – Samani method and the crop factors (K_c) used, derived either from the relative bibliography (FAO bulletin 56, Tsanis et al., 1997) or experimental data that were available for Crete and were modified by the research team of IOTSP in the project BEWARE (2002-2005). The types of crops cultivated in the pilot areas were identified according to Corine Landcover 2000.

The total net evapotranspiration for each kind of crop and in total in the area of Voukolies and Maleme sub-basins are:

- Olive groves: 7.690.519,26m^3
- Orange groves: 2.541.738,81m^3

- Medicago disciformis: 2.360.661,42m^3

Total evapotranspiration: 12.592.919,48m^3

And for Havgas – Milatos are:

- Olive groves: 3.331.881,81m^3
- Medicago disciformis: 1.300.379,60m^3

Total evapotranspiration: 4.632.261,41m^3

1.2.1.3 Water availability for different hydrological conditions (wet, mid, dry)

As it has already been mentioned, the water infiltrates in the aquifers was the only water source that was used in both areas. Therefore, the infiltrated water in wet, mean and dry hydrological conditions is assumed to be the renewable water volume of the project's pilot sub basins.

According to the analysis of the previous paragraphs, the annual infiltration is the difference between the non-runoff volume (Turc method) and the water evapotranspiration by crops in the area of interest (Net evapotranspiration by Hargreaves – Samani and crop factor methods). The annual infiltration in wet, mean and dry hydrological conditions for both Tavronitis and Havgas – Milatos sub-basins are presented in Table 115 and Table 116, respectively.

Table 115: Water availability in Tavronitis basin.

Infiltration of Tavronitis basin (m^3)	
Minimum annual infiltration	8,353,632.62
Mean annual infiltration	14,513,860.97
Maximum annual infiltration	17,788,911.63

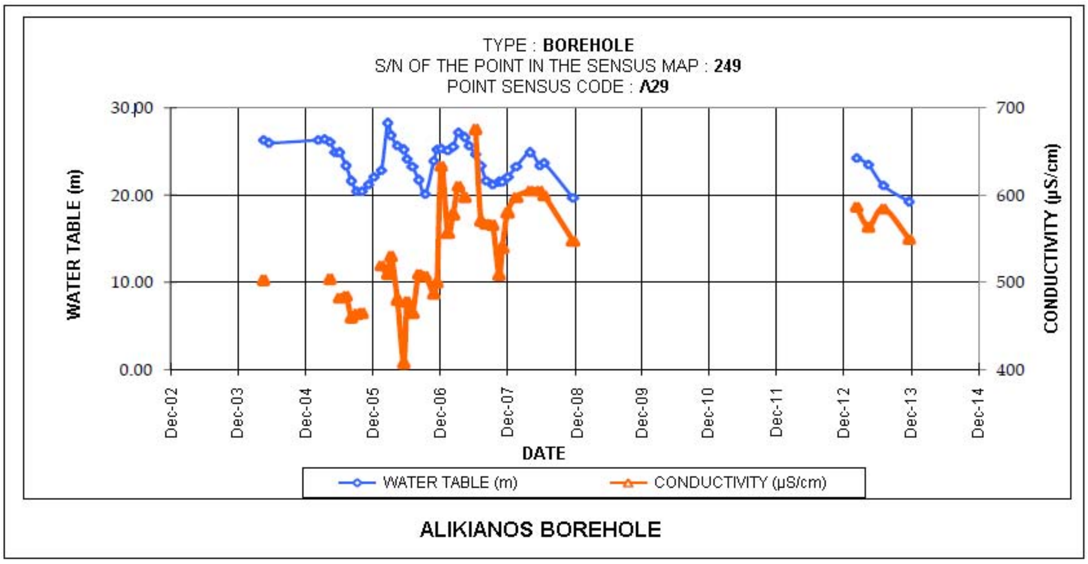
Table 116: Infiltration of Havgas – Milatos sub-basins.

Infiltration of Havgas – Milatos basin (m^3)	
Minimum annual infiltration	5,162,093.48
Mean annual infiltration	12,083,103.50
Maximum annual infiltration	17,650,134.25

1.2.1.4 Water stress periods (months) and assessment of the participation of agricultural sector

Voukolies and Maleme sub-basins

As depicted on Fig. 98 and Fig. 99, the water consumed by the water users in the pilot sub-basins is abstracted from the groundwater system of Porous aquifer of Campos Chanion (GR1300022). According to the study of "The water status of groundwater bodies of Crete" (M. Kritsotakis, S. Pavlidou, 2013) and particularly to the monitoring results of its water table for the period from 2003 to 2008 derives that it is varied during the year from 5 to 10 meters thus the annual water balance of the source is assumed stable. The water stress period is presented during the summer resulting in an increase of salinization.



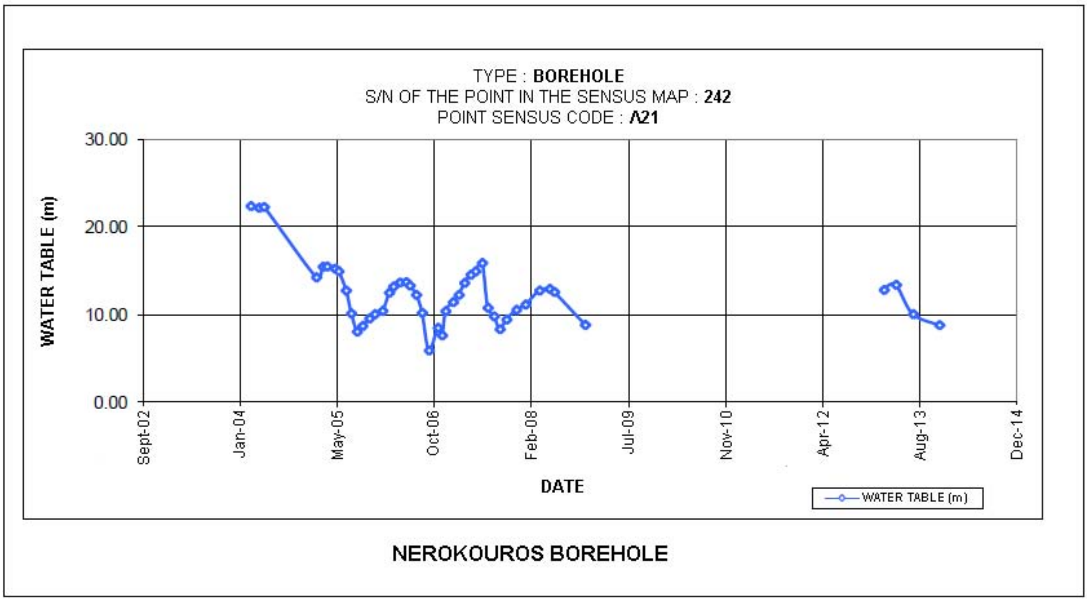


Fig. 105: Water table and conductivity variations of Porous aquifer of Campos Chanion (GR1300022) **(source: "T**he water status of groundwater bodies of Crete**"** M. Kritsotakis, S. Pavlidou, 2013)

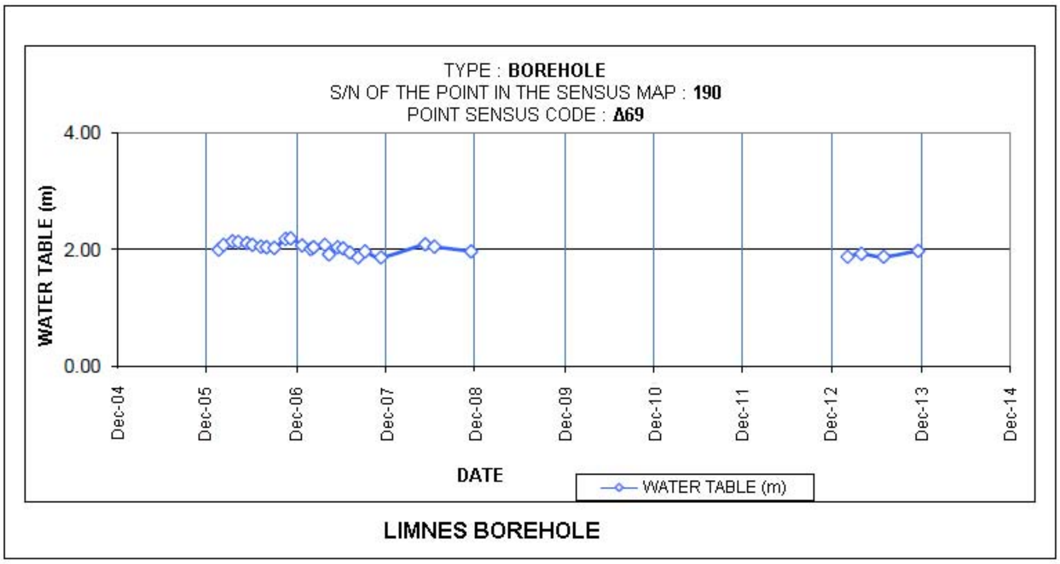
In Fig. 105 the variations of the water table of the two boreholes that are abstracted water from the Porous aquifer of Campos Chanion is observed. The reduction of the water table starts in early summer and it is completed at the end of September due to the reduced rainfall and the increase of water demand both from agriculture and tourism.

Havgas - Milatos sub-basin

As it is shown in Fig. 101 and Fig. 102, the majority of the abstraction points are located at the northern part of the Havgas (Milatos) sub-basin, northern of Milatos settlement and abstract water from the karstic aquifer of Sissio- Milatos- Elounda (GR1300116). In addition, water is abstracted from the fractured system of Dikti (GR1300240) and in a less degree from the Karstic system of Fournai-Elounta (GR1300115).

According to the same study as above, from the monitoring results of the water table of the Karstic system of Fournai - Elounta (GR1300115) for the period 2005 – 2014 (Fig. 106) derives that it is varied during the year but the annual water balance of the source is assumed stable. The water stress period is presented during the summer resulting an increase of salinization.

Data for the other groundwater bodies were not found.



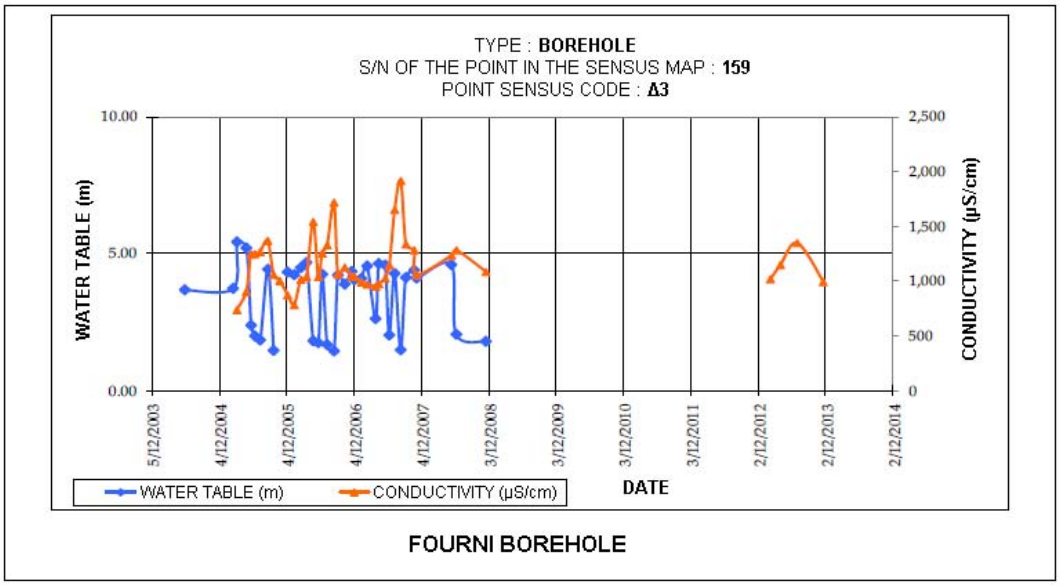


Fig. 106: Water table and conductivity variations in Karstic system of Fournai-Elounta (GR1300115) **(source: "T**he water status of groundwater bodies of Crete" M. Kritsotakis, S. Pavlidou, 2013)

1.2.2 Metapontino pilot area

In the Metapontino area dams and weirs are the source for all the water uses. Within the selected pilot sub-basins of Agri, the "Monte Cotugno" dam and the "Gannano" weir provide water for multiple uses. Monte Cotugno dam and Gannano weir belong to the Agri-Sinni hydraulic scheme (also named Jonico-Sinni scheme that include the Agri sub scheme and the Sinni sub scheme).

1.2.2.1 Monte Cotugno dam water balance

The dam of Monte Cotugno, in the municipality of Senise, is the biggest clay dam in Europe, with a max water capacity of 530 million m^3. The dam operation has started in 1983 and intercepts the flow of the River Sinni where its bed narrows. The water of the Sinni River is collected and used for irrigation, industrial and drinking purposes. In addition, water of the Sarmento Stream and of the Agri River is driven to the dam in order to assure its higher filling frequency.

In Table 117, data related with the water balance of Monte Catugno Dam are presented. It should be mentioned that the outflow represents also the volume that is consumed by the multiple users in the area.

Table 117: Annual water balance and availability for Monte Cotugno dam **(source: E.I.P.L.I.: Ente per lo Sviluppo dell'Irrigazione e la trasformazione** fondiaria in Puglia, Lucania e Irpinia)

Year	Volume outflow (Mm^3)	Volume inflow (Mm^3)	Ecological flow (Mm^3)	Water available for use (Mm^3)	Water used (Mm^3)	Water storage (Mm^3)	Water Used / Available (%)
2002	142.44	227.55	16.6	220.5	142.44	78.06	64.6
2003	278.57	398.11	16.6	459.57	278.57	181.00	60.6
2004	291.21	366.92	16.6	531.32	291.21	240.11	54.8
2005	316.93	327.35	16.6	550.86	316.93	233.93	57.5
2006	343.14	298.56	16.6	515.89	343.14	172.75	66.5
2007	333.52	210.70	16.6	366.85	333.52	33.33	90.9
2008	177.27	240.4	16.6	257.13	177.27	79.86	68.9
2009	285.51	540.14	16.6	603.4	285.51	317.89	47.3
2010	289.32	366.90	16.6	668.19	289.32	378.87	43.3
2011	285.05	148.65	16.6	510.92	285.05	225.87	55.8
2012	293.50	261.88	16.6	471.15	293.50	177.65	62.3
2013	274.34	374.51	16.6	535.56	274.34	261.22	51.2
2014	271.51	179.22	16.6	423.84	271.51	152.33	64.1
2015	271.45	222.91	16.6	358.64	271.45	87.19	75.7
Average	275.27	297.41	16.60	462.42	275.27	187.15	61.68

Interregional River Basin Authority of Basilicata, in compliance with EU Directive 2000/60, calculated the ecological flow (minimum vital outflow) at river basin scale. In Table 118 are presented the ecological flow values for Sinni and Agri rivers calculated for the Monte Cotugno and Gannano downstream area.

Table 118: Rivers ecological flow (source: Interregional River Basin Authority of Basilicata – Water balance and ecological flow of river basin plan)

River	Section	Minimum Vital Outflow/Ecological Flow (Mm^3/year)
Sinni	Monte Cotugno dam	16.60
Agri	Gannano weir	11.05 (during irrigation period)

1.2.2.2 Monte Gatugno dam water availability for different hydrological conditions (wet, mid, dry)

The Monte Cotugno dam timeseries presented in Table 117 were utilized in order to provide data in reference to the amount of water inflow in the dam during the three different hydrological conditions (dry, mean and wet).

Table 119: Different hydrological conditions (dry, mean and wet) for Monte Cotugno dam

Hydrological Conditions	Year	Volume outflow (Mm^3)	Volume inflow (Mm^3)	Water available for use (Mm^3)	Water used (Mm^3)	Water storage (Mm^3)	Water Used / Water Available (%)
Dry	2011	285.05	148.65	510.92	285.05	225.87	55.8
Wet	2009	285.51	540.14	603.4	285.51	317.89	47.3
Mean	2002-2015	275.27	297.41	462.42	275.27	187.15	61.68

From the above table it is derived that during dry hydrological years the annual amount of water inflows in the dam, equal to 148.65 Mm^3, is far from the average annual volume of consumed water which is equal to 275.27 Mm^3. Accordingly, during wet hydrological years the respective amount of water, 540.14 Mm^3, is much higher than the average annual volume of consumed water. Moreover, during the years with mean hydrological conditions the annual volume of water that inflows in the dam (297.41 Mm^3) is at least 20 Mm^3 higher than the mean annual consumed volume of water (275.27 Mm^3) and as a result not only all the annual water needs are covered but also an amount of 20 Mm^3 is stored. Thus, the water managing authority of the dam has to regulate the outflows considering all the possible hydrological conditions of the next year.

1.2.2.3 Monte Cotugno dam water stress periods (years) and assessment of the participation of agricultural sector

Utilizing the data of Table 117, it is derived that the years of the minimum volumes of available water for Monte Catugno Dam were in 2002 and 2008. During these years the values of water volume provided to several water uses not only are the lowest of the timeseries but also they are less than the mean annual volume which is used in order to cover all the water needs. The years with the minimum water availability measures are taken as the years the stress imposed to the water source (Monte Cotugno).

Table 120: Years of water stress for Monte Cotugno dam

Year	Volume outflow (Mm^3)	Volume inflow (Mm^3)	Water available for use (Mm^3)	Water used (Mm^3)	Water storage (Mm^3)	Water Used/Water Available (%)
2002	142.44	227.55	220.5	142.44	78.06	64.6
2008	177.27	240.4	257.13	177.27	79.86	68.9
2002-2015	275.27	297.41	462.42	275.27	187.15	61.68

As presented in Table 111, the 85.79% of the water provided to Agri sub-basin is consumed for irrigation purposes; it is obvious that agriculture is the major factor of the stress imposes on the dam.

Thus during water stress periods the Interregional River Basin Authority of Basilicata applies emergency measures related with the drastic reduction for agricultural irrigation water. For example in 2002 it was authorized only an aid to tree crops, excluding the herbaceous and vegetable crops. In this regard, the "Consorzio of bonifica", as early as the month of January 2002, asked agricultural users not to undertake horticultural and field crops since there was no certainty of water resources for irrigation. However, emergency facilities were activated along the waterways in order to ensure survival of the tree crops, during the summer period. The facilities could not guarantee a steady water supply. (source: http://www.adb.basilicata.it/adb/attivita/altreattivita.asp?tipo=2).

1.2.2.4 Gannano weir water balance

The Gannano weir intercepts the river Agri, already regulated by Pertusillo dam. The weir was built around 1951 by the "Consorzio di bonifica Bradano and Metaponto", has a capacity of 2.6 million cubic meters. The weir is used mainly for regulatory purposes while depending on the water entries in the weir some water quantities are also used for irrigation purposes.

Table 121: Annual water balance and water availability for Gannano weir (source: **E.I.P.L.I.: Ente per lo sviluppo dell'Irrigazione e la trasformazione** fondiaria in Puglia, Lucania e Irpinia)

Year	Volume inflow (Mm^3)	Volume outflow (Mm^3)	Ecological flow (Mm^3)	Water available for use (Mm^3)	Water used for irrigation (Mm^3)	Water Used/Water Available (%)
2005	29.40	73.84	11.05	18.35	73.84	402.43
2006	156.52	73.36	11.05	145.47	73.36	50.43
2007	233.20	84.58	11.05	222.15	84.58	38.07
2008	98.86	50.09	11.05	87.81	50.09	57.04
2009	118.36	63.75	11.05	107.31	63.75	59.40
2010	86.35	57.15	11.05	75.30	57.15	75.90
2011	156.22	77.73	11.05	145.17	77.73	53.55
2012	133.35	76.91	11.05	122.30	76.91	62.89

2013	31.71	63.99	11.05	20.66	63.99	309.79
2014	7.77	48.00	11.05	-3.28	48.00	-1462.97
2015	69.99	60.18	11.05	58.94	60.18	102.11
Average*	131.61	66,33	11,05	90,93	66,33	62.42

**the years 2005, 2013 and 2014 were not considered in the calculation of average values of inflows*

Data of water inflow and water consumed were provided by the responsible authority, "Consorzio di Bonifica di Bradano e Metaponto" and are presented in Table 121. In the same table the calculated water availability is also presented. It is obvious that the figures of volume of water inflows provided by the "Consorzio" at the grey marked lines are not correct since it is lower than the amount of volume outflow and will not be considered. It should be mentioned that outflow represents the consumed volume of water for irrigation use. Since the weir was constructed mainly in order to regulate the amounts of water not reserved by the tanks and dams that are located at the upstream areas of Agri basin, the amount of water storage is equal to zero.

1.2.2.5 Gannano weir water availability for different hydrological conditions (wet, mid, dry)

The Gannano weir timeseries presented in Table 121 are utilized in order to provide data on the amount of water inflows in the dam during the three different hydrological conditions (dry, mean and wet).

Table 122: different hydrological conditions (dry, mean and wet) for Gannano weir

Hydrological conditions	Year	Volume outflow (Mm^3)	Volume inflow (Mm^3)	Water available for use (Mm^3)	Water used (Mm^3)	Water Used/Water Available (%)
Dry	2015	60.18	69.99	58.94	60.18	102.11
Wet	2007	84.54	233.20	222.15	84.58	38.07
Mean	2006-2015	66.33	131.61	90.93	66.33	62.42

From the above table it is derived that during dry hydrological years the annual amount of water inflows in the weir, 69.99 Mm^3, marginally covers the average volume of consumed water which is equal to 66.33 Mm^3/year. In addition the annual water that inflows during wet hydrological years, such as 2007, is almost 3,5 times higher than the average annual volume of consumed water for irrigation, 66.33 Mm^3. During the years with mean hydrological conditions the annual volume of water that inflows in the dam (131.61 Mm^3) is almost 2 times higher than the mean annual consumed volume of water (66.33 Mm^3). The minimum quantity of water consumed by the weir is 48.00 m^3 in year 2014. This year was dry as it could also be identified by the inflow in Monte Cotugno Dam that was equal to 179.22 Mm^3, 40% lower than the average volume inflows in Monte Cotugno reservoir.

1.2.2.6 Gannano weir water stress periods (years) and assessment of the participation of agricultural sector

Since Gannano weir is used for the regulation of water inflows from the upstream areas of Agri basin as well of Pertusillo Dam, water from the weir is used for ensuring a constant flow for irrigation uses of the lower valley and the Ionian coastal plain and in order to maintain a constant flow rates during summer period (July, August: the months of highest demand for water). Thus, there isn't any water stress year as the amount of the water can be used for irrigation is always less than the amount of water that inflows in the weir annually thus the agricultural sector doesn't impose any stress in the weir.

1.3 Impacts on water quantity of the water sources (water bodies) utilized for abstraction

1.3.1 Voukolies and Maleme sub-basins (Platanias)

1.3.1.1 Water sources quantitative status

As shown in Fig. 98 and Fig. 99, the water consumed by the water users in the pilot sub-basin is abstracted from the groundwater system of Porous aquifer of Campos Chanion (GR1300022). According to Fig. 105 the water table of the aquifer is varied during the year from 5 to 10 meters thus the annual water balance of the source is assumed stable.

In addition, according to the river management plant of Water District of Crete, the quantitative water status of the water system is assessed as good (Table 123) with no increasing trend for further deterioration.

Table 123: Groundwater bodies in Voukolies and Maleme sub-basins

Code	Name	Aquifer Type	Anthropogenic Pressures / Impacts	Natural Pressures / impacts	Quantitative Status	Comments	Increasing trend of pollutant
GR1300022	Porous aquifer of Campos Chanion	porous	No	-	Good	-	No

1.3.1.2 Pressures and impacts by water abstraction

Based on the previous information no significant environmental and/ or socioeconomic impacts have been identified on the water body by anthropogenic pressures, agricultural included or natural pressures.

Considering the water consumed by all the water uses within the catchment area of the pilot sub-basins of Voukolies and Maleme that is presented in Table 100, its quantity is equally allocated to potable (52,13 %) and irrigation use (47,87%). Thus, any impacts on water abstraction are attributed to both uses in the same degree.

Regarding the use of irrigation water, data collected on the use of irrigation water by the 1st AWMS form revealed that 47 olive and the 8 citrus orchards irrigated in a total of 100 orchards.

Concerning the irrigation of olive orchards, the provided data present a significant deviation from what is considered as typical irrigation water requirements for olive trees in the area. Depending on climatic factors, full irrigation of olive orchards in North-Western Crete typically requires 228-270 mm of water (BEWARE project, 2005; Doupis et al., 2013), while the relevant limits on water use for irrigating olive trees, as set by the Decentralized Administration of Crete (DAC) in relevant local legislation (Decision published at FEK 2055B/2015) are 250-300 mm. However, according to farmers' interview data, the average annual application of irrigation water was only 63 mm, ranging from 17 to 334 mm. Based on the reported values, the vast majority of irrigated olive orchards could not be characterized as receiving adequate amounts of water and it is questionable if it can actually be beneficial in reducing water stress and increasing orchard productivity.

Concerning the water use in citrus orchards, provided data are much closer to reality, although they also present a significant variation, for reasons similar to those reported for olive orchards. The average annual water use reported was 325 mm, with typical requirements for citrus trees in the area estimated to be around 500 mm (BEWARE project, 2005) and the limits set by the DAC being 400-500mm. However, extreme values included two orchards representing the minimum (75 mm/year) and maximum (800 mm/year) values reported.

1.3.2 Havgas – Milatos sub-basin (Mirabello)

1.3.2.1 Water sources quantitative status

As shown in Fig. 101 and Fig. 102, most abstraction points are located at the northern part of the Havgas (Milatos) sub-basin, Northern of Milatos settlement and abstract water from the karstic aquifer of Sissio- Milatos- Elounda (GR1300116). In addition, water is also abstracted from the fractured system of Dikti (GR1300240) and in a less degree from the Karstic system of Fournai-Elounta (GR1300115).

According to the study on "The water status of groundwater bodies of Crete" (M. Kritsotakis, S. Pavlidou, 2013) as well as to the River management plan of Crete (Table 124) the quantitative status of the particular water bodies is good. However, more information on the particular bodies has as follows:

- The fractured aquifer of Dikti (GR1300240) that has a low water capacity is locally overexploited thus prohibitive measures on a) the drilling of new boreholds, b) the abstraction and transfer of water quantities higher than the limits defined in the existing water permits and c) the alteration of the current situation of the existing water abstraction infrastructures (dredging, increasing the amount of water, etc. have been set by the water directorate of Decentralize administration of Crete.
- The karstic aquifer of Sissio- Milatos- Elounda (GR1300116) presents high values of salinity due to the development of the karst in a negative altitude due and its vicinity to the sea. In addition, the high values of electrical conductivity are also increased during summer.
- The Karstic system of Fournai-Elounta (GR1300115) has a low water capacity/availability. The system is monitored by two stations (boreholes). In Fig. 106 the variation of water table as well of electrical conductivity are shown.

The variation of water table is low in general but the increasing conductivity (possible salinization) during summer reveals that the source is locally over-exploited during summer.

In addition, according to the river basin management plant of Water District of Crete, the quantitative water status of the groundwater water systems is assessed as good as presented in Table 124 with no increasing trend for further deterioration.

Table 124: Groundwater bodies in Havgas - Milatos sub-basin

Code	Name	Aquifer Type	Anthropogenic Pressures / Impacts	Natural Pressures/ impacts	Quanti-tative Status	Comments	Increasing trend of pollutant
GR1300116	Coastal karst of Sisi-Milatos-Elounda	karstic	No	Excess chloride values attributed to natural salinization (vicinity of the karst aquifer to the sea)	Good	Increased background values due to layers of gypsum	No
GR1300115	Karst of Fourni - Elounda	karstic	Marginal local over-exploitation	-	Good	Local over-exploitation of low water capacity aquifers	No
GR1300240	Fractured of Dikti	fractured	Local over-exploitation	-	Good	-	No

1.3.2.2 *Pressures and impacts by water abstraction*

Based on the previous information on water status of groundwater bodies that has been characterized as good, no significant environmental and/ or socioeconomic impacts have been identified on them by anthropogenic pressures, agricultural included. However, local over exploitation is mentioned on two out of three of them (GR1300240, GR1300115).

According to the same study as above (M. Kritsotakis, S. Pavlidou, 2013), from the monitoring results of the water table of the Karstic system of Fournai - Elounta (GR1300115) for the period 2005 – 2014 (Fig. 106) derives that it is varied during the year but the annual water balance of the source is assumed stable. In addition, the water stress period is presented during the summer resulting in an increase of salinization.

Considering the water consumed by all the water uses within the catchment area of the pilot sub-basins of Havgas – Milatos that is presented in Table 104, the total volume of water consumed per year is 414.047 m^3, out of which the 65,85% is used for irrigation and the rest for other uses. Thus, agriculture will have more potential impacts on water quantity only during the summer periods when the water needs are higher in comparison with the amounts that required during the rest periods of the year and only on the fractured system of Dikti (GR1300240) and the Karstic system of Fournai-Elounta (GR1300115) that has identified that are overexploited. Considering that the majority of abstraction points are located at the coastal karst of Sisi-Milatos-Elounda (Fig. 102), the decree of the impacts from agriculture on GR1300240 and GR1300115 is not expected to be significant as only a small number of the abstraction points that are within Havgas – Milatos sub-basins are abstracted water from these groundwater bodies.

Regarding the use of irrigation water, data collected on the use of irrigation water by the 1st AWMS form revealed that 11 olive orchards irrigated in a total of 101 orchards.

As compared to the data reported by farmers in the area of Platanias, the Mirabello data are definitely more realistic and seem more reliable. Actual irrigation water requirements are higher in Eastern Crete due to significantly lower precipitation as compared to the North-Western part of the island. A rough estimate, since there is no availability of experimental data, would be 300-330 mm of water, depending on climatic conditions, although there is a legislative limit of 300 mm per year set by the Decentralized Administration of Crete. According to farmers’ interviews, the average annual application of irrigation water was 271 mm, but ranging from 60 to 625 mm. Application rates above 600 mm are definitely beyond the actual crop requirements. The application rate per irrigation event is considerably high (115 mm) and definitely beyond the water holding capacity of any type of soil, but the validity of this parameter should be further investigated. At high application rates, it is expected that a significant amount of water is lost to soil layers beyond the root zone of the trees and therefore not utilized by the crop. Based on the above, it seems that there is a significant potential for improving irrigation water use efficiency.

1.3.3 Agri pilot sub-basin (Metapontino)

1.3.3.1 Water sources quantitative status

As shown in Fig. 103, the water stored in Monte Cotugno dam and regulated by Gannano weir is utilized for the provision of water to the multiple uses in the catchment area of the pilot Agri sub-basin.

According to the approved River Basin Management Plan of South Apennine 2015-2021 the ecological status of Monte Cotugno (ITF_017_LW-ME-4-Monte Cotugno) and Gannano (ITF_017_LW-ME-2-Gannano) are totally unknown. Thus, no conclusions on their quantitative status could be made from the particular information

Table 125: Ecological and Chemical Status of lakes in Agri sub-basin

EU_CD_LW	Name	Type	Ecological Status
ITF_017_LW-ME-4-Monte Cotugno	Monte Cotugno	Dam (ME-4)	Unknown
ITF_017_LW-ME-2-Gannano	Gannano	Dam (ME-2)	Unknown

However, an assessment on the quantitative status for the purposes of the LIFE AgroClimaWater could be made if the relation of the water available for use with the water consumed is considered.

Monte Cotugno dam has a maximum water capacity of 530 Mm^3. Considering the data presented for the period 2002 to 2015 in Table 117 the dam provides almost the half of its water capacity to water consumers, an average of 275.27 Mm^3 while a quantity is stored as a reserve for the next year. In dry hydrological conditions the water is not ample to satisfy all the water needs and restricted measures is taken by the managing authority of the reservoir. Special attention is given to measures related with irrigation water.

Regarding Gannano weir, its main operation is the regulation of water volumes released from Pertusillo dam, thus its storage water capacity is only 2.6 Mm^3. Therefore, the quantity of water provided for irrigation from Gannano weir depends on the quantities released by the Pertusillo dam and the water collected from the upper streams. Thus the quantitative status of Gannano weir is expected to be degraded on one hand during summer, drought periods as the water released from Pertusillo dam in this period of the year and also the water inflows in the weirs due to meteorological conditions is less than the rest period of the year and on the other hand when the managing authority of the weir decides to empty the weir at the end of each year.

1.3.3.2 Pressures and impacts by water abstraction

Considering the water consumed by all the water users within the catchment area of the pilot basin of Agri that presented in Table 111, the total volume of water consumed per year is 49.14 Mm^3, out of which the 92.13% is used for irrigation and the rest for other potable uses. Thus, agriculture might impose more impacts on water quantity than potable use.

Regarding Monte Cotugno dam, as presented in Table 105, the 54,56% of water consumption is irrigational for the entire area both Basilicata and Puglia while for the area of Bailicata the amount of the water provided to agriculture is 124.96 Mm^3 out of the 133.04 (93.93%). Thus the pressure might impose by the agriculture on the dam is severe especially during the dry years and the summer period.

As far as Gannano weir is concerned neither impacts nor pressures are expected to be imposed by water abstraction as water from the weir is used for irrigation purposes (for ensuring a constant flow for irrigation uses of the lower valley and the Ionian coastal plain and in order to maintain a constant flow rates during summer period) and when there is sufficiency water availability.

Regarding the use of irrigation water, data collected on the use of irrigation water by the 1st AWMS form revealed that 96 orchards irrigated in a total of 100 orchards. More in particular, the 47% of the olive orchards seem to be over irrigated, while in no orchards deficit irrigation is applied. The 5% of the citrus orchards seem to be over irrigated while in no one deficit irrigation is applied. The 17% of the peach orchards seem to be over irrigated, and in almost 38% of them deficit irrigation is applied. Finally, only 4 apricot orchards seem to be over irrigated, while in almost 45% of the farms deficit irrigation is applied.

1.4 Conclusions

Using the previous analysis the impacts are imposed on the water sources utilized for water abstraction by the agriculture within LIFE AgroClimaWater pilot sub-basins are summarized below.

For Voukolies and Maleme sub-basins in the area of Platanias municipality in Greece the following is summarized:

- The water source provides water from multiple uses is the Porous aquifer of Campos Chanion (GR1300022).

- Its water status is assessed as good with no increasing trend for further deterioration according to the rivers management plan of Crete water district (GR13)
- The water table remains stable in an annual basis while every summer it is reduced due to the increase of demand and the absence of precipitation.
- The water consumption is equally allocated to potable and irrigational use, thus any potential impacts should be equally attribute to both sectors.
- Based on data collected by the 1st AWMS in the frame of AgroClimaWater, the water quantities used by farmers for the irrigation of the majority of registered olive and citrus orchards could not be characterized as adequate and it is questionable if it can actually be beneficial in reducing water stress and increasing orchard productivity
- Considering the previous information no significant environmental and/ or socioeconomic impacts have been identified on the water body by anthropogenic pressures, agricultural included or natural pressures.

For Havgas – Milatos Sub-basin in the area of Agios Nikolaos municipality (Mirabello area) in Greece the following is summarized:

- The water sources provide water from multiple uses is the Coastal karst aquifer of Sisi-Milatos-Elounda (GR1300116), Karst aquifer of Fourni – Elounda (GR1300115) and fractured aquifer of Dikti (GR1300240).
- Their water status is assessed as good with no increasing trend for further deterioration according to the rivers management plan of Crete water district (GR13).
- The water table remains stable in an annual basis while every summer, stress period, it is reduced due to the increase of demand and the absence of precipitation, resulting in an increase of the salinization of water in GR1300240, GR1300115.
- The total volume of water consumed per year is 414.047 m^3, out of which the 65,85% is used for irrigation and the rest for other uses.
- Based on data collected by the 1st AWMS in the frame of AgroClimaWater, the average annual application of irrigation water on olive orchards was 271 mm that is within the limits set by the by the Decentralized Administration of Crete (DAC) in the relevant local legislation (Decision published at FEK 2055B/2015) are 250-300 mm
- Based on the previous information no significant environmental and/ or socioeconomic impacts have been identified on the water body by anthropogenic pressures, agricultural included or natural pressures. However, local over exploitation during summer on two out of three of them (GR1300240, GR1300115) is mentioned.

For Agri sub-basin in the Metapontino area in Basilicata region in Italy the following is summarized:

- The water sources provide water for several uses are Monte Cotugno dam (ITF_017_LW-ME-4) and Gannano weir (ITF_017_LW-ME-2).
- Their water status of both sources is totally unknown according to the approved River Basin Management Plan of South Apennine 2015-2021.
- Monte Cotugno provides almost the half of its water capacity to water consumers, an average of 275.27 Mm^3 while a quantity is stored as a reserve for the next

year. In dry hydrological conditions the water is not ample to satisfy all the water needs and restricted measures is taken by the managing authority of the reservoir. Special attention is given to measures related with irrigation water.

- Gannano weir's main operation is the regulation of water volumes released from Pertusillo dam. Therefore, the quantity of water provided for irrigation from Gannano weir depends on the quantities released by the dam and the water collected from the upper streams. Thus, its quantitative status depends on the status of the interrelated dam and the hydrological conditions of each year.
- Based on data collected by the 1st AWMS in the frame of AgroClimaWater in the area of Agri Pilot sub basin, the average annual volume of irrigation water applied on the majority the registered orchards are conformed with the limits set in the production regulation "Disciplinare di produzione integrata".
- The 54,56 % of water consumption from Monte Cotugno in the entire area both Basilicata and Puglia is irrigational while for the area of Basilicata the amount of the water provided to agriculture is 124.96 Mm^3 out of the 133.04 (93.93%). Thus the pressure might impose by the agriculture on the dam is severe especially during the dry years and the summer period.
- As far as Gannano weir is concerned neither impacts nor pressures are expected to be imposed by water abstraction as water from the weir is used for irrigation purposes (for ensuring a constant flow for irrigation uses of the lower valley and the Ionian coastal plain and in order to maintain a constant flow rates during summer period) and when there is sufficiency water availability.

2. IMPACTS ON WATER QUANTITY

The main scope of the following chapter is the estimation and assessment of impacts both on water bodies' quality and on High Conservation Value areas (HCV areas) that are included in the three pilot sub-basins and they are induced by agricultural activity.
In addition, through this chapter the criterion 2.2 "Describe impact on destinations affected by the effluent" of EWS standard in reference to the determination of all destinations which are potentially affected by the production sites' pollutants is implemented. According to the EWS standard as potential destinations are considered:

- Water bodies: groundwater, lakes, rivers (surface freshwater), transitional waters, coastal waters, sea, etc.
- Water related habitats: wetlands, riparian zones, etc.

In order to do this, a study in reference to the risk assessment (runoff, leaching & erosion) per pilot area (sub-deliverable C2.2[5] "Runoff, leaching and erosion risk assessment") and the identification and classification of the agrochemicals (plant protection products and fertilizers) that are applied in the three pilot areas (C2.3 "Inventory of applied substances in the project's registered farms") were implemented. For the scope of LIFE AgroClimaWater project all the registered farms where either plant protection products and/or fertilizers are applied were considered as potential high assessment areas. Taking into account the risk of leaching, erosion and run-off per farm and sub-basin (sub-deliverable C2.2) and the agrochemical practices that are applied (sub-deliverable C2.3), the sub-basins and farms which are potential to cause pollution were identified (sub-deliverable C2.2).The water bodies (surface and groundwater) and the HCV areas that are potential to be affected and polluted due to the agricultural activity were identified and then their status was checked according to the available data from the River Basin Management Plans in order an impact assessment to be performed.

2.1 Agricultural activity and affected water systems and HCV Areas

2.1.1 Voukolies and Maleme sub-basins

Based on the surface water bodies that have been recognized according to the River Basin Management Plan of Crete District (13) within Voukolies and Maleme sub-basins, the 100 registered orchards are located within 4 sub-basins (GR3901R000301006N, GR3901R000301007N, GR3901R000301057N and Maleme).
In GR3901R000301006N sub-basin 22 out of 100 (or 22%) registered orchards are located. In the majority of these orchards agrochemicals are applied as 86.4% of them (or 19 out of 22) are fertilized and in 77.2% (or 17 out 22) PPPs are used (Table 126, Fig. 107). Apart from the large number of orchards that use PPPs also important is the fact that almost half of them (9 out of 22 or 40.9%) use at least 1 PPP that is hazardous to the environment and mainly to the aquatic environment as it has been classified as H410 - very toxic to aquatic life with long-lasting effects. From the 22 registered orchards of this sub-basin only in 1 orchrad PPP that contains priority substance is

[5] All data that are presented in this deliverable and they are related with the runoff, erosion and leaching of the pilot areas and the applied agrochemical substances are described in more details in the sub-deliverables C2.2 and C2.3, respectively

applied, while in almost half of the orchards of this sub-basin (12 out of 22 or 54.5%) PPPs which contain specific pollutants are applied.
The area of this sub-basin is characterized by moderate average runoff and erosion potential causing faster downward movement of pollutants and not their absorption by the soil. This in combination with the fact that more than half of the registered orchards in this sub-basin (16 out of 22 or 72.7%) are irrigated and the intensive and rich in agrochemicals agricultural activity that takes place within its boundaries leads to the conclusion that the surface water bodies that are included within sub-basin are expected to be more affected by agricultural activity.
According to the River Basin Management Plan the water bodies that are included in GR3901R000301006N sub-basin and thus they are expected to be affected by the agricultural actives are GR3901R000301006N which is part of the main Tavronitis river, Y434KRI203 "Tavronitis estuary and marsh" which is the estuarine system of Tavronitis river, the Site of Community Importance GR4340003 "Chersonisos Rodopou – Paralia Maleme" (Natura Site) part of which is included in GR3901R000301006N sub-basin and GR1339C0002N "Coast of Chania Gulf", part of which is also included in GR3901R000301006N sub-basin and it is also interrelated with GR1339C0002N.

Table 126: Agrochemicals and surface water bodies in Voukolies – Maleme sub-basins

Sub-basin	GR3901R000301006N		GR3901R000301007N		GR3901R000301057N		MALEME	
Total Orchards	22		46		12		20	
Average Runoff	Moderate (1.79)		High (1.83)		High (1.99)		Moderate (1.77)	
Average Erosion	Moderate (15.47)		Moderate (20.43)		High (27.19)		Moderate (13.843	
	No	%	No	%	No	%	No	%
Fertilized Orchards	19	86.4	38	82.6	12	100.0	16	80.0
Orchards with PPP	17	77.3	40	87.0	12	100.0	14	70.0
Orchards with H400	0	0.0	2	4.3	0	0	0	0
Orchards with H410	9	40.9	25	54.3	8	66.7	5	25.0
Orchards with Specific Pollutants	12	54.5	17	37.0	8	66.7	13	65.0
Orchards with priority Substances	1	4.5	2	4.3	0	0	0	0
Irrigated orchards	16	72.7	24	52.2	5	41.7	10	50.0

In GR3901R000301007N sub-basin the majority of registered orchards is located (46 out of 100 or 46%). From these 82.6% (or 38 out of 46) and 87% (or 40 out of 46) of orchards use fertilizers and PPPs (Table 126, Fig. 107). Almost half of the orchards of this group are irrigated (52.2% or 24 out of 46) and use PPPs (54.3% or 25 out of 46) which are hazardous to the aquatic environment as they have been classified as H410. Moreover, in 17 out of 46 orchards (or 37%) PPPs which contain specific pollutants are applied and also there are 2 orchards (or 4.3%) where PPPs with priority substances are used. This is the only group orchards where PPPs classified as H400 – very toxic to aquatic life are used in 2 orchards (or 4.3%).

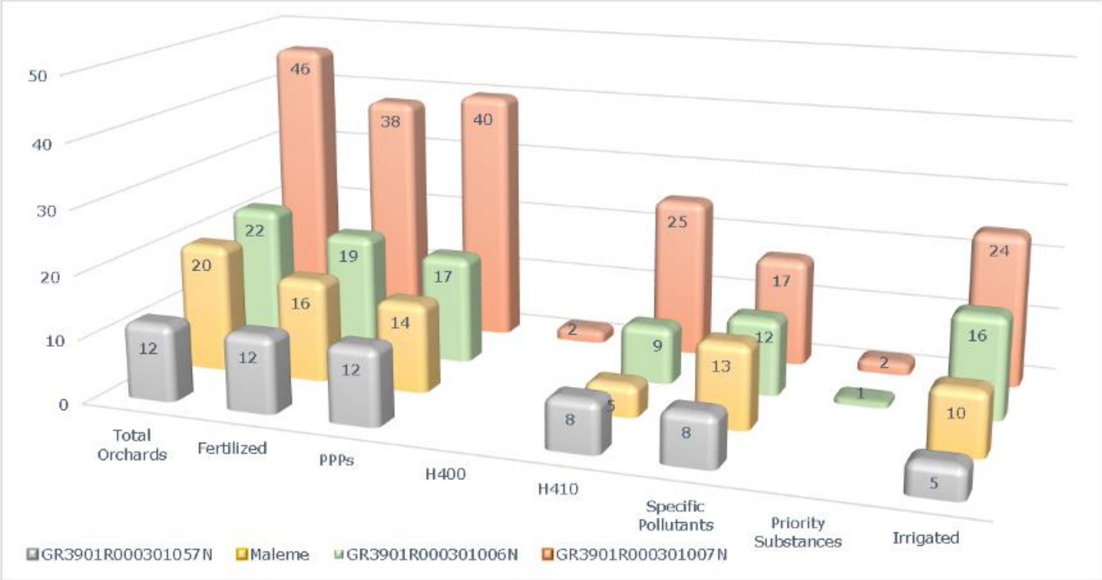


Fig. 107: Agrochemicals and surface water bodies in Voukolies – Maleme sub-basins

From all the above it is concluded that apart from the intensive agricultural activity within this sub-basin, a large number of agrochemical which may affect significant the environment is case of the application of non-good agricultural practices are used. Also, the fact that this area is characterized by high and moderate average runoff and erosion potential, respectively, leads to the conclusion that the surface water bodies that are included within this sub-basin are expected to be more affected by agricultural activity. The only surface water body which may be affected by the agricultural sector in this area is GR3901R000301007N which consists part of the main Tavronitis River and it is the only water body located within this sub-basin. Also, assuming that the pollutants will be moved downriver they will affect the part of the river below GR3901R000301007N which includes the above mentioned GR3901R000301006N water body.

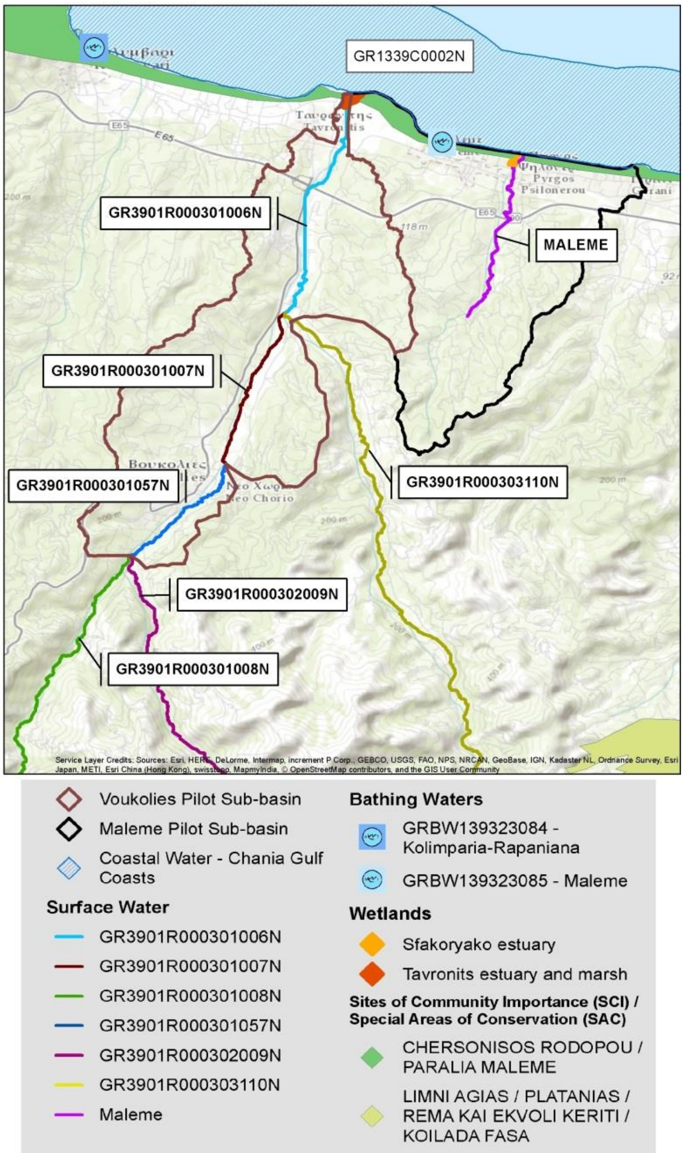


Fig. 108: High Conservation Value Areas and surface water systems in Voukolies – Maleme sub-basins

As far as GR3901R000301057N sub-basin is concerned from the statistical analysis it is concluded that agrochemicals usage is rather intensive as all the registered orchards are fertilized and PPPs are used. Also, the PPPs which are used in more than half of the registered orchards (66.7% or 8 out of 12) are very toxic to aquatic life with long lasting effects (H410) and contain priority substance. This in combination with the high runoff and erosion potential of this sub-basin and the fact that almost half of the registered orchards (41.7% or 5 out of 12) are irrigated leads to the conclusion that agricultural activity within this sub-basin is expected to significantly affect the water bodies that included within its boundaries.

Apart from the water body GR3901R000301057N which is part of main Tavronitis River no other significant water bodies included within this area. Moreover, the above mentioned water bodies GR3901R000301007N and GR3901R000301006N will also be affected as they are located downstream of this area.

The situation is similar also in Maleme sub-basin. From the 20 registered orchards that are located within this sub-basin 80% (or 16 out of 20) are fertilized and in 25% (or 5 out of 20) PPPs very toxic to aquatic life with long lasting effect are used. Also the majority of the PPPs that used in 65% (or 13 out of 20) of orchards contain specific pollutants. As far as runoff and erosion potential is concerned Maleme sub-basin is characterized by moderate values. This in combination with the fact that half of the registered orchards are irrigated (50% or 10 out of 20) lead to the conclusion that this area is expected to be affected by the agricultural activities of the area. This will affect the water body of Maleme (a second-order stream) which is included in this sub-basin, the estuarine system of Sfakoryako stream "Sfakoryako estuary" Y434KRI202, the Site of Community Importance GR4340003 "Chersonisos Rodopou – Paralia Maleme" (Natura Site) and GR1339C0002N "Coast of Chania Gulf", parts of which are also included in Maleme sub-basin and GRBW139323085 "Bathing waters of Maleme beach" which is located in front of Maleme sub-basin.

Table 127: Agrochemicals and groundwater bodies in Voukolies – Maleme sub-basins

Sub-basin	GR1300022		GR1300330	
Total Orchards	100		0	
Average Leaching	GR3901R000301006N: Low (1.18) GR3901R000301007N: Moderate (1.45) GR3901R000301057N: Moderate (1.43) Maleme: Moderate (1.24)		-	
	No	%	No	%
Fertilized Orchards	85	85.0	0	0.0
Orchards with PPP	83	83.0	0	0.0
Orchards with H400	2	2.0	0	0.0
Orchards with H410	47	47.0	0	0.0
Orchards with Specific pollutants	50	50.0	0	0.0
Orchards with priority Substances	3	3.0	0	0.0
Irrigated orchards	55	55.0	0	0.0

According to the statistical analysis of the data collected through the 1st AWMS form 85% of the registered orchards in Platanias (or 85 out 100) are fertilized and another significant amount equal to 83% (or 83 out 100) use PPPs (Fig. 109). Also, in half of them 50% (or 50 out 100) farmers use PPPs which contain at least one specific pollutant and they are classified as H410, which means that they are very toxic to aquatic life with long lasting effects (47% or 47 out 100 orchards). In contrast with the large number of orchards where PPPs are used only in 2% of orchards (or 2 out 100) PPPs classified as H400 and in in 3% (3 out 100) contain priority substances are used.

As far as the Voukolies sub-basin is concerned it is subdivided into 3 different sub-basins. According to the spatial distribution of average leaching potential score in Voukolies – Maleme sub-basins the corresponding class for the north coastal sub-basin GR3901R000301006N is low and for the other two sub-basins (GR3901R000301007N and GR3901R000301057N) is moderate. Also, the corresponding class for Maleme sub-basin is moderate. As a result the water body of Porous of Campos Chanion and Gypsum Karst of Crete (GR1300022), part of which is located under Voukolies and Maleme sub-basins is expected to be more affected by the agricultural activities of the area.

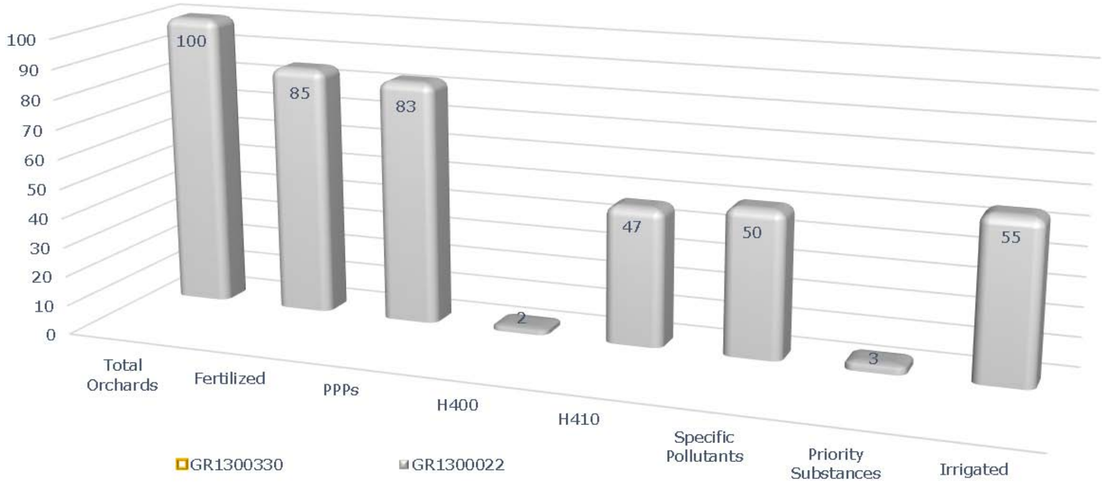


Fig. 109: Agrochemicals and groundwater bodies in Voukolies and Maleme sub-basins

2.1.2 Havgas - Milatos sub-basin

Within Hanvgas – Milatos sub-basins 6 surface water bodies (HM-1 to HM6) have been recognized by the project's scientif team. These 6 water bodies are not included in the River Based Management Plan of Crete District (13) and they have not been recognized as significant surface water bodies, as they are streams whose surface flow lasts for almost 3 months and this category of streams is not included in the system which is used by the River Based Management Plan. This is also the reason for which none of these rivers has a specific code. As a result the 101 registered orchards within Havgas - Milatos sub-basin are located within 6 sub-basins (HM-1 to HM-6).

In HM-1 sub-basin 14 out of 101 (or 13.9%) registered orchards are located. From these orchards only 28.6% of registered orchards (or 4 out 14) are fertilized and 35.7 % (5 out of 14) use PPPs and only 21.4% (3 out of 14) use PPPs classified as very toxic to aquatic life with long lasting effects (H410) (Table 128, Fig. 110). Moreover, only The 100 registered orchards in Havgas - Milatos pilot sub-basin belong in 6 sub-basins based on the hydrographic network of the area. At this point it should be mentioned that within this sub-basin there is no surface water body officially identified in the corresponding River Based Management Plan due to the small basin which overall produces low runoff volumes and therefore river flow is ephemeral and probably event based. However, for the scoped of this project Havgas - Milatos sub-basin was discretized into 6 sub-basins.

In HM-1 sub-basin 2 orchards (14.3) use PPPs which contain specific pollutants and 3 out of 14 (21.4%) use PPPs which contain priority substances. Despite the fact that the average erosion potential of this area is very low, the runoff potential is moderate. This in combination with the fact half of the registered orchards are irrigated (50% or 7 out of 14) will lead to the potential affection of both water systems and HCV areas that are included within this sub-basin. The potentially affected destinations within HM-1 sub-basin are "HM-1" water system, GR1341C0009N "Coast of Malia Gulf" and

GRBW139310032 "Milatos" recreational waters parts of which are located within this sub-basin. Also, as a small area of GR95341355 "Latsidiani Kefala Dimou Neapolis" is included within HM-1 and it is expected to be potentially affected by the agricultural activity (Fig. 111).

Table 128: Agrochemicals and surface water bodies in Havgas - Milatos sub - basin

Sub-basin	HM-1		HM-2		HM-3		HM-4		HM-5		HM-6	
Total Orchards	14		2		3		6		17		59	
Average Runoff	Moderate (1.27)		High (1.94)		High (1.87)		Moderate (1.77)		High (1.86)		High (2.07)	
Average Erosion	Very low(3.62)		Moderate (16.68)		Moderate (12.58)		Moderate (16.82)		Moderate 22.51		High (33.53)	
	No	%	No	%	No	%	No	%	No	%	No	%
Fertilized Orchards	4	28.6	0	0.0	0	0.0	1	16.7	3	17.6	32	54.2
Orchards with PPP	5	35.7	2	100	0	0.0	1	16.7	2	11.8	23	39.0
Orchards with H400	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Orchards with H410	3	21.4	2	100	0	0.0	1	16.7	0	0.0	14	23.7
Orchards with Specific pollutants	2	14.3	1	50.0	0	0.0	1	16.7	1	5.9	19	32.2
Orchards with priority Substances	3	21.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Irrigated orchards	7	50.0	0	0.0	0	0.0	2	33.3	0	0.0	4	6.8

The situation in HM-2 sub-basin is not very representative due to the fact that only 2% (or 2 out of 101) of the registered orchards are located within its boundaries. The main concussions from their data analysis are that while none of them is fertilized, both of them use PPPs which are classified as very toxic very toxic to aquatic life with long lasting effects (H410) and 1 of them (50%) contains also specific pollutant (Table 128, Fig. 110). According to the average runoff and erosion potential within this sub-basin they are characterized as high and moderate, respectively. As a result, the agricultural activity is expected to affect the second order water body "HM-2" and an area of GR95341355 "Latsidiani Kefala Dimou Neapolis" part of which is included within HM-2 sub-basin (Fig. 111).

In reference to HM-3 sub-basin 3 registered orchards are included within its boundaries, none of which is fertilized or use PPPs or is irrigated. While the average runoff and erosion of this sub-basin is high and moderate, respectively, the agricultural activity is not expected to affect any surface water or HCV area due to non-use of fertilizers and PPPs in this area.

From the 6 registered orchards which are located within HM-4 only 1 (or 16.7%) is fertilized and use PPP which is both classified as H410 and also contains specific pollutants. Also, 2 out of 6 (or 33.3%) registered orchards within this sub-basin are irrigated. The moderate runoff and erosion potential which characterize this area are expected to affect the water body of "HM-4" and the HCV areas that are found within this sub-basin and more specific an area of GR95341355 "Latsidiani Kefala Dimou Neapolis" and a very small are of GR4320013 "Farangi Selinari-Vrachasi" which has been identified as SPA (Special Protected Area) according to the Directive 2009/147/EC on the conservation of wild birds (Fig. 111).

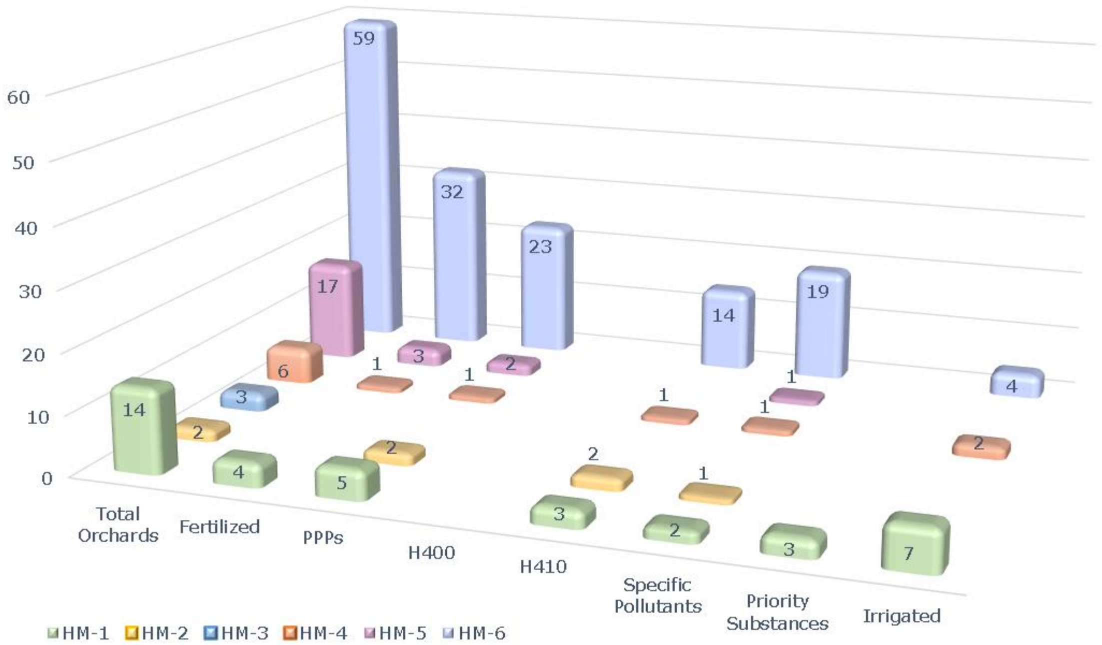


Fig. 110: Agrochemicals and surface water bodies in Havgas - Milatos sub-basin

HM-5 sub-basin is one of the registered sub-basins where mild agricultural practices are applied as from the 17 registered orchards that are found within this sub-basin only 3 (or 17.6%) are irrigated and in 2 (or 11.8%) registered orchards PPPs are applied from which only 1 (or 5.9%) contains specific pollutants. The average runoff and erosion potential within this sub-basin are equal to 1.86 and 22.51 and they are characterized as high and moderate, respectively and thus any surface water body or HCV area that are located within this sub-basin are expected to be affected by the agricultural activities. Apart from the water boy "HM-5" which is located within HM-5 sub-basin the HCV areas that are also expected to be affected are the Specific Protection Area of GR4320013 "Farangi Selinari-Vrachasi", the Wildlife Refuges of GR95341544 "Anavlocho (Vrachasiou)" and GR95341355 "Latsidiani Kefala Dimou Neapolis" and the Important Birds Area GR190 "Mount Dikti" which (Fig. 111).
The fact that the agricultural practises that are applied in Havgas - Milatos are not as intensive as the practises applied in Voukolies-Maleme sub-basin is also shown from the statistical analysis of data collected from HM-6 sub-basin. From the 59 registered orchards that are found within HM-6 sub-basin almost half (32 out of 59 or 54.2%) are fertilized and only a small number of registered orchards (23 out of 59 or 39%) use PPPs. Also, from these orchards only 14 out of 59 (or 23.7%) use PPPs which are very toxic to aquatic life with long lasting effects (H410) and 19 out of 59 (or 32.2%) use PPPs which contain specific pollutants. This in combination with the fact that the average runoff and erosion potential within this sub-basin are both high, leads to the conclusion that both the water bodies and the HCV areas that are included within HM-6 are expected to be more affected by agricultural activity. More specific, these destinations include the water body "HM-6", the Specific Protection Area of GR4320013 "Farangi Selinari-Vrachasi", the Site of Community Importance GR4320002 "Dikti: Oropedio Lasithioy, Katharo, Selena, Krasi, Selekanos, Chalasmeni Koryfi", the Wildlife Refuges

of GR95341544 "Anavlocho (Vrachasiou)" and GR95341355 "Latsidiani Kefala Dimou Neapolis" and the Important Birds Area GR190 "Mount Dikti" which (Fig. 111).

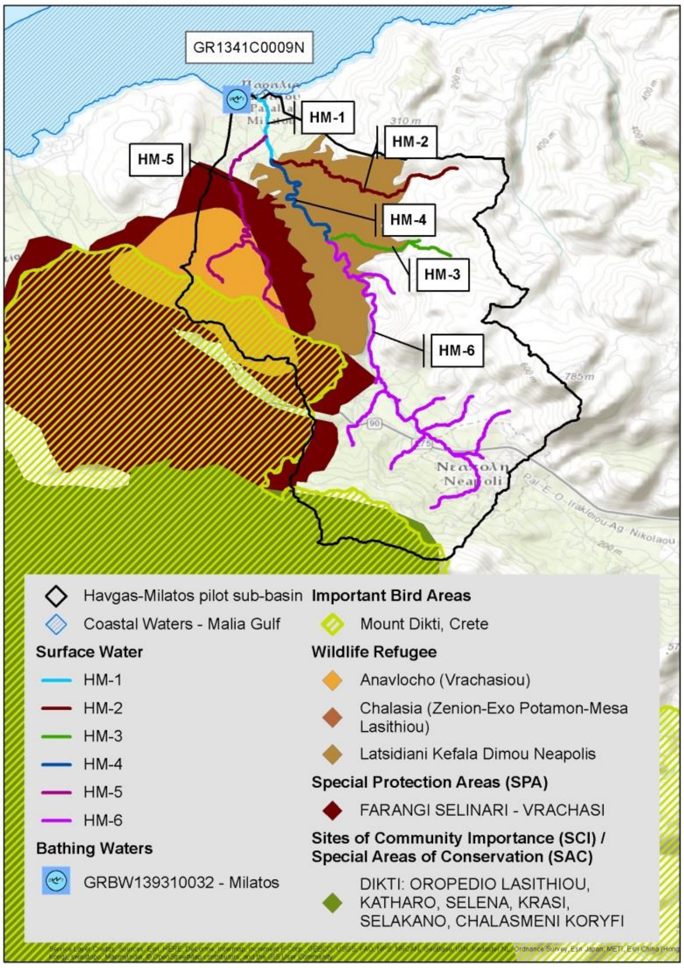


Fig. 111: High Conservation Value Areas and surface water systems in Havgas - Milatos sub-basin

The agricultural activity above each of the five groundwater bodies within Havgas - Milatos sub-basin has already been described in sub-deliverable C2.2 and it is also presented in Table 129 and Fig. 112.

In general, orchards are fertilized in significant number only above GR1300240 and GR1300115 and mainly in 57.1% (or 24 out of 59) and 44% (or 11 out of 25) of registered orchards, respectively. Also, the majority of the registered orchards where farmers use PPPs are located above these two groundwater bodies as they apply PPPs in 33% (or 14 out of 42) and 44% (or 11 out of 25), respectively and only above GR1300115 the orchards where PPPs which contain specific pollutants are more than 30%.

Table 129: Agrochemicals and groundwater water bodies in Havgas - Milatos sub-basin

Water Bodies	GR1300112	GR1300115	GR1300116	GR1300240	GR1300113
Total Orchards	4	25	30	42	0
Average Leaching	Low (0.98)	Low (1.14)	Low (1.02)	Low (1.18)	-

	No	%	No	%	No	%	No	%	No	%
Fertilized Orchards	1	25.0	11	44.0	4	13.3	24	57.1	0	0.0
Orchards with PPP	1	25.0	11	44.0	7	23.3	14	33.0	0	0.0
Orchards with H400	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Orchards with H410	0	0.0	7	28.0	4	13.3	9	21.4	0	0.0
Orchards with Specific pollutants	1	25.0	8	32.0	4	13.3	11	26.2	0	0.0
Orchards with priority Substances	0	0.0	0	0.0	3	10	0	0.0	0	0.0
Irrigated orchards	0	0.0	4	16.0	8	26.7	1	2.4	0	0.0

On the average, low leaching potential is demonstrated for all Havgas - Milatos sub-basin and above all groundwater bodies. As a result the groundwater bodies of GR1300116 "Coastal karst of Sisi-Milatos-Elounda", GR1300115 "Karst of Fourni – Elounda", GR1300240 "Fractured of Dikti" and GR1300112 "Karst of Malia – Selena" that are located under Havgas – Milato sub-basins are not expected to be affected by agriculture.

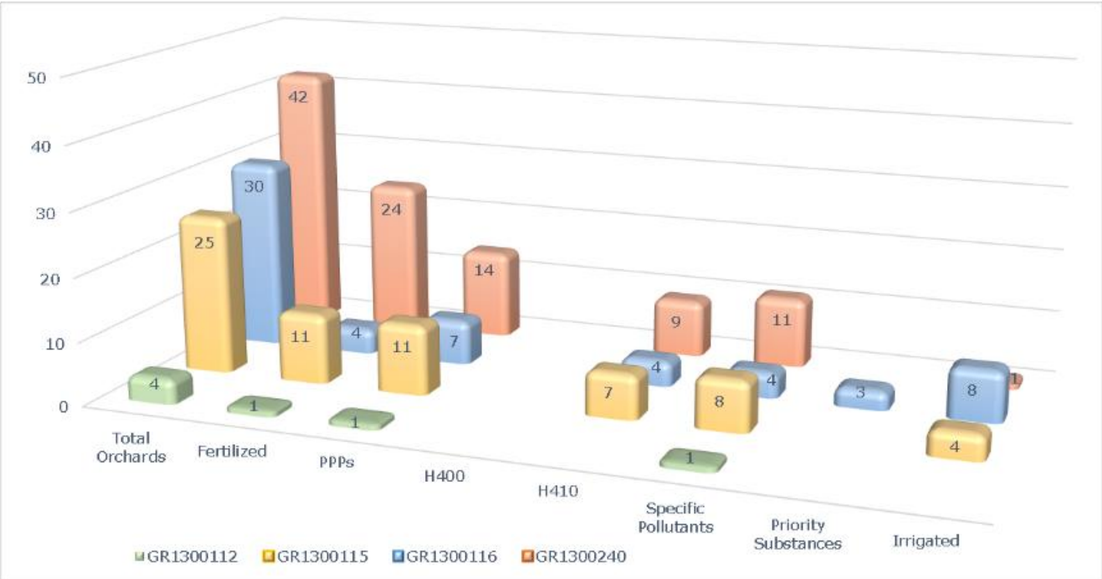


Fig. 112: Agrochemicals and groundwater water bodies in Havgas - Milatos sub-basin

2.1.3 Agri pilot sub-basin

14 sub-basins[6] have recognized within Agri sub-basin based on the surface water bodies. As the 100 registered orchards are located only within 6 sub-basins (Agri3, Agri4, Agri5, Agri8, Agri9, Agri10) of Agri pilot sub-basin the following analysis includes only these sub-basins and not all the 14 sub-basins.

In Agri-3 sub-basin 2 out of 100 (or 2%) registered orchards are located, in both of which PPPs are used which are classified as very toxic to aquatic life with long lasting

[6] More details about the 14 sub-basins are presented in sub-deliverable C2.2

effects and 1 of them is also irrigated (Table 130, Fig. 113). Taking into account that both the average runoff and erosion potential of this sub-basin is moderate, the above characteristics in reference to the agrochemicals that used within Agri-3 and also the irrigation pattern it is concluded that the surface water bodies and the HCV areas that are included within Agri-3 sub-basin are expected to be more affected by agricultural activity. More specific, the water bodies and HCV areas that are expected to be affected are the water system of "Gannano" dam - ITF_017_LW-ME-2-Gannano and the parts of "AGRI 1" river - ITF_017_RW-16SS03T-AGRI 1, "AGRI 2" - ITF_017_RW-18SS03T-AGRI 2, Vulnerable Nitrate Zone, water body to support fish life and shellfish "Fiume Agri da intermedio alla foce" – 46037 and Important Bird Area "Calanchi della Basilicata" – IBA 196 which are included within Agri-3 sub-basin (Fig. 114).

The main characteristics of the registered orchards that are located in Agri-4 sub-basin is that almost half of them (60% or 3 out of 5) are fertilized, in 100% (or 3 out of 5) PPPs classified as very toxic to aquatic life with long lasting effects are used and also all of them (100%) are irrigated (Table 130, Fig. 113). While the average erosion potential within this sub-basin is very low, the average runoff potential is moderate and thus the water systems and the HCV areas that are found within Agri-4 are expected to be affected by the agricultural sector. The affected destinations of this sub-basin are the parts of "AGRI 1" river - ITF_017_RW-16SS03T-AGRI 1, "Calanchi della Basilicata" – IBA 196 important bird area, "Fiume Agri da intermedio alla foce" - 46037 water body to support fish life and shellfish and Vulnerable Nitrate Zones which are included within its boundaries (Fig. 114).

Table 130: Agrochemicals and surface water bodies in Agri pilot sub-basin

Sub-basin	Agri3		Agri4		Agri5		Agri8		Agri9		Agri10	
Total Orchards	2		5		4		56		19		14	
Average Runoff	Moderate (1.68)		Moderate (1.45)		Moderate (1.53)		Moderate (1.27)		Moderate (1.39)		Low (1.08)	
Average Erosion	Moderate (17.24)		Very low (6.01)		Very low (6.80)		Very low (2.48)		Very low (4.98)		Very low (0.57)	
	No	%	No	%	No	%	No	%	No	%	No	%
Fertilized Orchards	0	0.0	3	60.0	2	50.0	53	94.6	19	100	14	100
Orchards with PPP	2	100	5	100	3	75.0	55	98.2	17	89.5	12	85.7
Orchards with H400	0	0.0	0	0.0	0	0.0	18	32.1	9	47.4	8	57.1
Orchards with H410	2	100	5	100	3	75.0	55	98.2	17	89.5	12	85.7
Orchards with Specific pollutants	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Orchards with priority Substances	0	0.0	0	0.0	0	0.0	24	42.9	12	63.2	12	85.7
Irrigated orchards	1	50.0	5	100	3	75.0	54	96.4	19	100	13	92.9

The situation in Agri-5 sub-basin is almost similar with what has been described above in reference to Agri-4 sub-basin. From the total of the registered orchards that are found within Agri-5 sub-basin 50% (or 2 out of 4) are fertilized and in 75% (or 3 out of 4) of registered orchards PPPs classified as very toxic to aquatic life with long lasting effects are applied (Table 130, Fig. 113). This in combination with the moderate average runoff and low-very low erosion and that the 75% (or 3 out 5) registered orchards are irrigated will affect negatively both the surface water systems and HCV areas that are found within Agri-5 sub-basin and that are parts of "AGRI 1" river - ITF_017_RW-16SS03T-AGRI 1, "Calanchi della Basilicata" – IBA 196 important bird area, "Fiume Agri da intermedio alla foce" - 46037 water body to support fish life and shellfish and Vulnerable Nitrate Zones which are included within its boundaries (Fig. 114).

Agri-8 is the sub-basin which includes the majority of registered orchards of this project. From the statistical analysis of the data collected it is concluded that almost all of the registered orchards within this sub-basin are both fertilized and use PPP, as the relevant percentages are equal to 94.6% (or 53 out of 56) and 98.2% (or 55 out of 56) of registered orchards, respectively (Table 130, Fig. 113). Apart from the fact that almost all registered orchards within this sub-basin use PPPs that are very toxic to aquatic life with long lasting effects, in an import number of these orchards (32.1% or 18 out of 56) also used PPPs that are classified as H400 (very toxic to aquatic life) and they are acute hazards.

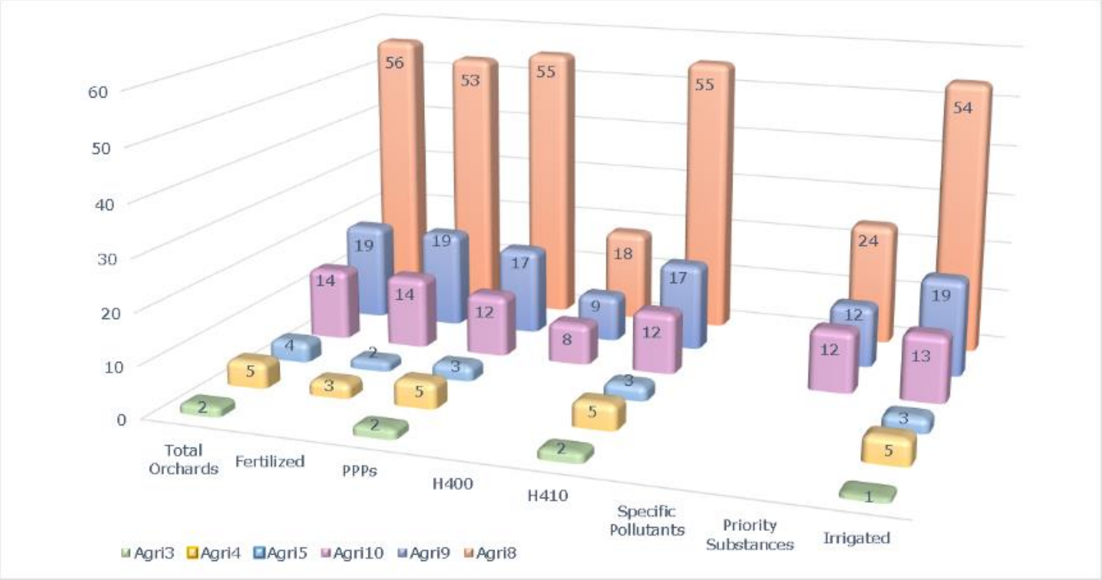


Fig. 113: Agrochemicals and surface water bodies in Agri sub-basin

While the average erosion potential within Agri-8 is classified as very low, the average runoff potential within Agri-8 is moderate. This, in combination with the fact that almost all registered orchards that are located within Agri-8 (96.4% or 54 out of 56) are irrigated and the intensive agricultural activity that takes place leads to the conclusion that both the surface water systems and HCV areas within Agri-8 are expected to be potentially affected by the agricultural activity.

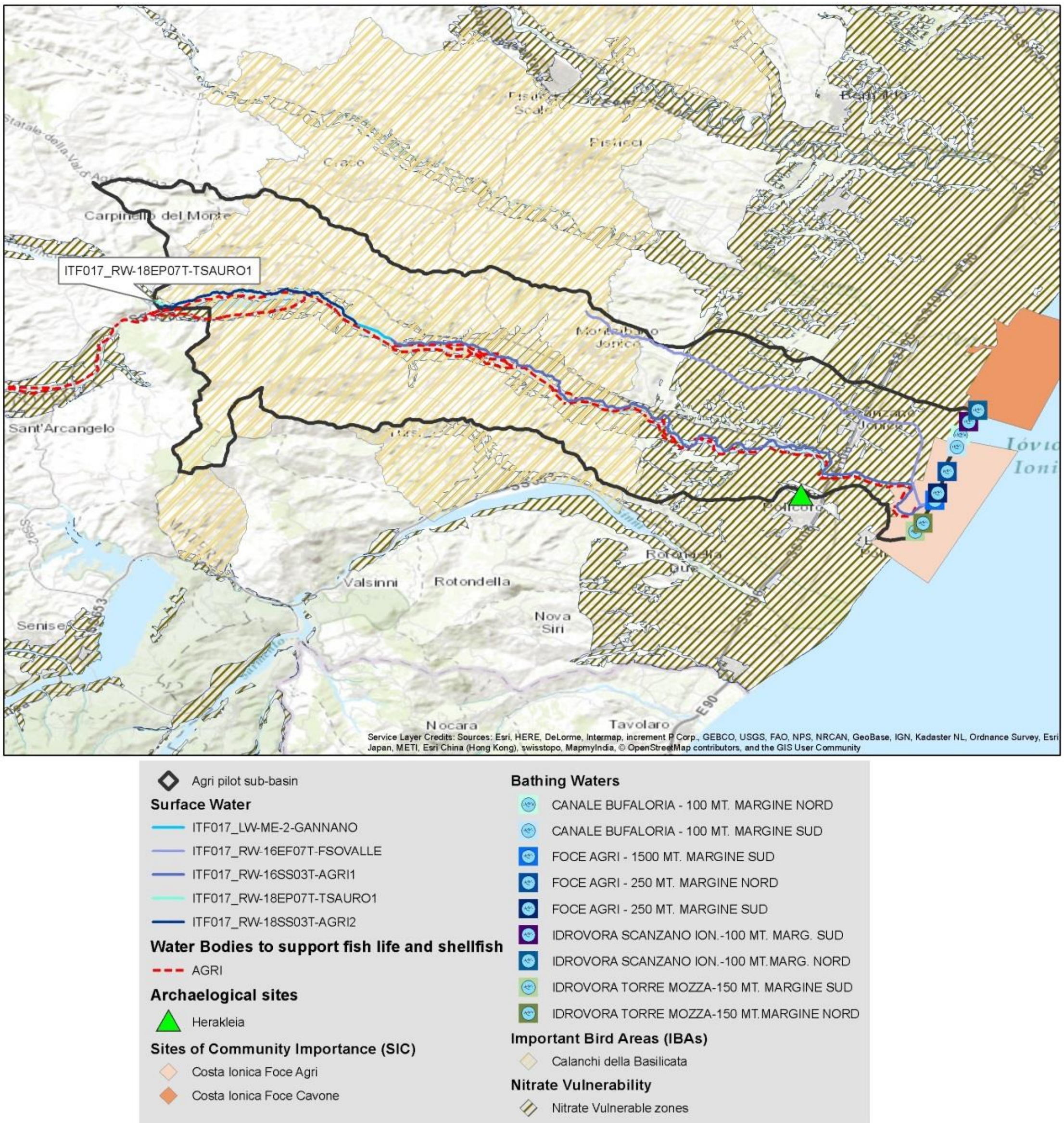


Fig. 114: High Conservation Value Areas and surface water systems in Agri sub-basin

As a result the potentially affected destinations are the tributary "F.SO VALLE" - ITF_017_RW-16EF07T-F.SO VALLE, the Vulnerable Nitrate Zones, the Important Bird Area "Calanchi della Basilicata" – IBA 196 and the water body to support fish life and shellfish "Fiume Agri da intermedio alla foce" - 46037 part of which are included within Agri-8, the coastal water system of "Piana del Cavone" - ITF_017_CW-F3_FLUV-Cavone, the bathing waters of "Canale Bufaloria – 100mt. margine nord" - IT017077031002, "Canale Bufaloria – 100mt. margine sub" - IT017077031003, "Idrovora Scanzano Ion. – 100mt. marg. nord" - IT017077031006, "Idrovora Scanzano Ion. – 100mt. marg. sud" - IT017077031007, the sites of Community importance of "Costa Ionica Foce Cavone" - IT9220095 and "Costa Ionica Foce Agri" - IT9220080, which are located in front of Agri-8 (Fig. 114).

As far as Agri-9 sub-basin is concerned almost all of the registered orchards that are located within its boundaries are both fertilized (100% or 19 out of 19) and use PPPs (89.5% or 17 out of 19). From the data analysis it is concluded that the PPPs that are used in these orchards are rather toxic to the aquatic environment as in almost half of the registered orchards (47.4% or 9 out of 19) use PPPs that are very toxic to the aquatic environment and acute hazardous (H400) and the 89.5% of them (or 17 out of 19) are very toxic to aquatic life with long lasting effects (H410). Also, in 63.2% of the registered orchards (or 12 out 19) the PPPs that are used contain priority substances (Table 130, Fig. 113). While according to the erosion potential none of the destinations are expected to be affected by the agricultural activity as its average value is very low, taking into account the average runoff potential, which is moderate for Agri-9 sub-basin, and the fact that all the registered orchards (19 out of 19) are irrigated lead to the conclusion that the parts of the water body to support fish life and shellfish "Fiume Agri da intermedio alla foce" – 46037, the river "Agri 1" - ITF_017_RW-16SS03T-AGRI 1, the Important Bird Area "Calanchi della Basilicata" – IBA 196 and the Vulnerable Nitrate Zone which are included within Agri-9 are expected to be potentially affected (Fig. 114). The situation is almost the same within Agri-10 sub-basin. More specific, all of the registered orchards are fertilized (14 out of 14) and in 85.7% of them PPPs are used. All the PPPs which are used in the above mentioned orchards are very toxic to aquatic life with long lasting effects (H410) and contain priority substances. Moreover, the PPPs which are used in the 57.1% (or 8 out of 14) of the registered orchards are also very toxic to the aquatic life and acute hazards (H400) (Table 130, Fig. 113). While majority of the registered orchards within this sub-basin are irrigated (92.9% or 13 out of 14), due to the average low runoff potential and very low erosion potential none of the surface waters and HCV areas that are located within Agri-10 sub-basin is expected to affected by the agricultural activities. However, these water bodies and HCV areas are expected to be affected by agriculture mainly due to the moderate runoff conditions that are characterise the sub-basins that are located upstream. More specific the potentially affected destinations are the two rivers "AGRI 1" - ITF_017_RW-16SS03T-AGRI 1 and "F.SO VALLE" - ITF_017_RW-16EF07T-F.SO VALLE, part of the Vulnerable Nitrate Zone of Agri sub-basin, the water body to support fish life and shellfish "Fiume Agri da intermedio alla foce" – 46037, the coastal water systems of "Piana di Policoro" - ITF_017_CW-C3_FLUV-Policoro and "Piana del Cavone" - ITF_017_CW-F3_FLUV-Cavone, the site of Community Importance "Costa Ionica Foce Agri" - IT9220080 and the bathing waters of "Force Agri – 1500mt. margine sud" - IT017077021006, "Force Agri – 250mt. margine nord" - IT017077031004, "Force Agri – 250mt. margine sud" - IT017077021003, "Idrovora Torre Mozza – 150 mt. margine sud" - IT017077021005 and "Idrovora Torre Mozza – 150 mt. margine nord" - IT017077021004.

Table 131: Agrochemicals and groundwater water bodies in Agri pilot sub-basin

Water Bodies	P-AGR		P-MET	
Total Orchards	13		25	
Average Leaching	Moderate (1.33)		Moderate (1.31)	
	No	%	No	%
Fertilized Orchards	11	84.6	24	96.0
Orchards with PPP	11	84.6	23	92.0
Orchards with H400	4	30.8	15	60.0
Orchards with H410	11	84.6	23	92.0
Orchards with Specific pollutants	0	0.0	0	0.0

Orchards with priority Substances	4	30.8	19	76.0
Irrigated orchards	13	100.0	23	92.0

The agricultural activity above each of the two groundwater bodies within Agri pilot sub-basin has already been described in sub-deliverable C2.2 and it is also presented in Table 131 and Fig. 115.

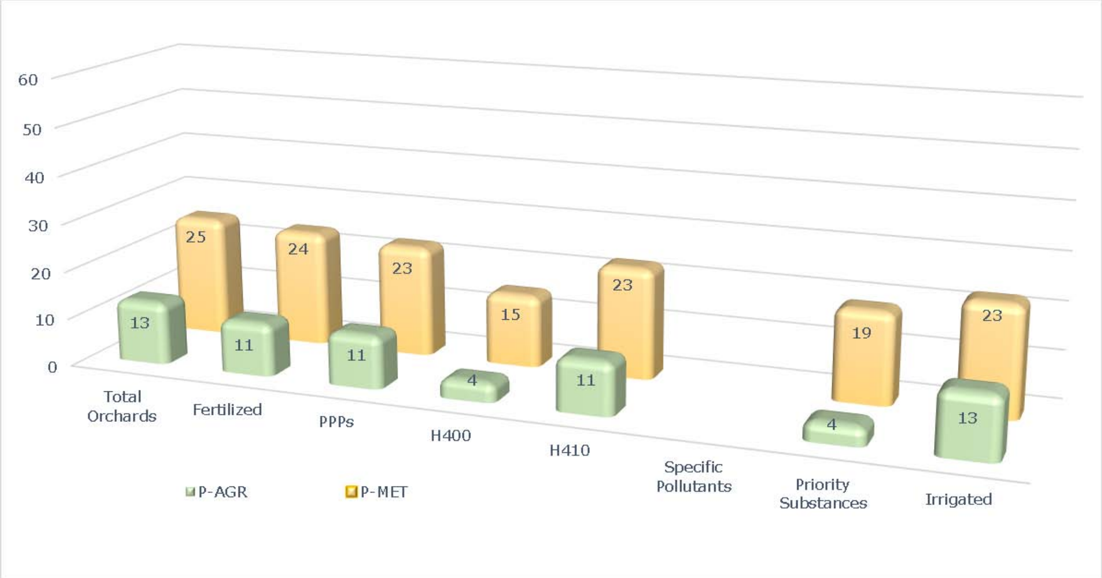


Fig. 115: Agrochemicals and surface water bodies in Agri pilot sub-basin

In general, almost all of the registered orchards that are located above the two groundwater bodies, 84.6% (or 11 out of 13) and 96.0% (24 out of 25), in P-AGR and P-MET, respectively are fertilized and also PPPs are applied in 84.6% (or 11 out of 13) and 92.0% (or 23 out of 25) of the registered orchards, respectively. 4 out of 13 (or 30.8) pilot orchards in P-AGR and 15 out of 25 (or 60%) in P-MET use PPPs that are very toxic to aquatic life and acute hazards (H400) and also the PPPs that are used in almost all the registered orchards are very toxic to aquatic life with long lasting effects (H410). Moreover, 4 out of 13 (or 30.8%) registered orchards above P-AGR and 19 out of 25 (76.0%) registered orchards above P-MET use PPPs which contain priority substances according to the European legislation.

Taking into account the intensive agricultural activities that take place according to the above description and the fact that the average leaching potential above the two groundwater bodies are demonstrated as moderate it is concluded that both P-AGR and P-MET are expected to be affected by the agricultural activities.

2.2 *Impacts on water quality and HCV Areas*

According to the EWS standard and more specific criterion 3.1 "Identify HCV areas" all HCV areas in a 25km radius around the production sites, water sources and points of discharge should be identified and described. However, as the 25km radius exceeds the boundaries of the river basins in all three pilot areas no impact on the quantity and quality of the water related HCV areas that are outside the three pilot basins are expected. Thus, the HCV areas that are located outside the boundaries of the target river basins will not be included in the following analysis.

2.2.1 Voukolies and Maleme sub-basins

The following tables (Table 132 to Table 137) represent the water bodies/systems (surface and groundwater) and the High Conservation Value Areas that located within Voukolies – Maleme pilot sub-basins.
The following Table 132 shows the 4 surface water bodies that are located within Voukolies – Maleme pilot sub-basins, the applied pressures per water body and their intensity, information in reference to the ecological and chemical status and the percentages of registered orchards within the catchment area of each water body where fertilizers and PPPs are used.

Table 132: Surface water bodies in Voukolies and Maleme sub-basins

Code	GR1339R00030 1006N	GR1339R00030 1007N	GR1339R00030 1057N	-
Name	TAVRONITIS	TAVRONITIS	TAVRONITIS	Maleme[7]
Type	RM1	RM1	RM1a	Unknown
Natural/HMWB[8]	Natural	Natural	Natural	Unknown
Anthropogenic Pressures	Settlements without WTP, number of IPPC plans, livestock, percentage of cultivated area	Number of IPPC plans, livestock, percentage of cultivated area	Settlements without WTP, number of IPPC plans, livestock, percentage of cultivated area	Percentage of cultivated area
Intensity of settlements without WTP	Moderate (2.000-10.000)	-	Moderate (2.000-10.000)	Unknown
Intensity of number of IPPC plans	Moderate (1-5)	Moderate (1-5)	Moderate (1-5)	Unknown
Intensity of livestock	Moderate (1-5)	High (>5)	High (>5)	Unknown
Intensity of percentage of cultivated area	High (≥50%)	Moderate (≥20%-<50%)	High (≥50%)	High (≥50%)[9]
Total Intensity of pressures	Low	Low	Low	Unknown
Ecological Status	Unknown	Unknown	Unknown	Unknown
Chemical Status	Unknown	Unknown	Unknown	Unknown
Protection Goal	Determination of ecological and chemical status and non-degradation of water status			
Total Orchards	22	46	12	20

[7] Maleme is a 3rd type stream (surface flow ≤ 3 months) and as a result it has not been recognized by the River Based Management Plan of Crete District (GR 13), that's why there isn't any relevant information in reference to its type, the anthropogenic pressures, its status etc.
[8] Heavily modified water body
[9] The intensity was calculated by the project team

Fertilized Orchards (%)	86.4	82.6	100.0	80.0
Orchards with PPP (%)	77.3	87.0	100.0	70.0
Orchards with H400 (%)	0.0	4.3	0.0	0.0
Orchards with H410 (%)	40.9	54.3	66.7	25.0
Orchards with Specific Pollutants (%)	54.5	37.0	66.7	65.0
Orchards with priority Substances (%)	4.5	4.3	0.0	0.0
Irrigated orchards (%)	72.7	52.2	41.7	50.0

As it is shown in the above table the agricultural activities that are applied within the catchment area of each water body are rather intensive as in the majority of the registered orchards fertilizers, PPPs classified as very toxic to aquatic life (H400 and H410) and specific pollutants are applied. According to the analysis of Part B "Description of the agricultural sector in the registered sub-basin" over-fertilizing in a significant number of orchard is actually true. Moreover, the main groups of the fertilizers that are applied in the pilot area contain either chemical forms with high concentrations which are linked to risks of environmental pollution due to N-containing fertilizers e or composite fertilizers which may lead to higher application rates of P.
Agriculture sector in Voukolies – Maleme sub-basins plays an important role in the environmental status of water systems as among the main pressures that are applied in all surface water bodies is the percentage of cultivated area which is classified as high (more the 50% of the area is cultivated) for the water bodies GR1339R000301006N, GR1339R000301057N and Maleme and moderate for GR1339R000301007N.
Taking all the above into account someone can assume that in cases where non good agricultural practices are applied, the agricultural activities will impact all the surface water bodies. The chemical status of all water bodies is unknown and thus there are no data available to perform any impact assessment from anthropogenic activities. For this reason the water steward of Platanias' F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced by agricultural activities.

Table 133: Coastal water systems in Voukolies – Maleme sub-basins

Code	GR1339C0002N
Name	Coast of Chania Gulf
Type	Shallow with sedimentary substratum
Ecological Status	Good
Chemical Status	Good
Protection Goal	Non-degradation of water status

Despite the intensive agricultural activities within the two pilot sub-basins, both the ecological and chemical status of the coastal water system of Chania Gulf (GR1339C0002N) is good (Table 133). This means that no significant environmental and/ or socioeconomic impacts have been identified on this water body due to the anthropogenic activities and especially agriculture.
As it has already been mentioned within Voukolies – Maleme sub-basin there are two wetlands "Tavronitis estuary and marsh" and "Sfakoryako estuary" that are expected to

be potentially affected by the agricultural activities (Table 134). The status and as a result the potential impacts of these two water systems are expected to be affected and related with the status of the interrelated surface water systems. More specific, "Tavronitis estuary and marsh" is interrelated with GR3901R000301006N and GR133901T0001N water bodies. As the chemical status of both interrelated water bodies and Tavronitis estuary and marsh is unknown (Table 132), there are no data available to perform any impact assessment from anthropogenic activities. For this reason the water steward of Platanias' F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced this water body by agricultural activities.

Table 134: The small island Wetlands in Voukolies – Maleme sub-basins

Code	Y434KRI203	Y434KRI202
Name	Tavronitis estuary and marsh	Sfakoryako estuary
Interrelated surface water systems	GR3901R000301006N GR133901T0001N	GR1339C0002N Maleme
Protection Goal	Wetlands are complex ecosystems that contribute to the prosperity and the proper functioning of both the environment and people.	

As far as Sfakoryako estuary is concerned it is affected mainly by the costal water system of Chania Gulf (GR1339C0002N) and the water body of Maleme. While on one hand the chemical status of the costal water system of Chania Gulf is good and no significant environmental and/ or socioeconomic impacts are identified on the other hand the chemical status of Maleme water body is unknown and there isn't available information in reference to its impacts. In this case we cannot conclude if there are impacts on Y434KRI202 from the agricultural activity. Thus, the water steward of Platanias' F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced this water system.
The bathing water of Maleme beach (GRBW139323085) which is included within the boundaries of Voukolies – Maleme sub-basins is mainly affected by the water system of Coast of Chania Gulf (GR1339C0002N) (Table 135). For this water system not only the status of the interrelated surface water system is good but also the qualitative status of Maleme beach is excellent. As a result it is concluded that no significant environmental and/ or socioeconomic impacts have been identified on Maleme beach water system due to the anthropogenic activities and especially agriculture.

Table 135: Bathing waters in Voukolies – Maleme sub-basins

Code	GRBW139323085
Name	Bathing waters of Maleme beach
Interrelated surface water systems	GR1339C0002N
Qualitative Status	Excellent
Protection Goal	Non-degradation of water status
Pressures	Wastewater disposal from sewage treatment plant, potential discharge of pollutant from the agricultural sector through estuaries and streams

The only HCV area of these pilot sub-basins is the site of community importance "Chersonisos Rodopou – Paralia Maleme" (Table 136). This HCV area is mainly affected by the water bodies GR1339R000301006N and Maleme and the coast of Chania Gulf.

While the status of the coast of Chania Gulf is good and thus no impacts are expected to affect this HCV area, the status of the other two water bodies is totally unknown, which means that there are no data available to perform any impact assessment from anthropogenic activities. This, in combination with the medium threats of this area due to the use of biocides, hormones and chemicals, fertilization and cultivation don't allowed us to conclude if there are impacts on Y434KRI202 from the agricultural activity or not. Thus, the water steward of Platanias' F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced this water system.

Table 136: High Conservation Value Areas in Voukolies – Maleme sub-basins

Code	GR4340003
Name	Chersonisos Rodopou – Paralia Maleme
Interrelated surface water systems	GR1339C0002N GR1339R000301006N Maleme
Threats[10] (intense)	Cultivation – increase of agricultural area (medium), grazing (medium), fertilization (medium), irrigation – temporary transition from dry to mesic or wet conditions due to irrigation (low), use of biocides, hormones and chemicals (medium)
Ecological status	-
Protection Goal	The quality and importance of "Rodopos" site is indicated by the following characteristics: 1) The archaeological site of Diktynaio in the northern area of the peninsula and the absence of a road in a good condition after the village Rodopos, act as a barrier for extensive human activities. 2) In the area of Ravdoucha mammal subfossils have been found. 3) The site as a whole is very important for the avifauna of Crete (CORINE, MEDSPA) because of its position and its geomorphology (important to cliff nesting birds – important migration route for harriers and herons). 4) There are a lot of endemic species (plants and animals) in a variety of sufficiently conserved habitat types. There are also species such as Fritillaria graeca, an endemic of the Aegean islands, which in the island of Crete it has been found only in odopos peninsula and its presence is very rare.5) The coastal area from Kolympari to Platanias is one of the most important places for the reproduction of Caretta caretta in Crete.

As it has already been mentioned in "2.1.1 Voukolies and Maleme sub-basins" the intensive agricultural activities that take place within Voukolies – Maleme sub-basins and the moderate leaching potential within these sub-basins are expected to affect the water bodies of Porous of Campos Chanion and Gypsum karst aquifer of Crete part of which are located below Voukolies – Maleme sub-basins. However, as both the quantitate and qualitative status of both water bodies have been identified as good (Table 137) no significant environmental and/ or socioeconomic impacts have been identified on these water bodies due to the anthropogenic activities and especially agriculture.

Table 137: Groundwater bodies in Voukolies – Maleme sub-basins

Code	GR1300022	GR1300330
Name	Porous aquifer of Campos Chanion	Gypsum karst aquifer of Crete
Aquifer Type	Porous	Karstic
Anthropogenic Pressures / Impacts	NO	NO
Natural Pressures / impacts	-	Excess sulphate values due to layers of gypsum

[10] Threats only from the agriculture sector are mentioned in this field. http://natura2000.eea.europa.eu

Quantitative Status	Good	Good
Qualitative Status	Good	Good
Comments	-	Increased background values due to layers of gypsum
Increasing trend of pollutant	NO	NO
Protection Goal	Non-degradation of water status	Non-degradation of water status
Total Orchards	100	0
Fertilized Orchards (%)	85.0	0.0
Orchards with PPP (%)	83.0	0.0
Orchards with H400 (%)	2.0	0.0
Orchards with H410 (%)	47.0	0.0
Orchards with Specific pollutants (%)	50.0	0.0
Orchards with priority Substances (%)	3.0	0.0
Irrigated orchards (%)	55.0	0.0

2.2.2 Havgas - Milatos sub-basin

The following tables (Table 138 to Table 142) represent the water bodies/systems (surface and groundwater) and the High Conservation Value Areas that are located within Havgas - Milatos pilot sub-basin.

Table 138 represents the 6 surface water bodies that are located within Havgas - Milatos pilot sub-basin, the applied pressures per water body and their intensity, information in reference to the ecological and chemical status and the percentages of pilot orchards per catchment area where fertilizers and PPPs are used.

Table 138: Surface water bodies in Havgas - Milatos sub-basin

Code	-	-	-	-	-	-
Name	HM-1	HM-2	HM-3	HM-4	HM-5	HM-6
Type	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Natural/HMWB [11]	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Anthropogenic Pressures	Percentage of cultivated area	Percentage of cultivated area	Percentage of cultivated area	Percentage of cultivated area	Percentage of cultivated area	Percentage of cultivated area
Intensity of percentage of cultivated area[12]	High (≥50%)	Moderate (≥20%-<50%)	Low (<20%)	Moderate (≥20%-<50%)	Moderate (≥20%-<50%)	High (≥50%)
Intensity of other pressures	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Ecological Status	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Chemical Status	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Protection Goal	Determination of ecological and chemical status and non-degradation of water status					
Total Orchards	14	2	3	6	17	59

[11] Heavily modified water body

[12] The intensity was calculated by the project team

Fertilized Orchards (%)	28.6	0.0	0.0	16.7	17.6	54.2
Orchards with PPP (%)	35.7	100	0.0	16.7	11.8	39.0
Orchards with H400 (%)	0.0	0.0	0.0	0.0	0.0	0.0
Orchards with H410 (%)	21.4	100	0.0	16.7	0.0	23.7
Orchards with Specific Pollutants (%)	14.3	50.0	0.0	16.7	5.9	32.2
Orchards with priority Substances (%)	21.4	0.0	0.0	0.0	0.0	0.0
Irrigated orchards (%)	50.0	0.0	0.0	33.3	0.0	6.8

At this point it should be mentioned that the water bodies HM-1 to HM-6 are not included in the River Based Management Plan of Crete District (13) and they have not been recognized as significant surface water bodies, as they are streams whose surface flow lasts for almost 3 months and this category of streams is not included in the system which is used by the River Based Management Plan. This is also the reason for which none of these rivers has a specific code.
As it is shown in the above table the agricultural activities that are applied within the catchment area of each water body are not as intensive as those that have described in Platanias pilot area. More specific, only the 39.6% of the registered orchards (or 40 out 101) use fertilizers and only in 32.7% (or 33 out of 101) PPPs are applied. Moreover, the registered orchards where specific pollutants, priority substance or PPPs classified as very toxic to aquatic environment with long lasting effects are used is less than 23% of the registered orchards. According to the analysis of Part B "Description of the agricultural sector in the pilot sub-basin" over-fertilizing in a significant number of orchard is actually true. Moreover, the main groups of fertilizers that are applied in the pilot area contain either chemical forms with high concentrations which are linked to risks of environmental pollution due to N-containing fertilizers or composite fertilizers which may lead to higher application rates of P.
Taking all the above into account someone can assume that in cases where non good agricultural practices are applied the agricultural activities will impact all the surface water bodies and the HCV areas that are found in the study area. The chemical status of all water bodies is unknown and thus there are no data available to perform any impact assessment from anthropogenic activities. For this reason the water steward of Mirabello's F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced by agricultural activities.
Within the boundaries of the pilot sub-basin only one coastal water system "Malia Gulf" (GR1341C0009N) is located (Table 139). While its ecological status is good, its chemical status is unknown and thus there are no available data in order to identify the impact from the agriculture activities in this water system (if any exists). For this reason the water steward of Mirabello's F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced this water system.

Table 139: Coastal water systems in Havgas - Milatos sub-basin

Code	**GR1341C0009N**
Name	Coast of Malia Gulf
Type	Shallow with sedimentary substratum

Ecological Status	Good
Chemical Status	Unknown
Protection Goal	Determination of ecological and chemical status and non-degradation of water status

The bathing water of Milatos (GRBW139310032) which is included within the boundaries of Havgas - Milatos sub-basin is mainly affected by the water system of Coast of Malia Gulf and the water body of HM-1 (Table 140). While the chemical status of both water systems is totally unknown, the qualitative status of GRBW139310032, according to the River Based Management Plan is excellent. As a result no significant environmental and/ or socioeconomic impacts have been identified on Milatos water system due to the anthropogenic activities and especially agriculture.

Table 140: Bathing water in Havgas - Milatos sub-basin

Code	GRBW139310032
Name	Milatos
Interrelated surface water systems	GR1341C0009N HM-1
Qualitative Status	Excellent
Pressures	Wastes and sewage disposal from small private vessels and potential oil leakage
Protection Goa	Non-degradation of water status

The following Table 141 presents the High Conservation Value Areas that are located within Havgas – Milatos pilot sub-basins, the interrelated water systems and their threats. More specific in this pilot area there are 5 different HCV areas: the Wildlife Refuge Latsidiani Kefala Dimou Neapolis (GR95341355) which is affected by almost all the surface water bodies (HM-1, HM-2, HM-4, HM-5, HM-6), the Wildlife Refuge of Anavlocho (Vrachasiou) (GR95341544) and the Important Birds Area Mount Dikti (GR190) which are interrelated with the surface water bodies HM-5 and HM-6 and also affected by them, the Special Protection Area Farangi Selinari-Vrachasi (GR4320013) which is affected by the surface water bodies of HM-4, HM-5 and HM-6 and the Site of Community Importance Dikti: Oropedio Lasithioy, Katharo, Selena, Krasi, Selekanos, Chalasmeni Koryfi (GR4320002) which is affected by the surface water bodies of HM-6 and GR1341R000101003N, which is located outside of the two pilot sub-basins and for this reason it will be excluded from the estimation of impacts of this water body. The status of all 5 surface water bodies (HM-1, HM-2, HM-4, HM-5, and HM-6) which are interrelated with the above mentioned HCV areas is totally unknown and as a result there are no data available to perform any impact assessment from anthropogenic activities on these areas. Thus, the water steward of Mirabello's F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced this water system

Table 141: High Conservation Value Areas in Havgas – Milatos sub-basins

Code	GR95341355	GR4320013	GR95341544	GR4320002	GR190
Name	Latsidiani Kefala Dimou Neapolis	Farangi Selinari-Vrachasi	Anavlocho (Vrachasiou)	Dikti: Oropedio Lasithioy, Katharo, Selena, Krasi, Selekanos,	Mount Dikti

				Chalasmeni Koryfi	
Interrelated surface water systems	HM-1 HM-2 HM-4 HM-5 HM-6	HM-4 HM-5 HM-6	HM-5 HM-6	GR1341R000 101003N HM-6	HM-5 HM-6
Threats	-	Fire, illegal hunting, use of poisoned baits	-	Fragile balance in danger due to overgrazing, fires, tourism activities, soil erosion due to the degradation of stabilizing vegetation caused by overgrazing, possible pollution of underground waters due to the general use of pesticides and of fertilization	Agricultural intensificatio n/expansion (high), burning of vegetation (high), firewood collection (medium), recreation/to urism (unknown)
Ecological quality	-	-	-	Great variety of habitat types, rich flora in common species and in rare and vulnerable endemic species, rich fauna in endemic and rare species, vineyards with old varieties of vines, caves with endemic fauna, scientifically important fossils.	-
Protection Goal	Natural areas (terrestrial, wetland or marine) of particular importance, because of being major development sites of wild flora or habitats breeding, feeding, wintering wildlife species or areas where there are young and spawning fish, or as major marine habitats.				An important site for passage and breeding raptors and alpine species.

As it has already been mentioned in “2.1.2 Havgas - Milatos sub-basin” the intensive agricultural activities that take place within Havgas – Milatos sub-basin are not expected to affect the 5 groundwater bodies of GR1300240, GR1300116, GR1300115, GR1300113, GR1300112 which are included within their boundaries due to the low average leaching that characterizes this area. This, in combination with the fact that both quantitative and qualitative status of all 5 groundwater bodies are identified as good (Table 142) leads to the conclusion that no significant environmental and/ or socioeconomic impacts have been identified on these water bodies due to the anthropogenic activities and especially agriculture.

Table 142: Groundwater bodies in Havgas – Milatos sub-basins

Code	GR1300240	GR1300116	GR1300115	GR1300113	GR1300112
Name	Fractured of Dikti	Coastal karst of Sisi-Milatos-Elounda	Karst of Fourni – Elounda	Karst of NE Mount Dikti	Karst of Malia – Selena
Aquifer Type	fractured	karstic	karstic	karstic	karstic
Anthropogenic Pressures / Impacts	Local over-exploitation	NO	Marginal local over-exploitation	NO	Local over-exploitation at the coastal zone
Natural Pressures/ impacts	-	Excess chloride values attributed to natural salinization (vicinity of the karst aquifer to the sea)	-	-	-
Quantitative Status	Good	Good	Good	Good	Good
Qualitative Status	Good	Good	Good	Good	Good
Comments	-	Increased background values due to layers of gypsum	Local over – exploitation of low water capacity aquifers	-	Local over – exploitation of coastal part during the summer period
Increasing trend of pollutant	NO	NO	NO	NO	NO
Protection Goal	Non-degradation of water status				
Total Orchards	4	25	30	42	0
Fertilized Orchards (%)	25.0	44.0	13.3	57.1	0.0
Orchards with PPP (%)	25.0	44.0	23.3	33.0	0.0
Orchards with H400 (%)	0.0	0.0	0.0	0.0	0.0
Orchards with H410 (%)	0.0	28.0	13.3	21.4	0.0
Orchards with Specific Pollutants (%)	25.0	32.0	13.3	26.2	0.0
Orchards with priority Substances (%)	0.0	0.0	10	0.0	0.0
Irrigated orchards (%)	0.0	16.0	26.7	2.4	0.0

2.2.3 Agri pilot sub-basin

Table 143 to Table 147 present the water bodies/systems (surface and groundwater) and the High Conservation Value Areas that are located within Agri pilot sub-basin.
As it is shown in Table 143 the agricultural practices that are applied within this pilot sub-basin are rather intensive as in the 91% and 94% of the pilot orchards fertilizers

and PPPs that are classified as very toxic to the aquatic environment with long lasting effects are applied. Also, there is a significant number of registered orchards (48%) where PPPs which contain priority substances are used.

Table 143: Surface water bodies in Agri pilot sub-basin

Code	ITF_017_RW-16SS03T-AGRI 1	ITF_017_RW-18SS03T-AGRI 2	ITF_017_RW-16EF07T-F.SO VALLE	ITF_017_LW-ME-2-Gannano
Name	Agri-1	Agri-2	F.SO VALLE	Gannano
Water system	River	River	River	Dam
Type	16SS03T	18SS03T	16EF07T	-
Natural/HMWB [13]	HMWB	HMWB	-	HMWB
Anthropogenic Pressures	-	-	-	-
Intensity of pressure	-	-	-	-
Ecological Status	Sufficient	Sufficient	Unknown	Unknown
Chemical Status	Unknown	Unknown	Unknown	Unknown
Protection Goal	Determination of ecological and chemical status and non-degradation of water status			
Total Orchards	44	2	70	
Fertilized Orchards (%)	86.4	0.0	95.7	
Orchards with PPP (%)	88.6	100	95.7	
Orchards with H400 (%)	38.6	0.0	37.1	
Orchards with H410 (%)	88.6	100	95.7	
Orchards with Specific pollutants (%)	0.0	0.0	0.0	
Orchards with priority Substances (%)	54.5	0.0	51.4	
Irrigated orchards (%)	90.9	50.0	94.3	

As it has already been mentioned in Part B "Description of the agricultural sector in the pilot sub-basin" all agrochemicals used in these registered orchards are allowed for use in each crop and also the doses applied are in accordance with the Italian National Legislation. Moreover, the Metapontino area is considered as a nitrate vulnerable zone (NVZ) and, for this reason, it has specific allowed amount of nitrogen (that concerns mainly the spreading of organic manure and slurry in a specific period of the year). In any case, according to the analysis presented in the above mentioned Part B the risk of pollution by agrochemicals in the area of Metapontino is considered as moderate. Taking all the above into account the agricultural activities within this sub-basin are expected to cause impacts both on the surface water bodies and the HCV areas that are located within its boundaries.

Within Agri pilot sub-basin 3 surface water bodies AGRI-1, AGRI-2 and F.So. Valle are located.

Taking all the above into account someone can assume that in cases where non good agricultural practices are applied the agricultural activities will impact all the surface water bodies. The chemical status of all water bodies is totally unknown and thus there

[13] Heavily modified water body

are no data available to perform any impact assessment from anthropogenic activities. For this reason the water steward of Agri's F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced by agricultural activities.

Within Agri pilot sub-basin there is also the dam of Gannano (ITF_017_LW-ME-2-Gannano). The dam is located within Agri-3 pilot sub-basin and it is affected mainly by AGRI-2 (ITF_017_RW-18SS03T-AGRI 2) which discharges its water in the dam. As the chemical status of both AGRI-2 and dam is unknown there are no data available to perform any impact assessment from anthropogenic activities in reference to Gannano dam and thus the water steward of Agri's F.OR needs to contact the relevant authorities and request information update in order to identify potential impacts induced by agricultural activities.

Table 144: Bathing waters in Agri pilot sub-basin

Code	Name	Qualitative Status	Pressures	Protection Goal	Interrelated surface water systems
IT017077031002	CANALE BUFALORIA - 100 MT. MARGINE NORD	Excellent	-	Non-degradation of water status	ITF_017_RW-16EF07T-F.SO VALLE
IT017077031003	CANALE BUFALORIA - 100 MT. MARGINE SUD	Excellent	-		ITF_017_RW-16EF07T-F.SO VALLE
IT017077021006	FOCE AGRI - 1500 MT. MARGINE SUD	Excellent	-		ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-16EF07T-F.SO VALLE
IT017077031004	FOCE AGRI - 250 MT. MARGINE NORD	Excellent	-		ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-16EF07T-F.SO VALLE
IT017077021003	FOCE AGRI - 250 MT. MARGINE SUD	Excellent	-		ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-16EF07T-F.SO VALLE
IT017077031006	IDROVORA SCANZANO ION.-100 MT.MARG. NORD	Excellent	-		ITF_017_RW-16EF07T-F.SO VALLE
IT017077031007	IDROVORA SCANZANO ION.-100 MT.MARG. SUD	Excellent	-		ITF_017_RW-16EF07T-F.SO VALLE
IT017077021005	IDROVORA TORRE MOZZA-150 MT. MARGINE SUD	Excellent	-		ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-16EF07T-F.SO VALLE
IT017077021004	IDROVORA TORRE MOZZA-150 MT.MARGINE NORD	Excellent	-		ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-16EF07T-F.SO VALLE

The bathing waters of IT017077031002, IT017077031003, IT017077031006 and IT017077031007 are affected only from the water body of F.So. Valle, while the bathing waters of IT017077021006, IT017077031004, IT017077021003, IT017077021005 and IT017077021004 are affected from both the water bodies of F.So. Valle and AGRI-1 (Table 144). While the chemical status of both water bodies is unknown the qualitative status of all bathing waters that are located within the boundaries of Agri pilot sub-basin is excellent. As a result it is concluded that no significant environmental and/ or socioeconomic impacts have been identified on these water systems due to the anthropogenic activities and especially agriculture.

The surface water bodies AGRI-1, AGRI-2 and F.So. Valle are also interrelated with a significant number of coastal waters and HCV areas that are described in the following Table 145 and Table 146. As the chemical status of the surface waters, the coastal waters and the HCV areas is unknown the impacts of the agricultural activities in these coastal waters and HCV areas cannot be estimated. In order to do this the relevant F.OR needs to contact with the relevant authorities and ask for further information in order to perform the impact assessment from anthropogenic activities.

Table 145: Coastal water systems in Agri pilot sub-basin

Code	ITF_017_CW-C3_FLUV-Policoro	ITF_017_CW-F3_FLUV-Cavone
Name	Piana di Policoro	Piana del Cavone
Type	Coastal plain	Plain of dunes
Ecological Status	-	-
Chemical Status	-	-
Interrelated surface water systems	ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-16EF07T-F.SO VALLE	ITF_017_RW-16EF07T-F.SO VALLE
Protection Goal	Determination of ecological and chemical status and non-degradation of water status	

Table 146: High Conservation Value Areas in Agri pilot sub-basin

Code	Name	Type of HCVA	Threats	Ecological status	Interrelated surface water systems
IT9220080	Ionian coast mouth river Agri	SCI	-	-	ITF_017_RW-16EF07T-F.SO VALLE ITF_017_RW-16SS03T-AGRI 1
IT9220095	Ionian coast mouth river Cavone	SCI	-	-	ITF_017_RW-16EF07T-F.SO VALLE
IBA 196	Calanchi della Basilicata	Important Bird Area	-	-	ITF_017_RW-16EF07T-F.SO VALLE ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-18SS03T-AGRI 2
46037	Fiume Agri da intermedio alla foce	Water Bodies to support fish life and shellfish	-	-	ITF_017_RW-16EF07T-F.SO VALLE ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-18SS03T-AGRI 2
-	-	Nitrate Vulnerable Zones	-	-	ITF_017_RW-16EF07T-F.SO VALLE ITF_017_RW-16SS03T-AGRI 1 ITF_017_RW-18SS03T-AGRI 2

As it has already been mentioned in "2.1.3 Agri pilot sub-basin" the intensive agricultural activities that take place within Agri pilot sub-basin are expected to affect the 2 groundwater bodies of P-AGR and P-MET which are included within their boundaries due to the moderate average leaching that characterizes this area. This, in combination with the fact that both quantitative and qualitative status of both groundwater bodies are identified as not good (Table 147) leads to the conclusion that environmental and/ or socioeconomic impacts on these water bodies due to the anthropogenic activities and especially agriculture have been identified. More specific, in P-AGR the concentrations of nitrates exceed the threshold values that have been determined by the Italian National legislation, while in P-MET the concentrations of both chlorides and nitrates exceed these values. In this case the F.OR is suggested to request from the relevant authorities, further information in reference to the quality standards and/ or the threshold values that are not met.

Table 147: Groundwater bodies in Agri pilot sub-basin

Code	IT17DPAGR	IT17DPMET
Name	P-AGR	P-MET

Aquifer Type	clastic systems of the floodplain and fluvial-lacustrine basins	clastic systems of the floodplain and fluvial-lacustrine basins
Anthropogenic Pressures / Impacts	NO	NO
Natural Pressures / impacts	-	-
Quantitative Status	Not Good	Not Good
Qualitative Status	Not Good	Not Good
Pollutants that exceed the threshold	Niatrates	Chloreides and nitrates
Increasing trend of pollutant	NO	NO
Protection Goal	Upgrade of water status through the implementation of Programme of Measures	
Total Orchards	13	25
Fertilized Orchards (%)	84.6	96.0
Orchards with PPP (%)	84.6	92.0
Orchards with H400 (%)	30.8	60.0
Orchards with H410 (%)	84.6	92.0
Orchards with Specific pollutants (%)	0.0	0.0
Orchards with priority Substances (%)	30.8	76.0
Irrigated orchards (%)	100.0	92.0

2.3 Conclusions

Summing up the following results were derived from the previous analysis:

Voukolies and Maleme sub-basins

Runoff impact assessment: 2 out of 4 sub-basins, GR3901R000301057N and GR3901R000301007N, are characterized by high runoff risk potential and two, GR3901R000301006N and Maleme, by moderate potential. In addition, the registered orchards that are fertilized and in which PPPs are used and simultaneously are located in areas with runoff potential higher than moderate are equal to 84% and 81%, respectively.

Erosion risk assessment: Only one of the four sub-basins, GR3901R000301057N, is characterized by high erosion risk potential and three, GR3901R000301006N, GR3901R000301007N and Maleme, by moderate erosion potential. In addition, the registered orchards that are fertilized and in which PPPs are used and simultaneously are located in areas with erosion potential higher than moderate are equal to 46% and 45%, respectively.

Leaching potential: The leaching potential in the pilot area is varied from low to moderate with the largest part characterized by moderate leaching potential, as only 1 out of the 4 pilot sub-basins (GR3901R000301006N) is characterized by low leaching potential. The percentage of the register orchards in which fertilizers and PPPs are used and located in areas with a moderate leaching potential is equal to 61% and 59%, respectively.

Use of Agrochemicals: The 85 out of 100 registered orchards (85%) are fertilized while in the 83 out of 100 (83%) PPPs are used.

Specific pollutants and priority substances: In the 50% of the registered parcels, PPPs used contain specific pollutants (Copper, Dimethoate, or both of them) and in the

3% of the registered parcels, PPPs used contain a priority substance (Chlorpyrifos-ethyl).

Hazardous to the aquatic environment: In 2 registered orchards (2%), which are located in the sub-basin GR3901R000301007N, PPPs classified as H400 are used. In 47 registered orchards (47%), PPPs classified as H410 are used. The percentage of orchards in which such PPPs are applied in each sub-basin is varied from 25% the minimum, 5 orchards out of 20 located in sub-basin Maleme, to 66.7% the maximum, 8 out of 12 in GR3901R000301057N.

Water status of affected destinations:

Surface water bodies and HCV areas: For 2 out 9 potentially affected destinations within Voukolies and Maleme sub-basins it is known that either their status or the status of their interrelated water systems is good. In particular, these are the surface water body of the Coast of Chania Gulf (GR1339C0002N) and the HCV area of bathing waters of Maleme beach (GRBW139323085). For the rest their status is unknown.

Groundwater bodies: The qualitative status of both water bodies, Porous aquifer of Campos Chanion (GR1300022) and Gypsum karst aquifer of Crete (GR1300330) have been identified as good.

Impacts on Water status by agricultural activities:

Surface water bodies and HCV areas:

According to the River Based Management Plan of Crete District (GR 13) the ecological and chemical status of the 4 surface bodies (rivers) located in the pilot area are unknown. Based on the same plan, the agricultural activities that are applied within the catchment area of each water body are intensive (Table 132), are highly intensive in three of them (GR1339R000301006N, GR1339R000301057N and Maleme), and moderate for the fourth (GR1339R000301007N) sub-basin. Considering also the information presented above and in particular that:

- The agricultural activities that are applied are intensive.
- the runoff and erosion risk potential for the entire basin is categorized higher than the moderate
- Fertilizers and PPPs are used in the majority of the register farms
- The PPPs that are used in the 56% of the registered orchards contain substances that are hazardous for the aquatic environment (H400 or H410) and the PPPs that are applied in the 50% of the registered orchards contain specific pollutants (Copper, Dimethoate).

It can be assumed that in cases where non good agricultural practices are applied, the agricultural activities can impact all the surface water bodies due to the runoff and erosion risk potential considering also the fact that the 53% of the registered orchards are irrigated. Nevertheless, since the chemical status of all water bodies is unknown, there are no data to assess the impacts impose to them by anthropogenic activities/pressures and agriculture particularly so far. The identification of their status is a demanding process and should be elaborated by the relevant authorities.

Regarding the impacts of agricultural activities on the 3 out of 5 HCV areas (Y434KRI203, Y434KRI202 and GR4340003), they could not be also assessed since they are interrelated with surface bodies with unknown ecological and chemical status. However, as far the impacts on the bathing water of Maleme and the coast of Chania Gulf are concerned, as their status is either good or excellent it can be assumed that the agricultural activities have no impact them in terms of their quality so far.

Groundwater bodies:
According to the River Based Management Plan of Crete District (GR 13) the qualitative status of the 2 groundwater bodies, Porous aquifer of Campos Chanion (GR1300022) and Gypsum karst aquifer of Crete (GR1300330) located in the pilot area is good. Considering also the information presented above and in particular that:

- The agricultural activities that are applied are intensive.
- The leaching potential is moderate
- The information on the used fertilizers and PPPs

It can be assumed the agricultural activities have no impact on the groundwater bodies in terms of their quality so far. In addition, the area has not designated as a Nitrate Vulnerable Zone (NVZ) for the purposes of the EU Nitrate Directive. However, it can be assumed that in cases where non good agricultural practices are applied, there is a moderate potential to be polluted by substances contained in the agrochemical used.

Havgas - Milatos sub-basin

Runoff impact assessment: 4 out of 6 sub-basins are characterized by high runoff risk potential and two by moderate potential. In addition, the registered orchards that are fertilized and in which PPPs are used and simultaneously are located in areas with runoff potential higher than moderate are equal to 38% and 33%, respectively. Also, only the 11% of the registered orchards is both irrigated and located in areas with such runoff potential.
Erosion risk assessment: Only one of the six sub-basins, is characterized by high erosion risk potential, 4 by moderate and one by very low erosion potential. In addition, the registered orchards that are fertilized and in which PPPs are used and simultaneously are located in areas with erosion potential higher than the moderate are equal to 27% and 24%, respectively.
Leaching potential: The leaching potential in the entire pilot area is low.
Use of Agrochemicals: The 40 out of 101 registered orchards (39,6%) are fertilized while in the 33 out of 101 (32,7%) PPPs are used.
Specific pollutants and priority substances: In the 23,8% of the registered parcels, the PPPs used contain specific pollutants (either Copper or Dimethoate) and in 3% of the registered parcels, the PPPs used contain a priority substance (Chlorpyrifos-ethyl).
Hazardous to the aquatic environment: In none registered orchard, located in the pilot area, PPPs classified as H400 are used. In 20 out of 101 registered orchards (or 19,8%), PPPs classified as H410 are used. The registered orchards in which such PPPs are applied in each sub-basin are 1 to 3 orchards per sub-basin with the only exception of sub-basin HM-6 in which such PPPs are applied in 14 registered orchards.

Water status of affected destinations:
Surface water bodies and HCV areas: It should be mentioned that none surface water body (river) has identified in the River Based Management Plan of Crete District (13), as they are streams whose surface flow lasts for almost 3 months and this category of streams is not included in the system which is used by the River Based Management Plan. However, the project team has recognized 6 surface water bodies as presented in Fig. 111 whose ecological and chemical status is unknown. Regarding the surface water body of Coast of Malia Gulf (GR1341C0009N) it ecological status is good and its chemical is unknown.
In addition, 6 HCV areas are located within the catchment area. The bathing water of Milatos (GRBW139310032) whose qualitative status is excellent, according to the River

Based Management Plan and the rest 5 presented in Table 141 that interrelated with the majority of surface river bodies.

Groundwater bodies: The qualitative status of all 5 groundwater bodies is identified as good (Table 142). However, the coastal karst of Sisi-Milatos-Elounda (GR1300116) presents excess chloride values attributed to natural salinization due to the vicinity of the karst aquifer to the sea).

Impacts on Water status by agricultural activities:

Surface water bodies and HCV areas:

According to the above information the ecological and chemical status of the 6 surface bodies (rivers) located in the pilot area are unknown. Based on information presented in Table 138, the agricultural activities that are applied within the catchment area of Havgas - Milatos are highly intensive in sub-basins HM-1 and HM-6, lowly intensive in HM-3 and moderately in the rest sub-basins. Considering also the information presented above and in particular that:

- the agricultural activities that are applied are in most part of the basin is rather intensive.
- the runoff and erosion risk potential for the entire basin is categorized higher than the moderate.
- Fertilizers and PPPs are used approximately in the 40% and 33% of the registered farms, respectively.
- The PPPs that are used in the 19.8% of the registered orchards contain substances that are hazardous for the aquatic environment (H410) and the PPPs that are applied in the 3% of the registered orchards contain specific pollutants (Copper, Dimethoate).

It can be assumed that in cases where non good agricultural practices are applied, the agricultural activities can impose impacts on all the surface water bodies due to the runoff and erosion risk potential. However, the potential impacts are not expected to significant in comparison with the other pilot areas of the project since agrochemicals are used in the 40% of the orchards while only the 13% of the registered orchardas are irrigated. Nevertheless, since the chemical status of all water bodies is unknown, there are no data to assess the impact impose to them by anthropogenic activities/pressures and agriculture particularly so far. The identification of their status is a demanding process and should be elaborated by the relevant authorities.

Regarding the impacts of agricultural activities on the HCV areas, they could not be also assessed since they interrelated with surface bodies with unknown ecological and chemical status. The only exception is the bathing water of Milatos as its status is excellent and it can be assumed that the agricultural activities have no impact on it in terms of its quality so far.

Groundwater bodies:

According to the River Based Management Plan of Crete District (GR 13) the qualitative status of the 5 groundwater bodies, located in the pilot area is good. However, according to the same plan, two of the water bodies are overexploited during the summer (GR1300240 and GR1300112). Considering also the information presented above and in particular that:

- the agricultural activities that are applied are in most part of the basin is rather intensive
- The leaching potential is low

- The information on the used fertilizers and PPPs

It can be assumed the agricultural activities have no impact on the groundwater bodies in terms of their quality so far. In addition, the area has not designated as a Nitrate Vulnerable Zone (NVZ) for the purposes of the EU Nitrate Directive. However, it can be assumed that in cases where non good agricultural practices are applied, there is a low potential to be polluted by substances contained in the agrochemical used.

Agri pilot sub-basin

While the analysis of agrochemicals and impacts on water bodies and affected destinations took place only for the 6 sub-basins whithin which the 100 registered orchards are located, the analysis in reference to runoff, erosion and leaching potential took place for all the 14 sub-basins that have been recognized within Agri pilot sub-basin.

Runoff impact assessment: 2 out of 14 sub-basins, Agri 6 and Sauro 1, are characterized by high runoff risk potential, eleven (11) are characterized by moderate potential (Agri 1, Agri 2, Agri 3, Agri 4, Agri 5, Agri 7, Agri 8, Agri 9, Sauro 2, Sauro 3, Sauro 4) and one (Agri 10) by low potential. In addition, the registered registered orchards that are fertilized and in which PPPs are used and simultaneously are located in areas with moderate runoff potential are equal to 51% and 53%, respectively.

Erosion risk assessment: 5 out of 14 sub-basins (Agri 4, Agri 5, Agri 8, Agri 9, Agri 10) are characterized by very low erosion risk potential, two, Agri 2 and Sauro 4, by low erosion, 6 by moderate erosion and only one (Agri 6) by high erosion risk potential. Furthermore, 2 out of 100 of the registered orchards fertilized and 3 out of 100 used PPPs located in areas with erosion potential higher than moderate.

Leaching potential: The leaching potential in the pilot area demonstrates a wide range of variations, with the largest part characterized by low to moderate potential. As far as the leaching potential of the area of both groundwater bodies is concerned it is presented a wide range of variation (from very low to high), thus indicating significant leaching potential variability. On the average, leaching potential is estimated as moderate. The percentage of the registered orchards in which fertilizers and PPPs are used and located in areas with a moderate leaching potential is equal to 53% for both categories.

Use of Agrochemicals: The 91 out of 100 registered orchards (91%) are fertilized while in the 94 out of 100 (94%) PPPs are used.

Specific pollutants and priority substances: In the registered parcels, there are no PPPs used that contain specific pollutants, but the percentage of registered parcels that use PPPs with priority substances is 48%. More specifically, in the 12% of the registered parcels, PPPs used contain the priority substance of Chlorpyrifos-ethyl and in the 43% of the registered parcels, PPPs used contain the priority substance of Naphthalene.

Hazardous to the aquatic environment: In 35 registered orchards (35%) PPPs classified as H400 are used. The percentage of orchards in which such PPPs are applied in each sub-basin is varied from 0% the minimum in sub-basins Agri 3, Agri 4 and Agri 5, to 85.7% the maximum, 12 out of 14 in Agri 10 sub-basin. As far as PPPs classified as H410 are consenred they are used in 94 registered orchards (94%). The percentage of orchards in which such PPPs are applied varied from 75% to 100% in all sub-basins.

Water status of affected destinations:

Surface water bodies and HCV areas: Concerning the Agri pilot sub-basin, it is known that 9 out of 17 HCVAs have excellent qualitative status. Particularly, these are the 9

bathing waters that are described in Table 144. For the rest HCVAs and the 3 surface waters bodies their status is unknown (ecological and chemical).
Groundwater bodies: The qualitative and quantitative status of both water bodies, P-AGR (IT17DPAGR) and P-MET (IT17DPMET) have been identified as not good, but with no increasing trend of pollutants.

Impacts on Water status by agricultural activities:
Surface water bodies and HCV areas:
In Agri pilot sub-basin, 3 surface water bodies are identified, out of which 2 (Agri-1 and Agri-2) have been characterized as sufficient concerning their ecological status. However, there are no data for any of the surface water bodies relating to their chemical status. Taking into account the information presented above and especially:

- o The runoff risk potential for the entire basin is categorized higher than moderate,
- o The intensive agricultural practices applied, where 91 out of 100 registered orchards use fertilizers and 94 out of 100 registered orchards use PPPs that are very toxic to the aquatic environment with long lasting effects (H400 & H410),
- o 48% of the registered orchards use PPPs with priority substances (naphthalene, chlorpyrifos-ethyl)

It can be assumed that in cases where non good agricultural practices are applied, the agricultural activities can impact all the surface water bodies due to the runoff risk potential considering also the fact that the 95% of the registered orchards are irrigated. Nevertheless, since the chemical status of all water bodies is unknown, there are no data to assess the impacts impose to them by anthropogenic activities/pressures and agriculture particularly so far. The identification of their status is a demanding process and should be elaborated by the relevant authorities.
In relation to the impacts of agricultural activities in 8 out of HCV areas (ITF_017_LW-ME-2-Gannano, ITF_017_CW-C3_FLUV-Policoro, ITF_017_CW-F3_FLUV-Cavone, IT9220080, IT9220095, 46037, IBA 196 and NVZ), they could not be also assessed since they are interrelated with surface bodies with mostly unknown ecological and chemical status. However, given all the above it is concluded that these 8 HCV areas that are included within Agri pilot sub-basin are expected to be affected by agricultural activity. As far the impacts on the 9 bathing waters are concerned, as their status is excellent it can be assumed that the agricultural activities have no impact them in terms of their quality so far.
Groundwater bodies:
According to the approved River Basin Management Plan of South Apennine 2015-2020 the qualitative and quantitative status of the 2 groundwater bodies, P-AGR (IT17DPAGR) and P-MET (IT17DPMET) located in the pilot area is not good. Considering also the information presented above and in particular that:

- o The agricultural activities that are applied are intensive.
- o The average leaching potential is moderate
- o The information on the used fertilizers and PPPs

It can be assumed the anthropogenic activities and in particular the agricultural activities have an impact on the environment in general and specifically the groundwater bodies. Furthermore, the area has been designated as a Nitrate Vulnerable Zone (NVZ) for the purposes of the EU Nitrate Directive, due to the high concentrations of chlorides and nitrates to both the groundwater bodies respectively. As a result, the Italian National Legislation is imposing measures and limits as far as the use of PPPs and fertilizers is concerned. Thus, in cases where non good agricultural practices are applied, there is a very high risk of further polluting water bodies irreversibly.

PART D – EVALUATION OF F.ORS' **GOVERNANCE** STRATEGY

1. EVALUATION OF F.ORS' GOVERNANCE STRATEGY

This report aims to analyze the results of the 3rd Agricultural Water Management System (AWMS) form and assess the readiness of the three Farmers Organizations (F.ORs) to take adaptive action, in line with the 4th Principle of the EWS standard as modified in Action A2, so as to propose actions in the frame of action C3.

The 3rd AWMS form, pursuant to the 4th EWS Principle which aims at achieving equitable and transparent management of water resources, is designed to draw information on the existing mechanisms that had been developed and applied to F.OR's level and ensure:

- Awareness and compliance with relevant legislation,
- Awareness-raising on issues related to water,
- The design of integrated management of water resources and
- Transparency and continuous improvement policy followed in relation to the management of water resources by the F.ORs.

The structure of the 3rd AWMS form, which is presented as filled-in by the three F.ORs in Annex I, was developed based on the criteria indicated by the 4th EWS Principle, excluding the criterion 4.2 which refers to water management in the supply chain and therefore it is not applied in agriculture. Despite the fact that the 1st and 2nd AWMS forms are addressed to farmers and agriculturalists, the 3rd AWMS form has to be filled-in by the FOR's management and by persons or departments related to water governance, if any. The analysis of the 3rd AWMS form results as well as the assessment of the three F.OR's readiness is presented for each of the 7 criteria of the 4th EWS Principle, while general directions according to EWS Standard (http://www.ewp.eu/wp-content/uploads/2012/04/EWS+European-Water-Stewardship-Standard-v4.8-Dec-2012-Doc.pdf) are also presented.

1.1 Criterion 4.1: Ensuring compliance with all legal requirements linked to water use

According to the EWS Standard this criterion includes one sub-criterion (4.1.1) and two indicators:

- *A person or department is identified who ensures compliance with legal requirements linked to water.*
- *Procedures are established, implemented and monitored which ensure that legal aspects and compliance with the law by the production sites' on water abstraction, reuse or discharge are entirely disclosed and kept up-to-date.*

Based on the above two indicators, the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.1: Does F.OR maintain a list of applicable water legislation?

4.1.1a: Has a person or department been identified who ensures compliance with legal requirements linked to water, such as validity of licenses for abstraction and limits for water consumption for crop irrigation.

4.1.1b: Have the procedures for ensuring of legal compliance been documented?

4.1.1c: Are these procedures up to date and entirely disclosed?

4.1.1d: Do these procedures address the organization's own requirements to satisfy the objectives and targets of its strategy (AWMS)?

4.1.1e: Have all the above requirements been communicated to the farmers-members of the organization by e.g. work instructions, training etc?

4.1.1f: Are these procedures implemented per parcel of crop?

4.1.1g: Is this implementation monitored?

4.1.1h: Are the results of this monitoring recorded and available?

According to the response of the three F.ORs to the 9 questions, their readiness to comply with the legal requirements linked to water use is considered as low due to the fact that all F.ORs responded negatively in almost all of the corresponding questions. More specifically:

- Only Platanias' F.OR maintains a list of the applicable water legislation. The other two F.ORs responded that they did not maintain the legislation list. This is possibly attributed to the link of FOR with the local municipality that has a legal service in place. The other two F.ORs have little direct interference with water issues and no legal service.
- None of the three F.ORs had defined a person or department who ensures compliance with legal requirements linked to water.
- None of the three F.ORs have established and documented procedures in order to ensure compliance of its farmers-members with the legal requirements and consequently all the related processes, such as keeping the procedures up to date, communicating the legal requirements to the farmers-members of the F.ORs, implementing and monitoring how the procedures at parcel level are implemented.

Therefore, and in accordance to the minimum baseline requirements the following actions have to be performed in order to conform with the 4.1 criterion of the 4th Principle:

- 4.1.1 Establish the procedure and the related documentation that will ensure compliance with the legal requirements related to water management. Implement the procedure and monitor its rate of implementation. In the context of AgroClimaWater project, the communication of the legal requirements to the farmers has to be included in the corresponding procedure.
- 4.1.2 Identify a responsible person or department that will ensure the implementation of the above described procedure.
- 4.1.3 Maintain and keep updated a list of the applicable legal and regulatory requirements related to water management.
- 4.1.4 Check and update the permits linked to water management.

1.2 Criterion 4.3: Linking water management to the management of other resources

According to the EWS Standard this criterion includes two sub-criteria and two indicators:

4.3.1: *The (quantitative) relation of water and energy use is identified and optimized.*

4.3.2: *The (quantitative) relation of water and other resources than energy is identified and optimized.*

Based on the above two indicators the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.3.1a: Has a recording system been established to capture water and energy consumption per irrigation event and parcel?

4.3.1b: Is this information used for the improvement of water and energy use?

4.3.2a: Has a recording system will be established to capture water and other inputs (such as fertilizations, soil & weed management and pruning) used?

4.3.2b: Is this information used for the optimization of water and the other inputs used?

With respect to linking water management to the management of other resources (such as energy and soil) and according to the responses of the three F.ORs in the 4 questions, the degree of readiness can be considered as variable. Two out of the three F.ORs participating in AgroClimaWater project indicate low readiness in linking water management to the management of other resources, such as energy. More specifically, AFI's and Platanias' F.ORs have not established recording procedures in order to capture water and energy consumption per irrigation event and parcel, as well as other inputs, such as fertilization, weed management etc. Since they have not established that kind of procedures, they are not able to take the advantage and optimize their water, energy and other inputs use. On the contrary, Mirabello's F.OR has established relevant recording procedures in the context of the application of an Environmental Management System. These recordings are including water, energy and other inputs and they can be used in order to improve the water, energy and other inputs efficiency.

Therefore and in accordance to the minimum baseline requirements as presented in the EWS Standard, the following actions have to be performed in order to conform with the 4.3 criterion of the 4th Principle:

- 4.3.1: The energy (fossil fuel and electricity) consumption not only for irrigation but for other activities incorporated into the agricultural production procedure, such as fertilizer application, plant protection related activities, soil cultivation/weed management, pruning and harvesting has to be documented and optimized. Therefore, the appropriate documentation and forms for recording by the farmers has to be developed and the corresponding results to be used in order to improve energy efficiency.
- 4.3.2: Identify and evaluate measures and practices that will lead to improvement and optimization of water management in relation to other resources, which in the case of agricultural sector may include a wide variety of management practices, such as those proposed by AgroClimaWater project. For example, by applying appropriate pruning, a reduction of water evaporation and transpiration water losses is expected and consequently improved water use efficiency is expected. Also, proper soil management can lower leaching and runoff potential, increasing thus water retention, hence the efficacy of irrigation, and reducing water losses.

1.3 Criterion 4.4: Raising efficiency of water consumption

According to the EWS Standard this criterion includes four sub-criteria and the corresponding four indicators:

4.4.1: *Recycling is included in the water management strategy and the volume of recycled/re-used water* is monitored.*

4.4.2: *Water losses are identified. Type and destination of losses are described.*

4.4.3: *A strategy is in place and described to achieve optimized water efficiency.*

4.4.4: *Water consumption per unit (e.g. of product) is quantified.*

Based on the above four indicators, the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.4.1a: Is water recycle or re-use applied in the context of water management?

4.4.1b: Is there a system established in order to monitor the quantity of recycled/re-used water?

4.4.2a: Is it possible to estimate water losses?

4.4.2b: Is it possible to determine the type and the destination (soil, air) of water losses?

4.4.3: Is there a water management strategy implemented to achieve optimum water consumption (increase water efficiency, reduce water losses, and improve irrigation systems and methods)?

4.4.4: Can water consumption per production unit be estimated?

According to the response of the three F.ORs to the 6 questions, their readiness to raise the efficiency of water consumption is not related to recycling as there is no such a practice in open field agriculture (sub-criterion 4.4.1). Moreover, none of the F.ORs could estimate the amount of water lost during the application of irrigation (sub-criterion 4.4.2). Nevertheless, Mirabello's F.OR responded that the type and the destination of water losses can be determined, while the other two F.ORs responded that they cannot perform such kind of estimation (sub-criterion 4.4.2). According to 3rd AWMS form responses, none of the F.ORs is implementing an established methodology in order to improve water consumption rates, such as increasing water use efficiency, reducing water losses and improving irrigation systems and methods (sub-criterion 4.4.3). Except from Mirabello's F.OR which responded that water consumption per production unit could be estimated, the other two F.ORs indicated that they currently cannot perform such kind of estimation (sub-criterion 4.4.4). Taking into account all the above, the readiness of the three F.ORs in raising efficiency of water consumption can be considered as low, mainly due to the fact that there is no suitable methodology established to monitor efficiency.

Therefore and in accordance to the minimum baseline requirements as presented in the EWS Standard, the following actions have to be performed in order to conform with the 4.4 criterion of the 4th Principle:

- 4.4.1: No action is applicable in the case of the three F.ORs.
- 4.4.2: Identify, estimate and report water losses caused by irrigation activity, as well as the affected destinations.
- 4.4.3: As part of the general water management strategy that has to be developed according to criterion 4.8, each F.OR has to develop a specific procedure that will target to optimize the water use by increasing water efficiency and reducing water losses and should include all the related factors related to irrigation such as selection, performance monitoring and maintenance of irrigation systems, as well as appropriate irrigation scheduling.
- 4.4.4: The total water use and/or consumption per unit of product have to be estimated. This action is assisted by data collected in the 1st AWMS form.

1.4 Criterion 4.5: Ensuring transparency on water management

According to the EWS Standard this criterion includes six sub-criteria and the corresponding seven indicators, as sub-criterion 4.5.5 includes two indicators:

4.5.1: *A person or department is identified who participates and reports on River Basin Committee activities.*

4.5.2: *Internal transparency: Sustainable water management is disseminated within the operation.*

4.5.3: *External transparency: The water management is publically available for customers, the public and authorities, e.g. by a water report.*

4.5.4: *Campaigns or partnerships to inform stakeholders on water topics are described and implemented.*

4.5.5: *Management of incidents: 1) Procedures are established, implemented and monitored to respond to accidents, security incidents, emergency situations, disasters and the like. 2) The impacts of such an occurrence to the environments, employees, the regional population and communities are described or estimated.*

4.5.6: *Only applicable for irrigation: Measures or facilities to deal with unforeseen climatic conditions and system breakdown are implemented and monitored.*

Based on the above seven indicators, the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.5.1: Has a person or department been identified who participates and reports on River Basin Committee activities?

4.5.2: Are the principles of sustainable water management disseminated within the F.OR?

4.5.3a: Are the principles of sustainable water management disseminated to customers, the public and authorities?

4.5.3b: Are any reports available for customers, the public and authorities that describe the principles of sustainable water management?

4.5.4: Are there any informational campaigns performed in order to inform stakeholders on water management?

4.5.5a: Is there any plan to prevent accidents, disasters and similar incidents?

4.5.5b: Are the impacts of such an incident to the environments, employees, the regional population and communities described or estimated?

4.5.6: Are there any measures applied and monitored in order to deal with unforeseen climatic conditions?

Considering the response of the three F.ORs to the 8 questions, the readiness of the three F.ORs in ensuring transparency on water management was identified as low, since all the F.ORs have responded negatively on the questions related to this criterion, except from one question in which AFI's F.OR responded that the principles of sustainable water management are disseminated within the F.OR. More specifically, none of the three F.ORs has defined a person or department that participates and reports on River Basin Committee activities, while there are no documents or other dissemination actions, such as informational campaigns performed from the three F.ORs related to sustainable water resources management. Furthermore, none of the three F.ORs has developed specific plans in order to prevent accidents, disasters and similar incidents and react in case of unforeseen climatic conditions or extreme events.

Therefore and in accordance to the minimum baseline requirements as presented in the EWS Standard, the following actions have to be performed in order to conform with the 4.5 criterion of the 4th Principle:

- 4.5.1: A person or department has to defined which will represent and report on River Basin Committee activities. Moreover, the River Basin Water Resources Management Plan has to be available in F.OR's premises.
- 4.5.2: Identify and apply a list of measures that will promote and ensure the internal dissemination of sustainable water management including training sessions and informational material.
- 4.5.3: According to EWS Standard, a report with information on operational water management has to be available for customers, the local community and

the authorities (both, for water and for agriculture). This report shall include basic information on water management (for example water abstractions and their distribution on to the several crops) and other information such as actions and achievements linked to sustainable water management, definition of water-related risks and preventive measures implemented. Since the three F.ORs are not performing the operational water management, such a report does not have to be created.

- 4.5.4: Promotional campaigns have to be organized and implemented on topics related to water. For agriculture such campaigns may be related to irrigation (scheduling, methods, deficit irrigation, and irrigation systems maintenance) and good agricultural practices that promote the sustainable water management from both the quantitative and qualitative point of view.
- 4.5.5: Risk assessment and risk management procedures have to be established which will include emergency situations such as flooding, leakages, fire, and droughts. Risk management procedures must be based on the related civil protection plans developed by governmental authorities.
- 4.5.6: Especially for irrigated agriculture, a list of measures has to be created and monitored in order to deal with unforeseen climatic conditions.

1.5 Criterion 4.6: Ensuring continuous improvement

According to the EWS Standard this criterion includes three sub-criteria and the corresponding three indicators:

4.6.1: *Best Management Practices (BMPs) are in place and integrated in a water resource management strategy. If no recognized BMPs are in place the water steward him/herself identifies appropriate BMPs.*

4.6.2: *The implementation procedures and the evaluation of BMPs are described.*

4.6.3: *The water steward implements and documents innovative measures to improve the sustainability of the internal and the river basin water management.*

Based on the above seven indicators, the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.6.1: Is it possible to achieve a continuous improvement of water management strategy by implementation of Best Management Practices?

4.6.2: Are the procedures of Best Management Practices application described in reports?

4.6.3: Is it possible to improve the sustainability and river basin water management according to the Water Steward?

With respect to ensuring the continuous improvement of water resources management, the current readiness status of the three F.ORs is variable. AFI's and Mirabello's F.ORs are currently implementing some Best Management Practices (BMPs), mainly within the context of the already established Environmental Management Systems (sub-criterion 4.6.1). When asked whether the procedures of BMPs application are described in the corresponding management plans, Mirabello's F.OR responded positively, while AFI's responded negatively, commenting that this procedure is reported only for farmers that adhere to GLOBALGAP standards (sub-criterion 4.6.2). Both F.ORs responded positively with regard to the possibility to improve the sustainability and river basin water management according the Water Steward (sub-criterion 4.6.3). Platanias' F.OR responded negatively to all the three questions included in this criterion. Therefore the readiness of Mirabello's, AFI's and Platanias' F.ORs in ensuring the continuous improvement of water resources management is considered as medium, medium and low, respectively.

Therefore and in accordance to the minimum baseline requirements as presented in the EWS Standard, the following actions have to be performed in order to conform to the 4.6 criterion of the 4th Principle:

- 4.6.1: The list of any currently applied BMPs related to water management has to be reported, while the impacts of each BMP has to be identified, if possible. In case that there are no BMPs actually applied, a basic BMP strategy has to be developed, in line with the demonstration actions of the project.
- 4.6.2: The implementation of BMPs has to be monitored, while their performance has to be evaluated. In case that F.OR is not able to perform such an evaluation, this procedure should be assisted by external experts.
- 4.6.3: A list of the innovative measures and practices (in addition to the ones that will be established by the project) has to be developed in case those measures will be implemented. Such measures may include advance irrigation scheduling techniques, high performance irrigation methods etc.

1.6 Criterion 4.7: Ensuring transparency on economic aspects of water management

According to the EWS Standard this criterion includes two sub-criteria and the corresponding two indicators:

4.7.1: *Investments made for maintenance and improvement of the water management are fully reported.*

4.7.2: *An environmental cost analysis is in place.*

Based on the above seven indicators, the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.7: How is the transparency on economic aspects of water management ~~is~~ ensured?

4.7.1: Are there reports available on the related infrastructures and investments already made?

4.7.2: Is the F.OR able to compose an environmental cost analysis in relation to water?

Concerning the ensuring of transparency on economic aspects of water management, Mirabello's F.OR indicate that given the fact that water resources management is performed by official authorities which are complying to the corresponding legislation it can be considered that economic transparency is ensured, even in cases in which private water sources are used. Therefore, according to Mirabello's F.OR, the economic transparency is indirectly ensured. The issue will be investigated further, as there seems to be an option for interesting action there. AFI's and Platanias' F.ORs did not stated any mechanisms with which the economic transparency is ensured (criterion 4.7). None of the F.ORs is maintaining reports on the related to water resources infrastructures and investments (sub-criterion 4.7.1), while AFI's and Mirabello's F.ORs responded that are able to compose an environmental cost analysis (sub-criterion 4.7.1). Therefore, with respect to ensuring transparency on economic aspects of water management the current state of readiness is considered as low to medium for AFI's and Mirabello's F.ORs and low for Platanias' F.OR.

Therefore and in accordance to the minimum baseline requirements, as presented in the EWS Standard, the following actions have to be performed in order to conform with the 4.7 criterion of the 4th Principle:

- 4.7.1: Maintain a list of investments related to water resources management (maintenance and improvement) and identify the opportunities for which relation water saving is related to money saving.
- 4.7.2: An environmental analysis cost report has to be constructed. Nevertheless, this action belongs to the recommended and not to the obligatory.

1.7 Criterion 4.8: Water Resources Management Strategy

According to the EWS Standard this criterion consists of one sub-criterion which includes two indicators:

4.8.1: *1) An exhaustive water resources management strategy, which covers all 4 Water Stewardship principles, is established, implemented and monitored. 2) A person or department is identified who ensures the implementation of the water resources management strategy.*

Based on the above seven indicators, the following questions were included in the 3rd AWMS form in order to explore the F.OR's conformance level:

4.8.1: Is there a common strategy of water management which covers all 4 Water Stewardship principles?

4.8.2: Has a person or department been identified who ensures the implementation of the water resources management strategy according to AWMS?

With regard to water resources management strategy and as expected, none of the three F.ORs has a common strategy of water management which covers all 4 Water Stewardship principles and subsequently there is no person or department defined that ensures the implementation of the water resources management strategy according to AWMS. Therefore all three F.ORs have to develop their case-specific water resources management strategy and identify a person or department that will have the responsibility for its implementation.

2. CONCLUSIONS

Considering the above analysis and the results of the fulfilled 3rd AWMS forms by the three F.ORs, Table 148 was created in which the degree of readiness of each F.ORs to comply with each of the 7 criteria of the 4th EWS principle is presented. Overall, the readiness of the three F.ORs is considered as low. Nevertheless, AFI's F.OR demonstrate medium readiness in two out of the seven criteria (4.3 (page 242) and 4.6 (page 246)), while Mirabello's F.OR demonstrate for the same two criteria high and medium readiness. The higher degree of readiness for those two criteria is directly connected to other management systems that Mirabello's and AFI's F.ORs are already implementing. In the case of Platanias' F.OR, the readiness for all the seven criteria is considered as low.

Table 148: Degree of readiness of the three F.ORs in order to comply to the requirements of the 4th EWS Principle

EWS-AWMS Criterion	Degree of F.OR Readiness		
	AFI	Mirabello**'s**	**Platanias'**
4.1: Legal requirements	Low	Low	Low
4.3: Linking water management to management of other sources	Medium	Medium	Low
4.4: Raising efficiency of water consumption	Low	Low	Low
4.5: Ensuring transparency on water management	Low	Low	Low
4.6: Ensuring continuous improvement	Medium	Medium	Low
4.7: Ensuring transparency on economic aspects	Low	Low	Low
4.8: Water Resources Management Strategy	Low	Low	Low

A general aspect of the mechanisms, procedures and actions that have to be considered towards the successful implementation of the 4th Principle by the three F.ORs, were given in accordance to the EWS Standard. The specific tools procedures and mechanisms for each of the three F.ORs are going to be developed in the context of Action C3.

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Appendix I: 2nd AWMS form

Table 149: The 2nd AWMS form as it has been fulfilled by HYETOS & KEDHP

***Εντοπίζονται σε ακτίνα** 25 **χλμ από το αγροτεμάχιο / τις χρησιμοποιούμενες πηγές νερού/ τους πιθανούς αποδέκτες οι παρακάτω περιοχές υψηλής αξίας διατήρησης**? / Are any of the following High Conservation Value Areas located within a 25km radius around the farm/ water sources/ water receptors?*					
Περιοχές υψηλής αξίας διατήρησης / High Conservation Value Areas	**Ναι /** Yes	**Όχι / No**	**Ονομασία Περιοχών / Areas Names**	**Κωδικοποίηση Περιοχών /** Areas Codes	**Ορισμός /** Designation
Περιοχές NATURA 2000/ Natura 2000 Sites					
a. **Ζώνες Ειδικής Προστασίας** (**ΖΕΠ**) / Special Protection Areas (SPA)	x		CHERSONISOS RODOPOU (SPA) • CHERSONISOS GRAMVOUSSAS KAI NISIDES IMERI KAI AGRIA GRAMVOUSSA, PONTIKONISI (SPA) • NISIDA AGIOI THEODOROI (SPA) • LIMNI AGIAS (CHANIA) (SPA) • METERIZIA AGIOS DIKAIOS - TSOUNARA - VITSILIA LEFKON OREON (SPA) • ETHNIKOS DRYMOS SAMARIAS - FARANGI TRYPITIS - PSILAFI – KOUSTOGERAKO (SPA)	• GR4340021 • GR4340017 • GR4340018 • GR4340020 • GR4340016 • GR4340014	• JMD HP 37338/1807/E103/1-9-2010 (OJ 1495 B)
b. **Τόποι Κοινοτικής Σημασίας** (**ΤΚΣ**) / Sites of Community Importance (SIC)	x		• IMERI KAI AGRIA GRAMVOUSSA - TIGANI KAI FALASARNA - PONTIKONISI, ORMOS LIVADI – VIGLIA (SCI) • CHERSONISOS RODOPOU - PARALIA MALEME (SCI) • ELOS - TOPOLIA - SASALOS - AGIOS DIKAIOS (SCI) • ORMOS SOUGIAS - VARDIA - FARANGI LISSOU MECHRI ANYDROUS KAI PARAKTIA ZONI (SCI) • LIMNI AGIAS - PLATANIAS - REMA KAI EKVOLI KERITI - KOILADA FASA (SCI) • FARANGI THERISSOU (SCI)	• GR4340001 • GR4340003 • GR4340004 • GR4340005 • GR4340006 • GR4340007 • GR4340008	• Law 3937/29-3-11 (OJ 60 A)

			• LEFKA ORI KAI PARAKTIA ZONI (SCI)		
c. **Ειδικές Ζώνες Διατήρησης** (**ΕΖΔ**) / Special Areas of Conservation (SAC)	x		• IMERI KAI AGRIA GRAMVOUSSA - TIGANI KAI FALASARNA - PONTIKONISI, ORMOS LIVADI – VIGLIA (SCI) • CHERSONISOS RODOPOU - PARALIA MALEME • ELOS - TOPOLIA - SASALOS - AGIOS DIKAIOS (SCI) • ORMOS SOUGIAS - VARDIA - FARANGI LISSOU MECHRI ANYDROUS KAI PARAKTIA ZONI (SCI) • LIMNI AGIAS - PLATANIAS - REMA KAI EKVOLI KERITI - KOILADA FASA (SCI) • FARANGI THERISSOU (SCI) • LEFKA ORI KAI PARAKTIA ZONI (SCI)	• GR4340001 • GR4340003 • GR4340004 • GR4340005 • GR4340006 • GR4340007 • GR4340008	• Law 3937/29-3-11 (OJ 60 A)
Προστατευόμενες Περιοχές / Nationally Designated Areas					
I) Περιοχές Απόλυτης Προστασίας της Φύσης / Strict Nature Reserves		x			
II) Εθνικά Πάρκα - **Δρυμοί / National** Parks	x		• SAMARIA	• GR0516378	• OJ 200/A/1962, as amended by OJ 33/A/1964
III) Μνημεία της Φύσης / Natural Monuments		x			
IV) Περιοχές προστασίας οικοτόπων και ειδών / Habitat- Species Management Areas	x		Wildlife Refugees • AGIOU DIKAIOU - VITSINIAS KAI ELAFONISOU DIMON INACHORIOU KAI PELEKANON • VOREIO TMIMA CHERSONISOU RODOPOU DIMOU KOLYMVARIOU • STAVRO CHORDAKI DIMOU AKROTIRIOU • STYLOU - KATOCHORIOU DIMOU ARMENON KAI KERAMEION – • LEFKA ORI ANATOLIKOU SELINOU KAI SFAKION	• GR95341331 • GR95341332 • GR95341333 • GR95341340 • GR95341497	• OJ 813/B/2001, as amended by OJ 1187/B/2002 • 53762/2963/01-07-76, as amended by: OJ 813/B/2001 & OJ 1187/B/2002 • 54616/3093/01-07-76, as amended by 100400/2368/01-07-1986 & OJ 813/B/2001

					• OJ 458/B/1985, as amended by OJ 1144/B/2002 • OJ 803/B/2001
V) **Προστατευόμενα Τοπία** / Protected Landscape -Seascape		x			
VI) Περιοχές διαχειριζόμενων φυσικών πόρων - Managed Resource Protected Areas	x		• PROSTATEFTIKO DASOS OREINOU OGKOU LEFKON OREON NOMOU CHANION • PROSTATEFTIKO DASOS OREINOU OGKOU APOPIGADI SELINOU NOMOU CHANION	• GR24341920 • GR24341941	• OJ 65/D/2006
VII) Άλλα / Others	x		• THODOROU CHANION (Game breeding station)	• GR2192572	• OJ 706/B/1976
Υγρότοποι Διεθνούς Σημασίας (Ramsar) / Wetlands of International Importance (Ramsar Sites)		x			
Μικροί Νησιωτικοί και άλλοι Υγρότοποι/ Small island and other wetlands	x		• STAVROS • TERSANA LAKE • KALATHOREMA ESTUARY • KLADISSOS ESTUARY • OMALOS CHANION TEMPORARY POND • PLATANIAS ESTUARY (IARDANOS RIVER) • ESTUARY OF GERANI BEACH • SFAKORYAKO ESTUARY • TAVRONITIS ESTUARY AND MARSH • ESTUARY OF RAPANIANA BEACH • SPILIANOS ESTUARY • LIMNI • ARAPIS ESTUARY • VATHYREMA ESTUARY • MILIAS ESTUARY • KAMARIANOS ESTUARY • FALASARNA	• Y434KRI182 • Y434KRI184 • Y434KRI187 • Y434KRI188 • Y434KRI196 • Y434KRI200 • Y434KRI201 • Y434KRI202 • Y434KRI203 • Y434KRI204 • Y434KRI205 • Y434KRI218 • Y434KRI219 • Y434KRI220 • Y434KRI221 • Y434KRI222 • Y434KRI225	• OJ 229/Α.Α.Π./2012

Ύδατα Αναψυχής (συμπεριλαμβανομένων των υδάτων κολύμβησης)/ Recreation waters (including bathing waters)	x		• AGIA MARINA-STALOS • AGIOI APOSTOLOI-EOT ANATOLIKA • AGIOI APOSTOLOI-EOT-DYTIKA • AGIOS ONOUPHRIOS • VLITES • GERANI-PLATANIAS • KALATHAS • KALAMAKI • KASTELLI KISSAMOU ANATOLIKA • KASTELLI KISSAMOU DYTIKA • KOLYMPARIA-RAPANIANA • KOUM KAPI • LIMANAKI PLATANIA • MALEME • NEA CHORA • SOUGIA • STAVROS • FALASARNA • CHRYSI AKTI	• GRBW139325110 • GRBW139325118 • GRBW139325109 • GRBW139325111 • GRBW139325120 • GRBW139323083 • GRBW139325113 • GRBW139325116 • GRBW139322066 • GRBW139322067 • GRBW139323084 • GRBW139325117 • GRBW139325119 • GRBW139306073 • GRBW139325112 • GRBW139321061 • GRBW139325114 • GRBW139322068 • GRBW139325108	• JMD 8600/416/E103/2009
Ύδατα για την απόληψη πόσιμου νερού/ Water Bodies used for potable water	x		• KARST OF TOPOLIA • KARST OF SFINARIO • KARST OF NW LEFKA ORI (AGIA) • KARST OF NORTHERN LEFKA ORI (STILOU-ARMENON) • KARST OF CHRISOSKALITISSA • COASTAL KARST OF GRAMVOUSA • COASTAL KARST OF SPATHA (RODOPOS) • COASTAL KARST OF AKROTIRI (SOUDA) • CRETE'S ISLETS	• GR1300011 • GR1300012 • GR1300031 • GR1300032 • GR1300172 • GR1300321 • GR1300322 • GR1300323 • GR1300340	• OJ 570/B/2015
Ύδατα για τη διαβίωση ψαριών και οστρακοειδών / Water Bodies to support fish life and shellfish		x			
Παρόχθιες Ζώνες/ Riparian zones					
Περιοχές Ευαίσθητες στη Νιτρορύπανση / Nitrate Vulnerable Zones		x			

Αρχαιολογικοί Χώροι / Archaeological sites					
Άλλες περιοχές τοπικής σημασίας (Για πολιτιστικούς, θρησκευτικούς, οικολογικούς, κοινωνικο-οικονομικούς λόγους) / Other important areas (for cultural, religious, ecological, socio- economic reasons)	x		Important Bird Areas • Gramvousa peninsula and Gramvouses and Pontikonisi islets • Rodopos peninsula • Agioi Theodori islet • Mount Koutroulis, Mount Ag. Dikaios and Modia plateau • Lefka mountains	• GR175 • GR 176 • GR 177 • GR 178 • GR 179	National:Partial International:Partial

Αν ναι, συμπληρώστε για κάθε μία από τις παραπάνω περιοχές υψηλής αξίας διατήρησης τον παρακάτω πίνακα / If so, please provide the following information about each of the High Conservation Value Area Identified above.

Ονομασία - Κωδικοποίηση Περιοχών / Areas Names - Codes **(όπως παραπάνω** / as above)	**Θέση /** Location	**Καθεστώς Προστασίας / Protection** Status	**Στόχος Προστασίας / Protection Goal**
Περιοχές NATURA 2000/ Natura Sites			
a. **Ζώνες Ειδικής Προστασίας** (**ΖΕΠ**) / Special Protection Areas (SPA)			
CHERSONISOS RODOPOU (SPA) – GR4340021	Longitude 23.739444 Latitude 35.661111	Directive 2009/147/EC (Partially overlapped by GR95 "Voreio Tmima Chersonisou Rodopou Dimou Kolymvariou" & is totally included in IN06 "Chersonisos Rodopou")	This is an important area for passage migrants and breeding raptors. Species of concern include Gyps fulvus and Falco biarmicus.
CHERSONISOS GRAMVOUSSAS KAI NISIDES IMERI KAI AGRIA GRAMVOUSSA, PONTIKONISI (SPA) - GR4340017	Longitude 23.588889 Latitude 35.549722	Directive 2009/147/EC (This site and IN06 "Chersonisos Tiganis, Nisoi Grambouses kai Pontikonisi" site are coisident)	An important site for raptors associated with sea cliffs and seabirds. Species of concern include: Falco eleonorae.
NISIDA AGIOI THEODOROI (SPA) - GR4340018	Longitude 23.932222 Latitude 35.537778	Directive 2009/147/EC (Partially overlapped by GR21 "Thodorou Chanion" & is coisident with IN06 "Nisida Agioi Theodoroi")	This is an important site for species associated with coastal cliffs and scrub. Species of concern include: Falco eleonorae.
LIMNI AGIAS (CHANIA) (SPA) - GR4340020	Longitude 23.937222 Latitude 35.480278	Directive 2009/147/EC	This is an important area for passage and wintering waterbirds. Species of concern include: Egretta garzetta and Aythya nyroca.
METERIZIA AGIOS DIKAIOS - TSOUNARA - VITSILIA LEFKON OREON (SPA) - GR4340016	Longitude 23.606667 Latitude 35.330556	Directive 2009/147/EC (Partially overlapped by GR95 "Agiou Dikaiou - Vitsinias kai Elafonisou Dimon Inachoriou ka" & is totally incuded by IN06 "Oros Koutroulis, Oros Agios Dikaios kai Oropedio Modia"	The site is important for species characteristic of Mediterranean scrub. Species of concern include: Gypaetus barbatus.The site includes important bird areas & endemic plant species.

ETHNIKOS DRYMOS SAMARIAS - FARANGI TRYPITIS - PSILAFI – KOUSTOGERAKO (SPA) - GR4340014	Longitude 23.915833 Latitude 35.270278	Directive 2009/147/EC (Partially overlapped by IN04 "Samaria", IN01 "Samaria", GR24 "Prostateftiko dasos oreinou ogkou Lefkon Oreon nomou Chanion", IN02 "Samaria", GR05 "Samaria", IN03 "Samaria", GR95 "Lefka Ori Anatolikou Selinou kai Sfakion" and is completely included by IN06 "Lefka Ori")	This is an important site for breeding and passage raptors, and for species characteristic of scrub and montane habitats. Species of concern include: Gypaetus barbatus, Aquila chrysaetos, Falco peregrinus and Pyrrhocorax pyrrhocorax. Samaria gorge is the oldest National Park in Greece.
b. **Τόποι Κοινοτικής Σημασίας** (**ΤΚΣ**) / Sites of Community Importance (SIC)			
IMERI KAI AGRIA GRAMVOUSSA - TIGANI KAI FALASARNA - PONTIKONISI, ORMOS LIVADI – VIGLIA (SCI) - GR4340001	Longitude 23.590278 Latitude 35.564167	Directive 92/43/EEC (Is completely included by IN06 "Chersonisos Tiganis, Nisoi Grambouses kai Pontikonisi")	The peninsula and the islands of Gramvousa and Pontikonisi are very important areas for many Greek endemic or stenoendemic plant species as well as for endemic or rare species and subspecies of reptiles and invertebrates. In addition the area is important for migratory birds.
CHERSONISOS RODOPOU - PARALIA MALEME (SCI) - GR4340003	Longitude 23.795000 Latitude 35.538889	Directive 92/43/EEC (Partially overlapped by GR95 "Voreio Tmima Chersonisou Rodopou Dimou Kolymvariou" and is completely included by IN06 "Chersonisos Rodopou")	The quality and importance of "Rodopos" site is indicated by the following characteristics: 1) The archaeological site of Diktynaio in the northern area of the peninsula and the absence of a road in a good condition after the village Rodopos, act as a barrier for extensive human activities. 2) In the area of Ravdoucha mammal subfossils have been found. 3) The site as a whole is very important for the avifauna of Crete (CORINE, MEDSPA) because of its position and its geomorphology (important to cliff nesting birds - important migration route for harriers and herons). 4) There are a lot of endemic species (plants and animals) in a variety of sufficiently conserved habitat types. There are also species such as Fritillaria graeca, an endemic of the Aegean islands, which in the island of Crete it has been found only in odopos peninsula and its presence is very rare.5) The coastal area from Kolympari to Platanias is one of the

			most important places for the reproduction of Caretta caretta in Crete.
ELOS - TOPOLIA - SASALOS - AGIOS DIKAIOS (SCI) - GR4340004	Longitude 23.650833 Latitude 35.377222	Directive 92/43/EEC (Partially overlapped by GR95 "Agiou Dikaiou - Vitsinias kai Elafonisou Dimon Inachoriou ka" & is completely included by IN06 "Oros Koutroulis, Oros Agios Dikaios kai Oropedio Modia")	The site includes important bird areas such as Koutroulis mount, areas with endemic plant species (Dikaios mount and gorge), important caves (Agia Sofia) with stenoendemic invertebrates (the spider Pholcus creticus is found only in this cave), as well as gorges, running waters and rare plant formations, such as the chestnut groves and the Arbutus unedo maquis.
ORMOS SOUGIAS - VARDIA - FARANGI LISSOU MECHRI ANYDROUS KAI PARAKTIA ZONI (SCI) - GR4340005	Longitude 23.763611 Latitude 35.253611	Directive 92/43/EEC	The ecological quality of the area derives from the following elements:1) the plenitude of habitat types2) the large number of endemics and local endemics of the especially rich flora3) the presence of important orchid sites4) the presence of fauna species protected by international conventions5) the Byzantine site of Lissos representing the cultural element of the site.
LIMNI AGIAS - PLATANIAS - REMA KAI EKVOLI KERITI - KOILADA FASA (SCI) - GR4340006	Longitude 23.917222 Latitude 35.424444	Directive 92/43/EEC	The quality and importance of Agia lake and Keritis stream estuary is due to the following: 1) The limited number of freshwater bodies in Crete. 2) the important role of freshwater biotopes for the water balance and the biodiversity of the island of Crete. 3) the importance of the wetland as a refugee for many bird species. 4) the variety of habitat types. 5) the high degree of diversity both in animal and in plant species. 6) the presence of the endemic species Podarcis erhardii cretensis is important, as Crete is the southern distribution limit for the restricted population of the species. 7) the geographical connection of the site with a quite biodiverse CORINE biotope, the White Mountains of Crete.

FARANGI THERISSOU (SCI) - GR4340007	Longitude 23.988056 Latitude 35.425556	Directive 92/43/EEC	The quality and importance of Therissos gorge is comprised of the following elements: 1) It is of great aesthetic value. 2) It is easy to approach, due to its location near the town of Chania and the existence of the road, running along it. 3) There is a variety of sufficiently conserved habitats within a small area. 4) Its flora is rich in common and endemic species; the latter are of great interest and most of them are rare or threatened and protected at international (Bern Convention) or national (Presidential Decree 67/81) level.
LEFKA ORI KAI PARAKTIA ZONI (SCI) - GR4340008	Longitude 24.007222 Latitude 35.299444	Directive 92/43/EEC (This site completely includes IN03 "Samaria", IN04 "Samaria", IN02 "Samaria", GR05 "Samaria", IN01 "Samaria", is completely included by IN06 "Lefka Ori" and is partially overlapped by GR95 "Lefka Ori Anatolikou Selinou kai Sfakion" and GR24 "Prostateftiko dasos oreinou ogkou Lefkon Oreon nomou Chanion")	The described site is of utmost importance. It includes a great variety of very important habitats that host a great number of species of flora and fauna, a large proportion of which are endemics or even stenoendemics, restricted to the site.
c. **Ειδικές Ζώνες Διατήρησης** (**ΕΖΔ**) / Special Areas of Conservation (SAC)			
IMERI KAI AGRIA GRAMVOUSSA - TIGANI KAI FALASARNA - PONTIKONISI, ORMOS LIVADI – VIGLIA (SCI) - GR4340001	Longitude 23.590278 Latitude 35.564167	Directive 92/43/EEC (Is completely included by IN06 "Chersonisos Tiganis, Nisoi Grambouses kai Pontikonisi")	The peninsula and the islands of Gramvousa and Pontikonisi are very important areas for many Greek endemic or stenoendemic plant species as well as for endemic or rare species and subspecies of reptiles and invertebrates. In addition the area is important for migratory birds.

CHERSONISOS RODOPOU - PARALIA MALEME (SCI) - GR4340003	Longitude 23.795000 Latitude 35.538889	Directive 92/43/EEC (Partially overlapped by GR95 "Voreio Tmima Chersonisou Rodopou Dimou Kolymvariou" and is completely included by IN06 "Chersonisos Rodopou")	The quality and importance of "Rodopos" site is indicated by the following characteristics: 1) The archaeological site of Diktynaio in the northern area of the peninsula and the absence of a road in a good condition after the village Rodopos, act as a barrier for extensive human activities. 2) In the area of Ravdoucha mammal subfossils have been found. 3) The site as a whole is very important for the avifauna of Crete (CORINE, MEDSPA) because of its position and its geomorphology (important to cliff nesting birds - important migration route for harriers and herons). 4) There are a lot of endemic species (plants and animals) in a variety of sufficiently conserved habitat types. There are also species such as Fritillaria graeca, an endemic of the Aegean islands, which in the island of Crete it has been found only in odopos peninsula and its presence is very rare.5) The coastal area from Kolympari to Platanias is one of the most important places for the reproduction of Caretta caretta in Crete.
ELOS - TOPOLIA - SASALOS - AGIOS DIKAIOS (SCI) - GR4340004	Longitude 23.650833 Latitude 35.377222	Directive 92/43/EEC (Partially overlapped by GR95 "Agiou Dikaiou - Vitsinias kai Elafonisou Dimon Inachoriou ka" & is completely included by IN06 "Oros Koutroulis, Oros Agios Dikaios kai Oropedio Modia")	The site includes important bird areas such as Koutroulis mount, areas with endemic plant species (Dikaios mount and gorge), important caves (Agia Sofia) with stenoendemic invertebrates (the spider Pholcus creticus is found only in this cave), as well as gorges, running waters and rare plant formations, such as the chestnut groves and the Arbutus unedo maquis.

ORMOS SOUGIAS - VARDIA - FARANGI LISSOU MECHRI ANYDROUS KAI PARAKTIA ZONI (SCI) - GR4340005	Longitude 23.763611 Latitude 35.253611	Directive 92/43/EEC	The ecological quality of the area derives from the following elements:1) the plenitude of habitat types2) the large number of endemics and local endemics of the especially rich flora3) the presence of important orchid sites4) the presence of fauna species protected by international conventions5) the Byzantine site of Lissos representing the cultural element of the site.
LIMNI AGIAS - PLATANIAS - REMA KAI EKVOLI KERITI - KOILADA FASA (SCI) - GR4340006	Longitude 23.917222 Latitude 35.424444	Directive 92/43/EEC	The quality and importance of Agia lake and Keritis stream estuary is due to the following: 1) The limited number of freshwater bodies in Crete. 2) the important role of freshwater biotopes for the water balance and the biodiversity of the island of Crete. 3) the importance of the wetland as a refugee for many bird species. 4) the variety of habitat types. 5) the high degree of diversity both in animal and in plant species. 6) the presence of the endemic species Podarcis erhardii cretensis is important, as Crete is the southern distribution limit for the restricted population of the species. 7) the geographical connection of the site with a quite biodiverse CORINE biotope, the White Mountains of Crete.
FARANGI THERISSOU (SCI) - GR4340007	Longitude 23.988056 Latitude 35.425556	Directive 92/43/EEC	The quality and importance of Therissos gorge is comprised of the following elements: 1) It is of great aesthetic value. 2) It is easy to approach, due to its location near the town of Chania and the existence of the road, running along it. 3) There is a variety of sufficiently conserved habitats within a small area. 4) Its flora is rich in common and endemic species; the latter are of great interest and most of them are rare or threatened and protected at

			international (Bern Convention) or national (Presidential Decree 67/81) level.
LEFKA ORI KAI PARAKTIA ZONI (SCI) - GR4340008	Longitude 24.007222 Latitude 35.299444	Directive 92/43/EEC (This site completely includes IN03 "Samaria", IN04 "Samaria", IN02 "Samaria", GR05 "Samaria", IN01 "Samaria", is completely included by IN06 "Lefka Ori" and is partially overlapped by GR95 "Lefka Ori Anatolikou Selinou kai Sfakion" and GR24 "Prostateftiko dasos oreinou ogkou Lefkon Oreon nomou Chanion")	The described site is of utmost importance. It includes a great variety of very important habitats that host a great number of species of flora and fauna, a large proportion of which are endemics or even stenoendemics, restricted to the site.
Προστατευόμενες Περιοχές / Nationally Designated Areas			
II) Εθνικά Πάρκα - Δρυμοί / National Parks			
SAMARIA – GR0516378	Longitude 23.9586663 Latitude 35.2922931	Law 1650/86	
IV) Περιοχές προστασίας οικοτόπων και ειδών / Habitat- Species Management Areas			
Καταφύγια Άγριας Ζωής / Wildlife Refugees			
AGIOU DIKAIOU - VITSINIAS KAI ELAFONISOU DIMON INACHORIOU KAI PELEKANON - GR95341331	Longitude 23.5889813 Latitude 35.3326324	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4340016 "METERIZIA AGIOS DIKAIOS - TSOUNARA - VITSILIA LEFKON OREON (SPA)" & GR4340004 "ELOS - TOPOLIA - SASALOS - AGIOS DIKAIOS (SCI)")	Natural areas (terrestrial, wetland or marine) of particular importance, because of being major development sites of wild flora or habitats breeding, feeding, wintering wildlife species or areas where there are young and spawning fish, or as major marine habitats.
VOREIO TMIMA CHERSONISOU RODOPOU DIMOU KOLYMVARIOU - GR95341332	Longitude 23.7471134 Latitude 35.6580985	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4340021 "CHERSONISOS RODOPOU" & GR4340003 "CHERSONISOS RODOPOU - PARALIA MALEME (SCI)")	
STAVRO CHORDAKI DIMOU AKROTIRIOU - GR95341333	Longitude 24.1216076 Latitude 35.5928999	Law 177/75, as amended by Law 2637/98	

STYLOU - KATOCHORIOU DIMOU ARMENON KAI KERAMEION - GR95341340	Longitude 24.085186 Latitude 35.4373312	Law 177/75, as amended by Law 2637/98	
LEFKA ORI ANATOLIKOU SELINOU KAI SFAKION - GR95341497	Longitude 23.889454 Latitude 35.27287	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4340014 "ETHNIKOS DRYMOS SAMARIAS - FARANGI TRYPITIS - PSILAFI – KOUSTOGERAKO (SPA)" & GR4340008 "LEFKA ORI KAI PARAKTIA ZONI (SCI)")	
VI) **Περιοχές διαχειριζόμενων φυσικών πόρων** - Managed Resource Protected Areas			
Προστατευτικό Δάσος / Protected Forest			
PROSTATEFTIKO DASOS OREINOU OGKOU LEFKON OREON NOMOU CHANION - GR24341920	Longitude 23.9912869 Latitude 35.3113599	L.D. 86/1969 (Partially overlapped by GR4340014 "ETHNIKOS DRYMOS SAMARIAS - FARANGI TRYPITIS - PSILAFI – KOUSTOGERAKO (SPA)" & GR4340008 "LEFKA ORI KAI PARAKTIA ZONI (SCI)")	Areas which contribute to the protection of soils, water sources, streems, streets, monuments and urban areas.
PROSTATEFTIKO DASOS OREINOU OGKOU APOPIGADI SELINOU NOMOU CHANION - GR24341941	Longitude 23.7964308 Latitude 35.3538117	L.D. 86/1969	
VII) Άλλα / Others			
THODOROU CHANION – GR2192572 (Game breeding station)	Longitude 23.9299389 Latitude 35.5366502	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4340018 "NISIDA AGIOI THEODOROI")	Area which protects wild goats (Capra Aegagrus), ground squirrels (Spermophilus citellus) and perdixes (Perdicinae)
Μικροί Νησιωτικοί και άλλοι Υγρότοποι/ Small island and other wetlands			
STAVROS - Y434KRI182	Longitude 24.095023 Latitude 35.591946	OJ 229/Α.Α.Π./2012	Wetlands are complex ecosystems that contribute to the prosperity and the proper functioning of both the environment and people.
TERSANA LAKE - Y434KRI184	Longitude 24.080275 Latitude 35.573859	OJ 229/Α.Α.Π./2012	
KALATHOREMA ESTUARY - Y434KRI187	Longitude 24.087100	OJ 229/Α.Α.Π./2012	

	Latitude 35.554876		
KLADISSOS ESTUARY - Y434KRI188	Longitude 24.001477 Latitude 35.510363	OJ 229/Α.Α.Π./2012	
OMALOS CHANION TEMPORARY POND - Y434KRI196	Longitude 23.890997 Latitude 35.324907	OJ 229/Α.Α.Π./2012	
PLATANIAS ESTUARY (IARDANOS RIVER) - Y434KRI200	Longitude 23.892354 Latitude 35.519965	OJ 229/Α.Α.Π./2012	
ESTUARY OF GERANI BEACH - Y434KRI201	Longitude 23.875774 Latitude 35.522373	OJ 229/Α.Α.Π./2012	
SFAKORYAKO ESTUARY - Y434KRI202	Longitude 23.854653 Latitude 35.523462	OJ 229/Α.Α.Π./2012	
TAVRONITIS ESTUARY AND MARSH - Y434KRI203	Longitude 23.826572 Latitude 35.534439	OJ 229/Α.Α.Π./2012	
ESTUARY OF RAPANIANA BEACH - Y434KRI204	Longitude 23.806731 Latitude 35.535723	OJ 229/Α.Α.Π./2012	
SPILIANOS ESTUARY - Y434KRI205	Longitude 23.791446 Latitude 35.539282	OJ 229/Α.Α.Π./2012	
LIMNI - Y434KRI218	Longitude 23.632507 Latitude 35.371043	OJ 229/Α.Α.Π./2012	

ARAPIS ESTUARY - Y434KRI219	Longitude 23.709829 Latitude 35.504293	OJ 229/Α.Α.Π./2012	
VATHYREMA ESTUARY - Y434KRI220	Longitude 23.686338 Latitude 35.499923	OJ 229/Α.Α.Π./2012	
MILIAS ESTUARY - Y434KRI221	Longitude 23.678353 Latitude 35.499168	OJ 229/Α.Α.Π./2012	
KAMARIANOS ESTUARY - Y434KRI222	Longitude 23.666663 Latitude 35.498272	OJ 229/Α.Α.Π./2012	
FALASARNA - Y434KRI225	Longitude 23.577832 Latitude 35.482512	OJ 229/Α.Α.Π./2012	
Ύδατα Αναψυχής (συμπεριλαμβανομένων των υδάτων κολύμβησης)/ Recreation waters (including bathing waters)			
AGIA MARINA-STALOS – GRBW139325110	Longitude 23.9393 Latitude 35.5167	Directive 2006/7/EC	
AGIOI APOSTOLOI-EOT ANATOLIKA – GRBW139325118	Longitude 23.9832 Latitude 35.5142	Directive 2006/7/EC	
AGIOI APOSTOLOI-EOT-DYTIKA – GRBW139325109	Longitude 23.9787 Latitude 35.5140	Directive 2006/7/EC	
AGIOS ONOUPHRIOS – GRBW139325111	Longitude 24.0631 Latitude 35.5488	Directive 2006/7/EC	

VLITES – GRBW139325120	Longitude 24.0613 Latitude 35.4971	Directive 2006/7/EC	
GERANI-PLATANIAS – GRBW139323083	Longitude 23.8965 Latitude 35.5201	Directive 2006/7/EC	
KALATHAS – GRBW139325113	Longitude 24.0869 Latitude 35.5545	Directive 2006/7/EC	
KALAMAKI – GRBW139325116	Longitude 23.9692 Latitude 35.5134	Directive 2006/7/EC	
KASTELLI KISSAMOU ANATOLIKA – GRBW139322066	Longitude 23.6589 Latitude 35.4980	Directive 2006/7/EC	
KASTELLI KISSAMOU DYTIKA – GRBW139322067	Longitude 23.6477 Latitude 35.4999	Directive 2006/7/EC	
KOLYMPARIA-RAPANIANA – GRBW139323084	Longitude 23.7829 Latitude 35.5430	Directive 2006/7/EC	
KOUM KAPI – GRBW139325117	Longitude 24.0292 Latitude 35.5161	Directive 2006/7/EC	
LIMANAKI PLATANIA – GRBW139325119	Longitude 23.9128 Latitude 35.5191	Directive 2006/7/EC	
MALEME – GRBW139306073	Longitude 23.8427	Directive 2006/7/EC	

	Latitude 35.5268		
NEA CHORA – GRBW139325112	Longitude 24.0067 Latitude 35.5142	Directive 2006/7/EC	
SOUGIA – GRBW139321061	Longitude 23.8099 Latitude 35.2478	Directive 2006/7/EC	
STAVROS – GRBW139325114	Longitude 24.0956 Latitude 35.5912	Directive 2006/7/EC	
FALASARNA – GRBW139322068	Longitude 23.5797 Latitude 35.4956	Directive 2006/7/EC	
CHRYSI AKTI – GRBW139325108	Longitude 23.9898 Latitude 35.5124	Directive 2006/7/EC	
Ύδατα για την απόληψη πόσιμου νερού/ Water Bodies used for potable water			
KARST OF TOPOLIA – GR1300011		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF SFINARIO – GR1300012		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF NW LEFKA ORI (AGIA) – GR1300031		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF NORTHERN LEFKA ORI (STILOU-ARMENON) –GR1300032		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF CHRISOSKALITISSA – GR1300172		River Basin Management Plan of Crete District (GR13), table 6.13	
COASTAL KARST OF GRAMVOUSA – GR1300321		River Basin Management Plan of Crete District (GR13), table 6.13	
COASTAL KARST OF SPATHA (RODOPOS) – GR1300322		River Basin Management Plan of Crete District (GR13), table 6.13	
COASTAL KARST OF AKROTIRI (SOUDA) – GR1300323		River Basin Management Plan of Crete District (GR13), table 6.13	

CRETE'S ISLETS – GR1300340		River Basin Management Plan of Crete District (GR13), table 6.13	
Σημαντικές Περιοχές για τα πουλιά / Important Bird Areas			
Gramvousa peninsula and Gramvouses and Pontikonisi islets / GR175	Longitude 23.583333 Latitude 35.583333	National None International None (This site and GR4340017 "CHERSONISOS GRAMVOUSSAS KAI NISIDES IMERI KAI AGRIA GRAMVOUSSA, PONTIKONISI" site are coisident & it completely includes GR4340001 "IMERI KAI AGRIA GRAMVOUSSA - TIGANI KAI FALASARNA - PONTIKONISI, ORMOS LIVADI – VIGLIA (SCI)")	An important site for raptors associated with sea cliffs, and seabirds.
Rodopos peninsula / GR 176	Longitude 23.750000 Latitude 35.600000	National Partial International None (It includes GR4340021 "CHERSONISOS RODOPOU" & GR4340003 "CHERSONISOS RODOPOU - PARALIA MALEME (SCI)" completely)	The area is important for passage migrants and breeding raptors. Species of global conservation concern that do not meet IBA criteria: Haliaeetus albicilla (wintering).
Agioi Theodori islet / GR 177	Longitude 23.966667 Latitude 35.550000	National Partial International None (Is coisident with GR4340018 "NISIDA AGIOI THEODOROI")	An important site for species associated with coastal cliffs and scrub.
Mount Koutroulis, Mount Ag. Dikaios and Modia plateau / GR 178	Longitude 23.583333 Latitude 35.383333	National None International Partial (It includes GR4340016 "METERIZIA AGIOS DIKAIOS - TSOUNARA - VITSILIA LEFKON OREON (SPA)" & GR4340004 "ELOS - TOPOLIA - SASALOS - AGIOS DIKAIOS (SCI)")	The site is important for species characteristic of Mediterranean scrub.
Lefka mountains / GR 179	Longitude 24.000000 Latitude 35.300000	National Partial International Partial (It includes GR4340014 "ETHNIKOS DRYMOS SAMARIAS - FARANGI TRYPITIS - PSILAFI – KOUSTOGERAKO (SPA)" & GR4340008 "LEFKA ORI KAI PARAKTIA ZONI (SCI)")	This is an important site for breeding and passage raptors, and for species characteristic of scrub and montane habitats.

Table 150: the 2nd AWMS form as it has been fulfilled by HYETOS & Mirabello

Εντοπίζονται σε ακτίνα 25 **χλμ από το αγροτεμάχιο** / **τις χρησιμοποιούμενες πηγές νερού** / **τους πιθανούς αποδέκτες οι παρακάτω περιοχές υψηλής αξίας διατήρησης**? / Are any of the following High Conservation Value Areas located within a 25km radius around the farm/ water sources/ water receptors?

Περιοχές υψηλής αξίας διατήρησης / High Conservation Value Areas	**Ναι /** Yes	**Όχι / No**	**Ονομασία Περιοχών / Areas Names**	**Κωδικοποίηση Περιοχών /** Areas Codes	**Ορισμός /** Designation
Περιοχές NATURA 2000/ Natura 2000 Sites					
a. **Ζώνες Ειδικής Προστασίας** (**ΖΕΠ**) / Special Protection Areas (SPA)	x		• FARANGI SELINARI – VRACHASI (SPA) • LAZAROS KORYFI - MADARA DIKTIS (SPA) • KORYFI KOUPA (DYTIKI KRITI) (SPA)	• GR4320013 • GR4320010 • GR4310011	• JMD HP 37338/1807/E103/1-9-2010 (OJ 1495 B)
b. **Τόποι Κοινοτικής Σημασίας** (**ΤΚΣ**) / Sites of Community Importance (SIC)	x		• DIKTI: OMALOS VIANNOU (SYMI - OMALOS) (SCI) • DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI (SCI) • OROS THRYPTIS KAI GYRO PERIOCHI (SCI)	• GR4310006 • GR4320002 • GR4320005	• Law 3937/29-3-11 (OJ 60 A)
c. **Ειδικές Ζώνες Διατήρησης** (**ΕΖΔ**) / Special Areas of Conservation (SAC)	x		• DIKTI: OMALOS VIANNOU (SYMI - OMALOS) (SCI) • DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI (SCI) • OROS THRYPTIS KAI GYRO PERIOCHI (SCI)	• GR4310006 • GR4320002 • GR4320005	• Law 3937/29-3-11 (OJ 60 A)
Προστατευόμενες Περιοχές / Nationally Designated Areas					
I) Περιοχές Απόλυτης Προστασίας της Φύσης / Strict Nature Reserves		x			
II) Εθνικά Πάρκα - **Δρυμοί / National** Parks		x			
III) Μνημεία της Φύσης / Natural Monuments		x			
IV) Περιοχές προστασίας οικοτόπων και ειδών / Habitat- Species Management Areas	x		Wildlife Refuges • GIANNA KORYFI DIMOU AGIOU NIKOLAOU • LATSIDIANI KEFALA DIMOU NEAPOLIS • SELAKANO DIMOU IERAPETRAS • VATHY - ALMYROS DIMOU AGIOU NIKOLAOU	• GR95341338 • GR95341355 • GR95341357 • GR95341366 • GR95341367 • GR95341369 • GR95341374 • GR95341441	• 222145/3854/02-09-77, as amended by OJ 809/B/2001 • OJ 787/B/2001 • OJ 787/B/2001 • 157989/3074/11-07-84, as amended by OJ

			• BRAMIANA DIMOU IERAPETRAS • KATSELIO DIMOU AGIOU NIKOLAOU • AMIRON, KEFALOVRYSIOU DIMOU VIANNOU • APOSELEMI DIMOU CHERSONISOU • PLATHIANI LAGKADA DIMOU OROPEDIOU • ANO LIMNION DIMOU MALLION • THYLAKAS (AGIOU NIKOLAOU KRITSA) • CHALASIA (ZENION-EXO POTAMON-MESA LASITHIOU) • OXYA (AGIOU NIKOLAOU ELOUNTAS) • ANAVLOCHO (VRACHASIOU)	• GR95341457 • GR95341460 • GR95341540 • GR95341541 • GR95341543 • GR95341544	809/B/2001 & OJ 1108/B/2002 • OJ 787/B/2001 • 176521/3128/10-07-80, as amended by OJ 809/B/2001 & OJ 459/B/2002 • OJ 927/B/2002 • OJ 754/B/2001 • OJ 512/B/2003 • OJ 763/B/2001 • OJ 779/B/1976 • OJ 779/B/1976 • OJ 797/B/1977 • OJ 708/B/1982
V) **Προστατευόμενα Τοπία** / Protected Landscape -Seascape		x			
VI) **Περιοχές διαχειριζόμενων φυσικών πόρων** - Managed Resource Protected Areas		x			
VII) Άλλα / Others	x		• AGIOI PANTES LASITHIOU (Game breeding station)	• GR2192560	• OJ 706/B/1976
Υγρότοποι Διεθνούς Σημασίας (Ramsar) / Wetlands of International Importance (Ramsar Sites)		x			
Μικροί Νησιωτικοί και άλλοι Υγρότοποι/ Small island and other wetlands	x		• KALOS POTAMOS ESTUARY • ALMYROS SPRING AND MARSH (AGIOS NIKOLAOS) • LYGERI OF KRITSA • LIVADI TEMPORARY POND • DRIROS TEMPORARY POND	• Y432KRI055 • Y432KRI056 • Y432KRI058 • Y432KRI063 • Y432KRI069	• OJ 229/Α.Α.Π./2012
Ύδατα Αναψυχής (συμπεριλαμβανομένων των υδάτων κολύμβησης)/ Recreation waters (including bathing waters)	x		• AGIA VARVARA • AGIA PELAGIA • AGIOS GEORGIOS • AGIOS DIMITRIOS • AGIOS NIKOLAOS 1 • AGIOS NIKOLAOS 2 • AGIOS NIKOLAOS 3	• GRBW139310010 • GRBW139309127 • GRBW139309141 • GRBW139309133 • GRBW139310009 • GRBW139310026 • GRBW139310022	• JMD 8600/416/E103/2009

			• AGIOS PANTELEIMON • AKTI NAVARCHOU NEARCHOU • ALMYROS • AMMOS • AMMOS (MARINA) • AMMOUDARA • AMMOUDI • ANALIPSI • VLICHADA • VOULISMA • GARGADOROS • GOUVES 1 • GOUVES 2 • GOUVES 3 • DIMOTIKI AKTI CHAVANIA • DIMOTIKI AKTI CHAVANIA BOREIA • DRAPANOS • DRIROS • ELOUNDA • ELOUNDA • KALO CHORIO • KARAVOSTASI • KATO GOUVES • KITROPLATEIA • KLONTZANI • LIMANAKI ANALIPSIS • LIMIN CHERSONISOU 1 • LIMIN CHERSONISOU 2 • MILATOS • MIRABELLO • MPOUFOS • PACHIA AMMOS • PIGADAKIA ELOUNDA • PLAKA • POROS • POROS VOREIA • POTAMOS • POTAMOS 1 • SISI-LIMANI • STALIDA	• GRBW139310029 • GRBW139309124 • GRBW139310021 • GRBW139310012 • GRBW139310008 • GRBW139310015 • GRBW139310014 • GRBW139309132 • GRBW139309134 • GRBW139310018 • GRBW139310031 • GRBW139309140 • GRBW139309136 • GRBW139309129 • GRBW139310035 • GRBW139310013 • GRBW139309137 • GRBW139310011 • GRBW139310019 • GRBW139310027 • GRBW139310030 • GRBW139310034 • GRBW139309139 • GRBW139310017 • GRBW139309131 • GRBW139309122 • GRBW139309125 • GRBW139309130 • GRBW139310032 • GRBW139310007 • GRBW139310033 • GRBW139311057 • GRBW139310020 • GRBW139310024 • GRBW139310036 • GRBW139310028 • GRBW139309126 • GRBW139309135 • GRBW139310016 • GRBW139309143	

			• SCHISMA • CHERSONISOS • CHIONA	• GRBW139310025 • GRBW139309138 • GRBW139310023	
Ύδατα για την απόληψη πόσιμου νερού/ Water Bodies used for potable water	x		• KARST OF KAINOURGIO CHORIO-SMARI • COASTAL KARST OF HERAKLEION-GOUVA-CHERSONISOU • KARST OF WESTERN DIKTI • KARST OF MALLIA-SELENA • KARST OF NE DIKTI • KARST OF LAKKONIA-ALMYRO AG. NIKOLAOS • KARST OF FOURNI-ELOUNDA • COASTAL KARST OF SISI-MILATOS-ELOUNDA • KARST OF EASTERN-SOUTHERN DIKTI • COASTAL KARST OF MALAVRA-PAHEIA AMMOS • CRETE'S ISLETS • KARST OF THRYPTI	• GR1300311 • GR1300312 • GR1300111 • GR1300112 • GR1300113 • GR1300114 • GR1300115 • GR1300116 • GR1300117 • GR1300132 • GR1300340 • GR1300133	• OJ 570/B/2015
Ύδατα για τη διαβίωση ψαριών και οστρακοειδών / Water Bodies to support fish life and shellfish		x			
Περιοχές Ευαίσθητες στη Νιτρορύπανση / Nitrate Vulnerable Zones	x		• POROUS OF IERAPETRA - KENTRIOU	• GR1300121	• OJ 570/B/2015
Άλλες περιοχές τοπικής σημασίας (Για πολιτιστικούς, θρησκευτικούς, οικολογικούς, κοινωνικο-οικονομικούς λόγους) / Other important areas (for cultural, religious, ecological, socio- economic reasons)	x		Important Bird Areas • Mount Dikti	• GR190	National:Partial International:Partial

Αν ναι, συμπληρώστε για κάθε μία από τις παραπάνω περιοχές υψηλής αξίας διατήρησης τον παρακάτω πίνακα / If so, please provide the following information about each of the High Conservation Value Area Identified above.

Ονομασία - Κωδικοποίηση Περιοχών / Areas Names - Codes **(όπως παραπάνω / as above)**	**Θέση /** Location	**Καθεστώς Προστασίας / Protection** Status	**Στόχος Προστασίας / Protection Goal**

Περιοχές NATURA 2000/ Natura Sites			
a. **Ζώνες Ειδικής Προστασίας** (**ΖΕΠ**) / Special Protection Areas (SPA)			
FARANGI SELINARI – VRACHASI (SPA) - GR4320013	Longitude 25.552778 Latitude 35.269167	Directive 2009/147/EC (Partially overlapped by GR95 "Latsidiani Kefala Dimou Neapolis" & GR95 "Anavlocho (Vrachasiou)")	An important site for passage and breeding raptors. Species of concern include: Gypaetus barbatus and Gyps fulvus.
LAZAROS KORYFI - MADARA DIKTIS (SPA) - GR4320010	Longitude 25.533889 Latitude 35.064167	Directive 2009/147/EC (Partially overlapped by GR95 "Amiron, Kefalovrysiou Dimou Viannou" & GR95 "Selakano Dimou Ierapetras", it is completely included by IN06 "Mount Dikti")	An important site for passage and breeding raptors and alpine species. Species of concern include: Gyps fulvus and Aquila chrysaetos.
KORYFI KOUPA (DYTIKI KRITI) (SPA) - GR4310011	Longitude 25.383889 Latitude 35.070833	Directive 2009/147/EC (Partially overlapped by GR95 "Amiron, Kefalovrysiou Dimou Viannou" & is completely inclufed by IN06 "Oros Dikti")	An important site for passage and breeding raptors and alpine species. Species of concern include: Gyps fulvus and Aquila chrysaetos.
b. **Τόποι Κοινοτικής Σημασίας** (**ΤΚΣ**) / Sites of Community Importance (SIC)			
DIKTI: OMALOS VIANNOU (SYMI - OMALOS) (SCI) - GR4310006	Longitude 25.434167 Latitude 35.068611	Directive 92/43/EEC (Partially overlapped by GR95 "Amiron, Kefalovrysiou Dimou Viannou" & is completely inclufed by IN06 "Oros Dikti")	The total of the landscape and of the biotopes with the rare and endemic animals and plants compose a site with ecological and aesthetic value. The ecological importance lies on the existence of a range of habitat types, with a vegetation mostly at a good conservation status, from phrygana to maquis to forests to streams and ponds and to steep cliffs, screes and caves.
DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI (SCI) – GR4320002	Longitude 25.491667 Latitude 35.153333	Directive 92/43/EEC (Partially overlapped by GR95 "Ano Limnion Dimou Mallion", GR95 "Amiron, Kefalovrysiou Dimou Viannou" & GR95 "Selakano Dimou Ierapetras". It completely includes GR95 "Plathiani Lagkada Dimou Oropediou" & GR95 Chalasia (Zenion-Exo Potamon-Mesa Lasithiou)". It is included by IN06 "Oros Dikti")	The following elements comprise the ecological quality and importance of the site: 1) A great variety of habitat types, mostly well conserved, 2) Its flora is extremely rich in common species and in rare and vulnerable endemic species, mostly Cretan, 3) its fauna, although it needs further investigation, is expected to be rich in endemic and rare species, such as species of gastropods, 4) The plateau of Lassithi produces the majority of Crete's potato crops, 5) There are still vineyards

			with old varieties of vines at the slopes of Selekanos, 6) There are many caves with endemic fauna. 7) There are many and scientifically important fossils at Katharo mountains.
OROS THRYPTIS KAI GYRO PERIOCHI (SCI) - GR4320005	Longitude 25.888333 Latitude 35.075833	Directive 92/43/EEC (Partially overlapped by GR95 "Thrypti Dimou Ierapetras") and is completely included by IN06 "Ori Thryptis kai Orno", which both are located out of the study area.	The quality and importance of the site "Thrypti" is indicated by the following elements: 1) It is of great aesthetic value, especially its southern slopes; 2) The cave Theriospilios at Tholos area is of great importance because of the presence of both a relatively big colony of the bat Myotis myotis and many endemic invertabrates; 3) The tops of the mountain are very important for the avifauna of Crete, because of the presence of both a relatively big colony of the bat Myotis myotis and many endemic invertebrates;4) Its flora is rich in common and endemic species which are of great interest as most of them are endemic to the site or to the island. 5) The mamals populations are in excellent condition due to both the geomorphology of the site and to the limited human presence and impact; 6) There is a variety of quite well conserved habitats in a relatively small area, which are not very easy to access, in most of the site; 7) The pine forest is one of the few in Crete.
c. **Ειδικές Ζώνες Διατήρησης** (**ΕΖΔ**) / Special Areas of Conservation (SAC)			
DIKTI: OMALOS VIANNOU (SYMI - OMALOS) (SCI) - GR4310006	Longitude 25.434167 Latitude 35.068611	Directive 92/43/EEC (Partially overlapped by GR95 "Amiron, Kefalovrysiou Dimou Viannou" & is completely inclufed by IN06 "Oros Dikti")	The total of the landscape and of the biotopes with the rare and endemic animals and plants compose a site with ecological and aesthetic value. The ecological importance lies on the existence of a range of habitat types, with a vegetation mostly at a good conservation status, from phrygana to maquis to forests to streams

			and ponds and to steep cliffs, screes and caves.
DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI (SCI) – GR4320002	Longitude 25.491667 Latitude 35.153333	Directive 92/43/EEC (Partially overlapped by GR95 "Ano Limnion Dimou Mallion", GR95 "Amiron, Kefalovrysiou Dimou Viannou" & GR95 "Selakano Dimou Ierapetras". It completely includes GR95 "Plathiani Lagkada Dimou Oropediou" & GR95 Chalasia (Zenion-Exo Potamon-Mesa Lasithiou)". It is included by IN06 "Oros Dikti")	The following elements comprise the ecological quality and importance of the site: 1) A great variety of habitat types, mostly well conserved, 2) Its flora is extremely rich in common species and in rare and vulnerable endemic species, mostly Cretan, 3) its fauna, although it needs further investigation, is expected to be rich in endemic and rare species, such as species of gastropods, 4) The plateau of Lassithi produces the majority of Crete's potato crops, 5) There are still vineyards with old varieties of vines at the slopes of Selekanos, 6) There are many caves with endemic fauna. 7) There are many and scientifically important fossils at Katharo mountains.
OROS THRYPTIS KAI GYRO PERIOCHI (SCI) - GR4320005	Longitude 25.888333 Latitude 35.075833	Directive 92/43/EEC (Partially overlapped by GR95 "Thrypti Dimou Ierapetras") and is completely included by IN06 "Ori Thryptis kai Orno", which both are located out of the study area.	The quality and importance of the site "Thrypti" is indicated by the following elements: 1) It is of great aesthetic value, especially its southern slopes; 2) The cave Theriospilios at Tholos area is of great importance because of the presence of both a relatively big colony of the bat Myotis myotis and many endemic invertabrates; 3) The tops of the mountain are very important for the avifauna of Crete, because of the presence of both a relatively big colony of the bat Myotis myotis and many endemic invertebrates;4) Its flora is rich in common and endemic species which are of great interest as most of them are endemic to the site or to the island. 5) The mamals populations are in excellent condition due to both the geomorphology of the site and to the limited human presence and impact; 6) There is a variety of quite well conserved habitats in a relatively small

			area, which are not very easy to access, in most of the site; 7) The pine forest is one of the few in Crete.
Προστατευόμενες Περιοχές / Nationally Designated Areas			
IV) Περιοχές προστασίας οικοτόπων και ειδών / Habitat- Species Management Areas			
Καταφύγια Άγριας Ζωής / Wildlife Refugees			
GIANNA KORYFI DIMOU AGIOU NIKOLAOU - GR95341338	Longitude 25.6457068 Latitude 35.1026159	Law 177/75, as amended by Law 2637/98	Natural areas (terrestrial, wetland or marine) of particular importance, because of being major development sites of wild flora or habitats breeding, feeding, wintering wildlife species or areas where there are young and spawning fish, or as major marine habitats.
LATSIDIANI KEFALA DIMOU NEAPOLIS - GR95341355	Longitude 25.579279 Latitude 35.2975603	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4320013 "FARANGI SELINARI – VRACHASI")	
SELAKANO DIMOU IERAPETRAS - GR95341357	Longitude 25.5446582 Latitude 35.0619348	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4320010 "LAZAROS KORYFI - MADARA DIKTIS", GR4320002 "DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI")	
VATHY - ALMYROS DIMOU AGIOU NIKOLAOU - GR95341366	Longitude 25.7054189 Latitude 35.1766921	Law 177/75, as amended by Law 2637/98	
BRAMIANA DIMOU IERAPETRAS - GR95341367	Longitude 25.7022582 Latitude 35.0428003	Law 177/75, as amended by Law 2637/98	
KATSELIO DIMOU AGIOU NIKOLAOU – GR95341369	Longitude 25.7045159 Latitude 35.2951742	Law 177/75, as amended by Law 2637/98	
AMIRON, KEFALOVRYSIOU DIMOU VIANNOU - GR95341374	Longitude 25.455122 Latitude 35.0670481	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4320010 "LAZAROS KORYFI - MADARA DIKTIS",GR4310011 "KORYFI KOUPA (DYTIKI KRITI)" , GR4310006 "DIKTI: OMALOS VIANNOU (SYMI - OMALOS)",	

		GR4320002 "DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI")	
APOSELEMI DIMOU CHERSONISOU - GR95341441	Longitude 25.3431641 Latitude 35.3042264	Law 177/75, as amended by Law 2637/98	
PLATHIANI LAGKADA DIMOU OROPEDIOU - GR95341457	Longitude 25.4194068 Latitude 35.1712431	Law 177/75, as amended by Law 2637/98 (It is completely included by GR4320002 "DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI")	
ANO LIMNION DIMOU MALLION - GR95341460	Longitude 25.4809309 Latitude 35.2613685	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4320002 "DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI")	
THYLAKAS (AGIOU NIKOLAOU KRITSA) - GR95341540	Longitude 25.6732448 Latitude 35.1713745	Law 177/75, as amended by Law 2637/98	
CHALASIA (ZENION-EXO POTAMON-MESA LASITHIOU) - GR95341541	Longitude 25.5678241 Latitude 35.195157	Law 177/75, as amended by Law 2637/98 (It is completely included by GR4320002 "DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI")	
OXYA (AGIOU NIKOLAOU ELOUNTAS) - GR95341543	Longitude 25.7041904 Latitude 35.2435917	Law 177/75, as amended by Law 2637/98	
ANAVLOCHO (VRACHASIOU) - GR95341544	Longitude 25.558979 Latitude 35.288412	Law 177/75, as amended by Law 2637/98 (Partially overlapped by GR4320013 "FARANGI SELINARI – VRACHASI")	
VII) Άλλα / Others			
AGIOI PANTES LASITHIOU (Game breeding station) - GR2192560	Longitude 25.7295339 Latitude 35.1982064	Law 177/75, as amended by Law 2637/98	

Μικροί Νησιωτικοί και άλλοι Υγρότοποι/ Small island and other wetlands			
KALOS POTAMOS ESTUARY - Y432KRI055	Longitude 25.733860 Latitude 35.126193	OJ 229/Α.Α.Π./2012	Wetlands are complex ecosystems that contribute to the prosperity and the proper functioning of both the environment and people.
ALMYROS SPRING AND MARSH (AGIOS NIKOLAOS) - Y432KRI056	Longitude 25.709297 Latitude 35.178013	OJ 229/Α.Α.Π./2012	
LYGERI OF KRITSA - Y432KRI058	Longitude 25.660437 Latitude 35.174615	OJ 229/Α.Α.Π./2012	
LIVADI TEMPORARY POND - Y432KRI063	Longitude 25.628419 Latitude 35.220060	OJ 229/Α.Α.Π./2012	
DRIROS TEMPORARY POND - Y432KRI069	Longitude 25.636568 Latitude 35.257619	OJ 229/Α.Α.Π./2012	
Ύδατα Αναψυχής (συμπεριλαμβανομένων των υδάτων κολύμβησης)/ Recreation waters (including bathing waters)			
AGIOS GEORGIOS - GRBW139309141	Longitude 25.3817 Latitude 35.3379	Directive 2006/7/EC	
AGIOS DIMITRIOS - GRBW139309133	Longitude 25.4398 Latitude 35.352921	Directive 2006/7/EC	
AGIOS NIKOLAOS 1 - GRBW139310009	Longitude 25.7183 Latitude 35.2056	Directive 2006/7/EC	
AGIOS NIKOLAOS 2 - GRBW139310026	Longitude 25.7190 Latitude 35.2041	Directive 2006/7/EC	

AGIOS NIKOLAOS 3 - GRBW139310022	Longitude 25.7149 Latitude 35.1992	Directive 2006/7/EC	
AGIOS PANTELEIMON - GRBW139310029	Longitude 25.7344 Latitude 35.1268	Directive 2006/7/EC	
AKTI NAVARCHOU NEARCHOU - GRBW139309124	Longitude 25.3881 Latitude 35.3243	Directive 2006/7/EC	
ALMYROS - GRBW139310021	Longitude 25.7095 Latitude 35.1767	Directive 2006/7/EC	
AMMOS - GRBW139310012	Longitude 25.7142 Latitude 35.1849	Directive 2006/7/EC	
AMMOS (MARINA) - GRBW139310008	Longitude 25.7160 Latitude 35.1870	Directive 2006/7/EC	
AMMOUDARA - GRBW139310015	Longitude 25.7110 Latitude 35.1667	Directive 2006/7/EC	
AMMOUDI - GRBW139310014	Longitude 25.7128 Latitude 35.1980	Directive 2006/7/EC	
ANALIPSI - GRBW139309132	Longitude 25.3518 Latitude 35.3369	Directive 2006/7/EC	
VLICHADA - GRBW139309134	Longitude 25.4044	Directive 2006/7/EC	

	Latitude 35.3104		
VOULISMA - GRBW139310018	Longitude 25.7437 Latitude 35.1254	Directive 2006/7/EC	
GARGADOROS - GRBW139310031	Longitude 25.7124 Latitude 35.1822	Directive 2006/7/EC	
GOUVES 1 - GRBW139309140	Longitude 25.3229 Latitude 35.3352	Directive 2006/7/EC	
GOUVES 2 - GRBW139309136	Longitude 25.3038 Latitude 35.3366	Directive 2006/7/EC	
GOUVES 3 - GRBW139309129	Longitude 25.3181 Latitude 35.3347	Directive 2006/7/EC	
DIMOTIKI AKTI CHAVANIA - GRBW139310035	Longitude 25.7124 Latitude 35.2130	Directive 2006/7/EC	
DIMOTIKI AKTI CHAVANIA BOREIA - GRBW139310013	Longitude 25.7131 Latitude 35.2150	Directive 2006/7/EC	
DRAPANOS - GRBW139309137	Longitude 25.4207 Latitude 35.3052	Directive 2006/7/EC	
DRIROS - GRBW139310011	Longitude 25.7304 Latitude 35.2895	Directive 2006/7/EC	

ELOUNDA - GRBW139310019	Longitude 25.7243 Latitude 35.2773	Directive 2006/7/EC	
ELOUNDA - GRBW139310027	Longitude 25.7312 Latitude 35.2448	Directive 2006/7/EC	
KALO CHORIO - GRBW139310030	Longitude 25.7542 Latitude 35.1257	Directive 2006/7/EC	
KARAVOSTASI - GRBW139310034	Longitude 25.7252 Latitude 35.1317	Directive 2006/7/EC	
KATO GOUVES - GRBW139309139	Longitude 25.2987 Latitude 35.3346	Directive 2006/7/EC	
KITROPLATEIA - GRBW139310017	Longitude 25.7211 Latitude 35.1890	Directive 2006/7/EC	
KLONTZANI - GRBW139309131	Longitude 25.4598 Latitude 35.2934	Directive 2006/7/EC	
LIMANAKI ANALIPSIS - GRBW139309122	Longitude 25.3317 Latitude 35.3355	Directive 2006/7/EC	
LIMIN CHERSONISOU 1 - GRBW139309125	Longitude 25.3994 Latitude 35.3128	Directive 2006/7/EC	
LIMIN CHERSONISOU 2 - GRBW139309130	Longitude 25.4079	Directive 2006/7/EC	

	Latitude 35.3074		
MILATOS - GRBW139310032	Longitude 25.5628 Latitude 35.3194	Directive 2006/7/EC	
MIRABELLO - GRBW139310007	Longitude 25.7138 Latitude 35.2095	Directive 2006/7/EC	
MPOUFOS - GRBW139310033	Longitude 25.5302 Latitude 35.3122	Directive 2006/7/EC	
PACHIA AMMOS - GRBW139311057	Longitude 25.8039 Latitude 35.1108	Directive 2006/7/EC	
PIGADAKIA ELOUNDA - GRBW139310020	Longitude 25.7352 Latitude 35.2398	Directive 2006/7/EC	
PLAKA - GRBW139310024	Longitude 25.7279 Latitude 35.2952	Directive 2006/7/EC	
POROS - GRBW139310036	Longitude 25.7315 Latitude 35.2490	Directive 2006/7/EC	
POROS VOREIA - GRBW139310028	Longitude 25.7305 Latitude 35.2522	Directive 2006/7/EC	
POTAMOS - GRBW139309126	Longitude 25.4781 Latitude 35.2955	Directive 2006/7/EC	

POTAMOS 1 - GRBW139309135	Longitude 25.4858 Latitude 35.2966	Directive 2006/7/EC	
SISI-LIMANI - GRBW139310016	Longitude 25.5181 Latitude 35.3087	Directive 2006/7/EC	
STALIDA - GRBW139309143	Longitude 25.4283 Latitude 35.2943	Directive 2006/7/EC	
SCHISMA - GRBW139310025	Longitude 25.7223 Latitude 35.2645	Directive 2006/7/EC	
CHERSONISOS - GRBW139309138	Longitude 25.3934 Latitude 35.3169	Directive 2006/7/EC	
CHIONA - GRBW139310023	Longitude 25.7312 Latitude 35.2575	Directive 2006/7/EC	
Ύδατα για την απόληψη πόσιμου νερού/ Water Bodies used for potable water			
KARST OF KAINOURGIO CHORIO-SMARI - GR1300311		River Basin Management Plan of Crete District (GR13), table 6.13	
COASTAL KARST OF HERAKLEION-GOUVA-CHERSONISOU - GR1300312		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF WESTERN DIKTI - GR1300111		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF MALLIA-SELENA - GR1300112		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF NE DIKTI - GR1300113 COASTAL KARST OF SISI-MILATOS-		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF LAKKONIA-ALMYRO AG. NIKOLAOS - GR1300114		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF FOURNI-ELOUNDA - GR1300115		River Basin Management Plan of Crete District (GR13), table 6.13	

ELOUNDA - GR1300116		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF EASTERN-SOUTHERN DIKTI - GR1300117		River Basin Management Plan of Crete District (GR13), table 6.13	
COASTAL KARST OF MALAVRA-PAHEIA AMMOS - GR1300132		River Basin Management Plan of Crete District (GR13), table 6.13	
CRETE'S ISLETS - GR1300340		River Basin Management Plan of Crete District (GR13), table 6.13	
KARST OF THRYPTI - GR1300133		River Basin Management Plan of Crete District (GR13), table 6.13	
Περιοχές Ευαίσθητες στη Νιτρορύπανση / Nitrate Vulnerable Zones			
POROUS OF IERAPETRA – KENTRIOU - GR1300121[14]		River Basin Management Plan of Crete District (GR13), section 11.3.1	
Σημαντικές Περιοχές για τα πουλιά / Important Bird Areas			
Mount Dikti - GR190	Longitude 25.5 Latitude 35.16667	National None International None (It completely includes GR4320010 "LAZAROS KORYFI - MADARA DIKTIS", GR4310011 "KORYFI KOUPA (DYTIKI KRITI)", GR4310006 "DIKTI: OMALOS VIANNOU (SYMI - OMALOS)", GR4320002 "DIKTI: OROPEDIO LASITHIOU, KATHARO, SELENA, KRASI, SELAKANO, CHALASMENI KORYFI"))	An important site for passage and breeding raptors and alpine species.

Table 151: The 2nd AWMS form as it has been fulfilled by HYETOS, UNIBAS & AFI

***Εντοπίζονται σε ακτίνα** 25 **χλμ από το αγροτεμάχιο** / **τις χρησιμοποιούμενες πηγές νερού**/ **τους πιθανούς αποδέκτες οι παρακάτω περιοχές υψηλής αξίας διατήρησης**? / Are any of the following High Conservation Value Areas located within a 25km radius around the farm/ water sources/ water receptors?*					
Περιοχές υψηλής αξίας διατήρησης / High Conservation Value Areas	**Ναι /** Yes	**Όχι / No**	**Ονομασία Περιοχών / Areas Names**	**Κωδικοποίηση Περιοχών / Areas** Codes	**Ορισμός /** Designation
Περιοχές NATURA 2000/ Natura 2000 Sites					
a. **Ζώνες Ειδικής Προστασίας** (**ΖΕΠ**) / Special Protection Areas (SPA)	x		• Bosco Pantano di Policoro e Costa Ionica Foce Sinni • Massiccio del Monte Pollino e Monte	• IT 9220055 • IT 9210275 • IT 9210271	• Birds Directive (2009/147/EC)

[14] Within the boundaries of 25km buffer zone around Havgas-Milatos sub-basin there aren't land areas designated as NVZs. However, the area of porous aquifer of Ierapetra – Kentri - GR1300121 is proposed to be characterized as NVZ in future according to the River Basin Management Plan of Crete District (GR13).

			Alpi • Appennino Lucano, Valle Agri, Monte Sirino, Monte Raparo • Dolomiti di Pietrapertosa • Foresta Gallipoli – Cognato • Valle Basento Grassano Scalo – Grottole • Valle Basento – Ferrandina Scalo	• IT 9210105 • IT 9220130 • IT 9220260 • IT 9220255	DM 08/08/2014 (OJ n. 217 del 18/09/2014)
b. **Τόποι Κοινοτικής Σημασίας** (**ΤΚΣ**) / Sites of Community Importance (SIC)	x		• Bosco della Farneta • Bosco Pantano di Policoro e Costa Ionica Foce Sinni • Costa Ionica Foce Agri • Costa Ionica Foce Cavone • Costa Ionica Foce Basento • Costa Ionica Foce Bradano • Valle Basento Ferrandina Scalo • Valle Basento Grassano Scalo	• IT 9210025 • IT 9220055 • IT 9220080 • IT 9220095 • IT 9220085 • IT 9220090 • IT 9220255 • IT 9220260	• Habitats Directive (EEC/92/43) • 2015/2374/UE • DM 02/02/2014 (OJ n. 94 del 23/04/2014)
c. **Ειδικές Ζώνες Διατήρησης** (**ΕΖΔ**) / Special Areas of Conservation (SAC)	x		• Murge di S. Oronzio • Bosco di Montepiano • Dolomiti di Pietrapertosa • Foresta Gallipoli – Cognato	• IT 9210220 • IT 9220030 • IT 9210105 • IT 9220130	• Habitats Directive (EEC/92/43) • DPR n. 357 del 08/09/1997 • DM 20/01/1999 • DPR n. 120 del 12/03/2003 • DM 16/09/2013
Προστατευόμενες Περιοχές / Nationally Designated Areas					
I) Περιοχές Απόλυτης Προστασίας της Φύσης / Strict Nature Reserves	x		• Riserva Naturale Metaponto (State Nature Reserve) - EUAP0037 • Riserva naturale Marinella Stornara - EUAP0105	• EUAP0037 • EUAP0105	• DD.MM. 29.03.72/02.03.77 (Provvedimenti istitutivi) • DM 13/07/77 • DM/OJ 125/31-05-2010 Supplemento Ordinario
II) Εθνικά Πάρκα - **Δρυμοί /** National Parks	x		• Parco Nazionale del Pollino - EUAP0008 • Parco nazionale dell'Appennino Lucano - Val d'Agri - Lagonegrese - EUAP0851	• EUAP0008 • EUAP0851	• L. 67, 11.03.88 - L. 305, 28.08.89 - D.M. 31.12.90 - D.P.R. 15.11.93 - D.P.R. 02.12.97

					• D.P.R. 8.12.07 • DM/OJ 125/31-05-2010 Supplemento Ordinario
III) Μνημεία της Φύσης / Natural Monuments		x			
IV) Περιοχές προστασίας οικοτόπων και ειδών / Habitat-Species Management Areas	x		• Riserva naturale orientata Bosco Pantano di Policoro	• EUAP0547	• L.R. 28, 08.09.99 • DM/OJ 125/31-05-2010 Supplemento Ordinario
V) **Προστατευόμενα Τοπία** / Protected Landscape -Seascape	x		• Parco Naturale di Gallipoli Cognato – Piccole Dolomiti Lucane	• EUAP1053	• L.R. 47, 24.11.97 • DM/OJ 125/31-05-2010 Supplemento Ordinario
VI) Περιοχές διαχειριζόμενων φυσικών πόρων - Managed Resource Protected Areas		x			
VII) Άλλα / Others		x			
Υγρότοποι Διεθνούς Σημασίας (Ramsar) / Wetlands of International Importance (Ramsar Sites)		x			
Μικροί Νησιωτικοί και άλλοι Υγρότοποι/ Small island and other wetlands		x			
Ύδατα Αναψυχής (συμπεριλαμβανομένων των υδάτων κολύμβησης)/ Recreation waters (including bathing waters)	x		• CANALE BUFALORIA - 100 MT. MARGINE NORD • CANALE BUFALORIA - 100 MT. MARGINE SUD • CANALE SCOLMATORE - 50 MT. MARGINE NORD • CANALE SCOLMATORE - 50 MT. MARGINE SUD • CASELLO 48 LIDO • FOCE AGRI - 1500 MT. MARGINE SUD • FOCE AGRI - 250 MT. MARGINE NORD • FOCE AGRI - 250 MT. MARGINE SUD	• I92200031077031040 • I92200031077031041 • I92200021077021057 • I92200021077021058 • I92200020077020008 • I92200021077021054 • I92200031077031042 • I92200021077021043 • I92200003077003049 • I92200003077003034 • I92200020077020050 • I92200003077003064 • I92200003077003033	• EU Bathing Water Directive 2006/7/EC • D.Lgs 30/05/ 2008 n. 116 • DM del 30/03/2010

			• FOCE BASENTO - 2000 MT. - MARGINE NORD • FOCE BASENTO - 300 MT. MARGINE NORD • FOCE BASENTO - 450 MT. MARGINE SUD • FOCE BRADANO - 1000 MT. MARGINE NORD • FOCE BRADANO - 150 MT. MARGINE SUD • FOCE BRADANO - 15O MT. MARGINE NORD • FOCE BRADANO 1800 MT. - MARGINE SUD • FOCE CAVONE - 150 MT. MARGINE NORD • FOCE CAVONE - 150 MT. MARGINE SUD • FOCE CAVONE - 2000 MT. MARGINE SUD • FOCE SINNI - 250 MT. MARGINE NORD • FOCE SINNI - 250 MT. MARGINE SUD • FOCE SINNI - 800 MT. MARGINE SUD • FOSSO DELLA RIVOLTA-50 MT. MARGINE NORD • FOSSO DELLA RIVOLTA-50 MT. MARGINE SUD • IDROVORA CASELLO 48-50 MT. MARGINE NORD • IDROVORA CASELLO 48-50 MT. MARGINE SUD • IDROVORA DEL CONCIO-50 MT. MARGINE NORD • IDROVORA DEL CONCIO-50 MT. MARGINE SUD • IDROVORA METAPONTO - 50 MT. MARGINE NORD • IDROVORA METAPONTO - 50 MT. MARGINE SUD	• I922000003077003065 • I922000003077003048 • I92200020077020038 • I92200031077031039 • I92200031077031051 • I92200021077021059 • I92200023077023060 • I92200023077023061 • I92200023077023062 • I92200023077023063 • I92200020077020036 • I92200020077020037 • I92200021077021055 • I92200021077021056 • I92200003077003002 • I92200003077003003 • I92200018077018046 • I92200018077018047 • I92200031077031053 • I92200031077031052 • I92200021077021045 • I92200021077021044 • I92200003077003004 • I92200018077018031 • I92200021077021022 • I92200021077021024 • I92200023077023026 • I92200020077020010	

			• IDROVORA NOVA SIRI-150 MT. MARGINE NORD • IDROVORA NOVA SIRI-150 MT. MARGINE SUD • IDROVORA SCANZANO ION.-100 MT. MARG. SUD • IDROVORA SCANZANO ION.-100 MT.MARG. NORD • IDROVORA TORRE MOZZA-150 MT. MARGINE SUD • IDROVORA TORRE MOZZA-150 MT.MARGINE NORD • METAPONTO LIDO • NOVA SIRI LIDO • POLICORO LIDO - LATO NORD • POLICORO LIDO - LATO SUD • ROTONDELLA LIDO • SAN BASILIO LIDO		
Ύδατα για την απόληψη πόσιμου νερού/ Water Bodies used for potable water	x		• Invaso Monte Cotugno (Monte cotugno Dam)	• 1327	• Water Framework Directive (2000/60/EC), Art. 7 • D.Lgs. n. 152/2006, art. 80
Ύδατα για τη διαβίωση ψαριών και οστρακοειδών/ Water Bodies to support fish life and shellfish	x		• Fiume Frido da sorgente a confluenza • Fiume Sinni da sorgente a invaso Monte Cotugno • Fiume Agri da intermedio alla foce	• 50902 • 46043 • 46037	• 2000/60/EC D.Lgs. n. 152/2006, artt. 76 e 79 • D.G.R. n. 1814 del 07.10.2003 • D.C.R. n. 813 del 11.05.04
Παρόχθιες Ζώνες/ Riparian zones		x			
Περιοχές Ευαίσθητες στη Νιτρορύπανση / Nitrate Vulnerable Zones	x		• Vulnerable zones • Agricultural not vulnerable zones • Other not vulnerable zones (forest and natural areas, lakes) • Urban and industrial areas		• 91/676/EEC • 91/271/EEC • D.Lgs. n. 152/2006, art. 92 • D.M. 07/04/2006 • Delibera n. 508 del 25-03-02

					• Deliberazione del Consiglio Regionale 6 giugno 2006 n. 119 "art. 19 del Decreto Legislativo n. 152/99 – Programma d'azione della Basilicata per le zone vulnerabili ai nitrati di origine agricola" (B.U.R. n. 34 del 10-07-2006) • Deliberazione G.R. n.156 del 14 febbraio 2013 " Conferma zone vulnerabili ai nitrati di origine agricola in attuazione dell'art. 36 comma 7-ter del Decreto legge 18 ottobre 2012 n.179 , convertito in legge n.221 del 17/12/2012.
Αρχαιολογικοί Χώροι / Archaeological sites	x		• Archaeological area of Metaponto ("Tavole Palatine"),located in Bernalda • Archaeological area Herakleia , located in Policoro		• D. Lgs. 42/2004, "Codice dei beni culturali e del paesaggio" • L.R. 11 agosto 2015 n. 27
Άλλες περιοχές τοπικής σημασίας (**Για πολιτιστικούς**, **θρησκευτικούς**, **οικολογικούς**, **κοινωνικο**- **οικονομικούς λόγους**) / Other important areas (for cultural, religious, ecological, socio- economic reasons)	x		Important Bird Areas • Calanchi della Basilicata • Pollino e Orsomarso • Dolomiti di Pietrapertosa • Bosco della Manferrara • Val d' Agri • Alto Ionio Cosentino	• IBA 196 • IBA 195 • IBA 137 • IBA 138 • IBA 141 • IBA 144	• Birds Directive (2009/147/EC) • DM 06/11/2012
Αν ναι, συμπληρώστε για κάθε μία από τις παραπάνω περιοχές υψηλής αξίας διατήρησης τον παρακάτω πίνακα / If so, please provide the following information about each of the High Conservation Value Area Identified above.					

Ονομασία - Κωδικοποίηση Περιοχών / Areas Names - Codes **(όπως παραπάνω / as above)**	**Θέση /** Location	**Καθεστώς Προστασίας / Protection** Status	**Στόχος Προστασίας / Protection Goal**
Περιοχές NATURA 2000/ Natura Sites			
a. **Ζώνες Ειδικής Προστασίας** (**ΖΕΠ**) / Special Protection Areas (SPA)			
Bosco Pantano di Policoro e Costa Ionica Foce Sinni - IT 9220055	Longitude 16.666345 Latitude 40.154190	Directive 2009/147/EC, partially overlapping with Riserva Regionale Bosco Pantano di Policoro and completely included in Oasi WWF "Bosco Pantano"	Forests subject to periodic flooding characterized by a rich fanerofitica component (Quercus robur, Fraxinus oxycarpa, Populus alba, Salix sp. pl., Laurus nobilis, Ulmus minor, etc.), and with a well-developed shrub layer and woody climbing plants. Migratory bird populations, populations of Caretta caretta, Charadrius alexandrinus, Dendrocopos minor, Emys orbicularis, Barbastella barbastellus
Massiccio del Monte Pollino e Monte Alpi - IT 9210275	Longitude 16.189640 Latitude 40.055754	Directive 2009/147/EC, also designated as National Park	Territory with high level of preservation, very important for the considerable environmental diversity and numerous endemic animal and plant. Alcedo atthis, Alectoris graeca, Anthus campestris, Anthus spinoletta, Anthus trivialis, Apus apus.
Appennino Lucano, Valle Agri, Monte Sirino, Monte Raparo - IT 9210271	Longitude 16.022072 Latitude 40.226633	Directive 2009/147/EC, also designated as National Park	Territory with high level of preservation, very important for the considerable environmental diversity and numerous endemic animal and plant. Alcedo atthis, Alectoris graeca, Anthus campestris, Anthus spinoletta, Anthus trivialis, Apus apus.
Dolomiti di Pietrapertosa - IT 9210105	Longitude 16.0592 Latitude 40.5256	Directive 2009/147/EC, partially characterised as Vincolo idrogeologico and totally coinciding with IT11 (Bellezze Naturalli) and IT04 Parco Regionale di Gallipoli Cognato - Piccole Dolomiti Lucane	The main communities are referred to the habitat 8210 calcareous rocky slopes with vegetation chasmophytic for the presence of species such as rock Phagnalon S.L., Athamanta Sicilian, Teucrium flavum, Lomelosia crenata, Aurinia saxatilis, Dianthus gr. sylvestris, Centaurea deusta, habitus camefitico, Orchis tridentata, Orchis papilionacea, Orchis mascula,

			Ophrys tethrendinifera, Orchis provincialis, Orchis quadripuntata, Anacamptis pyramidalis
Foresta Gallipoli – Cognato - IT 9220130	Longitude 16.1247 Latitude 40.5353	Directive 2009/147/EC, DM 16/09/2013 - OJ 226 del 26-09-2013 designated at national or regional level: Riserva antropologica dello Stato di Monte Croccia, Parco Regionale di Gallipoli Cognato - Piccole Dolomiti Lucane, Legge n. 1497 del 1939 - Decreto Ministeriale 18 Aprile 1985	The forest of Gallipoli – Cognato is a scenic landscape of considerable interest site, almost entirely covered with deciduous forests. It is largely dominated by deciduous oak turkey oak (Quercus cerris), which can be found associated with the farnetto (Q. frainetto), oak (Q. pubescens S.L.), the oak (Q. petraea). Physospermo verticillati-Quercetum cerridis, Helleborus foetidus, Cornus mas, Vinca major, Vicia grandiflora, Fraxinus oxycarpa, Ranunculus velutinus, Quercus ilex, Quercus rotundifolia, Q. pubescens. Picus viridis, Dendrocopos major, Dendrocopos medius, Dendrocopos minor, Sitta europaea, Certhia brachydactyla),
Valle Basento Grassano Scalo – Grottole - IT 9220260	Longitude 16.244167 Latitude 40.598333	Directive 2009/147/EC	Part of the Basento river with good vegetation cover rich in arboreal elements and hygrophilous shrubs in the river bed and grassy steppe elements, typical of the clay, on the slopes. Salix alba, Populus alba, Paspalo-Agrostidion, Salix, Populus, Thero-Brachypodietea, Pegano-Salsoletea, Nerio-Tamaricetea e Securinegion tinctoriae. Monticola solitarius, Garrulus glandarius, Ciconia nigra, Lanius minor, Lanius collurio and Lanius senator
Valle Basento – Ferrandina Scalo - IT 9220255	Longitude 16.491667 Latitude 40.522500	Directive 2009/147/EC	The river is rich in fish fauna, crustaceans (Potamon fluviatile) and freshwater mollusks (Unio sp). The territory as a whole presents ecological characteristics suitable for the survival of many animal species of conservation interest. Ciconia nigra, Lanius minor, Lanius collurio, Lutra lutra, Emys orbicularis, Elaphe quatuorlineata, Pegano-Salsoletea,
b. **Τόποι Κοινοτικής Σημασίας** (**ΤΚΣ**) / Sites of Community Importance (SIC)			

Bosco della Farneta - IT 9210025	Longitude 16.309722 Latitude 40.069722	Directive 92/43/EEC Covered by Massiccio del Monte Pollino e Monte Alpi (IT 9210275), Pollino e Orsomarso (IBA 195) and Parco Nazionale del Pollino - EUAP0008	The ecological importance of this forest is notable because it is the most representative and extensive woods Quercus frainetto with a good state of conservation and good ecological functionality. Carpinus orientalis Mill. subsp. orientalis, Crepis leontodontoides All., Erica arborea L., Fraxinus ornus L. subsp. ornus, Malus sylvestris (L.) Mill., Pistacia terebinthus L. subsp. terebinthus, Quercus frainetto Ten., Sorbus torminalis (L.) Crantz.
Bosco Pantano di Policoro e Costa Ionica Foce Sinni - IT 9220055	Longitude 16.666345 Latitude 40.154190	Directive 92/43/EEC, partially overlapping with Riserva Regionale Bosco Pantano di Policoro and completely included in Oasi WWF "Bosco Pantano"	Forests subject to periodic flooding characterized by a rich fanerofitica component (Quercus robur, Fraxinus oxycarpa, Populus alba, Salix sp. pl., Laurus nobilis, Ulmus minor, etc.), and with a well-developed shrub layer and woody climbing plants. Migratory bird populations, populations of Caretta caretta, Charadrius alexandrinus, Dendrocopos minor, Emys orbicularis, Barbastella barbastellus
Costa Ionica Foce Agri - IT 9220080	Longitude 16.742049 Latitude 40.211049	Directive 92/43/EEC	It's a coast low formed by sandy sediments of Quaternary with silt and clay at the mouth. Climate thermomediterranean (xeroterica region). (Average temperature / a = 16/17 ° C). Important site for migratory birds. coastal wetland area rich in diverse habitats which houses specimens of migratory birds and summer visitors of Community interest; periodically report sightings of Caretta caretta. Testudo hermanni, Emys orbicularis, Juniperus oxycedrus ssp.macrocarpa, Ephedra distachya, Thymelea hirsuta, Smilax aspera, Daphne gnidium, Asparagus acutifolius, Pistacia lentiscus, Juniperus oxycedrus ssp. macrocarpa, Rhamnus alaternus, Phyllirea latifolia,

Costa Ionica Foce Cavone - IT 9220095	Longitude 16.782240 Latitude 40.280348	Directive 92/43/EEC	It a coast low formed by quaternary sediments with mainly sand and, at the mouth of the river, silt and clay. semi-arid Mediterranean climate. They are particularly representative of the populations behind the dunes and brackish waters. Coastal wetland area rich in diverse habitats which houses specimens of migratory birds and summer visitors of Community interest. Juncus maritimus, Halimione portulacoides, Cakile maritima, Salsola kali, Salsola soda, Poligonum maritimum, Xantium italicum, Sporobolus pungens, Agropyron junceum ssp. mediterraneum, Matthiola sinuata, Calystegia soldanella, Cyperus capitatus, Lotus cytisoides
Costa Ionica Foce Basento - IT 9220085	Longitude 16.816395 Latitude 40.327760	Directive 92/43/EEC, partially overlapping with Riserva Naturale Metaponto (State Nature Reserve - UAP0037)	Sandy coast composed of siliceous-calcareous sediments of Quaternary with clay and silt contributions near the mouth. semi-arid Mediterranean climate. They are particularly representative of the plant populations psammophilous retrodunal low costs of lowlands and brackish waters. The Juniper cores meant residual populations. Important stopover site for migratory birds. Coastal wetland area rich in diverse habitats which houses specimens of migratory birds and summer visitors of Community interest. Cakiletea maritimae, Agropyretum mediterraneum, Ephedra distachya, Juniperus oxycedrus ssp. macrocarpa, Pinus halepensis, Pinus pinea, Juniperus oxycedrus ssp. macrocarpa, Ephedra distachya, Thymelea hirsuta, Smilax aspera, Daphne gnidium, Asparagus acutifolius.
Costa Ionica Foce Bradano - IT 9220090	Longitude 16.852050 Latitude 40.377813	Directive 92/43/EEC, partially overlapping with Riserva Naturale Metaponto (State Nature Reserve - UAP0037) and Riserva naturale Marinella Stornara (EUAP0105)	It's a coast low formed by Quaternary continental sediments with a predominance of sand and, at the mouth of the river, silt and clay. bioclimate thermomediterranean (xeroterica region) (average annual temperature = 16-17 ° C). They are particularly

			representative of the populations psammophilous, behind the dunes and brackish waters. Important The populations of Euphorbia terracina and those Juniperus turbinata Juniperus macrocarpa and for their meaning relict. Important staging area for migratory birds. Coastal wetland area rich in diverse habitats which houses specimens of migratory birds and summer visitors of Community interest. Cakile maritima, Salsola kali, Salsola soda, Poligonum maritimum, Xantium italicum, porobolo arenarii-Agropyretum juncei, Sporobolus pungens, Agropyron junceum ssp. mediterraneum, Euphorbia paralias, Matthiola sinuata, Calystegia soldanella, Ammophiletum arundinaceae con Ammophila arenaria, Medicago marina, Anthemis maritima, Echinophora spinosa, Eryngium maritimum, Lotus cytisoides, Pancratium maritimum, Otanthus maritimus, Cyperus capitatus
Valle Basento Ferrandina Scalo - IT 9220255	Longitude 16.491667 Latitude 40.522500	Directive 2009/147/EC, also designated as SPA	Part of the Basento river with good vegetation cover rich in arboreal elements and hygrophilous shrubs in the river bed and grassy steppe elements, typical of the clay, on the slopes. Salix alba, Populus alba, Paspalo-Agrostidion, Salix, Populus, Thero-Brachypodietea, Pegano-Salsoletea, Nerio-Tamaricetea e Securinegion tinctoriae. Monticola solitarius, Garrulus glandarius, Ciconia nigra, Lanius minor, Lanius collurio and Lanius senator
Valle Basento Grassano Scalo - IT 9220260	Longitude 16.244167 Latitude 40.598333	Directive 2009/147/EC, also designated as Valle Basento Grassano Scalo-Grottole (SPA), partially overlapping with Dolomiti di Pietapetrosa (IBA 137) and Parco Naturale di Gallipoli Cognato – Piccole Dolomiti Lucane (EUAP1053)	The river is rich in fish fauna, crustaceans (Potamon fluviatile) and freshwater mollusks (Unio sp). The territory as a whole presents ecological characteristics suitable for the survival of many animal species of conservation interest. Ciconia nigra, Lanius minor, Lanius collurio, Lutra lutra, Emys

			orbicularis, Elaphe quatuorlineata, Pegano-Salsoletea,
c. **Ειδικές Ζώνες Διατήρησης** (**ΕΖΔ**) / Special Areas of Conservation (SAC)			
Murge di S. Oronzio - IT 9210220	Longitude 16.1703 Latitude 40.2572	Directive 92/43/EEC, DM 16/09/2013 - OJ 226 del 26-09-2013, designated at national or regional level as Parco Nazionale dell'Appennino Lucano Val d'Agri Lagonegrese	The area is mostly occupied by valuable forest formations or high spot in the dominance of sclerophyllous evergreen; 'habitat 6310 "Dehesas con Quercus spp. sempreverde", 'habitat 9340 "Foreste di Quercus ilex e Quercus rotundifolia, Teucrium siculum, Ptilostemon strictus, Echinops siculus e Lathyrus jordanii, Lathyrus jordani, Onosma echioides, Klasea flavescens subsp. cichoracea e Gypsophila arrostii subsp. arrostii, Helictotrichon convolutum, Malus florentina, Taeniatherum caput-medusae, Putoria calabrica, Salvia virgata, Pimpinella saxifraga, Jurinea mollis subsp. mollis, Iris lorea e Cardopatum corymbosum
Bosco di Montepiano - IT 9220030	Longitude 16.1325 Latitude 40.4447	Directive 92/43/EEC, DM 16/09/2013 - OJ 226 del 26-09-2013 Designated at national or regional level as Parco Gallipoli Cognato-Piccole Dolomiti Lucane; Designated at international level as Ente Parco Regionale di Gallipoli Cognato - Piccole Dolomiti Lucane.	The site represents a biotope of considerable interest to the peculiar characteristics of flora and vegetation of Turkey oaks that occupies the entire area. Physospermo verticillati-Quercetum cerridis, Dactylorhiza romana, Orchis mascula, Polygonatum multiflorum, Cyclamen hederifolium, Picus viridis, Dendrocopos major, Dendrocopos medius, Dendrocopos minor, Lissotriton italicus
Dolomiti di Pietrapertosa - IT 9210105	Longitude 16.0592 Latitude 40.5256	Directive 92/43/EEC, DM 16/09/2013 - OJ 226 del 26-09-2013 designated at national, regional level and international level: - Parco Regionale di Gallipoli Cognato - Piccole Dolomiti Lucane - Legge n. 1497 del 1939 - Decreto	The site has an undisputed landscape value for the presence of the complex of sedimentary rock, the biotic component origin outcrops however anchessa plays a significant meaning, both for the landscape value which contributes to the site, which for the interest more closely natural that primarily take

		Ministeriale 18 Aprile 1985 - Vincolo idrogeologico	biocenosis rupicole. rock environment is always interesting from the point of view of flora and vegetation as the bedrock favors a highly specialized flora and generally rich in endemic species or in restricted distribution. Phagnalon rupestre s.l., Athamanta sicula, Teucrium flavum, Lomelosia crenata, Aurinia saxatilis, Dianthus gr. sylvestris, Centaurea deusta, Orchis tridentata, Orchis papilionacea, Orchis mascula, Ophrys tethrendinifera, Orchis provincialis, Orchis quadripuntata, Anacamptis pyramidalis
Foresta Gallipoli – Cognato - IT 9220130	Longitude 16.1247 Latitude 40.5353	Directive 92/43/EEC, DM 16/09/2013 - OJ 226 del 26-09-2013 designated at national or regional level: Riserva antropologica dello Stato di Monte Croccia, Parco Regionale di Gallipoli Cognato - Piccole Dolomiti Lucane, Legge n. 1497 del 1939 - Decreto Ministeriale 18 Aprile 1985	The forest of Gallipoli – Cognato is a scenic landscape of considerable interest site, almost entirely covered with deciduous forests. It is largely dominated by deciduous oak turkey oak (Quercus cerris), which can be found associated with the farnetto (Q. frainetto), oak (Q. pubescens S.L.), the oak (Q. petraea). Physospermo verticillati-Quercetum cerridis, Helleborus foetidus, Cornus mas, Vinca major, Vicia grandiflora, Fraxinus oxycarpa, Ranunculus velutinus, Quercus ilex, Quercus rotundifolia, Q. pubescens. Picus viridis, Dendrocopos major, Dendrocopos medius, Dendrocopos minor, Sitta europaea, Certhia brachydactyla
Προστατευόμενες Περιοχές / Nationally Designated Areas			
I) Περιοχές Απόλυτης Προστασίας της Φύσης / Strict Nature Reserves			
Riserva Naturale Metaponto (State Nature Reserve) - EUAP0037	Longitude 16.8398098 Latitude 40.3700760	Partially overlapping with Costa Ionica Foce Bradano (IT 9220090) and Costa Ionica Foce Basento (IT 9220085)	The Nature Reserve is a protected natural area of Metaponto Basilicata region established in 1972. It occupies an area of 240 ha of coastline in the province of Matera, in the Metaponto area. Moreover, thanks to the geographical position is a reference point for many migratory routes. In the Metaponto Natural Park you can observe several species of waders including Actitis hypoleucos, Ardea cinerea, Limosa limosa and Gallinula clorophus. Also, of great interest

			is the presence on the coast of sea turtle (Caretta caretta), a protected species in danger of extinction.
Riserva naturale Marinella Stornara - EUAP0105	Longitude 16.8586612 Latitude 40.3942756	Partially overlapping with Costa Ionica Foce Bradano (IT 9220090)	The Stornara Nature Reserve is a protected area located between Puglia and Basilicata regions, on the ionian and it is managed by the provincial administration of Taranto. The name "Stornara" comes from the numerous transfers (Sturnus vulgaris) That willmigratein winter. Many other species of birds are present in the reserve, which is water the purple heron and the gray heron, the woodcock, the mallard, the white stork, the grebe and the wild goose. Many forest birds like the pigeon, the crow, the magpie, the robin, the blackcap, the cuckoo and woodpecker. The most common mammals are definitely rodents such as rabbit, vole country and the dormouse and animals such as foxes, hedgehogs, porcupines, badgers, wild cats and wild boar. The reserve is a protected coastal forest consisting of a pine forest of Aleppo pines (Pinus halepensis), a conifer typical Mediterranean.
II) Εθνικά Πάρκα - Δρυμοί / National Parks			
Parco Nazionale del Pollino - EUAP0008	Longitude 16.2522023 Latitude 40.0394526	Includes Bosco della Farneta (IT 9210025), Massiccio del Monte Pollino e Monte Alpi (IT 9210275), Pollino e Orsomarso (IBA 195)	Pollino National Park is the largest protected area in Italy, including, the geographical and administrative borders of regions Calabria and Basilicata, 3 provinces (Cosenza, Potenza, Matera), 56 municipalities (of which 24 in Basilicata region and 32 in Calabria region). The emblem of the park is the Pinus heldreichii, very rare species in Italy, present in other stations phytoclimatic of Balkan and Greek mountains.There are the golden eagle, the black woodpecker, the chough, the Lanner falcon, the Egyptian vulture, the red kite, the eagle owl, long-eared owl, raven, the peregrine falcon, the forest dormouse, the Apennine wolf, the cat wild, the native deer of Orsomarso and the

			otter. Among many other tree species in the Park are the white fir, beech, all seven types of maples whose Lobelius maple, black pine, the rate different species of oak, chestnut, and the most shares high and on steeper slopes is the Pinus heldreichii, rare species (found only here in Europe and in the Balkans)
Parco nazionale dell'Appennino Lucano - Val d'Agri - Lagonegrese - EUAP0851	Longitude 16.1155975 Latitude 40.2582428	Includes Murge di S. Oronzio (IT 9210220), Appennino Lucano, Valle Agri, Monte Sirino, Monte Raparo (IT 9210271), Val d' Agri (IBA 141)	The park has an area of 68,996 hectares along the Apennines of Lucania, includes 29 municipalities of Basilicata and 9 mountain communities. Among the various animals are reported in particular the wolf, the wild boar and otters along the Agri river. The territory is rich in forests. From the point of view of vegetation and flora, The area presents the evergreen oak forest and scrub with thermophilic oak, hornbeam, ash, flowering ash, oaks and beech trees mixed with holly, maple Lobelio or white spruce.
IV) Περιοχές προστασίας οικοτόπων και ειδών / Habitat- Species Management Areas			
Riserva naturale orientata Bosco Pantano di Policoro - EUAP0547	Longitude 16.6836358 Latitude 40.1586021	Includes the site Bosco Pantano di Policoro e Costa Ionica Foce Sinni - IT 9220055	The Natural Reserve Bosco Pantano is a protected natural area in the province of Matera, Basilicata, established in 1999. The area of 500 ha, of which 21 ha are oases of WWF Italy called "WWF Policoro Herakleia". On reserves insists the Site of Community Interest (SCI) "Bosco Pantano and Costa Ionica Foce Sinni. The Bosco Pantano is an important resting area for migratory birds, of which they were surveyed about 170 species: Casmerodius albus, Ardea cinerea, Egretta garzetta, Numenius arquata, Platalea leucorodia. Strix aluco, Tyto alba, Athene noctua, Circus aeruginosus, Falco tinnunculus, Milvus migrans, Milvus milvus, Buteo buteo. In the channel it is attested recently the presence of Lutra lutra and Alcedo atthis.

			Caretta caretta,Testudo hermanni, Emys orbicularis. The forest is home to over 2000 species. Among the mammals that inhabit the reserve there are the Martes foina, Martes martes and Meles meles. Among the reptiles, in addition to the turtles, there are the Coluber viridiflavus, Elaphe quatuorlineata and Anguis fragilis.
V) **Προστατευόμενα Τοπία** / Protected Landscape -Seascape			
Parco Naturale di Gallipoli Cognato – Piccole Dolomiti Lucane - EUAP1053	Longitude 40.4959989 Latitude 16.1625507	Includes Foresta Gallipoli – Cognato (IT 9220130), Dolomiti di Pietrapertosa (IT 9210105), Bosco di Montepiano (IT 9220030) and Dolomiti di Pietapetrosa (IBA 137); Overlapping with the follwing SPA: Dolomiti di Pietrapertosa (IT 9210105) and Bosco di Montepiano (IT 9220030)	The park stretches between the provinces of Matera and Potenza and includes the territories of the mountain communities of the Basento, the Middle Basento and Matera Hills.Among mammals the most important examples in the area of the park are the wolf, fox, badger, porcupine, wild cat, wild boar. Fallow deer and deer have been reintroduced in an oasis of wildlife in the forest of Gallipoli Cognato. The four-lined rat snake and are the easiest to meet reptiles. There are also many birds of prey: red kites, peregrine falcons, buzzards and kestrels the most common birds of prey, while among the night there are the owl, the owl and the tawny owl. Water course you can meet various types of frogs, salamanders and newts.
Σημαντικές Περιοχές για τα πουλιά / Important Bird Areas			
Calanchi della Basilicata - IBA 196	Latitudine 40.377496 Longitudine 16.514816	None	It's a large area, characterized by gullies, which includes the pre-coastal hilly areas of Basilicata. Milvus milvus, Ghiandaia marina, Coracias garrulus, Oenanthe hispanica, Emberiza melanocephala, biarmicus Bubo bubo Lanius collurio.
Pollino e Orsomarso- IBA 195	Latitudine 40.030041 Longitudine 16.226164	Partially overlapping with Bosco della Farneta (IT 9210025), Covered by Massiccio del Monte Pollino e Monte Alpi (IT 9210275) and Parco Nazionale del Pollino (EUAP0008)	It's a vast mountainous area of the southern Apennines between Calabria and Basilicata region very important for raptors. Milvus migrans, Milvus milvus, Falco peregrinus, Circaetus gallicus, Aquila chrysaetos, Nephron percnopterus.

Dolomiti di Pietapetrosa- IBA 137	Longitude 16.050000 Latitude 40.500000	Covered by Regional Nature Park (Gallipoli-Cognato-Piccole Dolomiti Lucane) and overlaps with SPA Dolomiti di Pietrapertosa - IT 9210105	A wooded, mountainous area in southern Italy, very rich in rocky cliffs and gorges. An important site for breeding raptors, Milvus milvus, Picoides medius, Milvus migrans, Circaetus gallicus, Lulla arborea, Oenanthe hispanica
Bosco della Manferrara- IBA 138	Longitude 16.500000 Latitude 40.533333	None	A wooded area (mainly oak Quercus) surrounded by cultivated land, in southern Italy, close to the village of Pomarico. The main land-uses are forestry and agriculture. An important site for kites Milvus.
Val d' Agri- IBA 141	Longitude 15.916667 Latitude 40.133333	partially covered by National Park (Val d'Agri-Lagonegrese) and Special Protection Area (Gole del Fiume Calore)	A mountain complex in southern Italy, including the sites Monte Sirino, Monte Raparo, Monte dell'Agresto, Monte Caldarosa, Monte Volturino, and Gole del fiume Calore. The main habitats are broadleaved and mixed woodlands, cliffs and agricultural land, crossed by rivers and streams. Land-uses include forestry, cultivation and cattle-rearing. `Gole del Fiume Calore' was listed as a separate IBA (former site IT089) in the previous pan-European IBA inventory (Grimmett and Jones 1989). Breeding (Milvus migrans and Orphean Warbler Sylvia hortensis) and resident birds (Milvus milvus, Falco biarmicus, Picoides medius, Lullula arborea, Oenanthe hispanica, Pyrrhocorax pyrrhocorax, Falco peregrinus, Dryocopus martius)
Alto Ionio Cosentino - IBA 144	Latitudine 40.094682 Longitudine 16.414808	None	A small valley facing the Ionian Sea, north of the village of Amendolara, rich in maquis, garrigue, grasslands and agricultural areas. The main land-use is agriculture. An important breeding site for raptors, and stop-over site for many migrants (Lanner Falcon Falco biarmicus)

Appendix II: 3rd AWMS form

Table 152: The 3rd AWMS form as it has been fulfilled by KEDHP's farmer organization

	3rd AWMS form - Water Governance by a Farmers' Organization	Απάντηση - Response			Παρατηρήσεις - Notes
A/A	**Τέταρτο αξίωμα**: **Επιτευξη ισης και διαφανούς διακυβέρνησης** - Fourth Principle: Achieve equitable and transparent water governance	Y	N	N/A	
P4.01	Εχει η Ο.Π. άμεση δυνατότητα ελέγχου στη διαχείριση του νερού της λεκάνης (ή της υπολεκάνης); - Does F.OR exert direct control over water management in the catchment (or the sub-catchment) area?	Y			
P4.02	Εχει η Ο.Π. έμμεση επιρροή στη διαχείριση του νερού της λεκάνης (ή της υπολεκάνης); - Does F.OR have indirect influence on the water management in the catchment (or the sub-catchment) area?	Y			
P4.03	Εχει η Ο.Π. τεκμηριωμένη πολιτική (goals) για τη διαχείριση νερού? - Does F.OR have a documented policy (goals) for the water management in the catchment area?		N		
P4.1	Διαθέτει η Ο.Π. αρχείο της ισχύουσας νομοθεσίας για το νερό γενικότερα; - Does F.OR maintain a list of applicable water legislation?	Y			
P4.1.1a	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα με ευθύνη την παρακολούθηση της τήρησης της νομοθεσίας για το νερό άρδευσης (αδειοδότηση, όρια άντλησης); - Has a person or department been identified who ensures compliance with legal requirements linked to water, such as validity of licences for abstraction and limits for water consumption for crop irrigation.		N		
P4.1.1b	Εχουν τεκμηριωθεί διαδικασίες για την διασφάλισης της τήρησης της νομοθεσίας ως προς την άντληση; (Y/N) - Have the procedures for ensuring of legal compliance been documented?		N		
P4.1.1c	Είναι επικαιροποιημένες και διαθέσιμες σε όλους αυτές οι διαδικασίες; (Y/N) - Are these procedures up to date and entirely disclosed?		N		
P4.1.1d	Περιλαμβάνουν την τήρηση των απαιτήσεων της ίδιας της οργάνωσης για την επίτευξη των σκοπών και στόχων της στρατηγικής της οργάνωσης (AWMS)? - Do these procedures address the organization's own requirements to satisfy the objectives and targets of its strategy (AWMS)?		N		

P4.1.1e	Εχουν γνωστοποιηθεί στους παραγωγούς-μέλη της οργάνωσης όλες οι παραπάνω απαιτήσεις, μέσω π.χ. Οδηγιών εργασίας, εκπαιδεύσεων κλπ; - Have all the above requirements been communicated to the farmers-members of the organization by e.g. work instructions, training etc?		N		
P4.1.1f	Εφαρμόζονται για κάθε αγροτεμάχιο; (Y/N) - Are these procedures implemented per parcel of crop?		N		
P4.1.1g	Παρακολουθείται η εφαρμογή τους; (Y/N) - Is this implementation monitored?		N		
P4.1.1h	Είναι διαθέσιμα τα αποτελέσματα της παρακολούθησης? (Y/N)- Are the results of this monitoring recorded and available?		N		
P4.3.1a	Εχει εγκατασταθεί κάποιο σύστημα καταγραφών της ποσότητας νερού και της κατανάλωσης ενέργειας για κάθε πότισμα, σε επίπεδο αγροτεμαχίου; (Y/N) - Has a recording system been established to capture water and energy consumption per irrigation event and parcel?		N		
P4.3.1b	Αξιοποιούνται οι πληροφορίες αυτές για την βελτίωση της αποτελεσματικότητας της άρδευσης σε σχέση προς την ενέργεια; (Y/N) - Is this information used for the improvement of water and energy use?		N		
P4.3.2a	Εχει εγκατασταθεί κάποιο σύστημα καταγραφών της ποσότητας νερού και άλλων εισροών εκτός της ενέργειας (π.χ. κλάδεμα, καλλιέργεια εδάφους-καταστροφή ζιζανίων, λίπανση) σε επίπεδο αγροτεμαχίου; (Y/N) - Has a recording system will be established to capture water and other inputs (such as fertilizations, soil & weed management and pruning) used?		N		
P4.3.2b	Αξιοποιούνται οι πληροφορίες αυτές για την βελτίωση της αποτελεσματικότητας της άρδευσης σε σχέση προς τις άλλες εισροές; (Y/N) - Is this information used for the optimization of water and the other inputs used?		N		
P4.4.1a	Εφαρμόζεται η ανακύκλωση/επαναχρησιμοποίηση στη διαχείριση των υδάτων; (Y/N) - Is water recycle or re-use applied in the context of water management?		N		
P4.4.1b	Υπάρχει σύστημα παρακολούθησης της ποσότητας του ανακυκλώμενου/επαναχρησιμο-ποιημένου νερού; (Y/N) - Is there a system established in order to monitor the quantity of recycled/re-used water?		N		
P4.4.2a	Υπάρχει η δυνατότητα εκτίμησης των απωλειών νερού; (Y/N) - Is it possible to estimate water losses?		N		
P4.4.2b	Υπάρχει η δυνατότητα περιγραφής της μορφής και της τύχης/αποδεκτών (έδαφος, αέρας) των απωλειών νερού; (Y/N) - Is it possible to determine the type and the destination (soil, air) of water losses?		N		

P4.4.3	Εφαρμόζεται κάποια μεθοδολογία για τη βέλτιστη χρήση του νερού (αύξηση αποδοτικότητας χρήσης, μείωση των απωλειών, εξοικονόμηση νερού, βελτίωση συστημάτων και μεθόδων άρδευσης κλπ); - Is there a water management strategy implemented to achieve optimum water consumption (increase water efficiency, reduce water losses, improve irrigation systems and methods)?		N		
p4.4.4	Είναι δυνατόν να εκτιμηθεί η κατανάλωση νερού ανά μονάδα παραγωγής προϊόντος; (Y/N) - Can water consumption per production unit be estimated ?		N		
p4.5.1	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα για να συμμετέχει και να καταγράφει τις δραστηριότητες που αφορούν σε θέματα Λεκάνης Απορροής του Φορέα Διαχείρισης; (Y/N) - Has a person or department been identified who participates and reports on River Basin Committee activities?		N		
P4.5.2	Οι αρχές της αειφόρου διαχείρισης των υδατικών πόρων έχουν διαδοθεί εντός της Ο.Π.; (Y/N) - Are the principles of sustainable water management disseminated within the F.OR?		N		
P4.5.3a	Οι αρχές της αειφόρου διαχείρισης των υδάτων έχουν διαδοθεί στο κοινό, τους πελάτες και τις αρχές;(Y/N) - Are the principles of sustainable water management disseminated to customers, the public and authorities?		N		
P4.5.3b	Υπάρχουν γραπτές οδηγίες για τις αρχές της αειφόρου διαχείρισης των υδατικών πόρων διαθέσιμες προς το κοινό, τους πελάτες και τις αρχές; (Y/N)- Are any reports available for customers, the public and authorities that describe the principles of sustainable water management?		N		
P4.5.4	Έχουν γίνει εκδηλώσεις για την ενημέρωση των ενδιαφερομένων σχετικά με τα θέματα διαχείρισης του νερού; (Y/N) - Are there any informational campaigns performed in order to inform stakeholders on water management?		N		
P4.5.5a	Υπάρχουν μέτρα πρόληψης ατυχημάτων, καταστροφών και παρόμοιων περιστατικών; (Y/N) - Is there any plan to prevent accidents, disasters and similar incidents?		N		
P4.5.5b	Περιγράφονται ή εκτιμούνται οι επιπτώσεις ενός τέτοιου γεγονότος στο περιβάλλον, στους εργαζόμενους, στον τοπικό πληθυσμό και στις κοινότητες; (Y/N) - Are the impacts of such an incident to the environments, employees, the regional population and communities described or estimated?		N		
P4.5.6	Εφαρμόζονται και παρακολουθούνται μέτρα για την αντιμετώπιση εκτάκτων κλιματικών συνθηκών (Ισχύει μόνο για άρδευση); (Y/N) - Are there any measued applied and monitored in order to deal with unforeseen climatic conditions (Applicable only for irrigation)?		N		

P4.6.1	Μπορεί να επιτυγχάνεται συνεχώς βελτίωση της στρατηγικής διαχείρισης ύδατος με την εφαρμογή των Καλών Πρακτικών Εφαρμογής;(Y/N) - Is it possible to achieve a continuous improvement of water management strategy by implementation of Best Management Practices?		N		
P4.6.2	Αυτές οι διαδικασίες εφαρμογής των Καλών Πρακτικών περιγράφονται σε αναφορές; (Y/N) - Are the procedures of Best Management Pracices application described in reports?		N		
P4.6.3	Είναι δυνατόν να βελτιώθει η βιωσιμότητα και η διαχείριση των υδάτων λεκάνης απορροής ποταμού ακολουθώντας το Water Steward; (Y/N) - Is it possible to improve the sustainability and river basin water management according the Water Steward?		N		
P4.7	Με ποιον τρόπο εξασφαλίζεται η διαφάνεια σχετικά με τις οικονομικές πτυχές της διαχείρισης των υδάτων; (Y/N) - How the transparency on economic aspects of water management is ensured?		N		
P4.7.1	Υπάρχουν αναφορές σχετικά με τα έργα υποδομής που πραγματοποιήθηκαν; (Y/N) - Are there reports available on the related infrastructures and investments already made?		N		
P4.7.2	Μπορεί να γίνει ανάλυση περιβαλλοντικού κόστους; (Y/N) - Is the FOR able to compose an environmental cost analysis?		N		
P7.8.1	Υπάρχει μια κοινή στρατηγική διαχείρισης των υδατικών πόρων, η οποία καλύπτει και τις 4 αρχές Water Stewardship; (Y/N) - Is there a common strategy of water management which covers all 4 Water Stewardship principles?		N		
P4.8.2	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα για να εξασφαλίζει την εφαρμογή της στρατηγικής για τη διαχείριση των υδατικών πόρων στο πλαίσιο του AWMS; (Y/N) - Has a person or department been identified who ensures the implementation of the water resources management strategy according to AWMS?		N		

Table 153: The 3rd **AWMS form as fulfilled by Mirabello’s farmer organization**

	3rd AWMS form - Water Governance by a Farmers' Organization	**Απάντηση** - Response			**Παρατηρήσεις** - Notes
A/A	**Τέταρτο αξίωμα**: **Επίτευξη ίσης και διαφανούς διακυβέρνησης** - Fourth Principle: Achieve equitable and transparent water governance	Y	N	N/A	
P4.01	Εχει η Ο.Π. άμεση δυνατότητα ελέγχου στη διαχείριση του νερού της λεκάνης (ή της υπολεκάνης); - Does F.OR exert direct control over water management in the catchment (or the sub-catchment) area?		X		ως σημερα

P4.02	Εχει η Ο.Π. έμμεση επιρροή στη διαχείριση του νερού της λεκάνης (ή της υπολεκάνης); - Does F.OR have indirect influence on the water management in the catchment (or the sub-catchment) area?		X		ως σημερα
P4.03	Εχει η Ο.Π. τεκμηριωμένη πολιτική (goals) για τη διαχείριση νερού? - Does F.OR have a documented policy (goals) for the water management in the catchment area?		X		θα δημιουργηθει
P4.1	Διαθέτει η Ο.Π. αρχείο της ισχύουσας νομοθεσίας για το νερό γενικότερα; - Does F.OR maintain a list of applicable water legislation?		X		θα δημιουργηθει
P4.1.1a	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα με ευθύνη την παρακολούθηση της τήρησης της νομοθεσίας για το νερό άρδευσης (αδειοδότηση, όρια άντλησης); - Has a person or department been identified who ensures compliance with legal requirements linked to water, such as validity of licences for abstraction and limits for water consumption for crop irrigation.		X		θα ορισθεί
P4.1.1b	Εχουν τεκμηριωθεί διαδικασίες για την διασφάλισης της τήρησης της νομοθεσίας ως προς την άντληση; (Y/N) - Have the procedures for ensuring of legal compliance been documented?		X		θα τεκμηριώνονται
P4.1.1c	Είναι επικαιροποιημένες και διαθέσιμες σε όλους αυτές οι διαδικασίες; (Y/N) - Are these procedures up to date and entirely disclosed?		X		θα επικαιροποιούνται
P4.1.1d	Περιλαμβάνουν την τήρηση των απαιτήσεων της ίδιας της οργάνωσης για την επίτευξη των σκοπών και στόχων της στρατηγικής της οργάνωσης (AWMS)? - Do these procedures address the organization's own requirements to satisfy the objectives and targets of its strategy (AWMS)?		X		θα τις περιλαμβάνουν
P4.1.1e	Εχουν γνωστοποιηθεί στους παραγωγούς-μέλη της οργάνωσης όλες οι παραπάνω απαιτήσεις, μέσω π.χ. Οδηγιών εργασίας, εκπαιδεύσεων κλπ; - Have all the above requirements been communicated to the farmers-members of the organization by e.g. work instructions, training etc?		X		θα γνωστοποιηθούν
P4.1.1f	Εφαρμόζονται για κάθε αγροτεμάχιο; (Y/N) - Are these procedures implemented per parcel of crop?	X			
P4.1.1g	Παρακολουθείται η εφαρμογή τους; (Y/N) - Is this implementation monitored?	X			
P4.1.1h	Είναι διαθέσιμα τα αποτελέσματα της παρακολούθησης? (Y/N)- Are the results of this monitoring recorded and available?	X			
P4.3.1a	Εχει εγκατασταθεί κάποιο σύστημα καταγραφών της ποσότητας νερού και της κατανάλωσης ενέργειας για κάθε πότισμα, σε επίπεδο αγροτεμαχίου; (Y/N) - Has a recording system been established to capture water and energy consumption per irrigation event and parcel?	X			EMS

P4.3.1b	Αξιοποιούνται οι πληροφορίες αυτές για την βελτίωση της αποτελεσματικότητας της άρδευσης σε σχέση προς την ενέργεια; (Y/N) - Is this information used for the improvement of water and energy use?	X			EMS
P4.3.2a	Εχει εγκατασταθεί κάποιο σύστημα καταγραφών της ποσότητας νερού και άλλων εισροών εκτός της ενέργειας (π.χ. κλάδεμα, καλλιέργεια εδάφους-καταστροφή ζιζανίων, λίπανση) σε επίπεδο αγροτεμαχίου; (Y/N) - Has a recording system will be established to capture water and other inputs (such as fertilizations, soil & weed management and pruning) used?	X			EMS
P4.3.2b	Αξιοποιούνται οι πληροφορίες αυτές για την βελτίωση της αποτελεσματικότητας της άρδευσης σε σχέση προς τις άλλες εισροές; (Y/N) - Is this information used for the optimization of water and the other inputs used?	X			
P4.4.1a	Εφαρμόζεται η ανακύκλωση/επαναχρησιμοποίηση στη διαχείριση των υδάτων; (Y/N) - Is water recycle or re-use applied in the context of water management?			X	
P4.4.1b	Υπάρχει σύστημα παρακολούθησης της ποσότητας του ανακυκλώμενου/επαναχρησιμο-ποιημένου νερού; (Y/N) - Is there a system established in order to monitor the quantity of recycled/re-used water?			X	
P4.4.2a	Υπάρχει η δυνατότητα εκτίμησης των απωλειών νερού; (Y/N) - Is it possible to estimate water losses?		X		ως σημερα
P4.4.2b	Υπάρχει η δυνατότητα περιγραφής της μορφής και της τύχης/αποδεκτών (έδαφος, αέρας) των απωλειών νερού; (Y/N) - Is it possible to determine the type and the destination (soil, air) of water losses?	X			
P4.4.3	Εφαρμόζεται κάποια μεθοδολογία για τη βέλτιστη χρήση του νερού (αύξηση αποδοτικότητας χρήσης, μείωση των απωλειών, εξοικονόμηση νερού, βελτίωση συστημάτων και μεθόδων άρδευσης κλπ); - Is there a water management strategy implemented to achieve optimum water consumption (increase water efficiency, reduce water losses, improve irrigation systems and methods)?		X		ως σημερα
p4.4.4	Είναι δυνατόν να εκτιμηθεί η κατανάλωση νερού ανά μονάδα παραγωγής προϊόντος; (Y/N) - Can water consumption per production unit be estimated ?	X			EMS
p4.5.1	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα για να συμμετέχει και να καταγράφει τις δραστηριότητες που αφορούν σε θέματα Λεκάνης Απορροής του Φορέα Διαχείρισης; (Y/N) - Has a person or department been identified who participates and reports on River Basin Committee activities?		X		θα ορισθεί
P4.5.2	Οι αρχές της αειφόρου διαχείρισης των υδατικών πόρων έχουν διαδοθεί εντός της Ο.Π.; (Y/N) - Are the principles of sustainable water management disseminated within the F.OR?		X		θα διαδοθούν

P4.5.3a	Οι αρχές της αειφόρου διαχείρισης των υδάτων έχουν διαδοθεί στο κοινό, τους πελάτες και τις αρχές;(Y/N) - Are the principles of sustainable water management disseminated to customers, the public and authorities?		X		θα διαδοθούν
P4.5.3b	Υπάρχουν γραπτές οδηγίες για τις αρχές της αειφόρου διαχείρισης των υδατικών πόρων διαθέσιμες προς το κοινό, τους πελάτες και τις αρχές; (Y/N)- Are any reports available for customers, the public and authorities that describe the principles of sustainable water management?		X		θα υπάρχουν
P4.5.4	Έχουν γίνει εκδηλώσεις για την ενημέρωση των ενδιαφερομένων σχετικά με τα θέματα διαχείρισης του νερού; (Y/N) - Are there any informational campaigns performed in order to inform stakeholders on water management?		X		θα γίνουν
P4.5.5a	Υπάρχουν μέτρα πρόληψης ατυχημάτων, καταστροφών και παρόμοιων περιστατικών; (Y/N) - Is there any plan to prevent accidents, disasters and similar incidents?		X		θα υπάρχουν
P4.5.5b	Περιγράφονται ή εκτιμούνται οι επιπτώσεις ενός τέτοιου γεγονότος στο περιβάλλον, στους εργαζόμενους, στον τοπικό πληθυσμό και στις κοινότητες; (Y/N) - Are the impacts of such an incident to the environments, employees, the regional population and communities described or estimated?		X		θα περιγράφονται και θα εκτιμώνται
P4.5.6	Εφαρμόζονται και παρακολουθούνται μέτρα για την αντιμετώπιση εκτάκτων κλιματικών συνθηκών (Ισχύει μόνο για άρδευση); (Y/N) - Are there any measued applied and monitored in order to deal with unforeseen climatic conditions (Applicable only for irrigation)?		X		ως σημερα
P4.6.1	Μπορεί να επιτυγχάνεται συνεχώς βελτίωση της στρατηγικής διαχείρισης ύδατος με την εφαρμογή των Καλών Πρακτικών Εφαρμογής;(Y/N) - Is it possible to achieve a continuous improvement of water management strategy by implementation of Best Management Practices?	X			
P4.6.2	Αυτές οι διαδικασίες εφαρμογής των Καλών Πρακτικών περιγράφονται σε αναφορές; (Y/N) - Are the procedures of Best Management Pracices application described in reports?	X			
P4.6.3	Είναι δυνατόν να βελτιώθει η βιωσιμότητα και η διαχείριση των υδάτων λεκάνης απορροής ποταμού ακολουθώντας το Water Steward; (Y/N) - Is it possible to improve the sustainability and river basin water management according the Water Steward?	X			

P4.7	Με ποιον τρόπο εξασφαλίζεται η διαφάνεια σχετικά με τις οικονομικές πτυχές της διαχείρισης των υδάτων; (Y/N) - How the transparency on economic aspects of water management is ensured?				Με δεδομενο ότι η διαχειρηση υδατων , γινεται μεσω επισημων φορεων και δεδομενης της τηρησης της νομοθεσιας από αυτους θεωρειται ότι εξασαλαλιζεται η διαφανεια,ακομα και στις περιπτωσεις που αφορουν ιδιωτικες πηγες π.χ. γεωτρησεις ,πηγαδια.
P4.7.1	Υπάρχουν αναφορές σχετικά με τα έργα υποδομής που πραγματοποιήθηκαν; (Y/N) - Are there reports available on the related infrastructures and investments already made?		X		ως σημερα
P4.7.2	Μπορεί να γίνει ανάλυση περιβαλλοντικού κόστους; (Y/N) - Is the FOR able to compose an environmental cost analysis?	X			EMS
P7.8.1	Υπάρχει μια κοινή στρατηγική διαχείρισης των υδατικών πόρων, η οποία καλύπτει και τις 4 αρχές Water Stewardship; (Y/N) - Is there a common strategy of water management which covers all 4 Water Stewardship principles?		X		θα υπάρξει
P4.8.2	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα για να εξασφαλίζει την εφαρμογή της στρατηγικής για τη διαχείριση των υδατικών πόρων στο πλαίσιο του AWMS; (Y/N) - Has a person or department been identified who ensures the implementation of the water resources management strategy according to AWMS?		X		θα ορισθεί

Table 154: The 3rd **AWMS form as fulfilled by AFI's farmer organization**

	3rd AWMS form - Water Governance by a Farmers' Organization 3rd Modulo AWMS - Governo dell'acqua da parte delle Organizzazioni degli Agricoltori	**Απάντηση** - Response Risposta			**Παρατηρήσεις** - Notes - Note
A/A	**Τέταρτο αξίωμα**: **Επίτευξη ίσης και διαφανούς διακυβέρνησης** - Fourth Principle: Achieve equitable and transparent water governance	Y	N	N/A	
P4.01	Εχει η Ο.Π. άμεση δυνατότητα ελέγχου στη διαχείριση του νερού της λεκάνης (ή της υπολεκάνης); - Does F.OR exert direct control over water management in the catchment (or the sub-catchment) area? Esercita l'OP un controllo diretto sulla gestione delle risorse idriche nel'area del bacino (o del sub-bacino) ?		X		

P4.02	Εχει η Ο.Π. έμμεση επιρροή στη διαχείριση του νερού της λεκάνης (ή της υπολεκάνης); - Does F.OR have indirect influence on the water management in the catchment (or the sub-catchment) area? Ha l'OP un 'influenza indiretta sulla gestione elle risorse idriche nel'area del bacino (o del sub-bacino) ?		X		
P4.03	Εχει η Ο.Π. τεκμηριωμένη πολιτική (goals) για τη διαχείριση νερού? - Does F.OR have a documented policy (goals) for the water management in the catchment area? Ha l'OP ha una politica documentata (obiettivi) per la gestione delle acque nel bacino idrografico?		X		
P4.1	Διαθέτει η Ο.Π. αρχείο της ισχύουσας νομοθεσίας για το νερό γενικότερα; - Does F.OR maintain a list of applicable water legislation? L'OP conserva/ha un elenco di legislazione in materia acque applicabile?		X		
P4.1.1a	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα με ευθύνη την παρακολούθηση της τήρησης της νομοθεσίας για το νερό άρδευσης (αδειοδότηση, όρια άντλησης); - Has a person or department been identified who ensures compliance with legal requirements linked to water, such as validity of licences for abstraction and limits for water consumption for crop irrigation. E' stato individuato una persona o un reparto/sezione che garantiscano il rispetto dei requisiti di legge legati all'acqua, come ad esempio la validità di licenze per l'estrazione di acqua e i limiti per il consumo di acqua destinato all'irrigazione delle colture?		X		
P4.1.1b	Εχουν τεκμηριωθεί διαδικασίες για την διασφάλισης της τήρησης της νομοθεσίας ως προς την άντληση; (Y/N) - Have the procedures for ensuring of legal compliance been documented? Sono state documentate le procedure per garantire la conformità legale? (SI/NO)		X		
P4.1.1c	Είναι επικαιροποιημένες και διαθέσιμες σε όλους αυτές οι διαδικασίες; (Y/N) - Are these procedures up to date and entirely disclosed? Vengono aggiornate queste procedure e interamente divulgate? (SI/NO) ?		X		
P4.1.1d	Περιλαμβάνουν την τήρηση των απαιτήσεων της ίδιας της οργάνωσης για την επίτευξη των σκοπών και στόχων της στρατηγικής της οργάνωσης (AWMS)? - Do these procedures address the organization's own requirements to satisfy the objectives and targets of its strategy (AWMS)? Queste procedure si rivolgono alle esigenze proprie dell'organizzazione di soddisfare gli obiettivi e i traguardi della sua strategia (AWMS)?		X		

P4.1.1e	Εχουν γνωστοποιηθεί στους παραγωγούς-μέλη της οργάνωσης όλες οι παραπάνω απαιτήσεις, μέσω π.χ. Οδηγιών εργασίας, εκπαιδεύσεων κλπ; - Have all the above requirements been communicated to the farmers-members of the organization by e.g. work instructions, training etc? Sono stati comunicati ,tutti i requisiti di cui sopra, agli agricoltori-membri dell'organizzazione per esempio attraverso istruzioni di lavoro, formazione, ecc (SI/NO)?		X		
P4.1.1f	Εφαρμόζονται για κάθε αγροτεμάχιο; (Y/N) - Are these procedures implemented per parcel of crop? Queste procedure vengono attuate per singolo appezzamento di coltura (SI/NO)?		X		
P4.1.1g	Παρακολουθείται η εφαρμογή τους; (Y/N) - Is this implementation monitored? E' monitorata l'implementazione (SI/NO) ?		X		
P4.1.1h	Είναι διαθέσιμα τα αποτελέσματα της παρακολούθησης? (Y/N)- Are the results of this monitoring recorded and available? I risultati di questo monitoraggio vengono registrati e sono disponibili (SI/NO)?		X		
P4.3.1a	Εχει εγκατασταθεί κάποιο σύστημα καταγραφών της ποσότητας νερού και της κατανάλωσης ενέργειας για κάθε πότισμα, σε επίπεδο αγροτεμαχίου; (Y/N) - Has a recording system been established to capture water and energy consumption per irrigation event and parcel? E' stato installato un sistema di registrazione per rilevare l'acqua catturata/usata e l'energia consumata per ogni turno di irrigazione e per ogni appezzamento?		X		
P4.3.1b	Αξιοποιούνται οι πληροφορίες αυτές για την βελτίωση της αποτελεσματικότητας της άρδευσης σε σχέση προς την ενέργεια; (Y/N) - Is this information used for the improvement of water and energy use? Saranno utilizzate queste informazioni per migliorare l'uso dell'acqua e dell' energia (SI/NO)?	X			

P4.3.2a	Εχει εγκατασταθεί κάποιο σύστημα καταγραφών της ποσότητας νερού και άλλων εισροών εκτός της ενέργειας (π.χ. κλάδεμα, καλλιέργεια εδάφους-καταστροφή ζιζανίων, λίπανση) σε επίπεδο αγροτεμαχίου; (Y/N) - Has a recording system will be established to capture water and other inputs (such as fertilizations, soil & weed management and pruning) used? E' stato installato un sistema di registrazione per rilevare l'acqua catturata/usata e gli altri input/fattori (come ad esempio le fertilizzazioni, la gestione del suolo e delle infestanti/erbe spontanee e le potature) (SI/NO)?		X		
P4.3.2b	Αξιοποιούνται οι πληροφορίες αυτές για την βελτίωση της αποτελεσματικότητας της άρδευσης σε σχέση προς τις άλλες εισροές; (Y/N) - Is this information used for the optimization of water and the other inputs used? Saranno queste informazioni utilizzate per l'ottimizzazione dell'acqua e degli altri input/fattori (SI/NO)?	X			
P4.4.1a	Εφαρμόζεται η ανακύκλωση/επαναχρησιμοποίηση στη διαχείριση των υδάτων; (Y/N) - Is water recycle or re-use applied in the context of water management? Viene applicato nel contesto il riciclo o riutilizzo dell'acqua nella gestione delle risorse idriche (SI/NO)?		X		
P4.4.1b	Υπάρχει σύστημα παρακολούθησης της ποσότητας του ανακυκλώμενου/επαναχρησιμο-ποιημένου νερού; (Y/N) - Is there a system established in order to monitor the quantity of recycled/re-used water? E' installato un sistemain grado di monitoraggio la quantità di acqua riciclata/riutilizzata (SI/NO) ?		X		
P4.4.2a	Υπάρχει η δυνατότητα εκτίμησης των απωλειών νερού; (Y/N) - Is it possible to estimate water losses? E' possibile stimare le perdite di acqua (SI/NO) ?		X		not analytically
P4.4.2b	Υπάρχει η δυνατότητα περιγραφής της μορφής και της τύχης/αποδεκτών (έδαφος, αέρας) των απωλειών νερού; (Y/N) - Is it possible to determine the type and the destination (soil, air) of water losses? E 'possibile determinare la tipologia delle perdite d'acqua e la loro destinazione (suolo, aria) ?		X		

P4.4.3	Εφαρμόζεται κάποια μεθοδολογία για τη βέλτιστη χρήση του νερού (αύξηση αποδοτικότητας χρήσης, μείωση των απωλειών, εξοικονόμηση νερού, βελτίωση συστημάτων και μεθόδων άρδευσης κλπ); - Is there a water management strategy implemented to achieve optimum water consumption (increase water efficiency, reduce water losses, improve irrigation systems and methods)? Esiste una strategia di gestione delle acque implementata per ottenere il consumo di acqua ottimale (aumentare l'efficienza idrica, ridurre le perdite idriche, migliorare sistemi e metodi di irrigazione)?		X			
p4.4.4	Είναι δυνατόν να εκτιμηθεί η κατανάλωση νερού ανά μονάδα παραγωγής προϊόντος; (Y/N) - Can water consumption per production unit be estimated ? Può essere stimato il consumo di acqua per unità di produzione?		X			
p4.5.1	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα για να συμμετέχει και να καταγράφει τις δραστηριότητες που αφορούν σε θέματα Λεκάνης Απορροής του Φορέα Διαχείρισης; (Y/N) - Has a person or department been identified who participates and reports on River Basin Committee activities? E' stata indivituata una persona o un reparto/sezione che partecipa e relaziona sull'attività dell'Autorità di Bacino?		X			
P4.5.2	Οι αρχές της αειφόρου διαχείρισης των υδατικών πόρων έχουν διαδοθεί εντός της Ο.Π.; (Y/N) - Are the principles of sustainable water management disseminated within the F.OR? I principi della gestione sostenibile dell'acqua sono diffusi all'interno dell'OP?	X				
P4.5.3a	Οι αρχές της αειφόρου διαχείρισης των υδάτων έχουν διαδοθεί στο κοινό, τους πελάτες και τις αρχές;(Y/N) - Are the principles of sustainable water management disseminated to customers, the public and authorities?I principi della gestione sostenibile dell'acqua sono divulgati verso i clienti, il pubblico e le autorità (SI/NO)?		X			
P4.5.3b	Υπάρχουν γραπτές οδηγίες για τις αρχές της αειφόρου διαχείρισης των υδατικών πόρων διαθέσιμες προς το κοινό, τους πελάτες και τις αρχές; (Y/N)- Are any reports available for customers, the public and authorities that describe the principles of sustainable water management? Sono disponibili report ,sui principi della gestione sostenibile dell'acqua, per i clienti, il pubblico e le autorità (SI/NO)?		X			

P4.5.4	Έχουν γίνει εκδηλώσεις για την ενημέρωση των ενδιαφερομένων σχετικά με τα θέματα διαχείρισης του νερού; (Y/N) - Are there any informational campaigns performed in order to inform stakeholders on water management? Ci sono campagne informative svolte al fine di informare le parti interessate sulla gestione dell'acqua?		X		
P4.5.5a	Υπάρχουν μέτρα πρόληψης ατυχημάτων, καταστροφών και παρόμοιων περιστατικών; (Y/N) - Is there any plan to prevent accidents, disasters and similar incidents? Esiste qualche piano per prevenire gli incidenti, disastri ed episodi simili (SI/NO)?		X		
P4.5.5b	Περιγράφονται ή εκτιμούνται οι επιπτώσεις ενός τέτοιου γεγονότος στο περιβάλλον, στους εργαζόμενους, στον τοπικό πληθυσμό και στις κοινότητες; (Y/N) - Are the impacts of such an incident to the environments, employees, the regional population and communities described or estimated? Sono stimati o descritti gli impatti di tali eventi verso l'ambiente, i dipendenti, la popolazione regionale e le comunità (SI/NO)		X		
P4.5.6	Εφαρμόζονται και παρακολουθούνται μέτρα για την αντιμετώπιση εκτάκτων κλιματικών συνθηκών (Ισχύει μόνο για άρδευση); (Y/N) - Are there any measued applied and monitored in order to deal with unforeseen climatic conditions (Applicable only for irrigation)? Ci sono misure applicate e monitorate al fine di affrontare le condizioni climatiche imprevedibili (applicabile solo per l'irrigazione)?		X		
P4.6.1	Μπορεί να επιτυγχάνεται συνεχώς βελτίωση της στρατηγικής διαχείρισης ύδατος με την εφαρμογή των Καλών Πρακτικών Εφαρμογής;(Y/N) - Is it possible to achieve a continuous improvement of water management strategy by implementation of Best Management Practices? E' possible raggiungere un continuo miglioramento della strategia di gestione delle risorse idriche attraverso l'attuazione di Buone Pratiche di Gestione (SI/NO)?	X			
P4.6.2	Αυτές οι διαδικασίες εφαρμογής των Καλών Πρακτικών περιγράφονται σε αναφορές; (Y/N) - Are the procedures of Best Management Pracices application described in reports? Sono descritte in formato report/relazioni le procedure di applicazione delle Buone Pratiche di Gestione?		X		Only for producers that adhere to GLOBALGAP standards.

P4.6.3	Είναι δυνατόν να βελτιώθει η βιωσιμότητα και η διαχείριση των υδάτων λεκάνης απορροής ποταμού ακολουθώντας το Water Steward; (Y/N) - Is it possible to improve the sustainability and river basin water management according the Water Steward? E' possibile migliorare la sostenibilità e la gestione della risorsa idrica del bacino idrografico secondo il Water Steward?	X			
P4.7	Με ποιον τρόπο εξασφαλίζεται η διαφάνεια σχετικά με τις οικονομικές πτυχές της διαχείρισης των υδάτων; (Y/N) - How the transparency on economic aspects of water management is ensured? E' presente la trasparenza sugli aspetti economici della gestione delle acque?	X			
P4.7.1	Υπάρχουν αναφορές σχετικά με τα έργα υποδομής που πραγματοποιήθηκαν; (Y/N) - Are there reports available on the related infrastructures and investments already made? Ci sono report/relazioni disponibili riguardanti le infrastrutture e gli investimenti già fatto?		X		
P4.7.2	Μπορεί να γίνει ανάλυση περιβαλλοντικού κόστους; (Y/N) - Is the FOR able to compose an environmental cost analysis? L'OP è grado di comporre/produrre una analisi costo ambientale?	X			
P7.8.1	Υπάρχει μια κοινή στρατηγική διαχείρισης των υδατικών πόρων, η οποία καλύπτει και τις 4 αρχές Water Stewardship; (Y/N) - Is there a common strategy of water management which covers all 4 Water Stewardship principles? C'è una strategia comune di gestione delle acque che copre tutti i 4 principi Water Stewardship?		X		
P4.8.2	Εχει ορισθεί κάποιο πρόσωπο ή τμήμα για να εξασφαλίζει την εφαρμογή της στρατηγικής για τη διαχείριση των υδατικών πόρων στο πλαίσιο του AWMS; (Y/N) - Has a person or department been identified who ensures the implementation of the water resources management strategy according to AWMS? E' stato identificato una persona o reparto che garantisce l'attuazione della strategia di gestione delle risorse idriche secondol' AWMS?	X			