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ΤΕΙ ΗΠΕΙΡΟΥ

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2	15/12/2013	Final (Part A. Field data survey and first level analysis)	

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1 Introduction

The present Document constitutes the deliverable 4.4.1 “Maps Provisioning” of the project “AGROQuality: Towards a Common Quality Control and food chain traceability system for the Greek – Italian primary sector of activity”.

TEI of Epirus, the leader partner (LP) of Agroquality, was in response to implement the corresponding study for the Region of Epirus.

The present document is accompanied by a series of data in electronic form (orthophotos, shapefiles, images, etc) which enable any interested party to use them in any combination and proceed in further analysis of them in order to create maps.

The shapefiles and the spatial analysis products have been prepared using ESRI ArcGIS software.

2 AGROQuality Maps

In order to cover the ECR needs the following geographical and tabular data where collected for the Regional Unities of Arta and Preveza of the Region of Epirus (GREECE):

- Landcover background (recent aerial photos) georeferenced in EGSA’87 (Greek Grid)
- Geographical boundaries of the areas, land height contours, hydrological formations and road network
- Soil characteristics (content in sand, silt and clay, pH, EC, Ca, N, P, K)
- Existing olive fields and relevant info regarding certified cultivations
- Economical data regarding olive cultivation
- Local infrastructure relevant to olive process and commerce
- Proposed areas for the cultivation of olives (in relation to deliverable 3.1.1.)

3 Landcover background

In order to cover the need for a digital chartographic background, the aerial photos LSO and VLSO from the National Land Registry Office (KTIMATOLOGIO S.A., 2008) were selected as the best choice. The relevant maps were granted from the company for use in the framework of the project under the term of not commercial use. The aerial photos were georeferenced in EGSA'87 (Greek Grid) and are attached in electronic form to the present document. The characteristics of the chartographic background is presented in the following table.

Table 1 Characteristics of the chartographic background

LSO

Pixel size in ground	0,5m
Perimetric intercoverage	4000m*3000m
Color analysis	True Color (24-bit)
File type	JPEG2000
Reference system	ITRF scale 1:5000
Geometrical accuracy	RMSEx ≤1,00m, RMSEx≤1m, RMSExy≤1,41m
Absolute accuracy	≤2,44m for a confidence level of 95%
Date of cartographic backgrounds	2007-2008

VLSO

Pixel size in ground	0,2m
Table size on ground	800m*600m
Radiometric analysis	True Color (24-bit)
File type	JPEG2000
Reference system	ITRF scale 1:1000
Table's number	13.125
Geometrical accuracy (on ground)	RMSEx ≤0,20m, RMSEx≤0,20m, RMSExy≤0,28m
Geometrical accuracy (peaks)	RMSEx ≤0,40m, RMSEx≤0,40m, RMSExy≤0,56m
Absolute accuracy	≤1,73m for a confidence level of 95%
Date of cartographic backgrounds	2007-2008

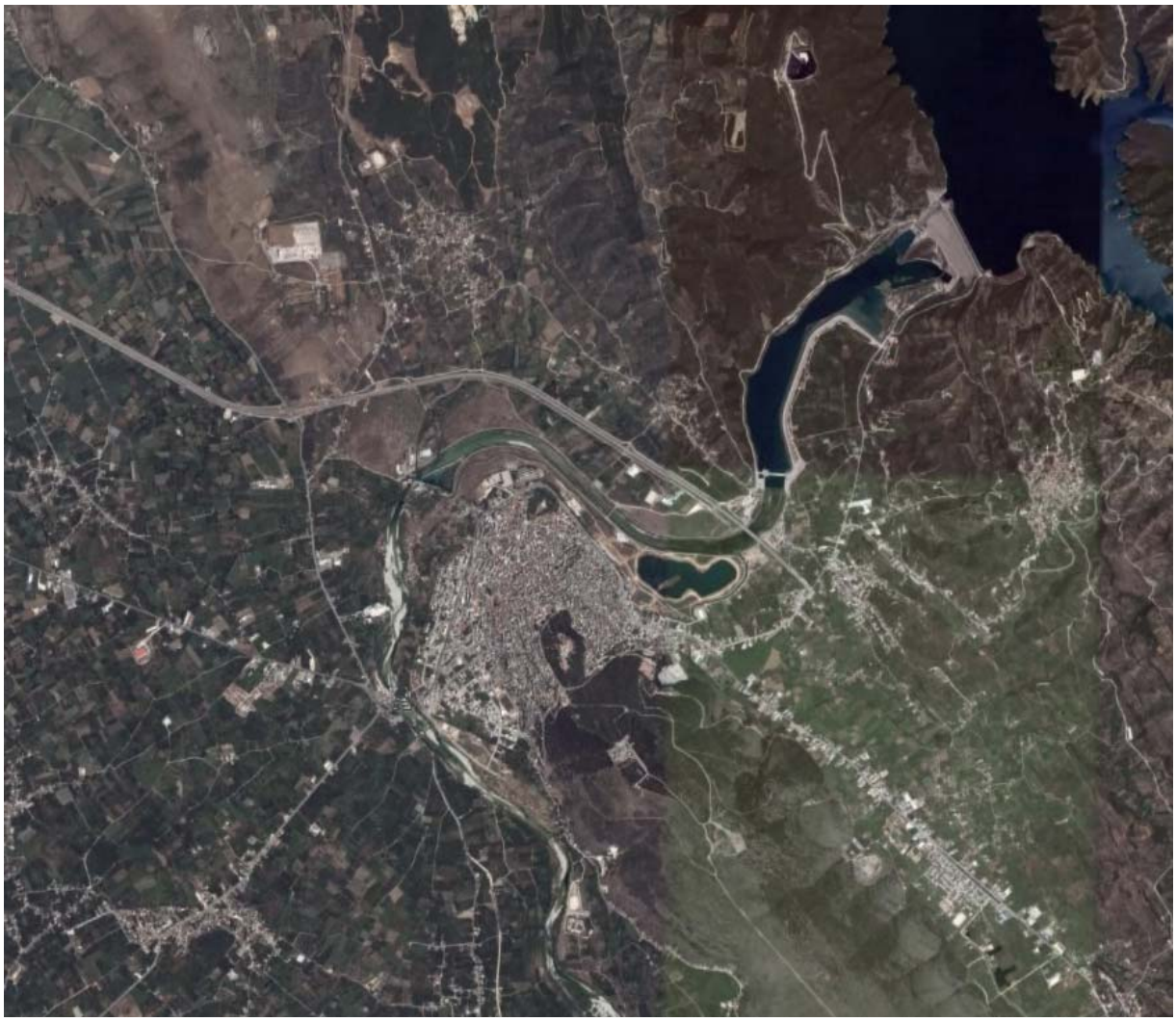


Figure 1 Sample Ktimatologio SA orthophoto (area of Municipality of Arta)

4 Background geographical information

The geographical characteristics of the areas under consideration (Regional Unities of Arta and Preveza): administration boundaries, cities and settlements, land height contours, hydrological formations and road network were retrieved by the Hellenic Mapping and Cadastral Organization (OKXE, 2010 and Greek Open GIS, 2013). The relevant shapefiles are attached in electronic form to the present document.

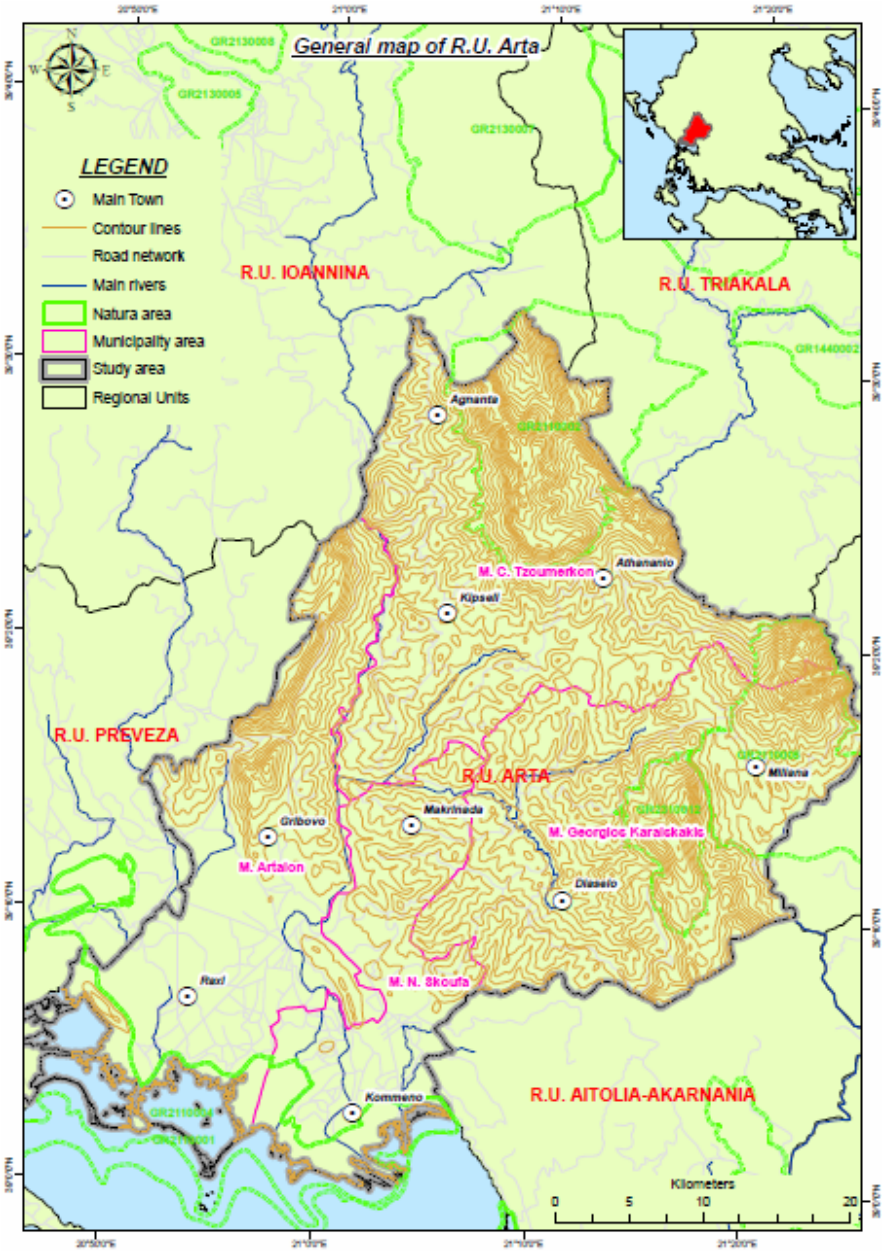


Figure 2 Regional Unit of Arta general map (synthesis of relevant shapefiles)

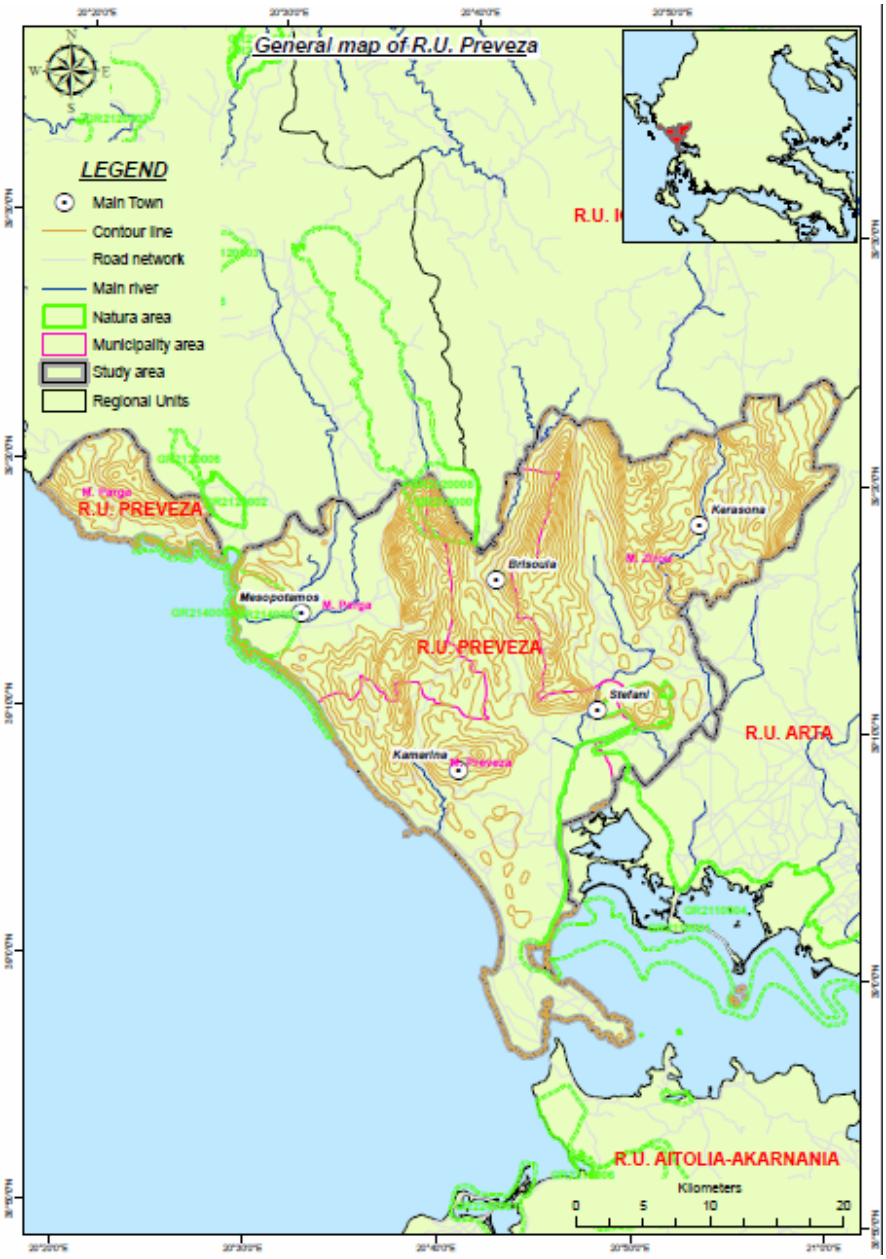


Figure 3 Regional Unit of Preveza general map (synthesis of relevant shapefiles)

5 Soil characteristics

For the creation of soil characteristics maps, soil analysis data from NEA GI project of TEI of Epirus (TEIEP, 2008), in combination with LUCAS Topsoil 2009 data (EU, 2009) were used. The spatial analysis have been made using the ordinary Kriging method (Baron and Aldstadt, 2010) with the following parameters: Spherical semivariogram model, 12 points around each pixel, output cell size: 60.

Figure 4 Soil analysis points in the Regional Unit of Arta (TEIEP, 2008)

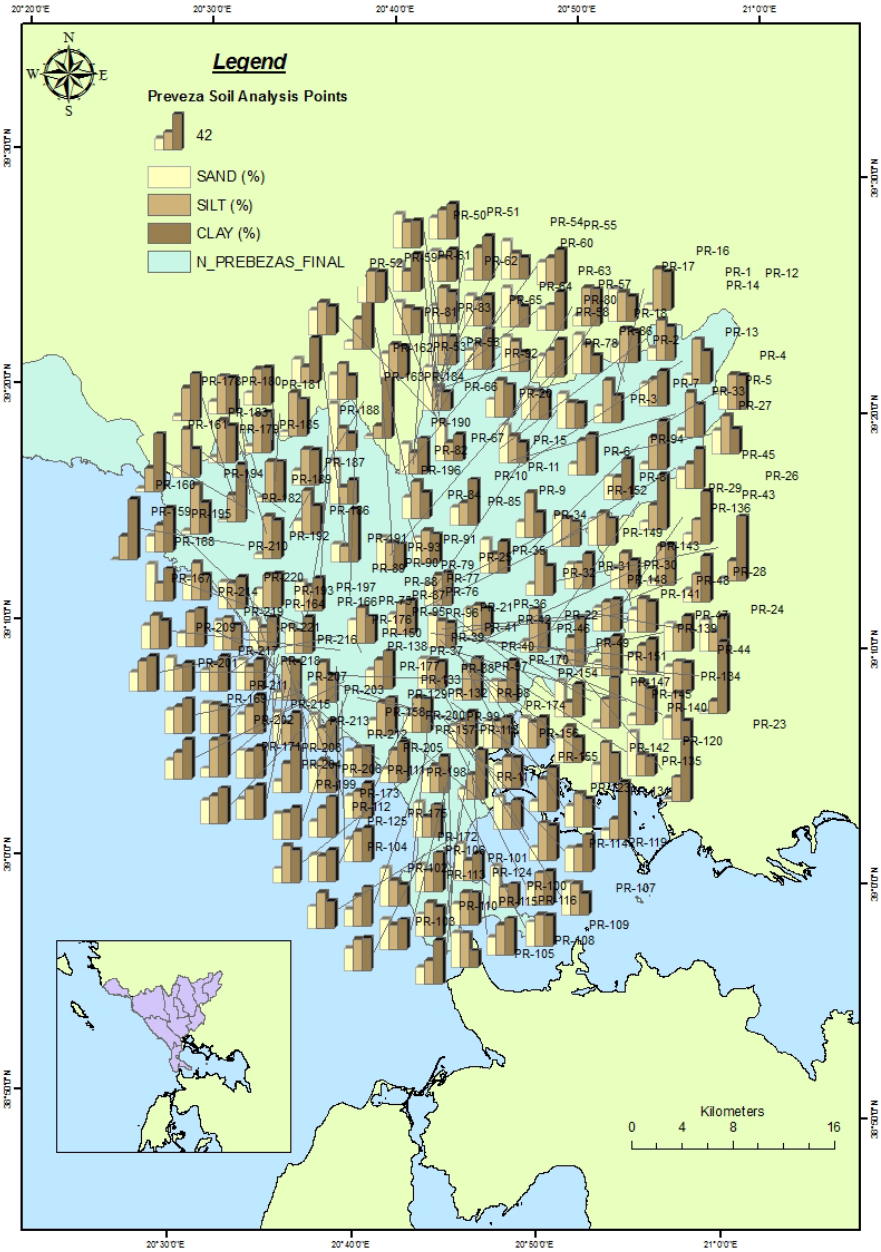


Figure 5 Soil analysis points in the Regional Unit of Preveza (TEIEP, 2008)

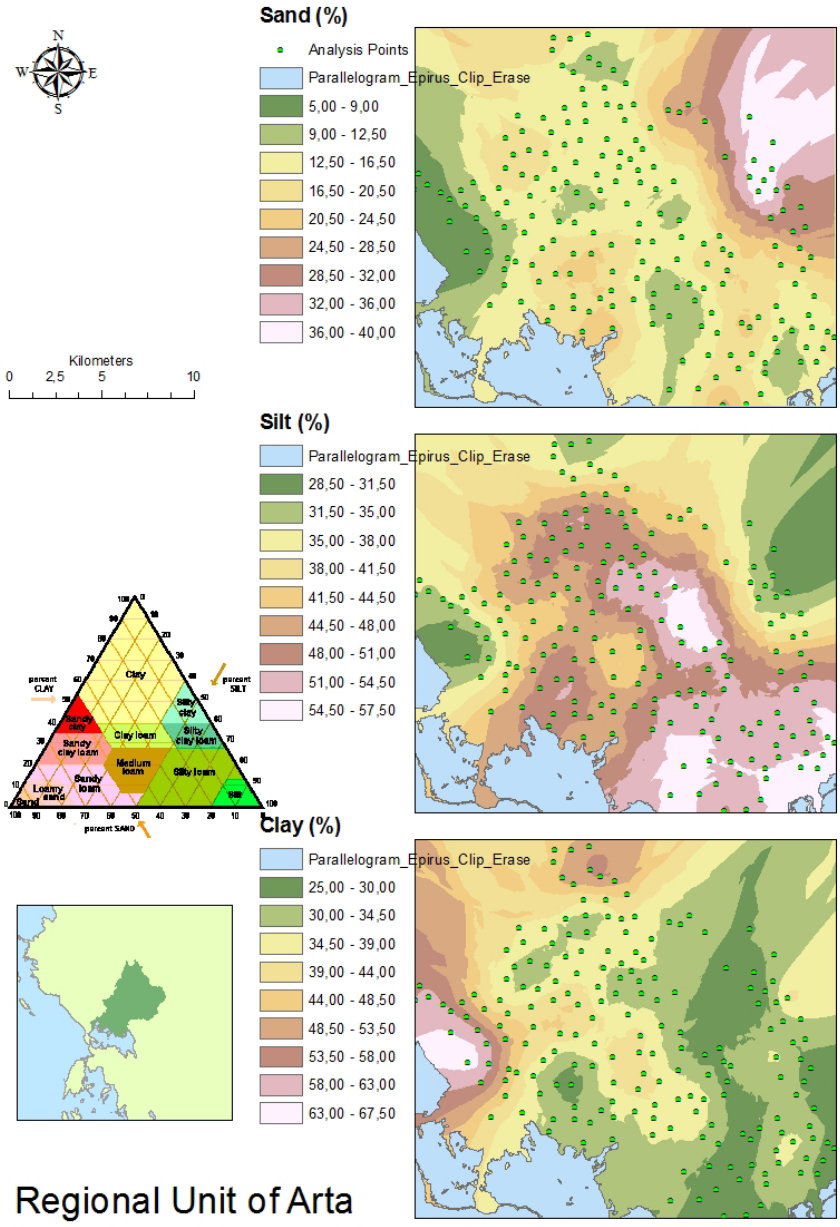


Figure 6 Soil content in sand, silt and clay (%) in the Regional Unit of Arta (TEIEP, 2008; EU, 2009)

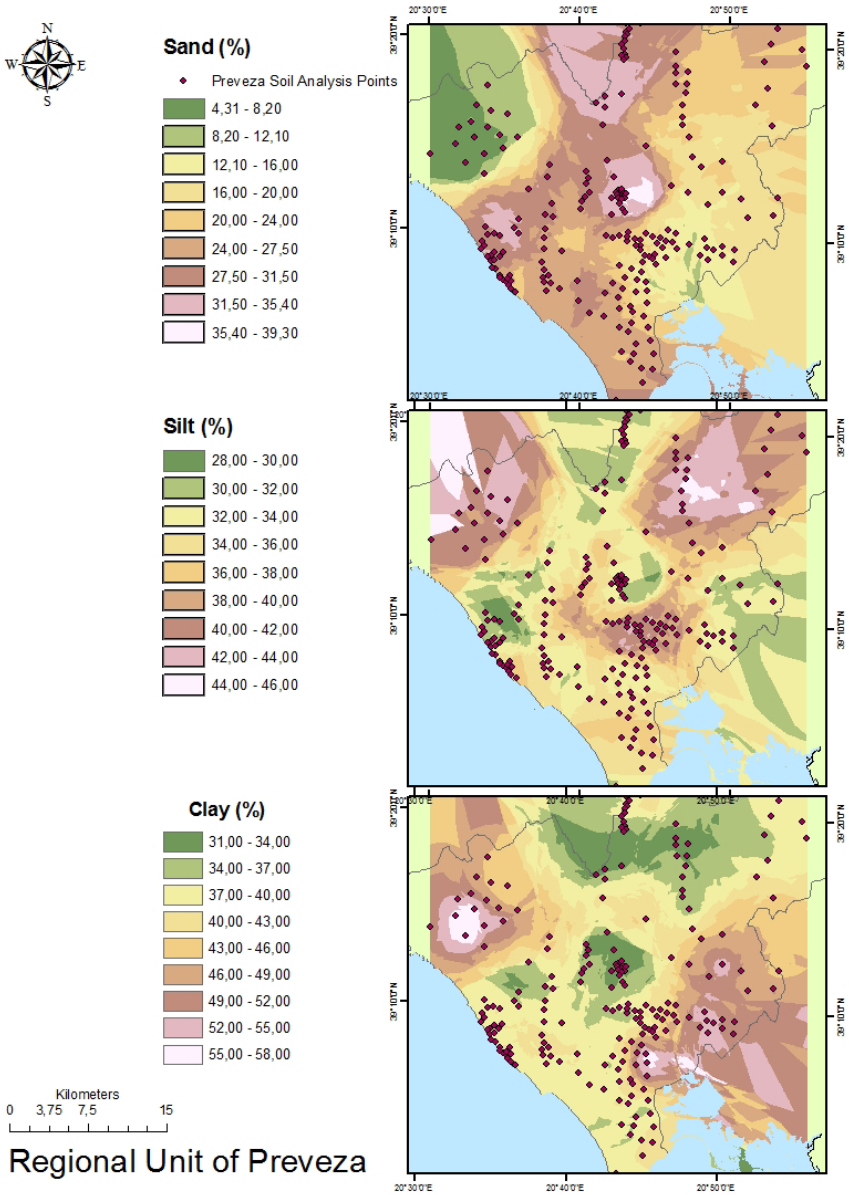


Figure 7 Soil content in sand, silt and clay (%) in the Regional Unit of Preveza (TEIEP, 2008; EU, 2009)

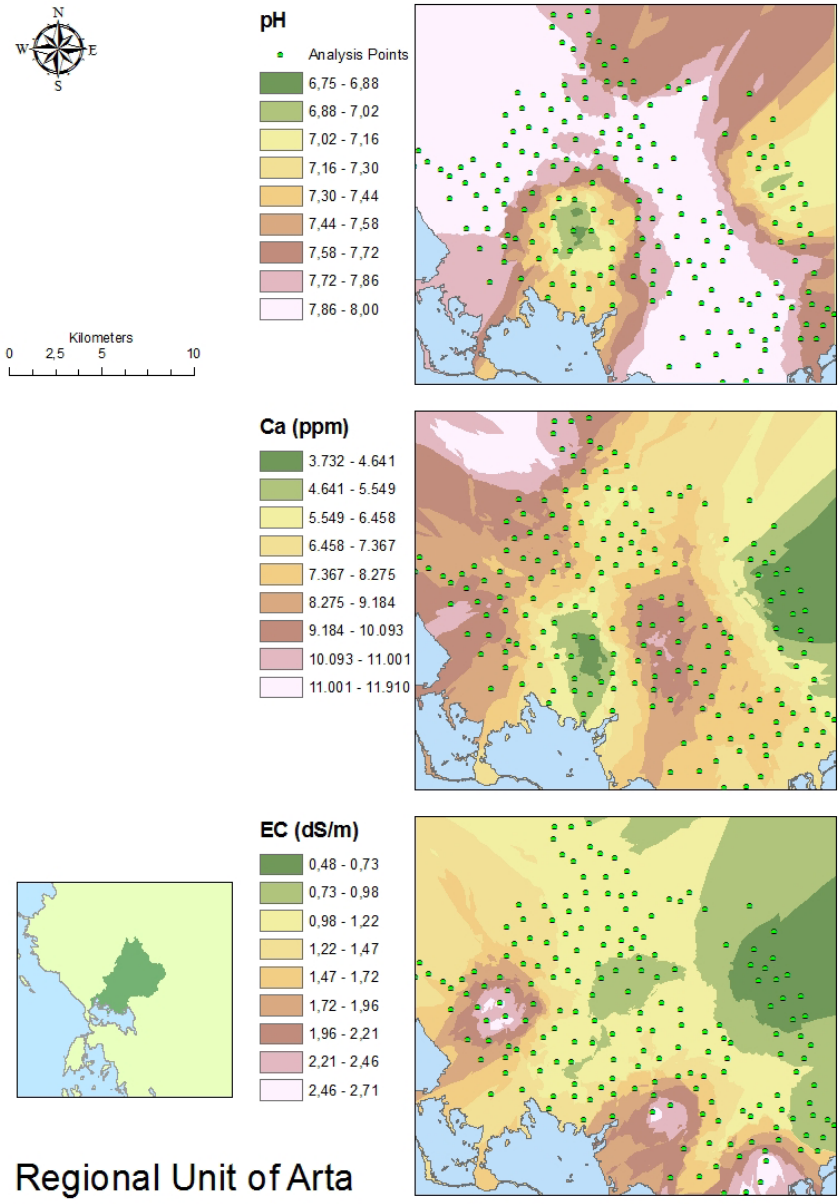


Figure 8 Soil pH, EC and Ca concentration for the Regional Unit of Arta (TEIEP, 2008; EU, 2009)

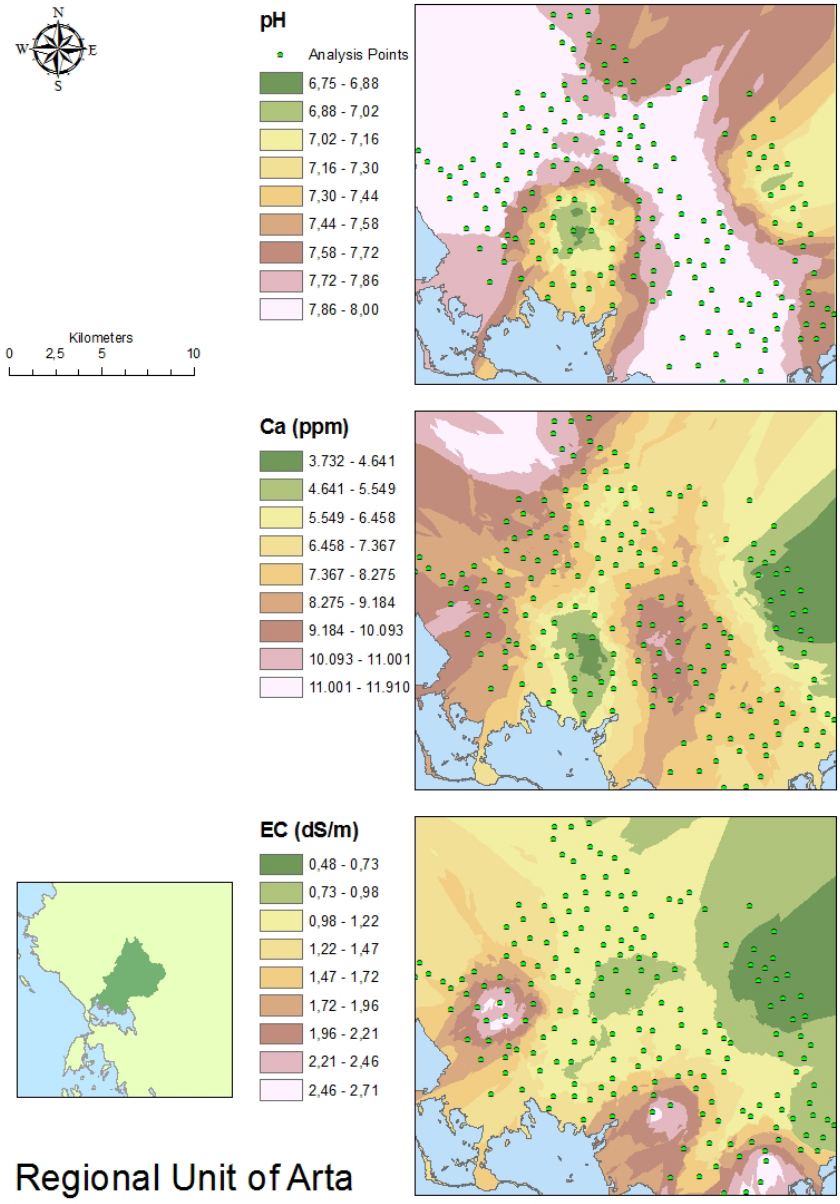


Figure 9 Soil pH, EC and Ca concentration for the Regional Unit of Preveza (TEIEP, 2008; EU, 2009)

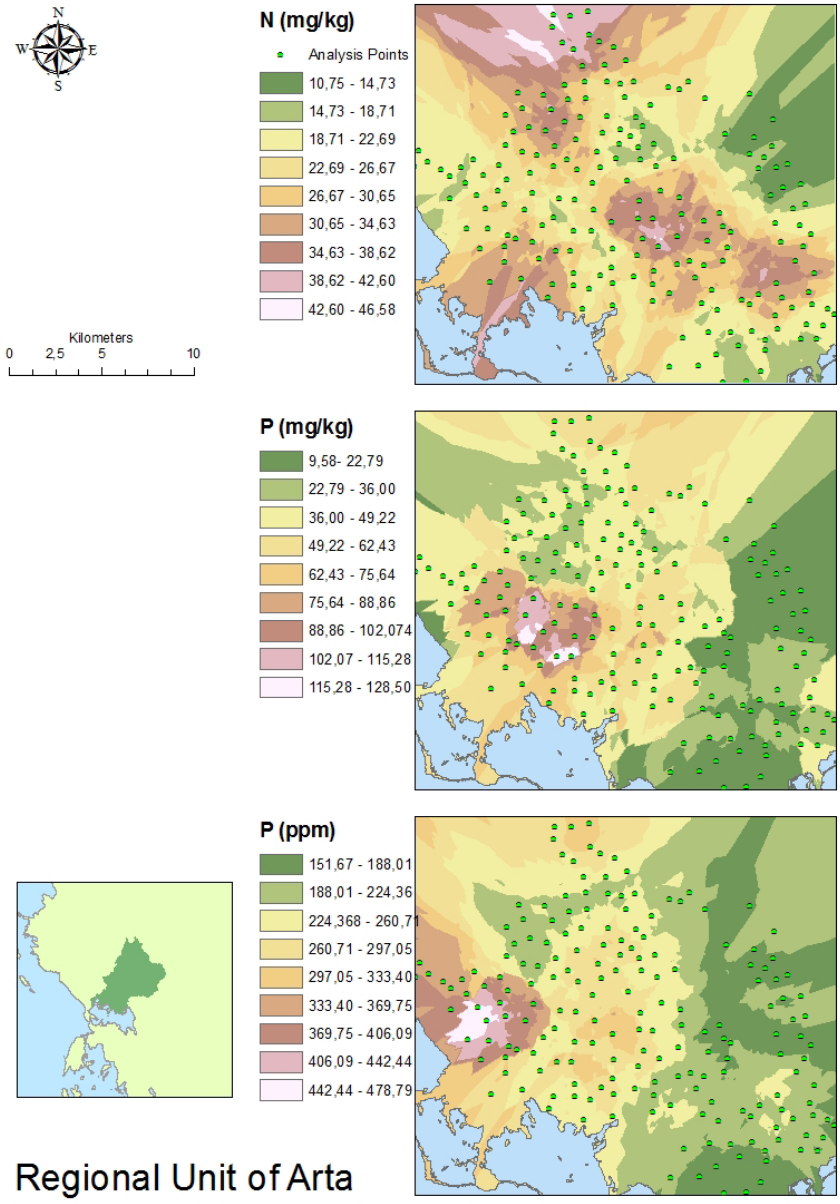


Figure 10 Soil N, P and K concentration for the Regional Unit of Arta (TEIEP, 2008; EU, 2009)

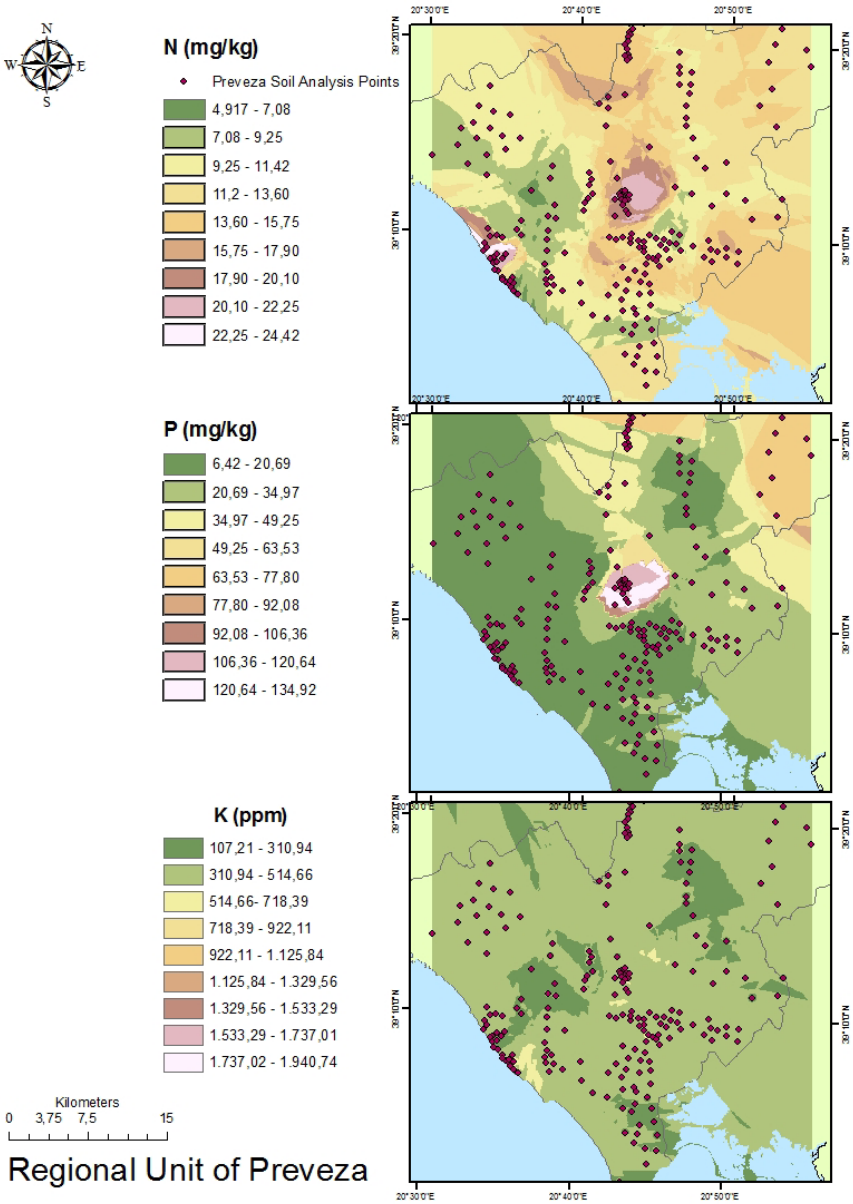


Figure 11 Soil N, P and K concentration for the Regional Unit of Preveza (TEIEP, 2008; EU, 2009)

6 Existing olive fields

Olive cultivation is very significant for both the Regional Units of Arta and Preveza (Table 2 and Table 3; Region of Epirus, 2011)

For the creation of existing olive trees maps, data from CORINE land cover 2000 (CLC2000) database were used in conjunction with data from the Greek Payment Authority of Common Agricultural Policy (OPEKEPE, 2011). The relevant spatial and tabular data were granted from the OPEKEPE for use in the framework of the project under the term of not commercial use.

Table 2 Basic facts regarding olive cultivation for the production of olive oil in Arta and Preveza

	R.U. Artas	R.U. Prevezas
Area (ha)	440	9.100
Trees (no)	52.800	1.092.000
Yield (tn/year)	800	4.000
Olive mils	7	22
Certified integrated cultivations (ha)		1.145
Certified organic cultivations (ha)		116

Table 3 Basic facts regarding olive cultivation for the production of table olives in Arta and Preveza

	R.U. Artas	R.U. Prevezas
Area (ha)	5.190	2.795
Yield (tn/year)	7.000	200
Processing units (no)	2	1
Certified integrated cultivations (ha)	219	
Certified organic cultivations (ha)	15	

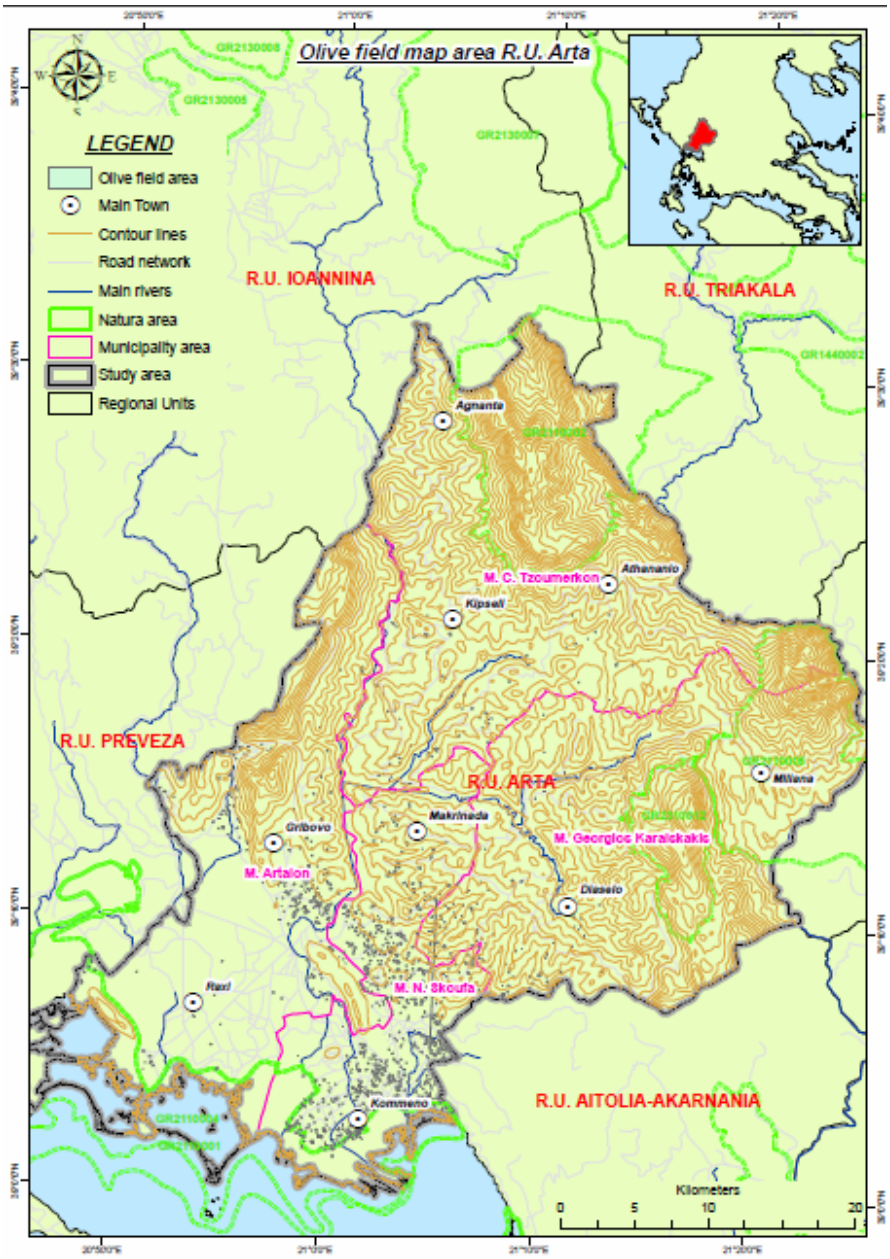


Figure 12 Olive fields in the Regional Unit of Arta

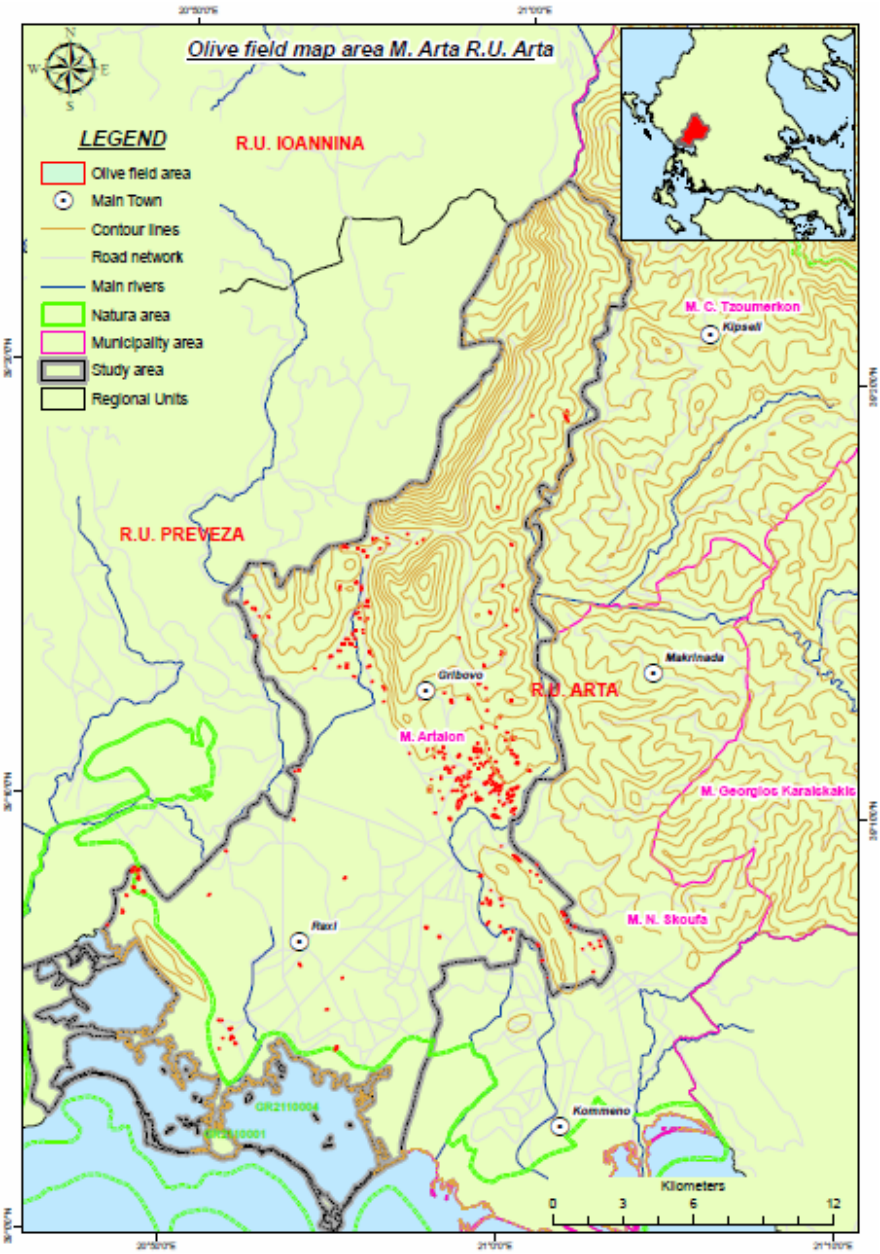


Figure 13 Olive fields in the Municipality of Arta (Regional Unit of Arta)

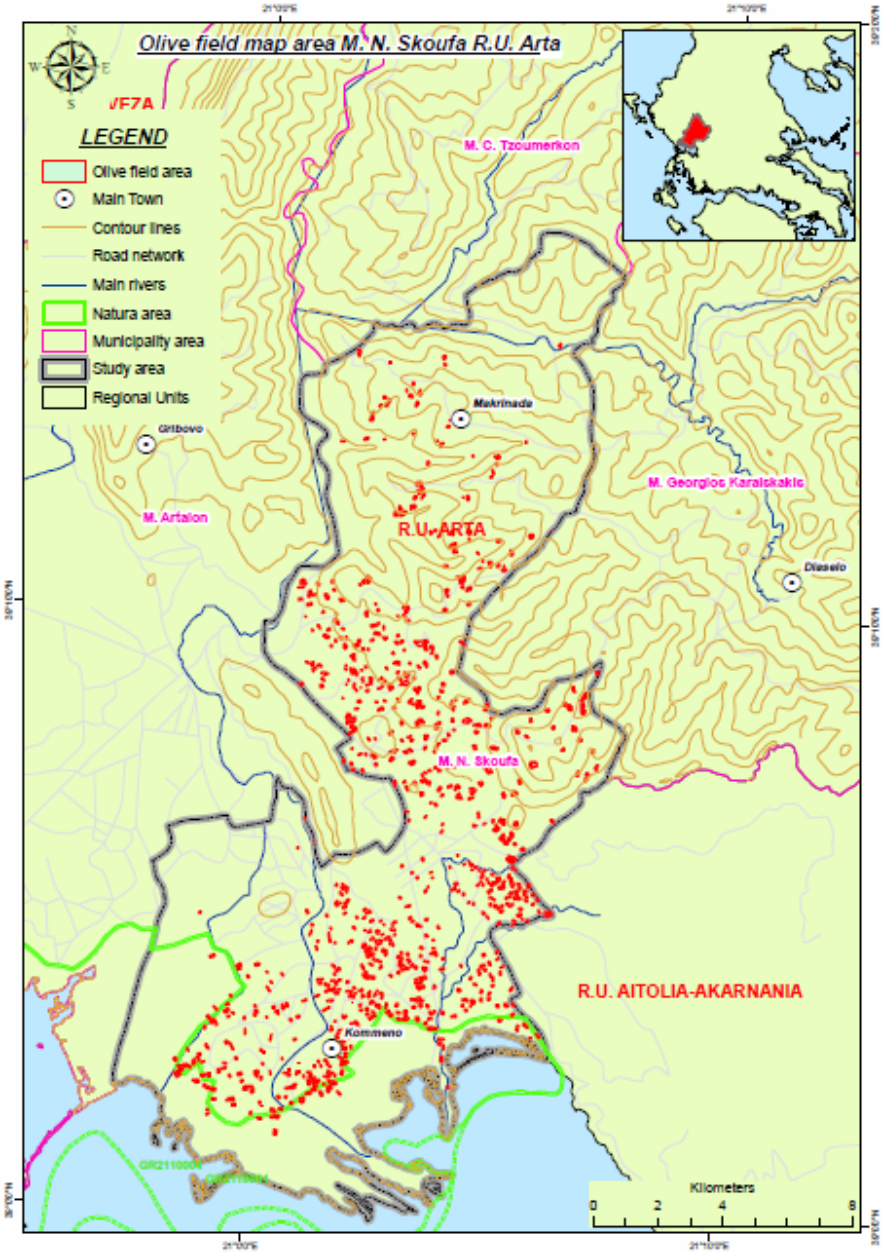


Figure 14 Olive fields in the Municipality of Nikolaos Skoufas (Regional Unit of Arta)

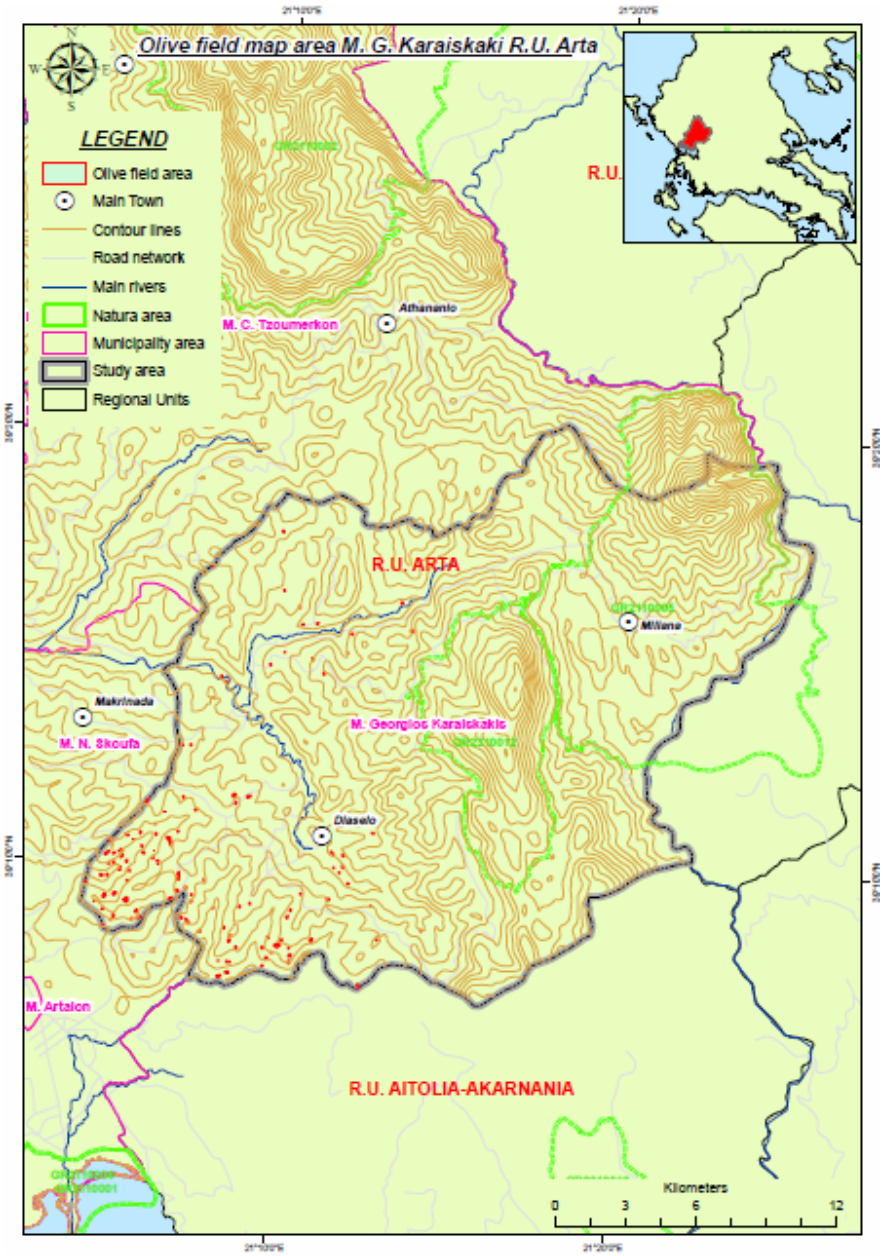


Figure 15 Olive fields in the Municipality of Georgios Karaiskakis (Regional Unit of Arta)

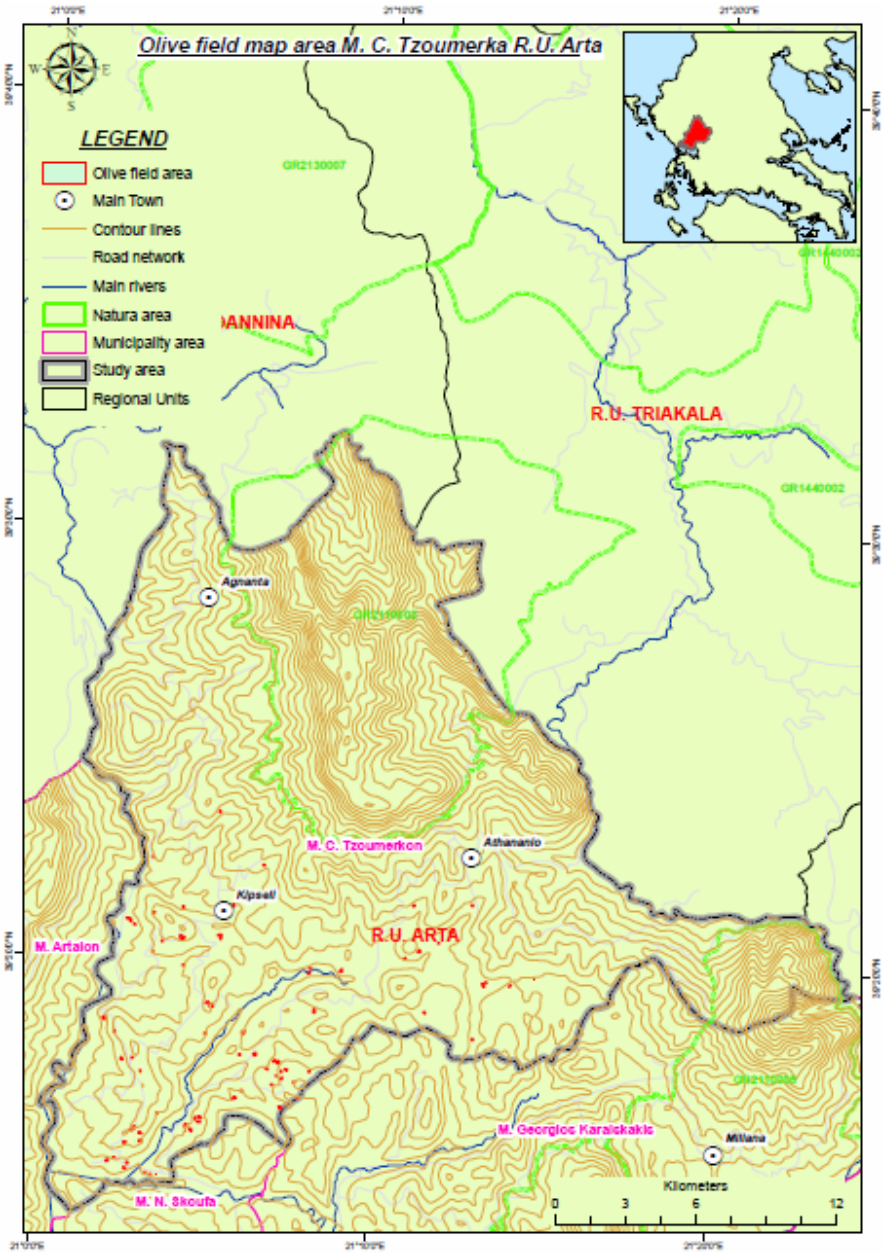


Figure 16 Olive fields in the Municipality of Dytika Tzoumerka (Regional Unit of Arta)

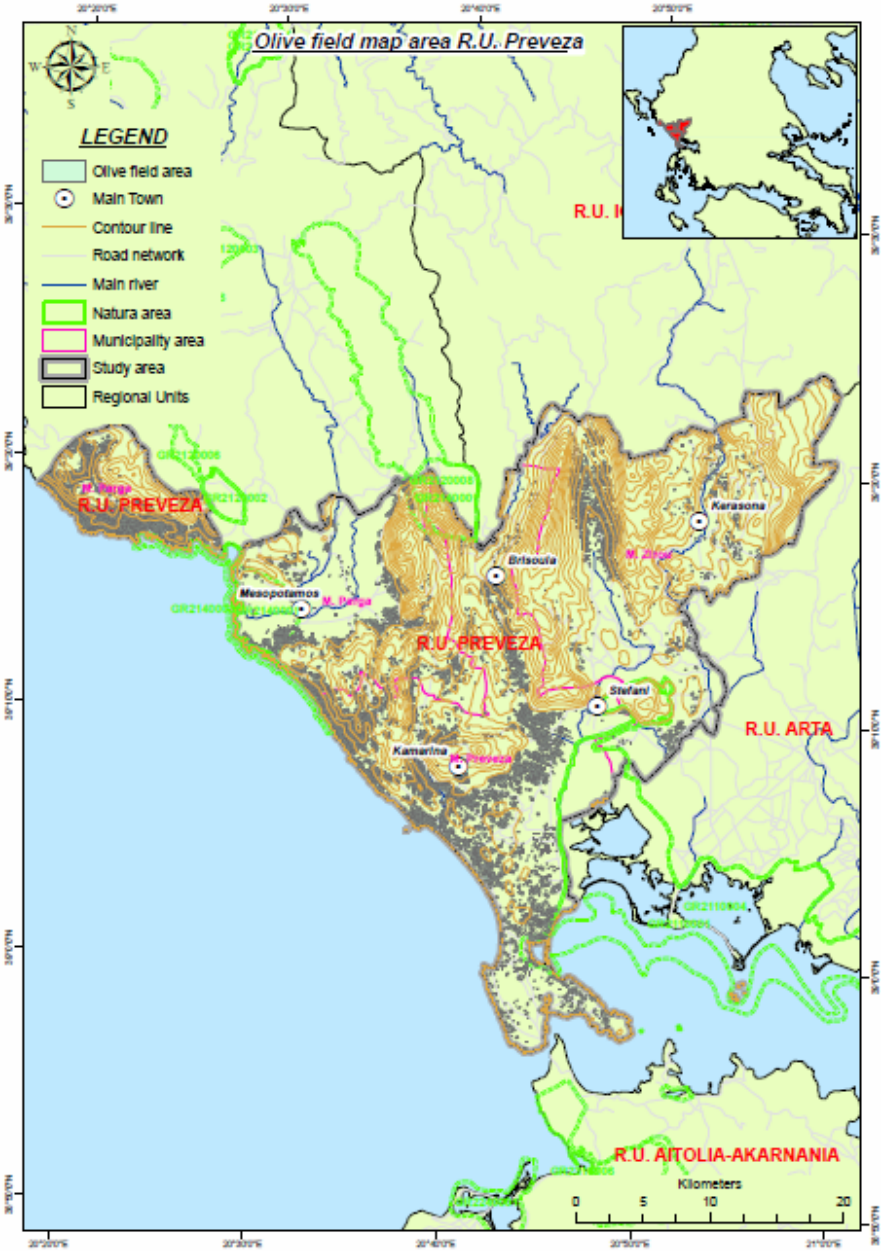


Figure 17 Olive fields in the Regional Unit of Preveza

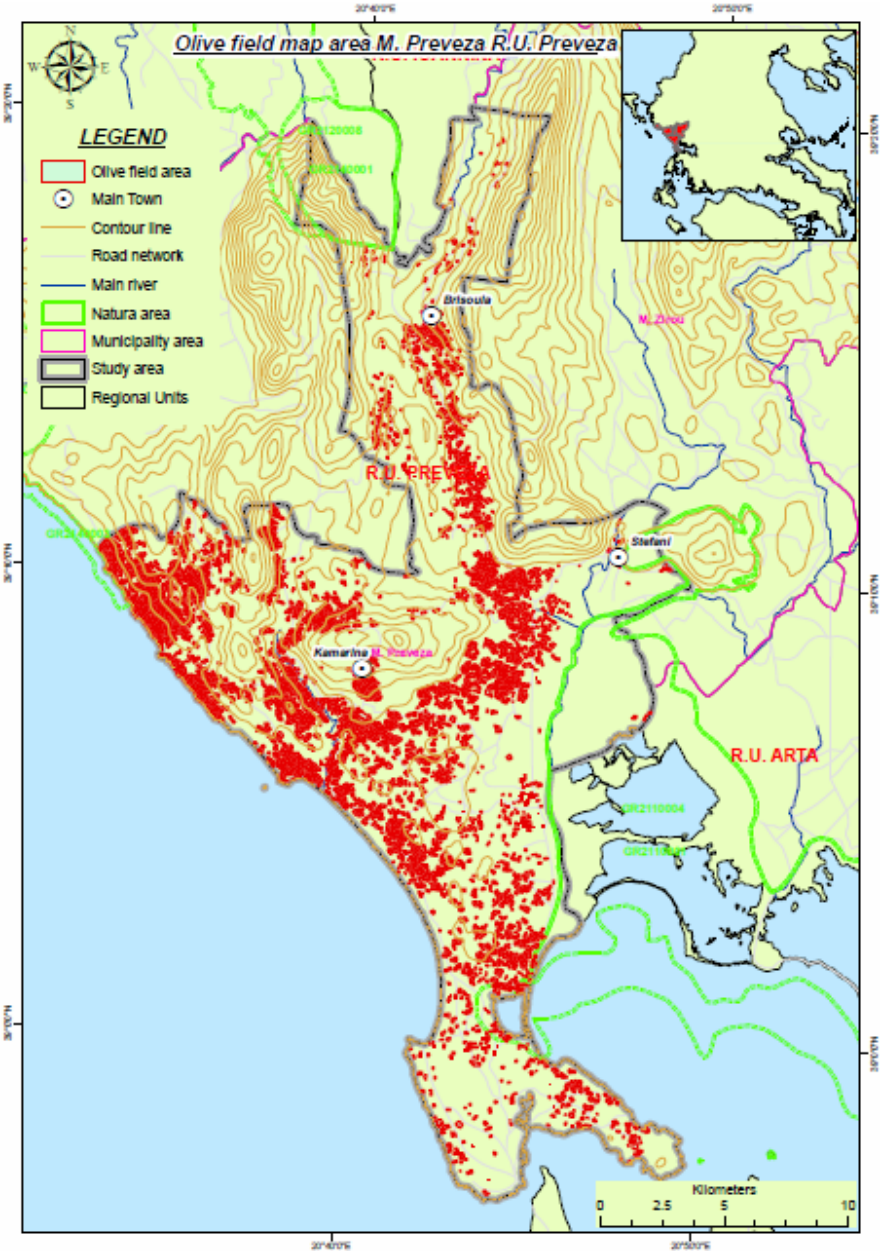


Figure 18 Olive fields in the Municipality of Preveza (Regional Unit of Preveza)

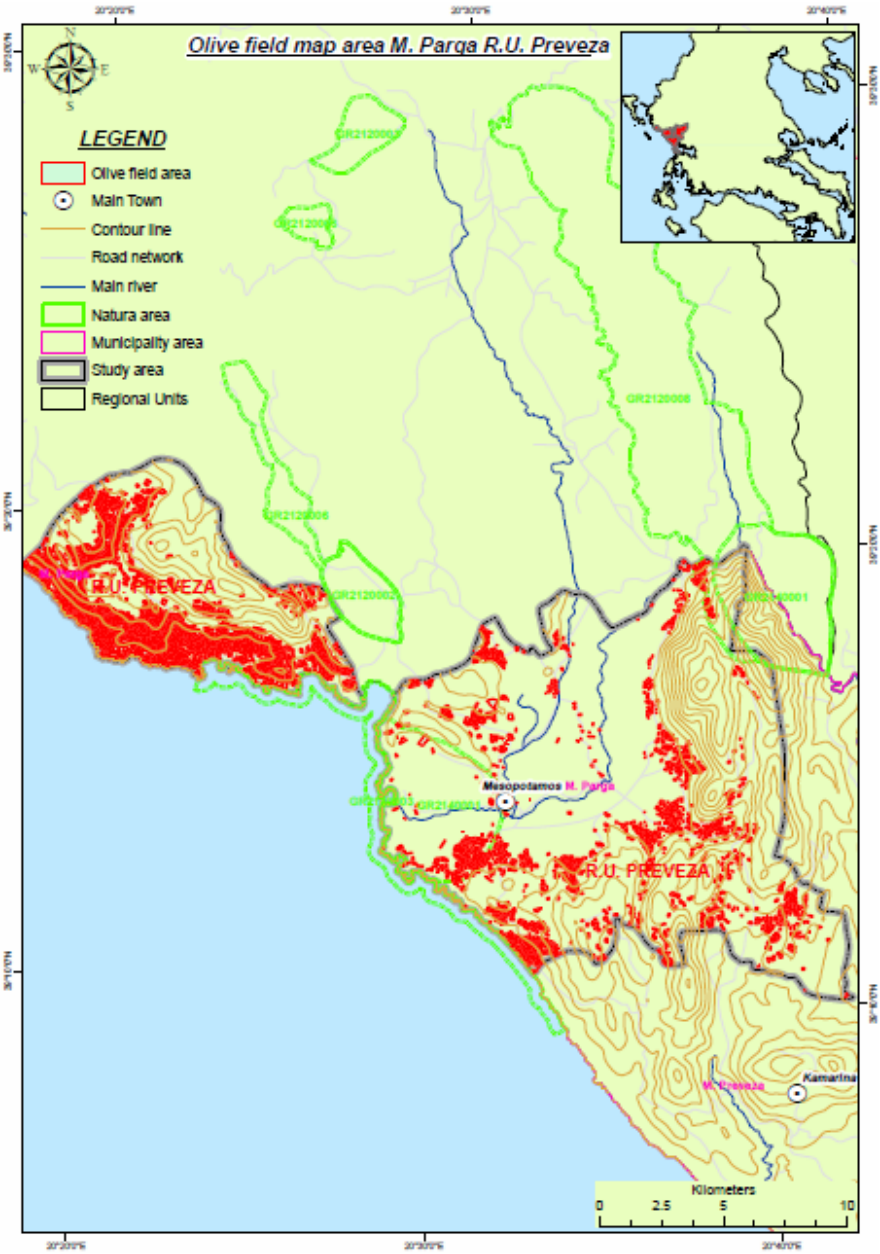


Figure 19 Olive fields in the Municipality of Parga (Regional Unit of Preveza)

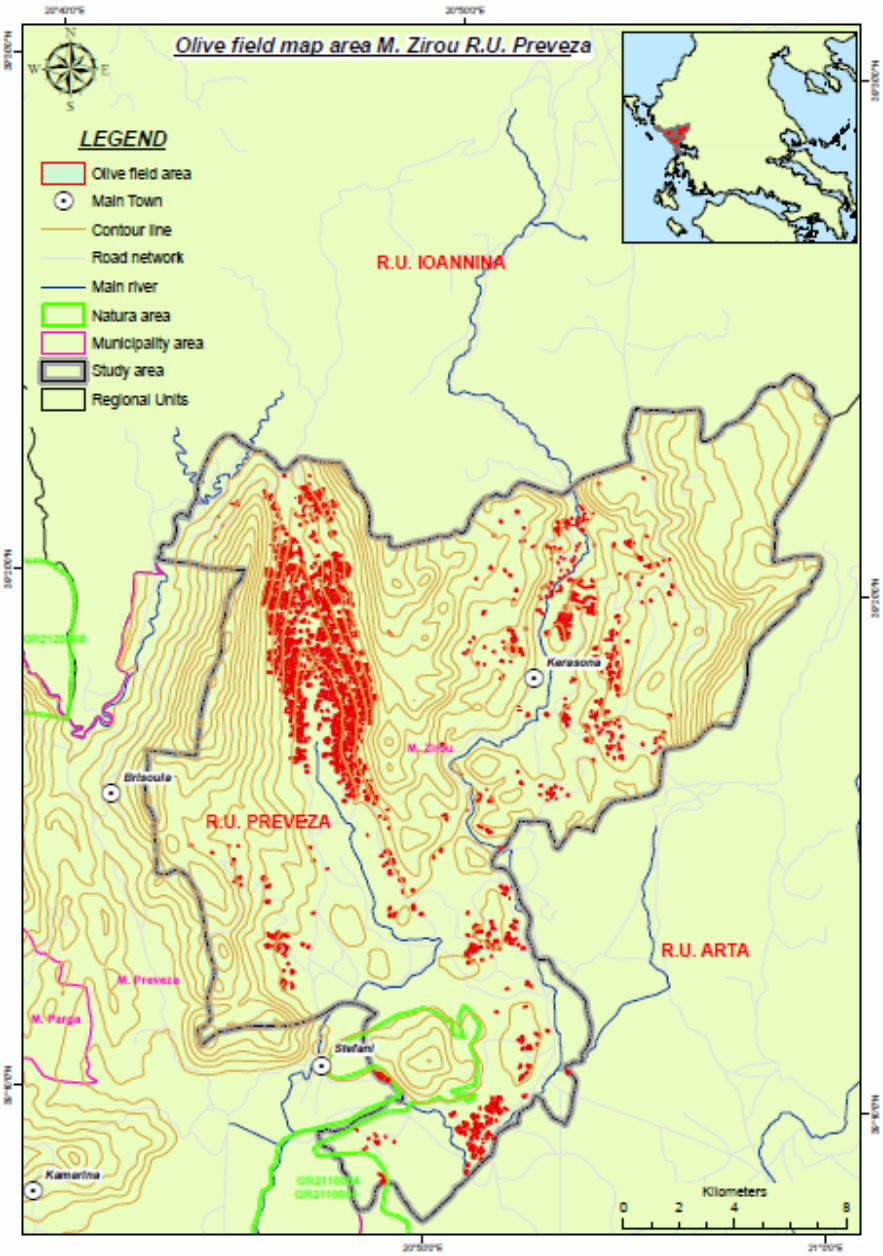


Figure 20 Olive fields in the Municipality of Ziros (Regional Unit of Preveza)

6.1 PGI areas for Konservolia Artas and Elaiolado Prevezas

Three EU schemes known as PDO (protected designation of origin), PGI (protected geographical indication) and TSG (traditional speciality guaranteed) promote and protect names of quality agricultural products and foodstuffs (EU, 2012).

The local variety of Arta "Konservolia Artas", has been defined as PGI with the Ministerial Decision (Greek Ministry of Agriculture) No: 317.713, published at the Governement Journal (FEK): 17b, 14/1/1994. The areas of the Regional Unit of Arta that are linked to this variety are: Peta, Kompoti, Grammenitsa, Vlaxerna.

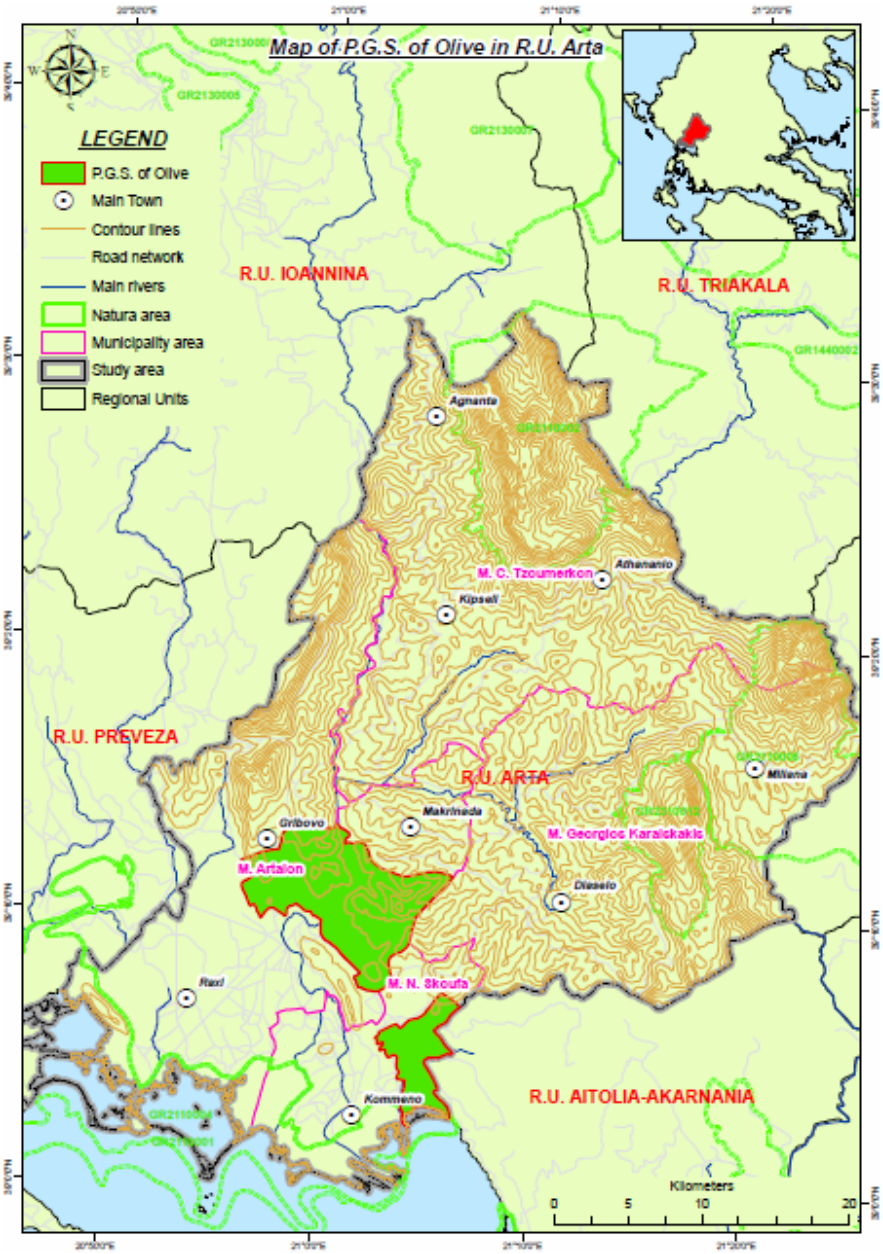


Figure 21 PGI "Konservolia Artas" areas (Regional Unit of Arta)

The olive oil "PREVEZA", has been defined as PGI with the Ministerial Decision (Greek Ministry of Agriculture) No: 440329, published at the Government Journal (FEK): 871b, 26/1/1993. The areas of the Regional Unit of Preveza that are linked to this olive oil are: Kamarina, Krypopigi, Riza, Lygia-Vrahos, Xeimadio, Michalitisi, Kastrosykia, Archaggelos and Megadendro.

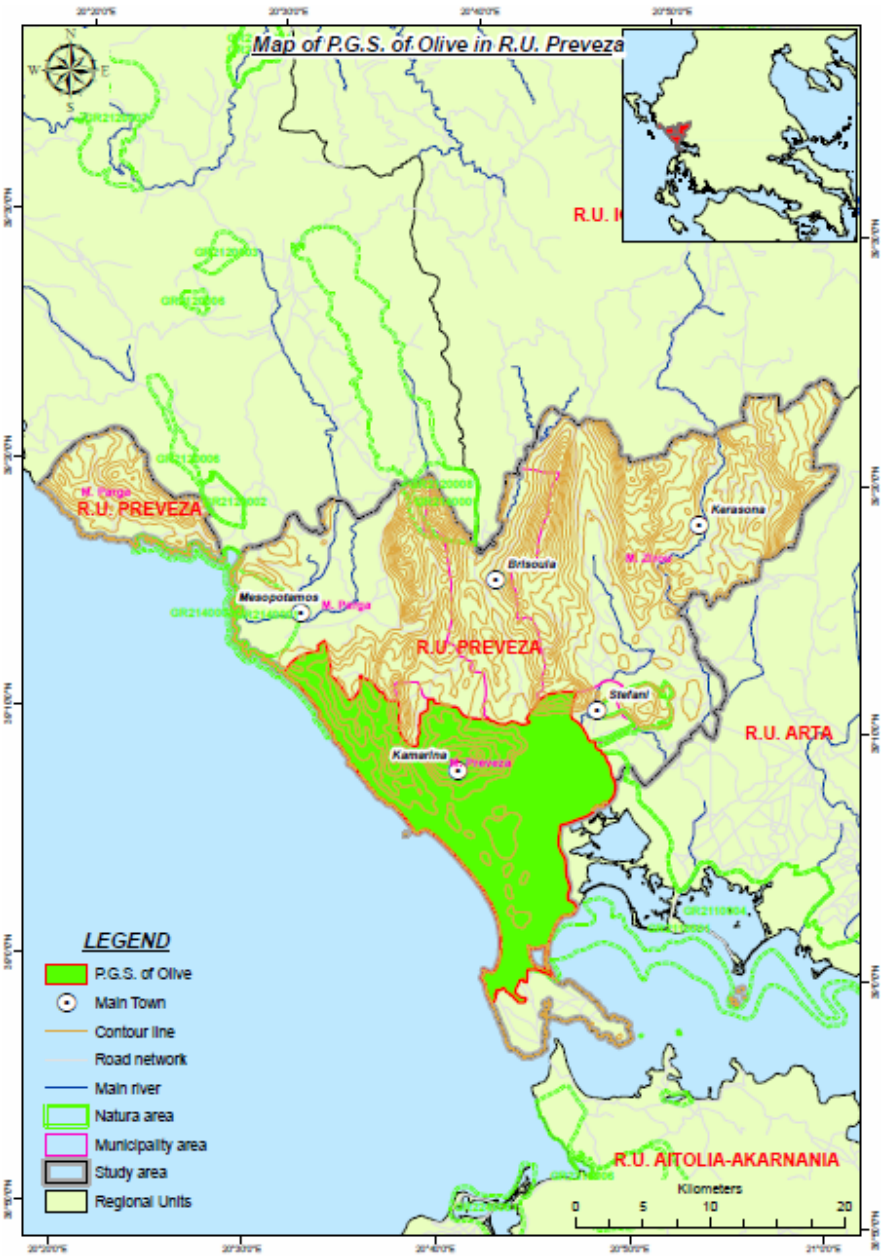


Figure 22 PGI "Elaiolado PREVEZA" areas (Regional Unit of Preveza)

7 Economical data regarding olive cultivation

According to the Greek Ministry of Agriculture (2010), the cost for establishment of an olive cultivation (without VAT) is about 1000€/ha for traditional layout (sparse) and about 1500€/ha for intensive layout (dense). The following table presents the operating costs and the expected yield and income from olive cultivation.

Table 4 Economical facts regarding olive cultivation in Arta and Preveza (Minagric, 2004)

Orientation: table olives	Orientation: olive oil
A. Operating costs (€/0.1ha):	**A. Operating costs (€/0.1ha):**
1. Fertilisers: 8,80-14,67	1. Fertilisers: 5,87-11,74
2. Chemicals: 11,74-73,37	2. Chemicals: up to 8,80
3. Miscellaneous (irrigation costs etc): 5,87-10,27	3. Miscellaneous (irrigation costs etc): 5,87
B. Labor needs in h/0.1ha (human labor / machines	**B. Labor needs in h/0.1ha (human labor / machines**
1. Non irrigated cultivations 50-90 / 3	1. Non irrigated cultivations 50-90 / 3
2. Irrigated cultivation from network / flooding 50-90 / 3	2. Irrigated cultivation from network / flooding 50-90 / 3
3. Irrigated cultivation from network / microirrigation 50-90 / 3	3. Irrigated cultivation from network / microirrigation 50-90 / 3
4. Irrigated cultivation from drilling / flooding or sprinkler 50-90 / 3	4. Irrigated cultivation from drilling / flooding or sprinkler 50-90 / 3
5. Irrigated cultivation from drilling / microirrigation 50-90 / 3	5. Irrigated cultivation from drilling / microirrigation 50-90 / 3
C. Yield (kg/0.1ha)	**C. Yield (kg/0.1ha)**
1. Non irrigated cultivations 20 kg / tree	1. Non irrigated cultivations 4-6 kg / tree
2. Irrigated with microirrigation 35 kg / tree	2. Irrigated with microirrigation 5-7 kg / tree
3. Irrigated with other ways 40 kg / tree	3. Irrigated with other ways 6-8 kg / tree
D. Products value (€/kg): 1,30	**D. Products value (€/kg): 2,50**
E. Subsidies (€/kg): 1,17	**E. Subsidies (€/kg): 1,17**

According to the Greek Ministry of Agriculture (2009), the expected gross income from olive cultivation is 2.307€/ha for olive oil and 3.615€/ha for table olives while the corresponding labour needs are 440 and 550 per ha and year.

8 Local infrastructure relevant to olive process and commerce

Olive oil production in Arta and Preveza is about 4.800 tn/year while table olive production is about 6-8.000 tn/year (Region of Epirus, 2011). 29 olive mills are based in these areas (7 in Arta and 22 in Preveza). Several very small table olive workshops are based in the area. One significant factory is based in Preveza and one in Arta.

Most of the taverns at the area use local olive oil and olives, while retail trading of these products is mainly done by producers.

For the collection of the relevant spatial and tabular data a field survey based on facts provided by local industry and agriculture departments of the Region of Epirus had to be made.

Figure 23 Konakis Bros, olive oil mill and shop at Louros, Preveza (www.konakisoil.com)

Figure 24 Eli SA, table olive process unit at Archaggelos, Preveza

Figure 25 Paragaea, Olive Cultivation Museum and Shop at Parga, Preveza (inside view, www.paragaea.gr)

Figure 26 The factory of Intercomm at Kompoti (the previous factory of the local olive-farmers cooperation)

Figure 27 Typical table olive processing installations of the area (most of them do not fulfill the relevant legislation requirements)

Figure 28 Typical small olive mills of the area (Nov 2013)

Table 1 Olive processing and trading units at Arta and Preveza

Name	Type	Place	Area
ΖΑΜΠΑ Κ. - ΦΩΤΗΣ ΧΡ. Ο.Ε.	Olive Mill	Ag. Demetrios	Arta
ΖΙΩΡΗ Κ. ΑΦΟΙ Ο.Ε	Olive Mill	Grammenitsa	Arta
ΠΑΠΑΘΑΝΑΣΙΟΥ ΑΘΗΝΑ & ΑΘΑΝΑΣΙΟΣ ΟΕ	Olive Mill	Kompoti	Arta
Δ.Ε.Λ.Α	Olive Oil Packaging	Kompoti	Arta
INTERCOMM FOODS A.E.	Table olives processing	Kompoti	Arta
ΜΠΑΛΤΑΓΙΑΝΝΗΣ ΝΙΚΟΛΑΟΣ	Table olives processing	Kompoti	Arta
ΑΜΒΡΑΚΙΑ	Table olives processing	Kompoti	Arta
ΣΕΡΓΙΑΝΝΗΣ ΝΙΚΟΛΑΟΣ	Olive Mill	Limini	Arta
ΛΑ.-ΔΗ. ΠΑΝΗΣ ΟΕ	Olive Mill	Megarhi	Arta
ΧΡΙΣΤΟΠΑΝΟΣ ΧΡΙΣΤΟΣ Κ.	Table olives processing	Megarhi	Arta
ΠΑΝΗΣ ΘΕΩΔΟΡΟΣ	Table olives processing	Megarhi	Arta
ΠΑΠΑΣΠΥΡΟΣ ΑΘΑΝΑΣΙΟΣ Σ.	Table olives processing	Peta	Arta
ΒΙΤΣΙΟΣ ΛΑΜΠΡΟΣ & ΣΙΑ ΟΕ	Olive Mill	Vlaxerna	Arta
ΛΙΑΛΙΑΣ ΒΑΣΙΛΕΙΟΣ	Olive Mill	Agia	Preveza
ΣΚΑΡΠΟΣ Κ	Olive Mill	Agia	Preveza
ΕΝΩΜΕΝΑ ΕΛΑΙΟΤΡΙΒΕΙΑ	Olive Mill	Agia	Preveza
ΛΟΥΚΑΣ ΑΝΔΡΕΑΣ	Olive Mill	Agia - Anthousa	Preveza
ΝΟΥΣΙΑΣ ΙΩΑΝΝΗΣ	Olive Mill	Kamarina	Preveza
ΒΑΣΣΗΣ ΟΕ	Olive Mill	Kanalaki	Preveza
ΝΟΒΑΣ Δ.	Olive Mill	Kastrosykia	Preveza
ΚΟΛΙΟΣ ΝΙΚΟΛΑΟΣ	Olive Mill	Kastrosykia	Preveza
ΒΑΣΣΙΟΣ ΕΥΑΓΓΕΛΟΣ	Olive Mill	Kotsanopoulo	Preveza
ΖΗΚΑΣ ΚΑΙ ΣΙΑ	Olive Mill	Kryopigi	Preveza
ΝΑΣΤΑΣ ΣΠΥΡΟΣ ΚΑΙ ΓΕΩΡΓΙΟΣ	Olive Mill	Loutsa	Preveza
ΑΦΟΙ ΜΠΑΚΑ	Olive Mill	Lygia	Preveza
ΖΗΣΗΣ ΚΑΙ ΣΙΑ	Olive Mill	Myrsini	Preveza
ELI S.A. ΜΠΟΚΙΑΣ ΘΕΟΔΩΡΟΣ	Table olives processing and Packaging	N. Sinopi	Preveza
ΑΦΟΙ ΒΟΥΛΙΣΤΙΩΤΗ	Olive Mill	Oropos	Preveza
ΚΟΝΑΚΗΣ ΑΦΟΙ	Olive Mill - Packaging / Resale point	Oropos	Preveza
ΑΦΟΙ ΜΠΟΚΙΑ	Olive Mill	Papadates	Preveza
PARAGAEA ΛΙΑΚΡΗΣ ΗΛΙΑΣ	Olive Mill Museum Packaging / Resale point	Parga	Preveza
ΑΦΟΙ ΚΑΣΚΑΝΗ	Olive Mill	Vraxos	Preveza

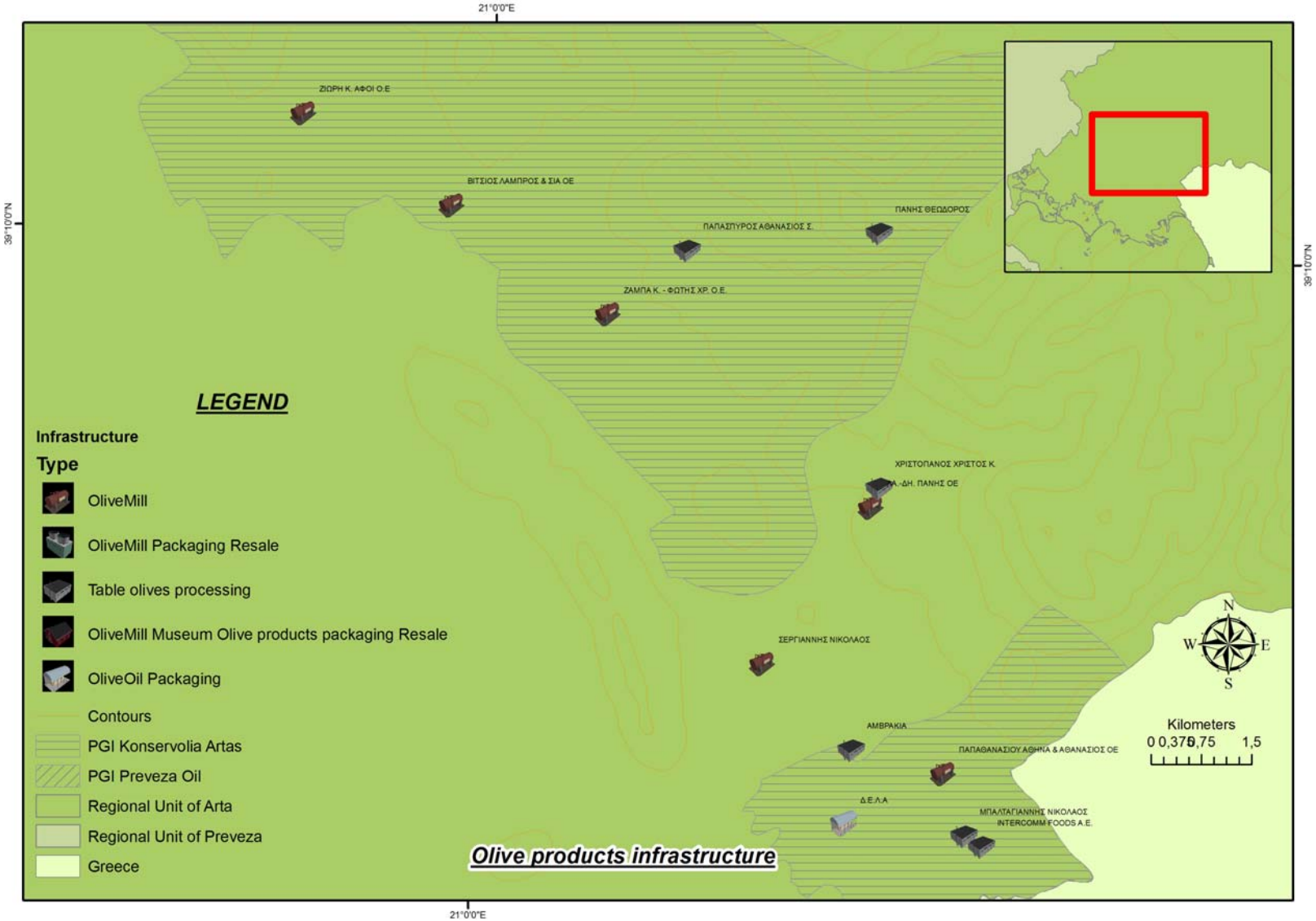
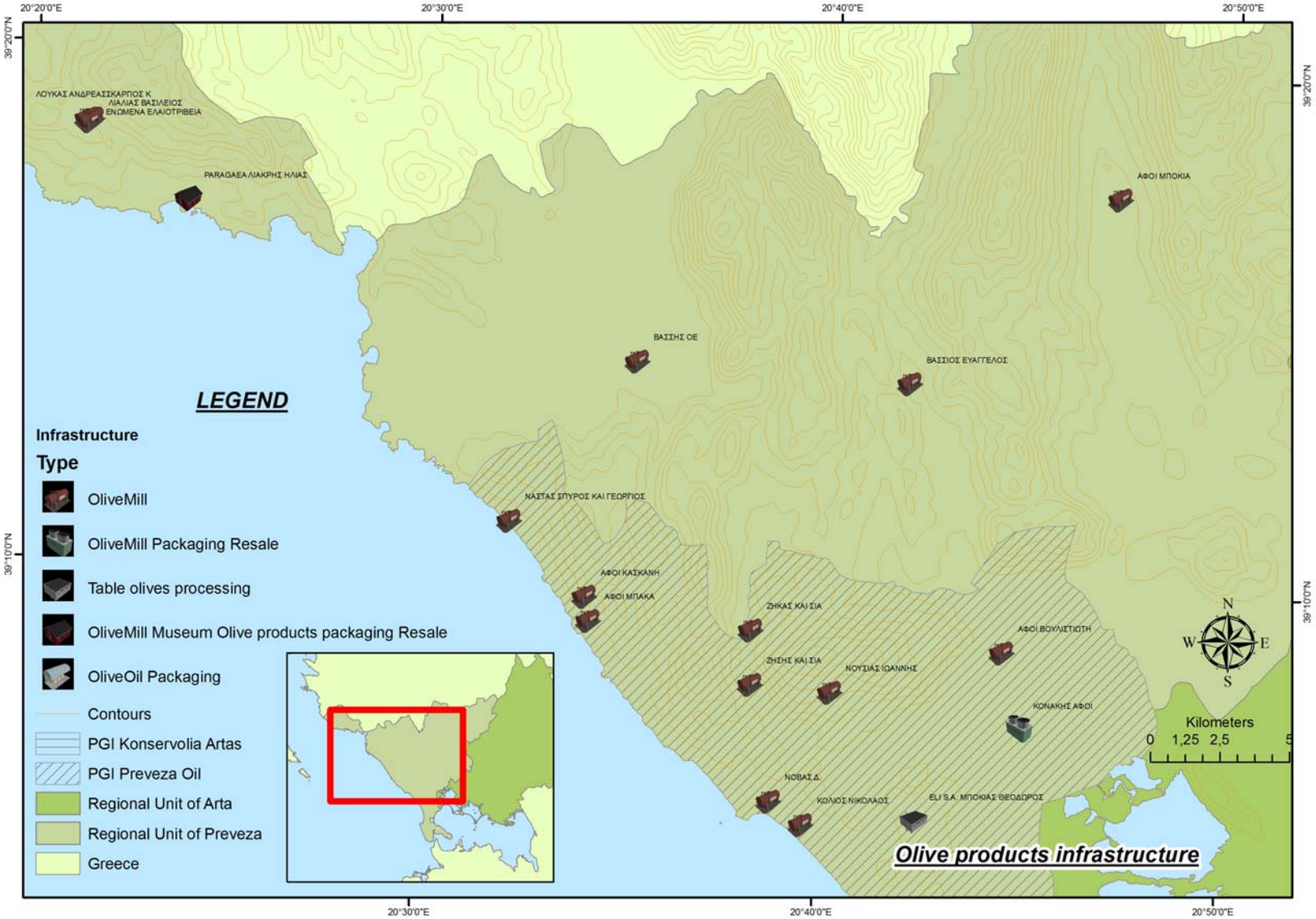


Figure 29 Map of olive process infrastructure in Arta


20°20'0"E
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39°10'0"N
ΛΟΥΚΑΣ ΑΝΔΡΕΑΣΙΚΑΡΠΟΣ Κ ΛΙΑΛΙΑΣ ΒΑΣΙΛΕΙΟΣ ΕΝΩΜΕΝΑ ΕΛΑΙΟΤΡΙΒΕΙΑ
PARAGAEA ΛΙΑΚΡΗΣ ΗΛΙΑΣ
ΑΦΟΙ ΜΠΟΚΙΑ
ΒΑΣΣΗΣ ΟΕ
ΒΑΣΣΙΟΣ ΕΥΑΓΓΕΛΟΣ
ΝΑΣΤΑΣ ΣΠΥΡΟΣ ΚΑΙ ΓΕΩΡΓΙΟΣ
ΑΦΟΙ ΚΑΣΚΑΝΗ
ΑΦΟΙ ΜΠΑΚΑ
ΖΗΚΑΣ ΚΑΙ ΣΙΑ
ΖΗΣΗΣ ΚΑΙ ΣΙΑ
ΝΟΥΣΙΑΣ ΙΩΑΝΝΗΣ
ΑΦΟΙ ΒΟΥΛΙΣΤΙΩΤΗ
ΚΟΝΑΚΗΣ ΑΦΟΙ
ΝΟΒΑΣ Δ.
ΚΟΛΙΟΣ ΝΙΚΟΛΑΟΣ
ΕΛΙ S.A. ΜΠΟΚΙΑΣ ΘΕΟΔΩΡΟΣ
LEGEND
Infrastructure
Type
OliveMill
OliveMill Packaging Resale
Table olives processing
OliveMill Museum Olive products packaging Resale
OliveOil Packaging
Contours
PGI Konservolia Artas
PGI Preveza Oil
Regional Unit of Arta
Regional Unit of Preveza
Greece
N
S
E
W
Kilometers
0 1,25 2,5 5
Olive products infrastructure

Figure 30 Map of olive process infrastructure in Preveza

9 Meteorological Facts

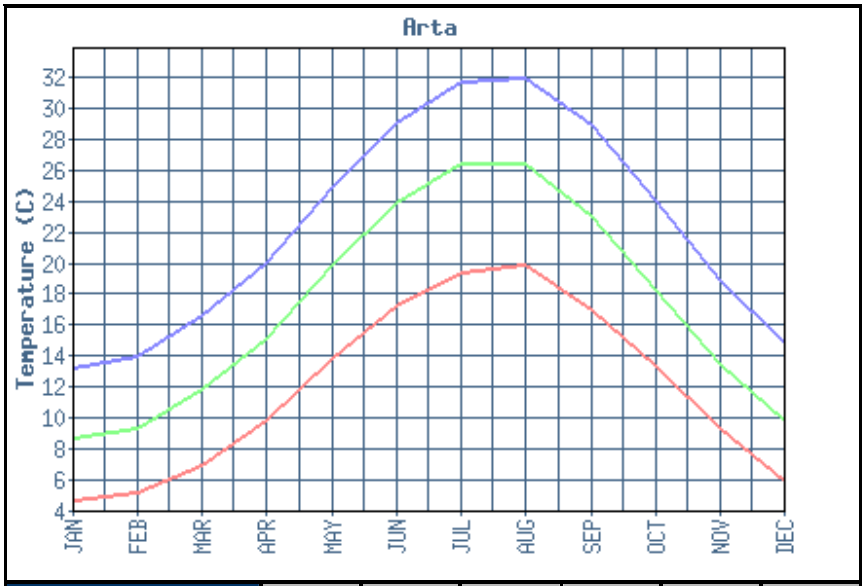
The following information is crucial in order to define the proposed areas for cultivation of olive trees.

Figure 31 Climatological information for Arta (HNMS, 2013)

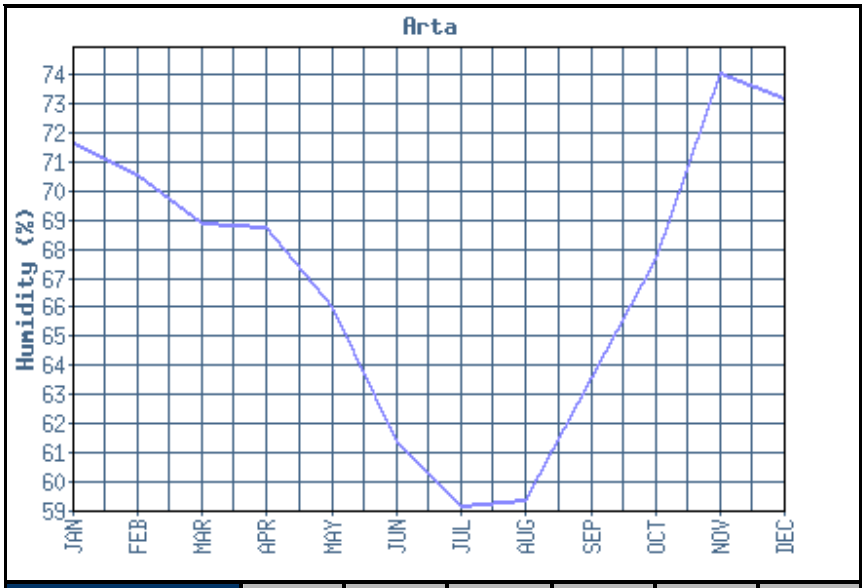
Arta: Longtitude 21°0'0" / Latitude 39°10'0"/ Alt 10,5m.

ABSOLUTE MAX. TEMP.: 41°C / ABSOLUTE MIN. TEMP.: -7,2°C

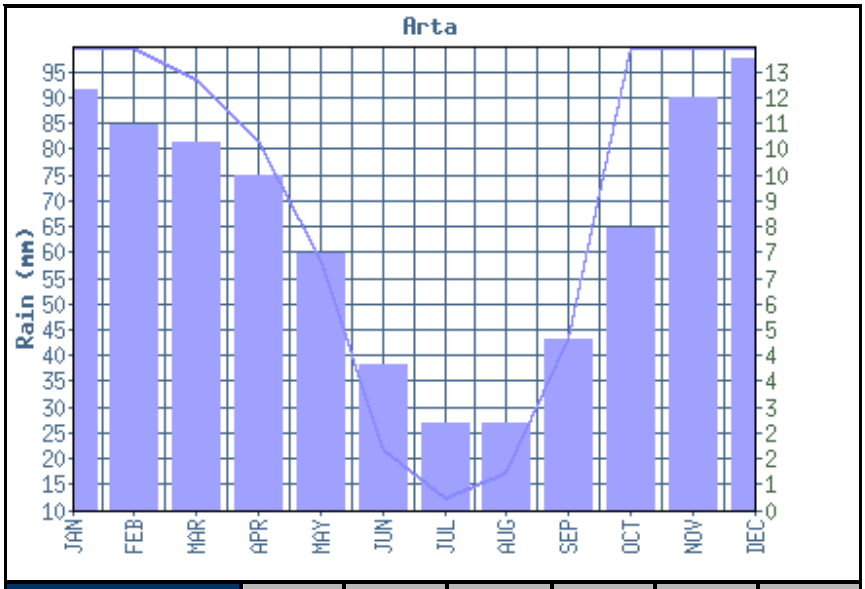
DATA PERIOD: 1976-1997



1° Semester	JAN	FEB	MAR	APR	MAY	JUN
Monthly Min Temperature	4.7	5.2	7.0	9.9	13.9	17.3
Monthly Average Temperature	8.7	9.4	11.9	15.2	19.9	24.0
Monthly Max Temperature	13.3	14.0	16.7	20.1	25.0	29.1
2° Semester	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Monthly Min Temperature	19.5	19.9	17.1	13.4	9.4	6.0
Monthly Average Temperature	26.5	26.5	23.1	18.3	13.5	9.9
Monthly Max Temperature	31.8	32.0	29.0	24.1	19.0	14.9

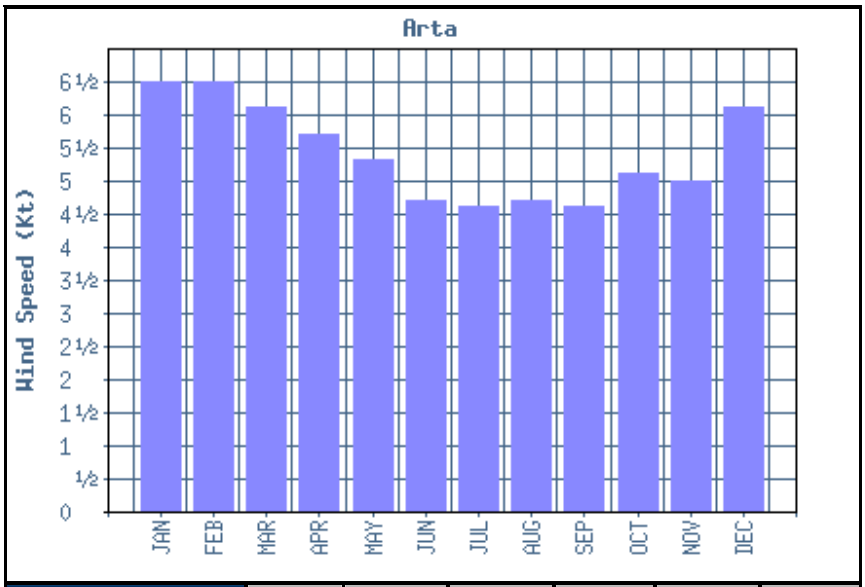


1° Semester	JAN	FEB	MAR	APR	MAY	JUN
Monthly Average Humidity	71.7	70.6	68.9	68.8	66.0	61.4
2° Semester	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Monthly Average Humidity	59.2	59.4	63.6	67.7	74.1	73.2

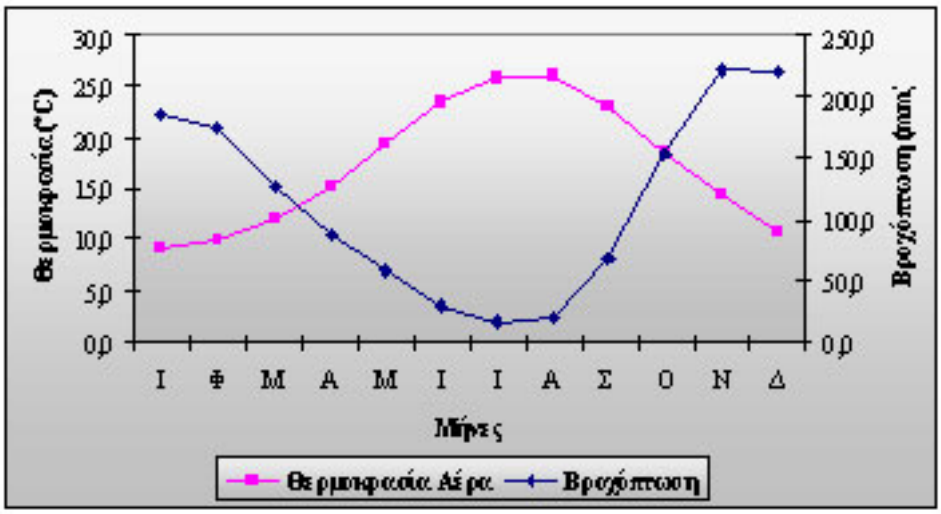


1° Semester	JAN	FEB	MAR	APR	MAY	JUN
Monthly Average Rainfall	99.9	99.9	93.8	81.5	58.5	21.8
Total days of Rain	12.1	11.1	10.6	9.6	7.4	4.2

2° Semester	JUL	AUG	SEP	OCT	NOV	DEC
Monthly Average Rainfall	12.6	17.2	43.5	99.9	99.9	99.9
Total days of Rain	2.5	2.5	4.9	8.1	11.9	13.0



1° Semester	JAN	FEB	MAR	APR	MAY	JUN
Monthly Average Wind Direction	NE	NE	NE	NE	NE	NE
Monthly Average Wind Speed	6.5	6.5	6.1	5.7	5.3	4.7
2° Semester	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Monthly Average Wind Direction	NE	NE	NE	NE	NE	NE
Monthly Average Wind Speed	4.6	4.7	4.6	5.1	5.0	6.1



Air temperature (°C) and Rainfall (mm)

Figure 32 Climatological information for the Regional Unit of Preveza (Regional Unit of Preveza, 2013)

Regarding microclimate data from the Global Land Data Assimilation System (GLDAS) are used.

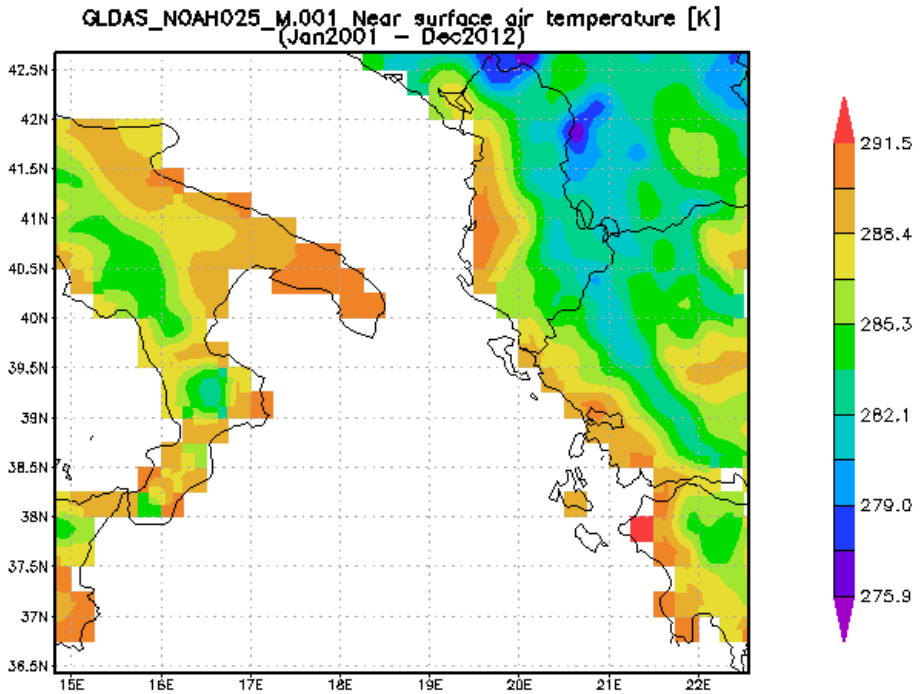


Figure 33 Twelve-year average (2001-2012) spatial distribution of Near Surface Air Temperature over the Arta and Preveza (GLDAS, 2013)

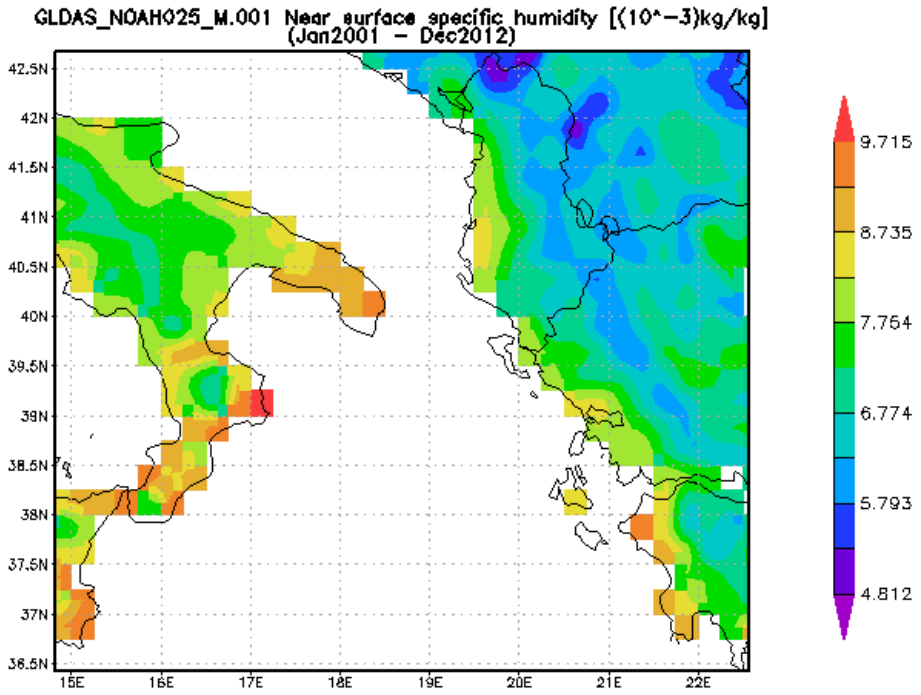


Figure 34 Twelve-year average (2001-2012) spatial distribution of Near Surface Specific Humidity over the Arta and Preveza (GLDAS, 2013)

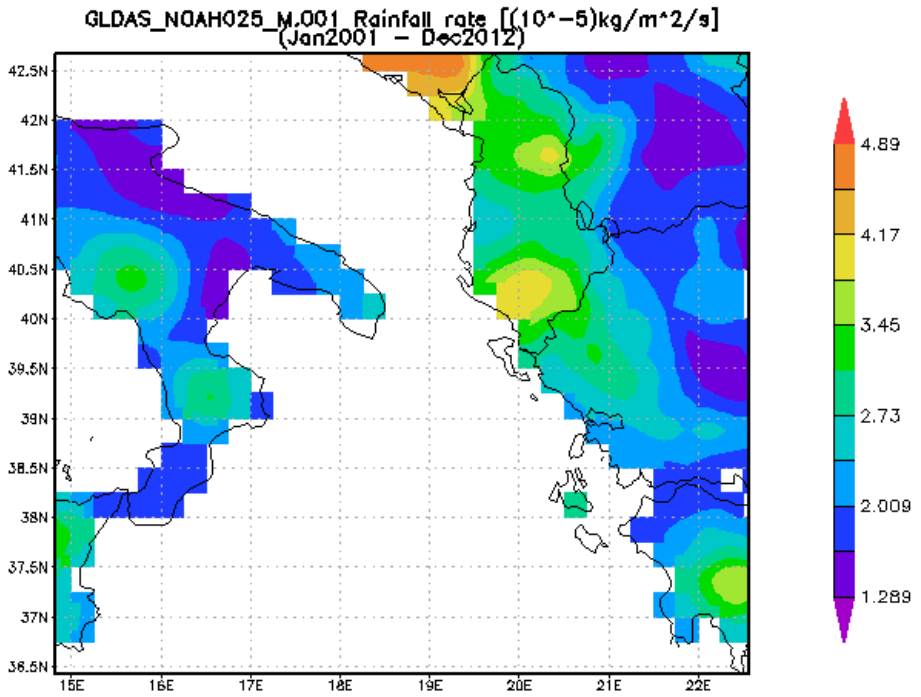


Figure 35 Twelve-year average (2001-2012) spatial distribution of Rainfall rate over the Arta and Preveza (GLDAS, 2013)

10 Proposed areas for the cultivation of olive trees

According to the relevant literature (Pontikis, 2000) olive trees should be cultivated in areas with:

- height 0-600m (with a preference to semi mountainous areas with a light slope)
- temperate climate with minimum temperature not less than -7°C
- acid soils (pH in every case should be less than 8,5).
- soils rich in calcium (Ca) and K

As the PGI areas for Arta and Preveza the proposed areas for the cultivation of olive trees in both regional units are presented in the following map.

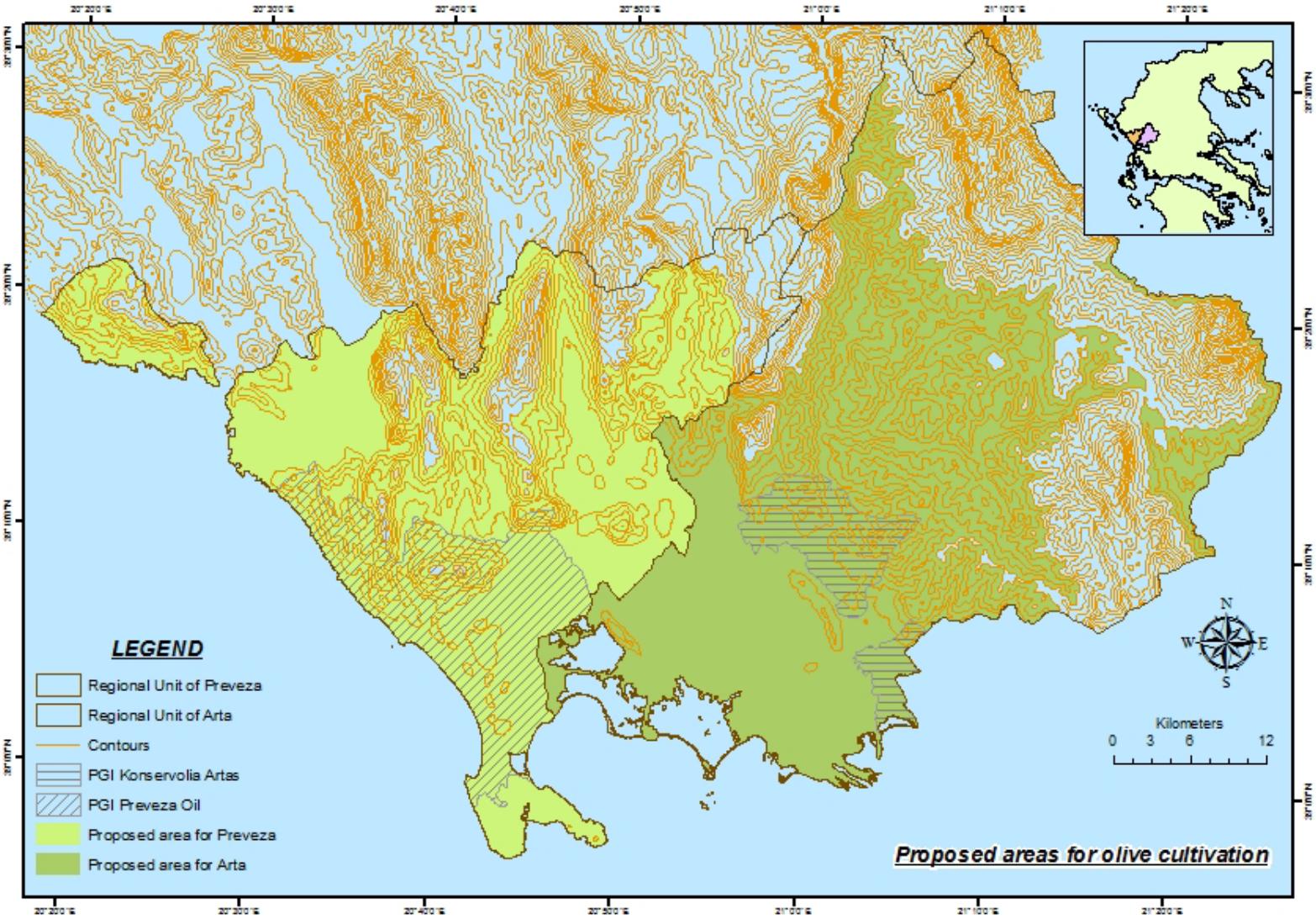


Figure 36 Proposed areas for the cultivation of olive trees in the regional units of Arta and Preveza

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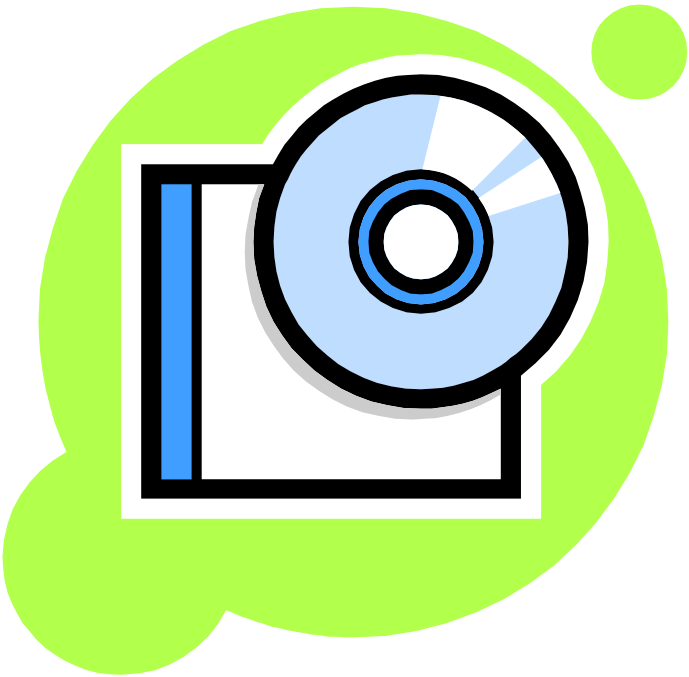
12 APPENDIX DVD with files in electronic form



Contains:

- Source aerial photos (jpg and/or tiff format)
- Source soil analysis data (xls format)
- Source data regarding olive cultivation in Arta and Preveza (xls format)
- Source shapefiles (shp)
- Produced shapefiles (shp)
- GIS projects and relevant maps (in pdf format)
- Images (jpg format)