



Flood impact assessment on the development of Archaia Olympia riparian area in Greece

C. N. Pasaporti, M. V. Podimata and P. C. Yannopoulos
Environmental Engineering Laboratory
Department of Civil Engineering, University of Patras, Greece
yannopp@upatras.gr



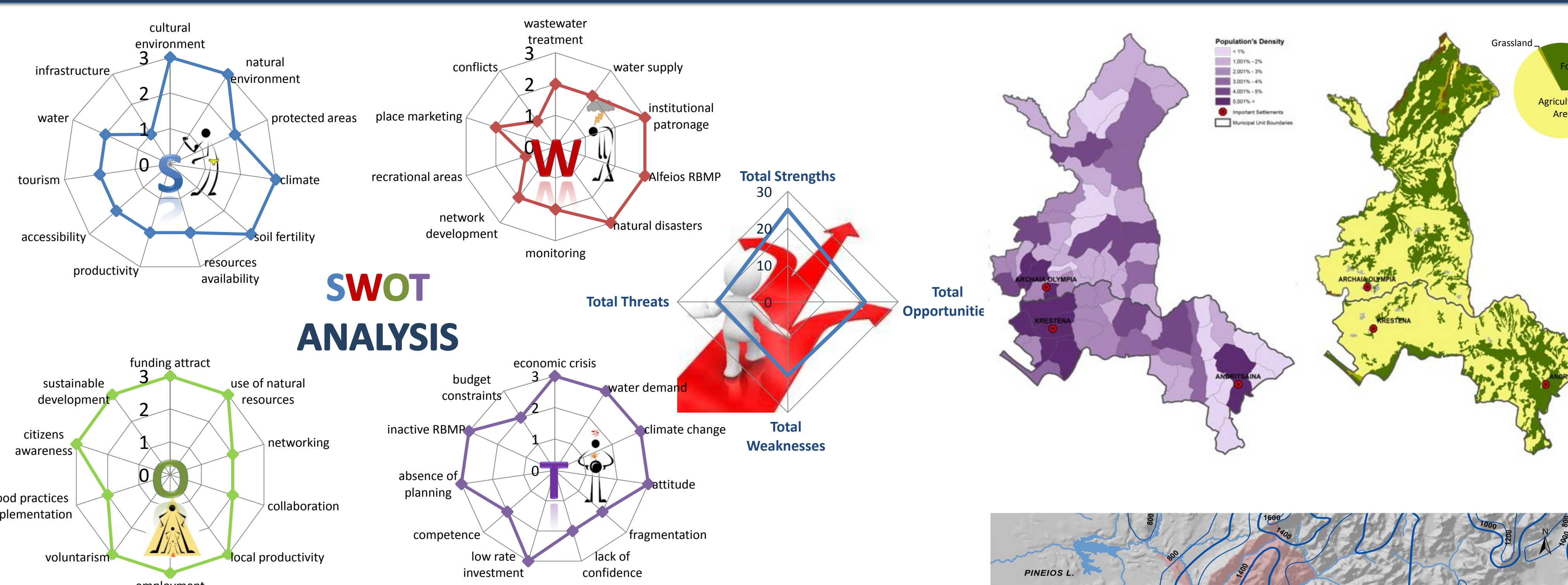
OVERVIEW

The riparian area of **Archaia Olympia** has outstanding cultural significance since it is the birthplace of the Olympic Games and athletic ideals. It is, also, characterized by a natural environment of great importance due to the fact that Alfeios River runs through it. Frequent **flood events** in the area have provoked many damages (i.e. ancient city of Olympia destruction by a massive layer of flood deposits) and, since nowadays, have led to severe economic and social impacts and high-cost flood protection works.

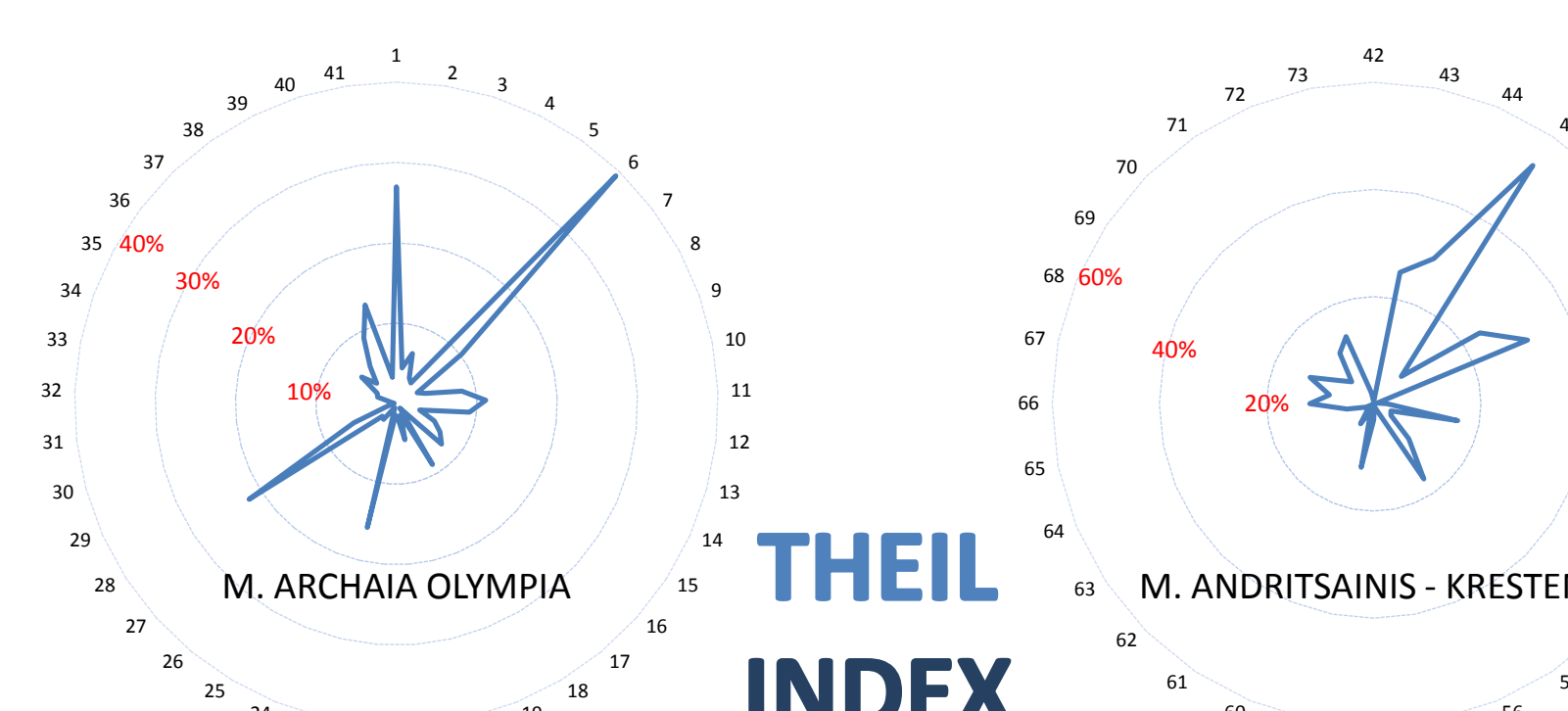
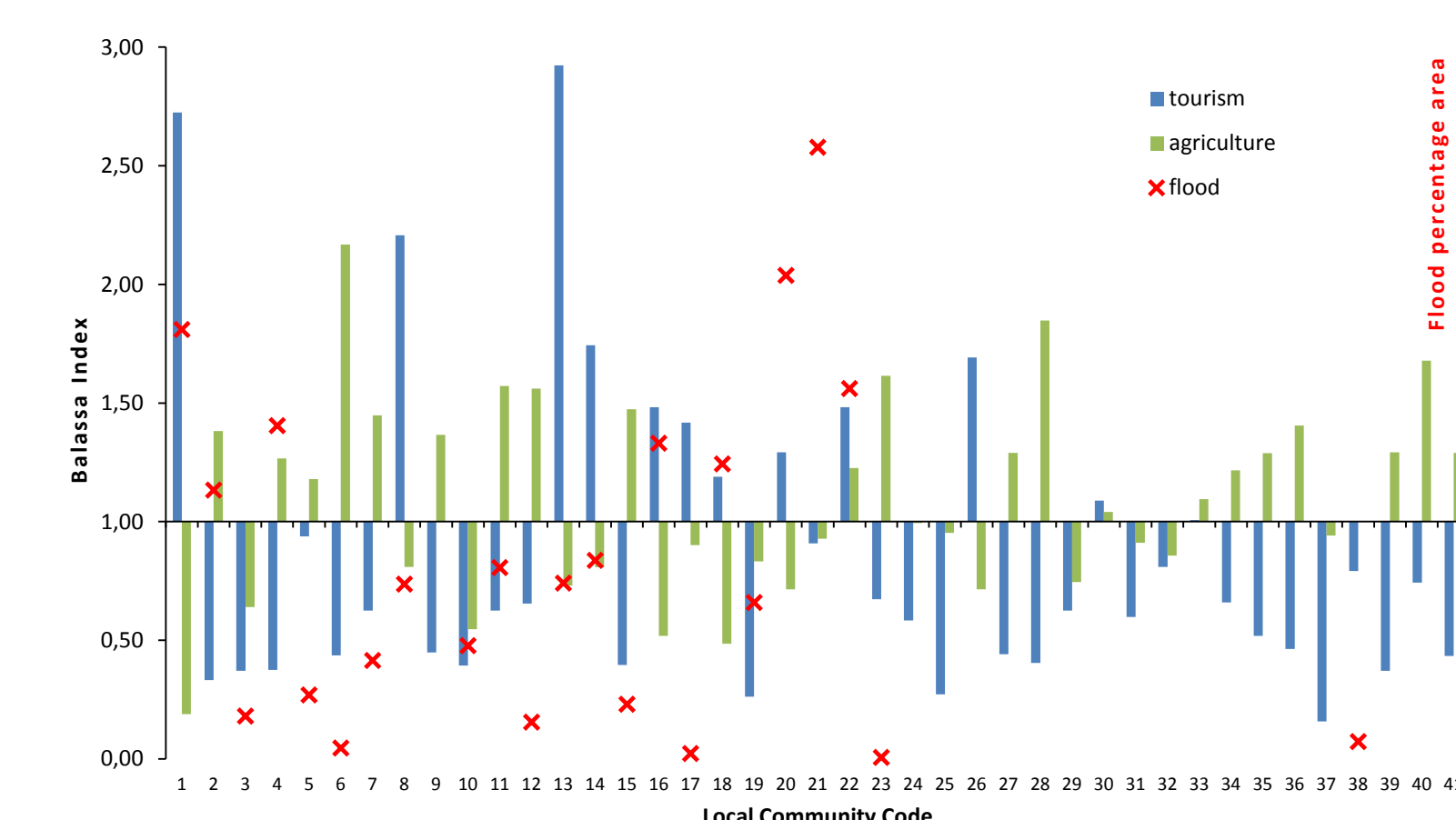
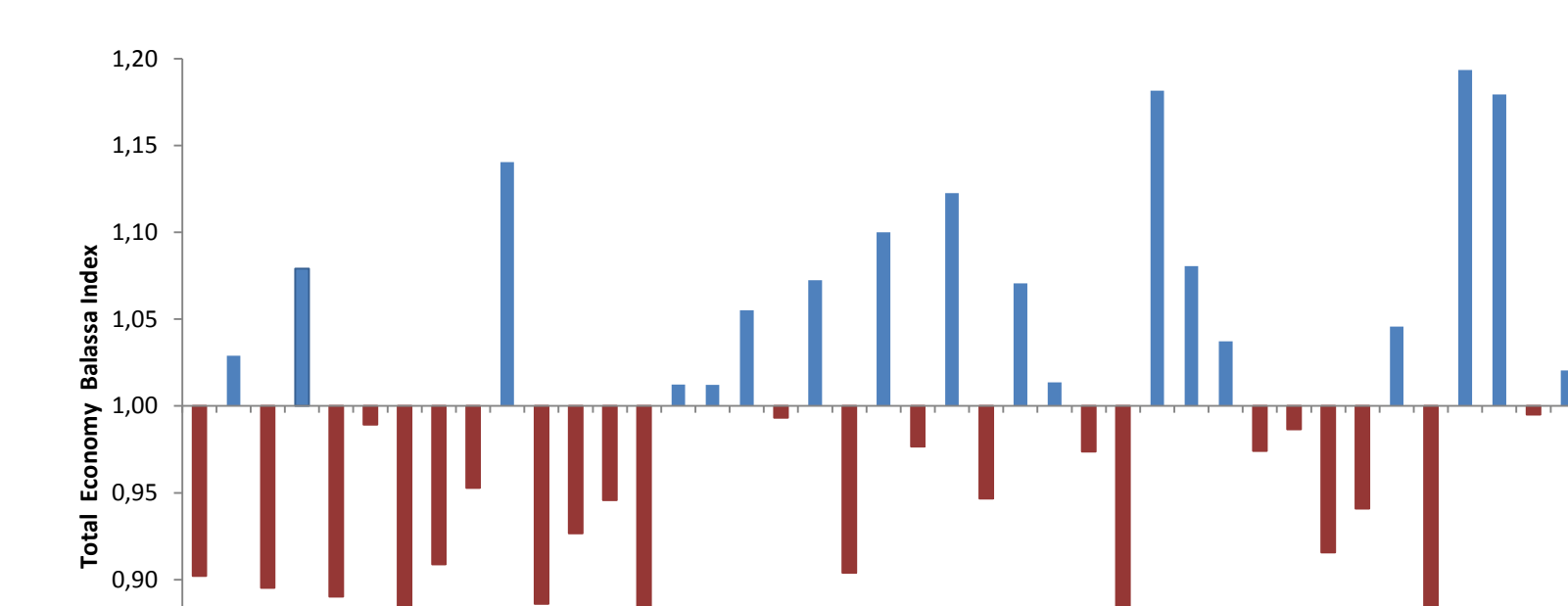
The importance of flooding in the studying area is demonstrated by flood protection works identified in the region since 1500 BC [1]. Pausanias scripts refer to flood contribution to high agricultural productivity in the area.

Recognizing the significance of the region for the developing economy and environmental sustainability, strategic management plans and flood control policies must be drawn up.

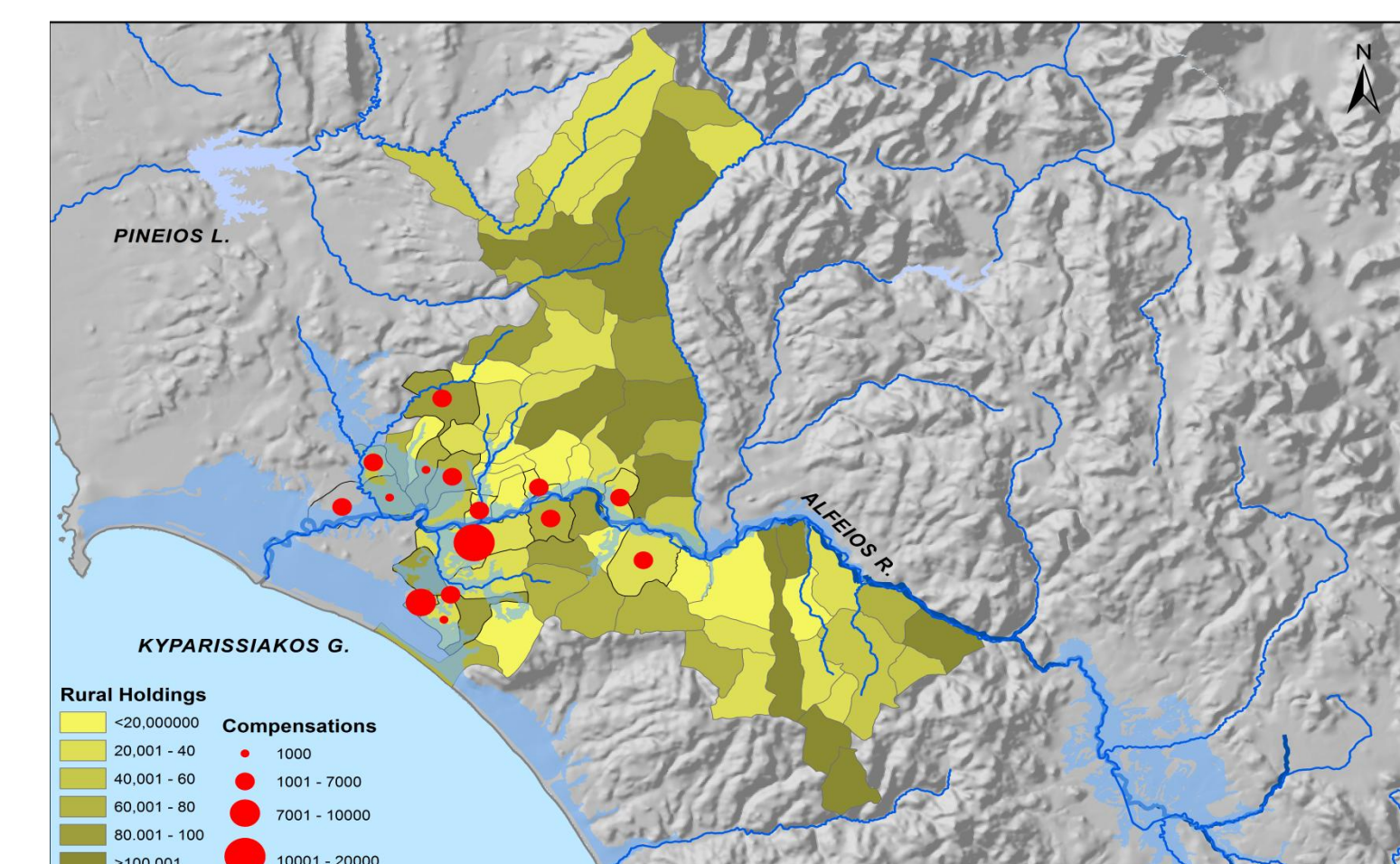
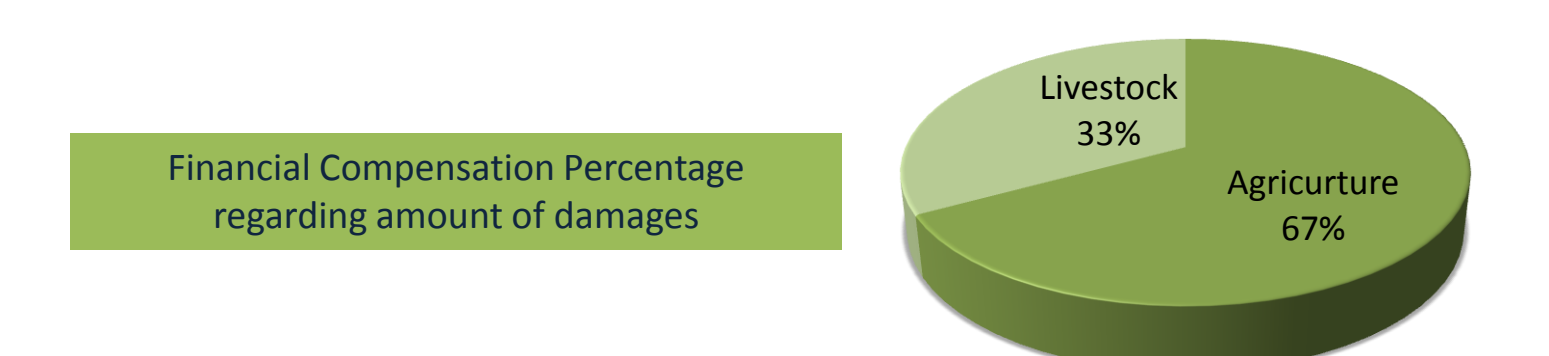
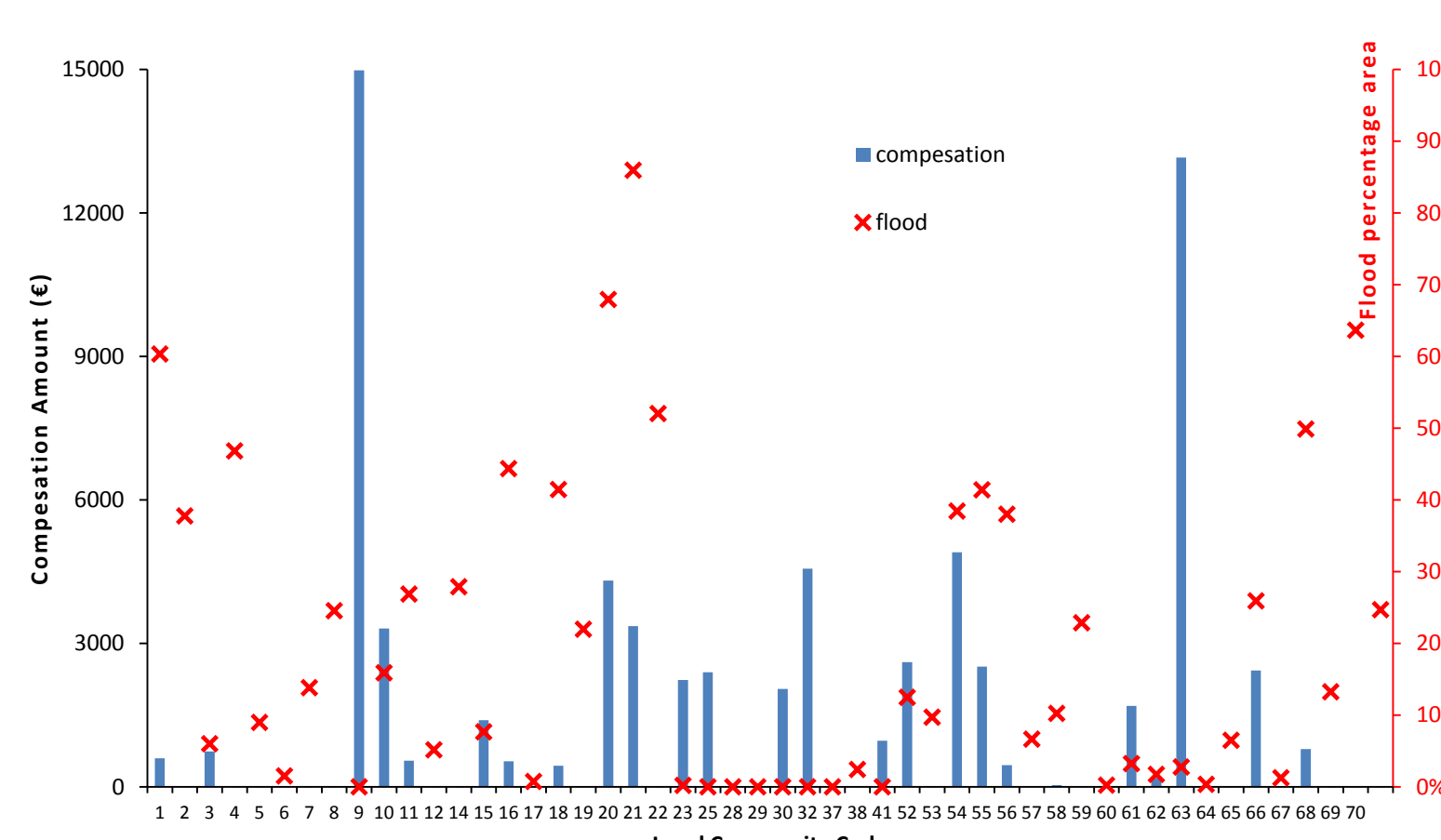
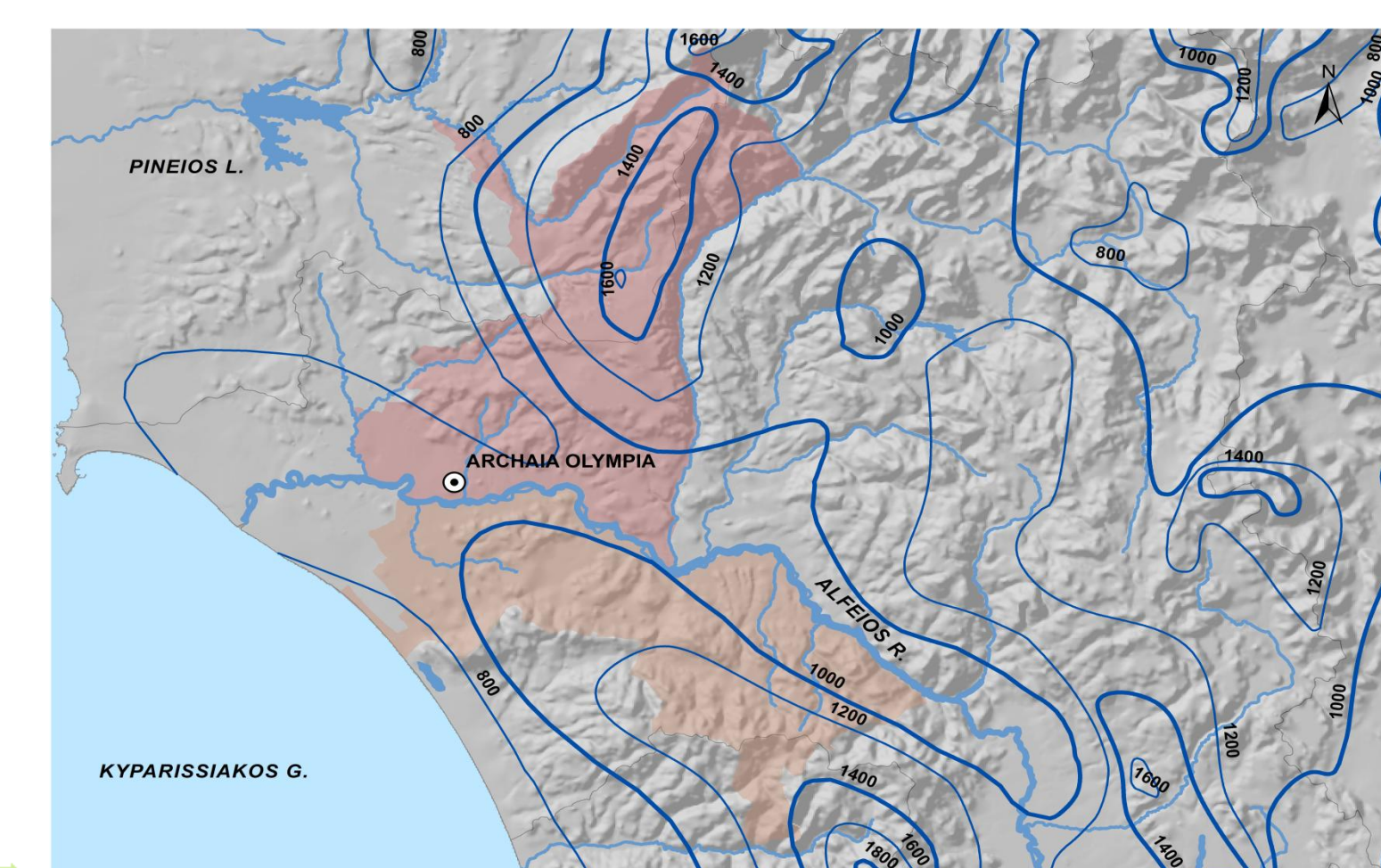
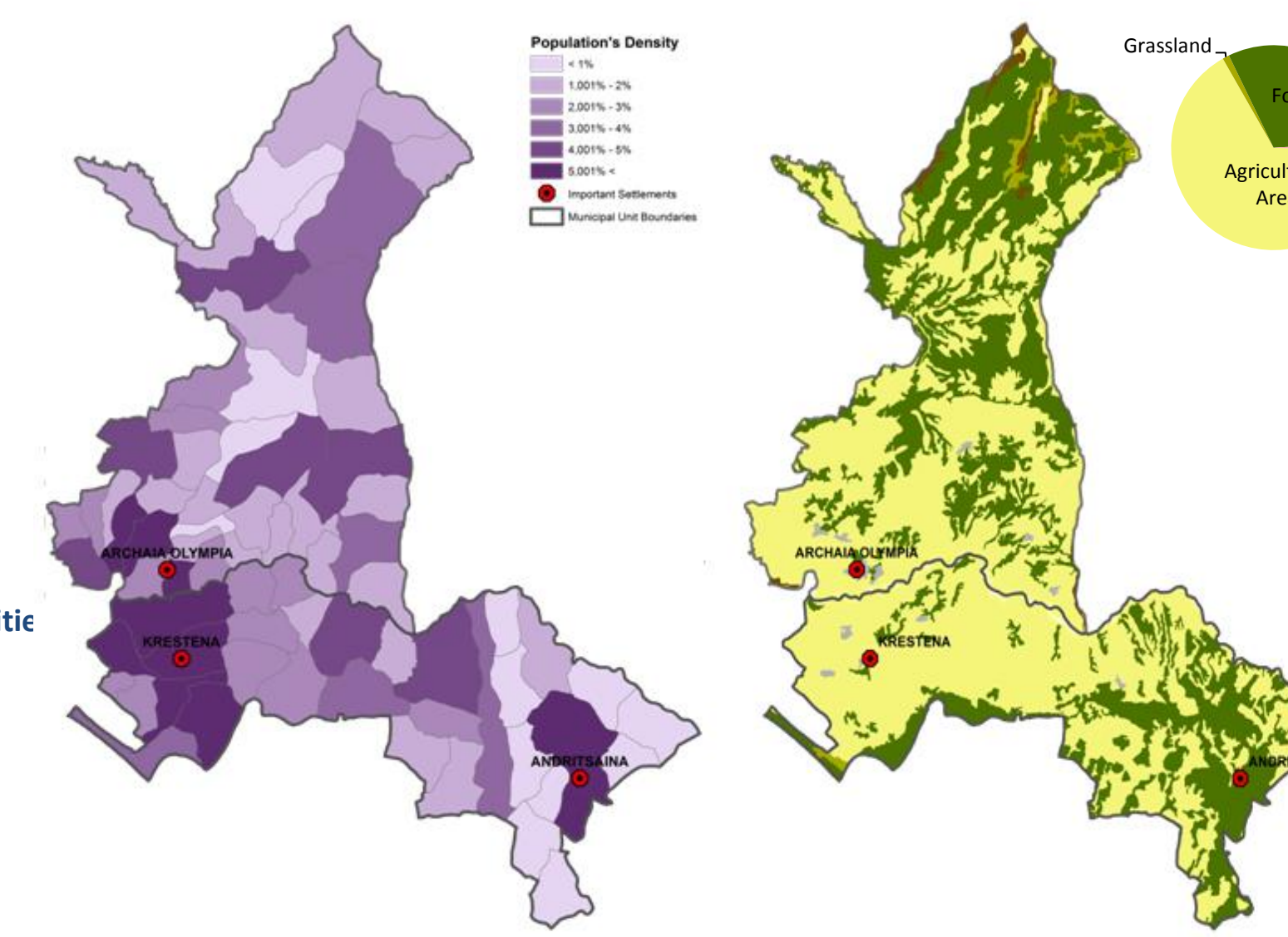
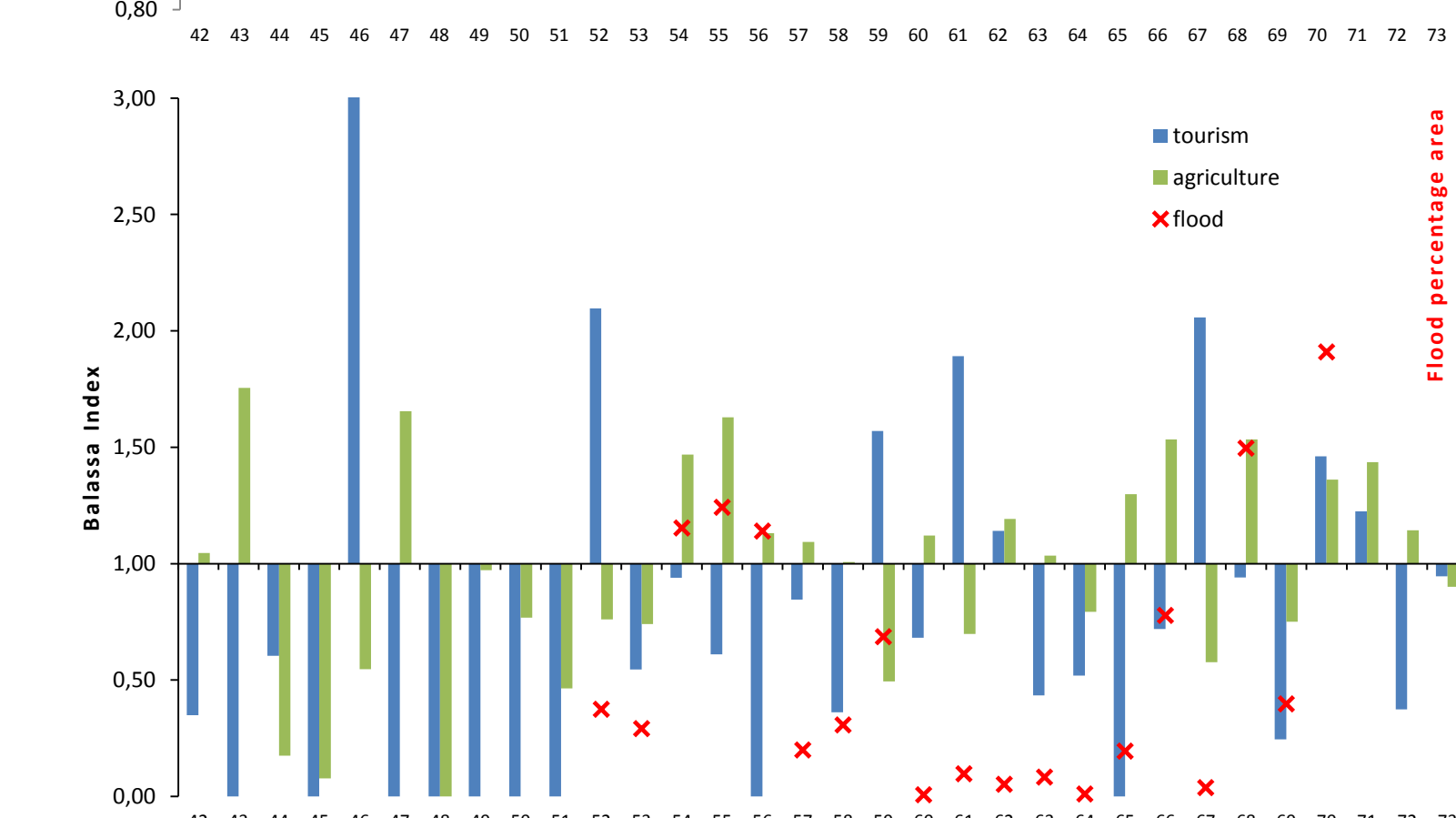
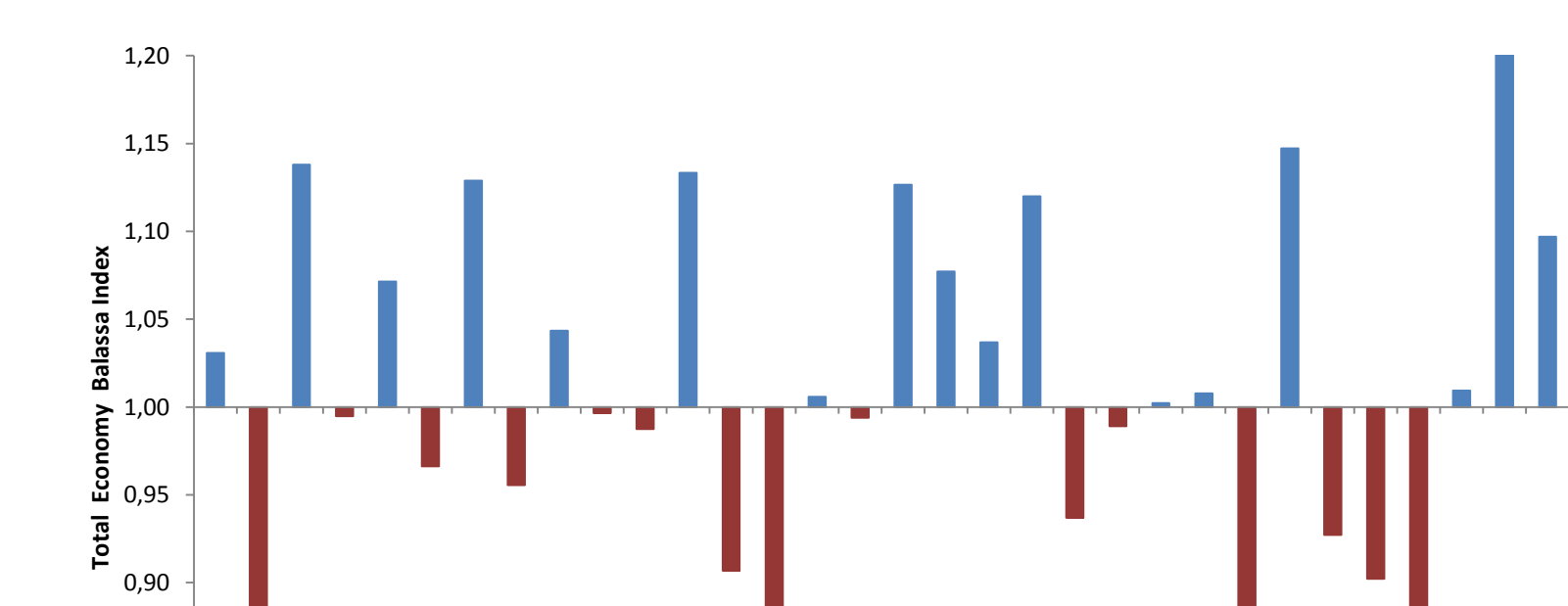
The main objective of this study is to identify the vulnerable local communities where the economic and social flood impacts are important. **SWOT analysis**, **Factor analysis** and **Spatial analysis** methods are proposed as policy tools, which contribute to decision-making processes. Understanding the adverse effects of flooding on development activities such as **farming**, **tourism** could assist in recognizing communities that need proper indemnifications and policy measures.



- L.C.s IN MUNICIPALITY OF ARCHAIA OLYMPIA
- 1 ARCHAIAS OLYMPIAS
- 2 ASPRON SPITION
- 3 VASILAKIOU
- 4 IRAKLIS
- 5 KAKEMIS
- 6 KAVKONIAS
- 7 KLADEOU
- 8 KOSKINA
- 9 KRYONERIOU
- 10 LINARIAS
- 11 LOUVROU
- 12 MAGIRA
- 13 MIRSARAS
- 14 MOURIAS
- 15 KSIROKAMPOU
- 16 PELOPIOU
- 17 PEUKON
- 18 PLATANOU
- 19 POURNARIOU
- 20 SMILAS
- 21 STREPIOU
- 22 FLOKA
- 23 CHELIDONIOU
- 24 ANTRONIOU
- 25 AGIAS KYRIAKIS
- 26 AGIAS TRIADOS
- 27 KAKOTARIOU
- 28 KRYOVRISIS
- 29 TSIPANON
- 30 LAMPHAS
- 31 ASTRA
- 32 OREINIS
- 33 LALA
- 34 ACHLADINIS
- 35 DOYKA
- 36 KOUMANI
- 37 MILEON
- 38 NEMOULTAS
- 39 NERAIIDAS
- 40 PERAINIS
- 41 FOLOIS



- L.C.s IN MUNICIPALITY OF ANDRITSAINIS - KRESTENON
- 42 LIVADAKIOU
- 43 VRESTOU
- 44 ANDRITSAINIS
- 45 THEISOAS
- 46 FANARIOU
- 47 MYRONION
- 48 ROVION
- 49 KOUFOPOULOU
- 50 LINISTAINIS
- 51 DRAGOIOU
- 52 KALYVAKION
- 53 FRIKSHS
- 54 MAKRISION
- 55 KALLIKOMOU
- 56 PLOUTOXORIOU
- 57 SKILLOYNTIAS
- 58 DIASELLON
- 59 KRESTENON
- 60 AMYGDALION
- 61 DAFNOULAS
- 62 KALITHEAS
- 63 SEKOUA
- 64 GRYLIOU
- 65 TRYPTIS
- 66 RAXON
- 67 GRAIKA
- 68 SAMIKOU
- 69 VRINAS
- 70 KATO SAMIKOU
- 71 PLATANAS
- 72 ALIFEERAS
- 73 MATESIOU

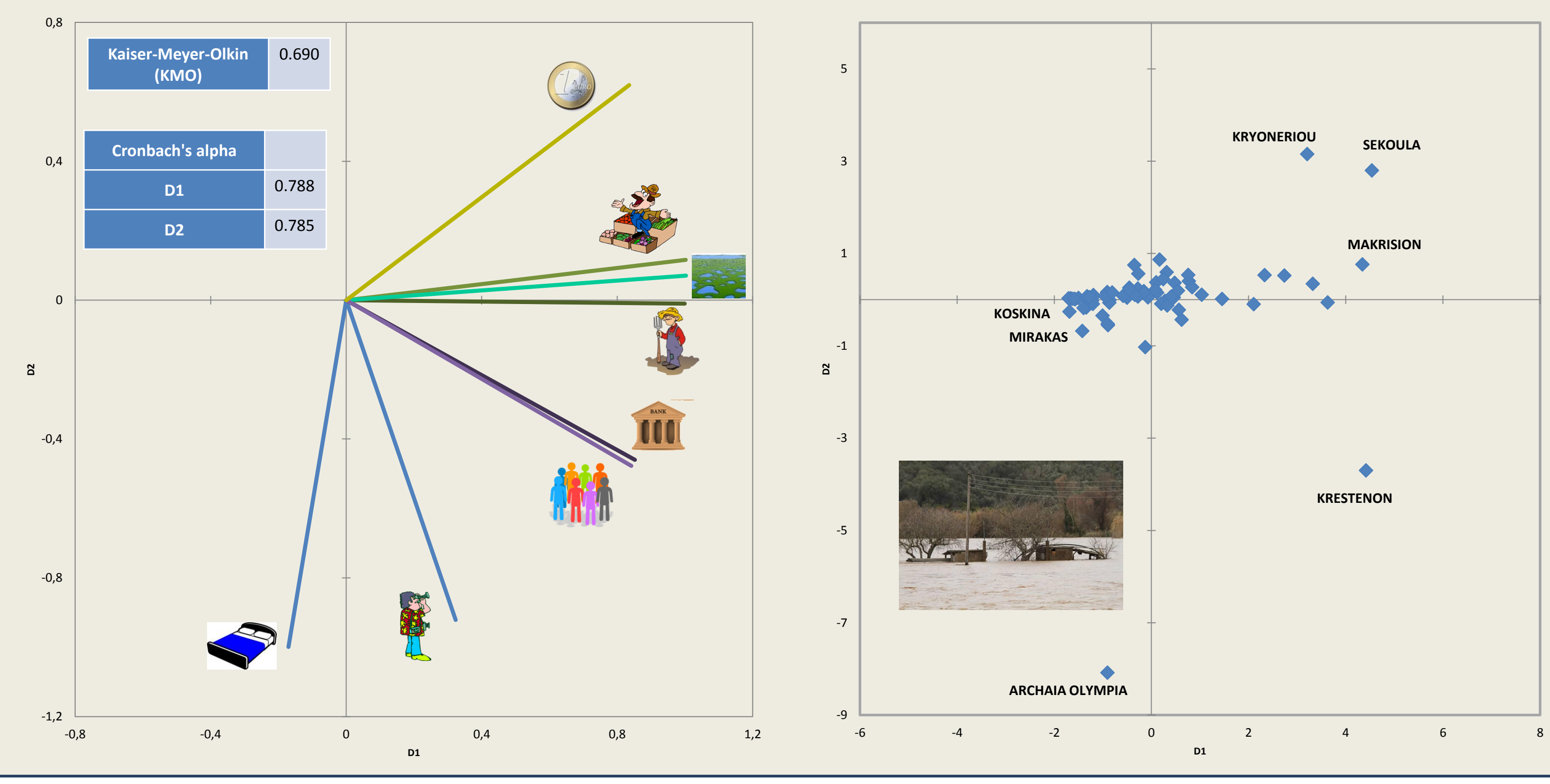


APPRICATIONS

Factor Analysis employs Principal Component Analysis as the extraction method and Oblimin with Kaiser Normalization, as the rotation method

Combining the outcomes of Factor Analysis, two hidden (but expected!) factors emerged: The characteristic hydro-morphology of the study area (factor D1) and the historical heritage value of ancient Olympia (factor D2). D1 explains the 36% of variance and D2 24%, respectively. The analysis underlines (a) high dependence of Archaia Olympia on the flood events of Alfeios R. (D1) which threaten the archaeological site and agricultural production and (b) the high economic development of this local community due to strong socio-economic and touristic variables (D2).

Oblimin rotation shows that (a) touristic variables are independent to flood and agriculture variables and (b) total economic factor depends both on touristic and agricultural activities.



CONCLUSION

SWOT analysis indicates the development perspective of the study area. The rating of strengths and opportunities is higher than weaknesses' and threats'. Balassa and Theil Index indicate (a) dissimilarities in sectoral composition of each community compared with the physiognomy of each municipality and (b) the comparative (dis)advantage of each community relative to the reference municipality. The combination of the described procedures combined with G.I.S. and Factor Analysis outcomes highlights the **adverse effects of flood events** on the economic growth of the riparian area and points out **critical communities**.

The methodology followed could act as a fundamental approach for decision-making and may be further examined with validation processes. **Decision-** and **policy-makers** can use the above methodology in order to support their decision-making on flood events.

REFERENCES

[1] Mariolakos I. and Fountoulis I. (2007), Geoenvironmental impacts of fires in the wider area of Archaia Olympia, Kronios Hill - Measure proposals, (http://library.tee.gr/digital/m2264/m2264_mariolakos1.pdf)
[2] Cutrini E. (2005), The Balassa Index meets the Theil Index: a Decomposition Methodology for Location Studies, (<http://www.sre.wu-wien.ac.at/ersa/ersaconfs/ersa05/papers/123.pdf>)
[3] http://en.wikipedia.org/wiki/Factor_analysis (accessed online 3/4/2013)

ACKNOWLEDGMENTS

Thanks to Greek Scholarship Foundation for PhD support, Mr. V. Gravalos (Greek Agricultural Compensation Organization) for providing data and Mr. G. Dimitropoulos (3Print Company) for printing lenticular and scoc cards. The present work is supported by HYDROCRITES University Network (<http://www.hydrocrites.upatras.gr>).

METHODOLOGY

- SWOT ANALYSIS**: estimates the vulnerable and strong elements of a study area by environmental and socio-economic perspective
- THEIL INDEX**: evaluates the economic structure diversification rate among the local communities of the study area [2]
- BALASSA INDEX**: indicates the advantageous and disadvantageous local communities related to the mean economic structure of each municipal unit
- FACTOR ANALYSIS**: calculates factors that explain the variability among eight observed, correlated variables [3]

