

NAVARINO ENVIRONMENTAL OBSERVATORY

NEO Management

Thursday, 08 August 2019

NEO NEA #32 (January - June 2019)

NEO stands for Navarino Environmental Observatory. But NEO in Greek (νέο) means news as well and NEA is its plural. So, this is our news!

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Foreword

NEO continues to develop as a meeting place for science, policy and education and the first six months of 2019 is no exception. An important event that can serve as an example was the stakeholder workshop organized in June at NEO under the Horizon2020 research programme COASTAL. This event brought together representatives from key economic sectors of the region that, together with researchers, identified challenges and opportunities related to land-sea interaction, and integrated coastal zone management. Similar workshops have been organized in the 6 regions under COASTAL, and NEO thus become part of a broader European network of research collaboration. The station has also hosted numerous researchers and visiting students and the work at NEO continues to generate academic publications. In addition, investments in monitoring capacities continues that will further strengthen NEOs relevance and capacity to host researchers and students.

The station continues to serve as an important base for various student field trips, covering a range of different disciplines. This demonstrates one of the advantages of this region, as it offers opportunities for applied research and studies within so many different areas. You can read more about this in the newsletter and we are open to host additional student groups in the future.

A major event this spring was the conference on “Challenges and Opportunities related to a new Climate Economy: Driving innovation for Sustainable Development” that was organized at the Academy of Athens on 2 May as a collaboration between the NEO Partners and the Swedish Embassy in Greece. More than 200 participants from academia, business, civil society and the public sector attended and event was honoured with the presence of HE The President of the Hellenic Republic Mr Prokopios Pavlopoulos and HRH Crown Princess Victoria of Sweden. The event also received broad media coverage.

In conjunction with the conference, a meeting with the heads of the three partners was organized to discuss the future of NEO. The current collaborative agreements between the Academy of Athens, TEMES SA and Stockholm University ends in March 2020 and a discussion was therefore held about the future of NEO. All three partners expressed their commitment to continue the collaboration and a new partner agreement covering the period 2020-2025 will be developed. The partners also committed to further increase their financial support (direct and/or in-kind) and also decided that the NEO collaboration should be open to new partners. This forms a strong basis to further develop the NEO in the coming years.

Happy Reading!



Figure 1: The Academy of Athens.



Figure 2: NEO Seminar was honoured with the presence of HE The President of the Hellenic Republic Mr Prokopios Pavlopoulos and HRH Crown Princess Victoria of Sweden and the Swedish Ambassador to Greece, Charlotte Sammelin.

Activities

Research

- **COASTAL (Collaborative Land-Sea Integration Platform) EU project (No 773782)**

General Assembly

The 1st annual General Assembly of the COASTAL project was held between 6-9 May 2019 in Methoni, SW Messinia, Greece, organised by HCMR and NEO (SU). The objectives of the meeting focus on discussing the overall progress of COASTAL: progress of the Work Packages, initial MAL outcomes and other interim results and upcoming tasks. There was also a modelling workshop and a visit to the Greek Case Study site in Pylos and the Navarino Environmental Observatory.



Figure 3: COASTAL researchers visiting NEO.

MAL workshop

NEO station, June 26

Under the umbrella of COASTAL (Collaborative Land-Sea Integration Platform) project, in June 2019, NEO hosted the first MAL (Multi-Actor Lab) workshop, which was co-organized by HCMR (Hellenic Centre of Marine Research) and NEO. Compared to the previous six sectoral workshops (NEONEA 31; NEONEA 30), in which land-sea interactions in each sector were analysed by local stakeholders separately, the MAL workshop brought together representative stakeholders from all the sectors (agriculture, local industry, fishing, tourism, public sector, universities, institutes and NGOs), with a threefold aim:

- a. To create a common understanding among the participants regarding the complexity and the connectivity of the socio-ecological system of SW Messinia.
- b. To validate the results from the six sectoral workshops.
- c. To discuss and agree on a common vision about the future of the area.



Figure 4: A group of participants working together on validating the land-sea interaction models.

- **Environmental monitoring**

Related Bachelor thesis in collaboration with the American College of Greece

- ✓ *Evaluating the effects, seasonal fluctuations and persistence of microplastic littering in Voidokilia beach, Messinia*

International Honors Program at the American College of Greece

(By Apostolos Fillipos Pappas, Supervisor: Michael Valahas)

- ✓ *Winter Seasonal Variation in Mediterranean Wetlands and the Effect of Agricultural Activities on Water Quality: The case of Yalova, Greece*

International Honors Program at the American College of Greece

(By Nephele Cauchi, Supervisor: Michael Valahas, Giorgos Maneas)

Related Master thesis

- ✓ *Unraveling diverse values of ecosystem services: a socio-cultural valuation using the Q-methodology in Messenia, Greece*

Master's Program "Social Ecological Resilience for Sustainable Development", Stockholm Resilience Centre

Stockholm, June 19

(By Sofia Maniatakou. Supervisors: Håkan Berg, Tim Daw, Giorgos Maneas)

Abstract

Modern People perceive the importance of ecosystem services in different ways, depending on their values, beliefs and needs. This study provides a nuanced understanding of the multiple ways stakeholder groups perceive the benefits derived from hydrologic services in the surrounding area of the "Gialova" coastal wetland in Messenia, Greece. The social-ecological system of this region depends on a steady flow of water-related ecosystem services and livelihoods are closely linked to agriculture and tourism. At the same time, these activities, along with climate change driven weather extremes, could affect regional water quality and

availability. The objective of the study is to understand the stakeholders' key viewpoints on water-based ecosystem services (WES) and provide contextual information regarding the drivers affecting the identified WES. A "value pluralism" lens is applied to capture the multiple dimensions of values expressed by the participants of the study. The study's primary method is "Q-methodology", a participatory mixed-methods approach suitable for eliciting patterns of valuation that are held in common within a group. Thirtytwo stakeholders participated in the study and the analysis highlighted five key perspectives, titled "Basic needs first", "Us vs. them", "Tradition and history", "Modern environmentalists" and "Ecocentric". The results indicate different perceptions of the importance of WES, alongside a range of multiple explanations of why the WES are important. The five perspectives were compared and they reflected divergent understandings of i) the nested nature of socio-ecological systems, ii) spatial perception of ecosystem services and, iii) trade-off between relational and instrumental values. The points of consensus and disagreement among the participants along with their perceptions of drivers of change, suggest promising leverage points for sustainable and inclusive water resource management. In addition, this empirical case study contributes methodological insights to the ecosystem services socio-cultural valuation body of literature.

- **Instrumentation and Maintenance**

NEO Atmospheric station

The new Air Nephelometer Auora 1000 was installed at NEO this spring by Iasonas Stauroulas researcher at the National Observatory of Athens.

Soil moisture sensors

The two eco-hydrological monitoring stations (one in an Olive orchard and one in a Golf course managed by TEMES S.A.), which have been running at high temporal frequency since 2016 have been uninstalled this spring. The analyses of the soil water balance at each site has allowed for water demand comparisons. Crop evapotranspiration rates of the grass at the golf course have usually varied between 1-5 mm/day for the period of low irrigation, and between 4-10 mm/day for the period of intense irrigation. Instead, the rates for the olive orchard have reached at most 5 mm/day, but the method neglected contributions from deep roots, which would have increase the estimated evapotranspiration during irrigation periods. Irrigation has therefore revealed to be a vital water resource for the growth of both traditional (olives) and new (turf grass) vegetation types.



Figure 5: Left picture: Iasonas Stauroulas installing the new Nephelometer and NEO atmospheric station. Right picture: Uninstalling the soil moisture sensors at the olive orchard.

Research publications (NEO researchers in bold, presenters underlined)

• *Peer reviewed journals*

Maneas, G.; Makopoulou, E.; Bousbouras, D.; **Berg, H.; Manzoni, S.** Anthropogenic Changes in a Mediterranean Coastal Wetland during the Last Century—The Case of Gialova Lagoon, Messinia, Greece. *Water*, 2019, 11, 350. <https://doi.org/10.3390/w11020350>

Katrantsiotis, C., Norström, E., Smittenberg, R., Finné, M., Weiberg, W., Hättstrand, M., Avramidis, P., Wastegård S., Climate changes in the eastern Mediterranean over the last 5000 years and their links to the high-latitude atmospheric patterns and Asian monsoons. *Global and Planetary change*, 2019. (available online: <https://doi.org/10.1016/j.gloplacha.2019.02.001>)

Finné M., Woodbridge J., Labuhn I., Roberts N.C. Holocene hydro-climatic variability in the Mediterranean: A synthetic multi-proxy reconstruction. *The Holocene* 2019, 29 (5), 847–863. (available online: <https://doi.org/10.1177/0959683619826634>)

NEO-relevant publications

Vigouroux G, Destouni G, Jönsson A, Cvetkovic V, A scalable dynamic characterisation approach for water quality management in semi-enclosed seas and archipelagos, *Marine Pollution Bulletin*, 139, 311–327, 2019. <https://authors.elsevier.com/sd/article/S0025326X18308737>

Khazaei B, Khatami S, Alemohammad SH, Rashidi L, Wu C, Madani K, **Kalantari Z, Destouni G,** Aghakouchak A, Climatic or regionally induced by humans? Tracing hydro-climatic and land-use changes to better understand the Lake Urmia tragedy, *Journal of Hydrology*, 569, 203-217, 2019. <https://www.sciencedirect.com/science/article/pii/S002216941830934X>

Education

Field Courses @ NEO

- **“Course in Physical Geography”**
Bachelors’ course, Stockholm University (March 2-9)

The eighth Physical Geography course took place at NEO in March. Sara Cousins and Peter Jansson were the instructors of the field course which was attended by 14 bachelor students. The main goal of this course was for the students to acquire knowledge in a variety of methodologies for environmental research, and the study schedule consisted of two phases. The first one was the excursions to different places all around Messenia and Arcadia, and the second one was the field work carried out at four study areas. Topics that were covered were the geomorphology of the area, the impacts of human pressure on ecosystems and how climate change and land use processes might shape the landscape in the future. During the excursions they visited a number of sites mainly in Messenia. Among them were the Gialova/Navarino Bay, Paloiokastro, Loussios River and Canyon, Artemisia, Taygetos Mountain and Methoni. During the field work, the students were separated into four groups and they studied Maniaki Terraces, Voidokoilia Dunes, Petrochori Dunes and Mesochori Badlands. The common feature of these areas is the terrain and the possibility for the students to do interesting measurements and start creating a database. Through this process students on future courses will be able to analyze the data and compare their results year on year.



Figure 6: A group photo on the way to Lousios River.

- **“Cultural Heritage Materials and Technologies”**
Masters’ course, Department of History and Archaeology, University of Peloponnese (March 17-19)

The MSc in Cultural Heritage Materials and Technologies **CultTech** from the Department of History and Archaeology, University of Peloponnese visited NEO Station in March. The course numbered 10 post graduates oriented from Greece, Cyprus, Canada and the U.S., the PhD researcher V. Panagiotidis and the program director Prof. N. Zacharias. During the 3-days field visit, the students followed lectures within the frames of Semester B **Environmental, Remote and Field Propection Studies**, including an introductory talk by the NEO Manager Mr. Giorgos Maneas. Field work activities, such as a GPS exercise took place in the nearby advanced cultural and environmental landscape of Gialova and Koryfasio. During their visit at NEO atmospheric station at Methoni, the students had a lab introduction and practice given by Dr. E. Gerasopoulos from NOA (National Observatory of Athens).



Figure 7: CultTech students and teachers outside NEO station.

- ***“Physics Department”***
Masters’ course in Applied Meteorology & Environmental Physics, University of Patras (April 18-21)

In total, four postgraduates and tree PhD students from the Physics department, University of Patras participated in the course. The students visited the NEO Atmospheric laboratory in Methoni, where they were got familiar with the instruments and trained on the calibration procedures. Moreover, they acquired hands-on experience on combining measurements and modeling techniques to interpret experimental data with emphasis on source apportionment of chemical compounds and aerosol measurements.

Apart from training on experimental and computational topics, the students were also introduced to fieldwork experience. Following a lecture on “Gialova Lagoon Wetland: Towards and Integrated Management of Ecosystem Services” by Giorgos Maneas, they visited Gialova Lagoon to implement water quality measurements in several points.



Figure 8: Students measuring the salinity of the lagoon.

During the first day of the course, another group of students from the Chemistry department, University of Patras joined, and all together participated in fieldwork activities related to the micro-plastic pollution on the beaches.



Figure 9: Students collecting micro plastics at the beach.

- ***“Course on Plant Biodiversity and Evolution”***
Masters’ course in Plant Biodiversity and Evolution, Stockholm University (May 5-11)

The sixth Masters course "Plant Biodiversity and evolution - a global perspective", took place at NEO in April. Per Ola Karis was the instructor of the field course. During the excursion, the students visited the following places:

1. The vicinity of the station, to get a good introduction to the local flora.
2. The Polylimnio waterfalls, close to Kazarma, which host a good luxuriant vegetation among olive trees, and offer a nice walk down to the stream and ponds, where it is shady under the large Platanus trees.
3. Gialova lagoon and ruin, as well as the adjacent beach to the west of the lagoon itself.
4. Taygetos mountains, Mystras, and the museum of olives in Sparta. A walk on foot through *Pinus nigra*-*Abies cephalonica* forest with lots of herbs on the ground, to above the timber line some 1-2 km after the shelter was estimated to be an appr. 20000 step walk up and down.
5. Pylos, with good vegetation around the fortress with large stands of Aleppo pine for example.



Figure 10: Students exploring the Taygetos biodiversity (photo: Per Ola Karis).

- **“Ecohydrology: a Mediterranean perspective”
Masters’ course in Ecohydrology, Stockholm University (June 15-22)**

MSc students attending the course "Ecohydrology: a Mediterranean perspective" (Department of Physical Geography, Stockholm University) visited NEO for a week of lectures, field work and excursions. At NEO, lectures by Stefano Manzoni and Giulia Vico, and a presentation by Christos Pantazis complemented the class activities conducted in Stockholm in the first week of the course and prepared the students for their field work. Divided in groups, they developed and tested research questions on soil-plant-atmosphere interactions. They contrasted different vegetation types (from dune vegetation to orchards) and identified the unique adaptations that Mediterranean species evolved to withstand seasonal drought and intense solar radiation. The data collected with a range of instruments are analyzed and presented in the last weeks of the course back at Stockholm University.



Figure 11: Students measuring the soil moisture (photo: Stefano Manzoni).

Summer schools

- **“HAAR-PANACEA Summer school”
“Theory and practice of aerosol chemistry and engineering for climate, air quality, emissions and health effects, by means of In-Situ and Remote Sensing Observations ” 3rd HAAR Summer School, Hellenic Association of Aerosol Research (June 5-13)**

The objective of the 3rd HAAR international summer school, which took place at NEO in June, was to train young researchers on state-of-the-art instruments for determining the key properties of atmospheric aerosols, the tools for analyzing and interpreting the data, and the knowledge for putting those in the context of climate change.

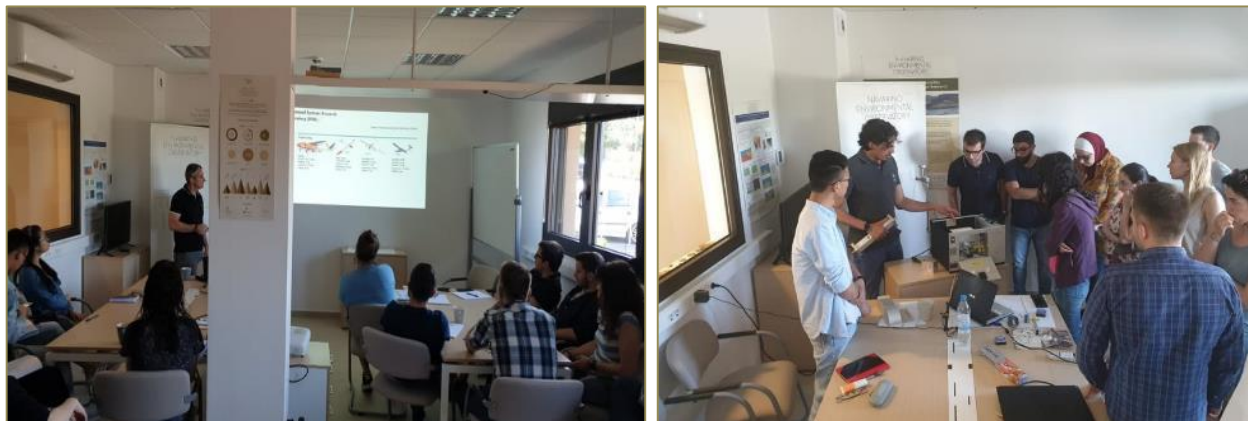


Figure 12: Jean Sciare’s lecture from Cyprus Institute (left), and hands-on training (right) during the 3rd HAAR summer school at NEO.

Aerosol particles are key components of the atmosphere and thus strong determinants of the climate at local, regional, and global scales. To understand how emissions by a number of natural and anthropogenic sources

contribute to the atmospheric aerosol and to climate change there is a need to combine both in-situ and remote sensing observations with model predictions.

The summer school was organized around lectures that covered the basic theory followed by hands-on experience on:

1. in-situ instruments for measuring the concentration, size and chemical composition of atmospheric particles,
2. systems for probing the vertical distribution of the atmospheric aerosol, and
3. new integrative approaches using models and observations for impact assessment.

The lectures and practical applications were provided by a total number of 16 invited leading experts in the above 3 fields (table 1).

Table 1: Invited researchers at the 2nd HAAR summer school at NEO.

Name	Affiliation
Jean Sciare, M. Pikridas, G. Biskos	Cyprus Institute, Cyprus
A. Nenes	Ecole Polytechnique Federale de Lausanne, Switzerland
H.C. Hansson	Stockholm University, Sweden
M.I. Manousakas	N.C.S.R. (National Centre for Scientific Research) Demokritos, Greece
N. Mihalopoulos, A. Bougiatioti, G. Grivas	NOA (National Observatory of Athens), Greece
S. Pandis	University of Patras, Greece
Al. Wiedensholer	Institute for Tropospheric Research (IFT), Leipzig, Germany
P. Panteliadis	Sunset Laboratory Inc., Netherlands, Amsterdam

Dissemination

Workshops @ NEO

- ***Hydrology, Water Resources, and Permafrost (HWP) Research Unit***
Department of Physical Geography, Stockholm University (April 28 – May 5)

The Hydrology, Water Resources, and Permafrost (HWP) research unit (Physical Geography department, Stockholm University) visited NEO during a week-long trip including a workshop, hiking around the Gialova lagoon, and an excursion to the Taygetos mountains.

The goal of the workshop, held at NEO, was to introduce the HWP group to the area around Gialova lagoon and its environmental issues, and to brainstorm about possible research activities to address these issues. These research activities would complement ongoing monitoring and recent projects (e.g., COASTAL, in which many in the HWP group are involved). They discussed issues related to water scarcity and quality, conflicting water uses, and land use changes through time that could affect hydrologic and ecological functions. In this context, the Gialova lagoon emerges as an ecosystem profoundly affected by human activities and already beyond a tipping point, having transitioned to a seasonally-hypersaline lagoon, while in the post-World War II years, it was still a largely freshwater wetland.

Addressing these issues requires quantifying water storages and fluxes, and the associated water quality (salinity, nutrient levels). Ongoing monitoring includes Gialova lagoon water level and salinity changes, but critical information is missing on freshwater sources to the lagoon, and how these sources are impacted (in terms of quantity and quality) by land use – especially agricultural activities. Leveraging the expertise in the HWP group we identified methods to measure surface water flows exchanged by the lagoon and to estimate groundwater flows. Conceptual and process-based models would complement these measurements.



Figure 13: Hydrological Group visiting Palaiokastro hill.

In the second part of the trip, some of the participants reached the Taygetos mountain hut and hiked up towards the Profitis Ilias peak, but stopped at about 1900 m of elevation, due to a remarkable snow cover. Along the way, they discussed about vegetation, soils, forest fires, and drivers of the treeline, and explored landforms associated to former glaciations (moraines). In conclusion, it was an enriching excursion, with plenty of ideas for new research around NEO and more broadly in Southern Peloponnese.

- **“Environmental Studies”
American College of Greece (May 13-17)**

In May of 2019 a research group of 20 American College of Greece students were accommodated at the NEO facilities under a collaborative scope of research projects centered around key aspects of ecosystems management and monitoring.

Events

NEO Seminar Academy of Athens, May 2

The challenges and opportunities emerging for a new economy in light of climate change, as well as proposals to promote innovation for sustainable development, were at the core of a seminar held at the Academy of Athens, which was organised by the Navarino Environmental Observatory (NEO) and the Swedish Embassy in Greece.

The seminar focused on opportunities arising from smart climate investments leading to Europe's 21st century reform. The speeches highlighted integrated management of natural resources to achieve sustainable development and the role of innovation, entrepreneurship and investment in global climate change. The event was honoured with the presence of HE The President of the Hellenic Republic Mr Prokopios Pavlopoulos and HRH Crown Princess Victoria of Sweden. For more information please visit [NEO webpage](#).



Figure 14: The speech of the President of Stockholm University Astrid Söderbergh Widding.

Café-NEO

“The science of Prognosis: From weather to epidemics”

Patras, March 20 (Gefyres Café)

The Café-NEO was organized by NEO in collaboration with the Laboratory of Atmospheric Physics of the University of Patras. The main subject of the discussion was about the risk of transmitted infectious diseases and how can we predict it. Some of the questions that the researchers tried to answer were:

- What is the transmission dynamics?
- What is a mathematical model?
- Is it possible to predict a disease?
- How can we control the spread of a disease?
- Does the climate change affect the risk of a disease?

NEO management

- ✓ The NEO team is growing. We would like to introduce Christos Pantazis, who joined us on 1 March as our new NEO assistant, working closely with Giorgos at the station. Christos has studied Environmental Sciences at the Aegean University, and he is about to finish his MSc in Environment and Development of Mountain Regions at the National Technical University of Athens, focusing on assessing groundwater properties in the NEO area.
- ✓ Two NEO Steering Committee meetings were held in the first six months of 2019. A skype meeting in April and a physical meeting in Athens. Among others, the SC adopted a new indicative strategy for NEO.



Figure 15: The members of the Steering Committee at TEMES's offices in Athens.

Upcoming

Research

- In September, a group of dendro-climatologists from the NEO Associated Member Department of Geography, Johannes Gutenberg University Mainz, Germany will visit several treeline sites at the Pindos Mountains in Northern Greece.

Education

- Students of the Justus-Liebig University of Giessen (a NEO Associated Member), Germany, will visit NEO in late August as part of their-course "Climate, Climate Change Impacts: Greece".
- Students of the Department of Environmental History and Archives from Kiel University, Germany, will visit NEO for a field course in September.