



**H.F.R.I.**  
Hellenic Foundation for  
Research & Innovation

**Description of the funded research project**  
**1st Call for H.F.R.I. Research Projects to Support Faculty**  
**Members & Researchers and Procure High-Value**  
**Research Equipment**

**Title of the research project:**

Understanding the Anthropocene. The Aegean Islands case

**Principal Investigator:**

Konstantinos A. Triantis

**Reader-friendly title:**

Four decades of environmental modification

**Scientific Area:**

Life Sciences

**Institution and Country:**

National and Kapodistrian University of Athens, Greece

**Host Institution:**

National and Kapodistrian University of Athens

**Collaborating Institution(s):**

- 1) University of Crete / Natural History Museum of Crete
- 2) Université de Pau et des Pays de l'Adour (UPPA)



**Budget:**

179.091,00 €

**Duration:**

36 months

## Research Project Synopsis

Humans are nowadays affecting the Biosphere to the extent that many geologists consider that we have entered a new epoch, the **Anthropocene**. **Extinctions** have increased dramatically, especially on islands; more species are threatened, ecosystems are disturbed, and **invasive species** become more abundant. Habitat destruction, pollution and climate change are amongst the main drivers of these effects, overall featuring a **global biodiversity crisis**. Islands provide an ideal model for understanding this global crisis of the Anthropocene, and how we can manage its impacts. While Anthropocene changes are well documented at large scales, the **accumulation of local events** that give rise to them are less well-known; there are **few detailed studies** of changes over time **in local communities**. Often, the **time span** over which such studies are conducted is **short**, and there is a **lack of replication** across localities that allow more general conclusions of use in conservation to be drawn. The Aegean islands provide a unique opportunity to remedy this lack. **Here**, we will use a data set of **well surveyed land snail communities from 290 sites among 29 Aegean islands to assess species and functional diversity changes across the major axes of time and the extent of human impact on habitats**. We will repeat surveys on sites sampled between **17 and 42 years ago**, to assess changes over a time span which is rare in ecological studies, globally. We will analyze changes in diversity in terms of taxonomic composition (species identity) and function (traits), and relate them to habitat changes at local (site) and regional (island) levels. **Species' conservation status will be reviewed using IUCN criteria**, the basis for global conservation policy. This approach will yield new insights into spatio-temporal changes resulting from human activity, and will provide a basis for predicting future ecological responses in the Anthropocene.

## Project originality

*Quantifying biodiversity changes in the Anthropocene, at both taxonomic and functional levels, is a key challenge of our time given the paucity of temporal and spatial data for most taxa on Earth. Although there are numerous large-scale studies of extinctions and invasions associated with human activity, the processes involved at the local level have rarely been documented with any precision. Hence, the nature, extent and background processes of the reorganization of natural communities remain controversial with most studies focusing on vertebrates and narrow time windows. For our better understanding of the processes characterizing the Anthropocene, long term data from local assemblages, mainly focusing on invertebrates – which represent 75% of known living species and 42% of currently recorded extinctions – are of pivotal importance. Core to the current research project is the re-survey of terrestrial and freshwater snail communities from 290 sites among 29 Aegean islands. All sites have been systematically surveyed for snails 17 to 42 years ago by members of our research group. The 29 islands have been selected on the basis of human impact during the last four decades, representing a continuum from least affected islands, e.g. Levitha, Ofidousa and Syrna, to heavily influenced islands, e.g., Mykonos, Paros, and Kalymnos. This time window coincides with an unprecedented touristic and economic development in the Aegean Islands and covers 80% of the duration of the Anthropocene, whose initiation is arguably dated back in the middle 20<sup>th</sup> century. Hence, the inclusion of least affected islands, without permanent presence of humans, offers the advantage of having a strong reference point to test our findings against pristine environments. As such, the current project breaks new grounds for understanding and predicting biodiversity changes on islands worldwide in relation to major human impacts, such as species extinction, habitat modification and introduction of exotic species, therefore setting the appropriate baseline for accurately assessing the future of biotic homogenizations.*



## Expected results & Research Project Impact

*Biodiversity is essential for sustaining the natural ecosystems upon which humans, and all life, depends. Our choice of study **meets the plea by many scientists for the accumulation of multidimensional biodiversity data** on animal and plant species and communities as a vital step in developing effective conservation and protection strategies. In this direction, our suggested multidisciplinary approach aims to **inform environmental protection policies for a most important global biodiversity hotspot, the Aegean islands**, whose habitats have been extensively affected by modern humans following their continuous presence within the archipelago for more than 10,000 years. The existence of a well-documented data set from the past, the use of an animal group known to be especially sensitive to environmental change and the range of islands and impacts considered will enable us to provide an analysis that will not only yield results of immediate utility, but will **demonstrate the methodology and data sets** needed to achieve similar, useful results in other contexts. **For each of the species identified as threatened** we will provide a **conservation plan**, with the required actions to take place according to the frameworks of the International Union for the Conservation of Nature Red List of Threatened Species (IUCN Red List), which is the currently most comprehensive standard for the protection of global biodiversity. The results of our study are expected to be used as a scaffold to illuminate the nature and interactions of the most significant factors influencing biotic change, and at the same time to highlight the implications of such changes at local and regional spatial scales. In economic terms, our study will give the **first sound basis for managing touristic development under sustainable schemes** while retaining, or even restoring, levels of biodiversity that constitute the underlying attraction and the foundations of ecological stability in the Aegean islands.*

## The importance of this funding

*Understanding the ecological implications underlying the ever-growing biotic alterations in the Anthropocene is a crucial step if we are to **ameliorate the currently unraveling Global Biodiversity Crisis** and succeed **sustainable** human-nature interactions. Apart from the description of large-scale patterns, this requires a combination of **institutional changes, scientific debate and social shifts** at the local level. The current research project will inform global efforts to this direction, by shedding light on the patterns and processes affecting one of the most sensitive and valuable non-vertebrate model-organisms in ecology and conservation biology, in one of the most important biodiversity hotspots globally. **The overall outcome of the current project will be a baseline for understanding and predicting biodiversity changes on islands world-wide in relation to human impacts such as species extinction, habitat modification and introduction of exotic species and therefore biotic homogenization. The project's results will be highly relevant for islands that are major touristic destinations.***



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