ALAS
«Aliens in the Aegean - a Sea under siege»

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:

ALAS «Aliens in the Aegean - a Sea under siege»

Principal Investigator:

Stelios Katsanevakis

Reader-friendly title:

ALAS "Aliens in the Aegean – a Sea under siege

Scientific Area: *Environment and Energy, Ecology*

Institution and Country:

Department of Marine Sciences, University of the Aegean, Greece

Project webpage (if applicable):

https://alas.edu.gr/?lang=en

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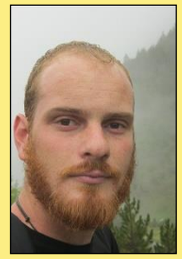

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Budget: *170,000 €*

Duration: *36 months*

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Research Project Synopsis

ALAS is a three-year research project conducted in the Aegean Sea (Greece) by the Marine Biodiversity and Ecosystems Management Lab of the Department of Marine Sciences of the University of the Aegean.

The scope is **to improve existing knowledge** on the life cycle, distribution patterns and ecological impacts of marine invasive species on the native marine biota of the Aegean Sea, in order to provide scientifically sound information for the **more effective prioritization of marine conservation actions**.

Alien species are taxa introduced to areas beyond their natural distribution by human activities, overcoming bio-geographical barriers. Biological invasions are a defining feature of the Anthropocene, as human activities are increasingly reshaping the spatial distribution of species. Accelerating movement of humans, animals and goods are driving an increasing rate of biological invasions. The global rate of new introductions is increasing with no sign of saturation in the accumulation of alien species. Both at a European (~1300 marine alien species) and at a Mediterranean (~1000) level the number of new introductions is constantly increasing.

Many alien species have become invasive with substantial impacts on biological diversity, ecosystem services and human health. Nevertheless, our knowledge of their effects on biodiversity and ecosystem services is mainly qualitative and largely based on weak scientific evidence.

The project focuses on the biotic interactions between alien and native species as well as priority habitats (rocky reefs and marine caves, Habitat 1170 and 8330 respectively in the Habitats Directive 92/43/EEC), and applies a multitude of approaches, such as satellite imaging, large-scale surveys, field experiments, interviews, species distribution modelling, and cumulative impacts assessments.

ALAS **aims to address important ecological questions regarding the mechanisms of alien species impacts**, which will assist marine managers to improve decision-making regarding marine conservation actions and the halting of biodiversity loss in the region.

Project originality

The Convention on Biological Biodiversity (CBD) recognized the need for "further research on the impact of alien invasive species on biological diversity". However, there are still substantial gaps in our understanding of the dynamics and implications of biological invasions across regions and taxa. Existing knowledge is mainly qualitative and largely based on weak scientific evidence. Understanding the distribution, abundance, spread, establishment success, spatio-temporal dynamics, invasiveness, and subsequent impacts of alien species is challenging as biological, social, geographic, economic and climatic factors influence the way an invasive species is introduced and interacts with the native biota.

ALAS will:

- combine **skills and analyses** in novel ways and provide results at a **large scale and high resolution**
- combine **classic and novel tools** (e.g. remote sensing, field surveys and experiments, interviews, species distribution modelling, cumulative impact assessments) and follow a trans-disciplinary approach, relating knowledge from invasions biology, conservation biology, biogeography, fisheries science, marine ecology, remote sensing, statistical modelling
- conduct for the first time in the Aegean Sea a comprehensive, high-resolution analysis of **cumulative impacts of marine invasive alien species** based on detailed habitat mapping, state-of-the-art species distribution modelling, and extensive field surveys and experiments
- conduct **large-scale research** covering an entire ecoregion (the Aegean Sea)
- provide results in formats appropriate for marine managers, decision-makers and society, thus transferring research-based knowledge to **inform and influence policy decisions and the general public**
- provide **cross-cutting deliverables** involving theoretical and applied understanding of biological invasions science coupled with the delivery of outputs through information and communication technologies (e.g. GIS), ultimately rendering efforts for the management of invasive species more effective

Expected results & Research Project Impact

ALAS is expected to **advance marine biological invasions science** through novel approaches. It will improve existing understanding of the mechanisms driving marine invasions' impacts, as well as the spatiotemporal characteristics and variation of impacts. Its outcomes include high resolution large scale data that will enhance our perspective on potential impacts in the Aegean Sea.

The cost of marine biological invasions to the **economy and human health** is huge, due to e.g. the decline of commercial fish stocks, degradation of water quality and habitats, increase of coastal erosion, decline of the recreational value of coastal areas. By investigating invasion mechanisms and properly mapping impacts at high spatial resolution, ALAS will contribute to the effective management of biological invasions and assist marine managers and policy makers in prioritizing management actions to confront **economic and social impacts**.

ALAS has a **strong policy relevance** and will support national, European, and international environmental policies and legislation. Specifically, it will support the implementation of:

- The **Convention on Biological Diversity** and Aichi Biodiversity Strategic Goal B (Target 9), which requires the identification and prioritization of invasive species. The CIMPAL approach used in ALAS enables the identification of hotspots of impacted areas, and the prioritization of sites, pathways and species for management actions, and can thus guide marine managers to achieve Target 9 in the region.
- The **European Biodiversity Strategy**, Target 5 and the relevant EU Regulation 1143/2014, which provisions the creation of a list of invasive species for which management measures shall be taken. ALAS will enhance its application in the marine environment, by improving existing knowledge on the impacts of marine alien species, and incorporating marine species in the list of invasives.
- The **Marine Strategy Framework Directive**, specifically Descriptor 2 and Criteria D2C2 and D2C3 of the revised Commission Decision 2017/848.

The importance of this funding

This fund provides the opportunity to carry out **advanced research** on a **timely environmental issue** of **global importance** that has strong links to **climate change** and the **overall deterioration of the marine environment**, as well as important **socioeconomic and human health-related implications**.

Moreover, it offers a **valuable opportunity for young researchers** to improve their career perspectives and gain international recognition by engaging in novel and high-impact research, which is expected to lead to a number of publications in highly ranked scientific journals. The knowledge, scientific skills, hands-on experience from fieldwork activities, and working on a topic of high policy and socioeconomic relevance will allow young researchers to gain high competence and experience, opening career opportunities.

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