

**East and South European  
Network for Invasive Alien  
Species – A tool to support  
the management of alien  
species in Bulgaria**

**ESENIAS-TOOLS**

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**Invasive alien species networking for  
information exchange and capacity building**

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**ESENIAS**  
East and South European  
Network for Invasive Alien Species



Invasive alien species (IAS) are species introduced outside their natural range with serious negative consequences for their new environment; they threaten biodiversity and ecosystem services, and have adverse socio-economic impact. The introductions and spread of IAS have increased recently due to human activities and global change. As a response to this threat, a new EU Regulation 1143/2014 on IAS has been adopted and in force since 1st January 2015. A list of invasive alien species of EU concern has been adopted. The list contains 37 species that cause damage on a scale that justifies dedicated measures across the EU. The European Alien Species Information Network (EASIN) was developed to facilitate the exploration of existing IAS information. Networking on IAS in different scales is needed to collect data, prevent new introductions and manage already widely spread invasive alien species.



The East and South European Network for Invasive Alien Species (ESENIAS) was established in 2011 to facilitate solving IAS issues at regional level. Currently, 12 countries are part of the network: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Italy, Kosovo under UNSC Resolution 1244/99, FYR Macedonia, Montenegro, Romania, Serbia and Turkey. The aims of ESENIAS are: exchange and share IAS information (*e.g.* distribution, biology, ecology, pathways of introductions, impact, and management) via an Internet portal; facilitate collaboration between institutions and IAS experts from SE Europe; develop joint research activities – publications, projects; develop and harmonise regional IAS policies; and integrate to European and global IAS initiatives. One of the main activities of ESENIAS has been the organisation of yearly workshops (Zagreb 2010, Sofia 2011, Belgrade 2012, Çanakkale 2013, Antalya 2014, and Sofia 2015) aimed at promoting capacity building initiatives and increasing knowledge on IAS within all countries in the region. Several projects have been initiated and implemented within the frame of ESENIAS, among them the ESENIAS-TOOLS project.



### **ESENIAS-TOOLS Project Goal:**

Networking and development of invasive alien species tools within the frame of ESENIAS in order to support the management of alien species in Bulgaria.

### **PROJECT OBJECTIVES:**

1. To develop the necessary technical infrastructure and tools within ESENIAS to support the management of IAS in Bulgaria and in the region;
2. To strengthen the regional cooperation within ESENIAS to ensure early detection and rapid response against IAS;
3. To raise the public awareness and gain wide support for combating IAS in Bulgaria;
4. To develop networking and cooperation with other IAS databases and gateways at national, regional and European level.

### **WORKING GROUPS (WG)**

#### **WG1: Database development and organisation (Bulgaria, IBER-BAS)**

The tasks in WG1 aim at development of IAS data infrastructure, including online data management platform with modular structure and different levels of access – public and registered users. The database will be accessible through the ESENIAS website ([www.esenias.org](http://www.esenias.org)). It will contain information about invasive alien species, projects, publications, experts, and institutions in the ESENIAS countries. Species data will be presented through species lists (alien, priority, alert), fact-sheets and distribution maps of priority species. The species lists will include general information (name, taxonomy, origin, habitat), as well as country information (introduction, pathways, status, established success, impact). The ESENIAS database will be compatible and will exchange data with the European Commission's European Alien Species Information Network (EASIN) and the Bulgarian Biodiversity Information System.

## WG2: Data collection, analysis, standardisation and harmonisation on alien marine species (HCMR, Greece)

The tasks in WG2 include: standardisation and harmonisation of methods, compilation of data on alien marine species based on literature review, molecular analysis and field surveys, preparation of lists of alien and priority species, and preparation of data fact-sheets for priority species. The ESENIAS area covers Black Sea, Aegean Sea and Adriatic Sea, as well as regional seas, such as: Balearic Sea, Ionian Sea, Levantine Sea, Libyan Sea, Ligurian Sea, Marmara Sea, and Tyrrhenian Sea.

**The Northern brown shrimp (*Penaeus aztecus*)** originates in the Western Atlantic. The species has established recently in the Mediterranean – Greece, Italy and Turkey – showing a rapid westward and northward expansion, fast acclimatisation, posing a potential threat to native species.



**The Seychelles dragonet (*Synchiropus sechellensis*)** is native to the Indo-West Pacific. The species was recorded in Antalya Gulf, Turkey, and Levantine Sea, Greece, in 2014, and Cyprus in 2016. In February 2016, the species was recorded for the first time in the Aegean Sea, in Rhodes Island. The short time interval between the findings indicates a possible establishment and dynamic spread of the species northwards in the Eastern Mediterranean.



**The North American soft-shell clam (*Mya arenaria*)** and the **Asian rapa whelk (*Rapana venosa*)** established abundant populations in the Black Sea coast along Bulgaria and Romania.



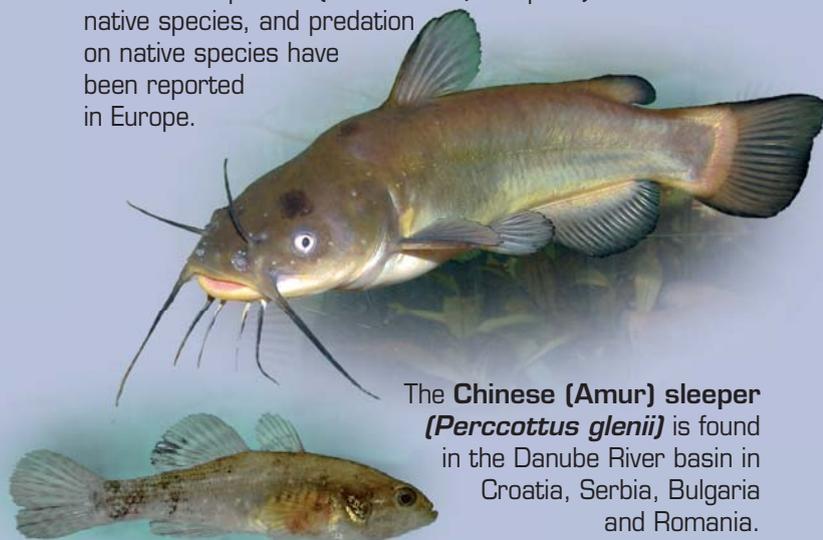
## WG3: Data collection, analysis, standardisation and harmonisation on alien freshwater species (CAEN, Croatia)

The tasks in WG2 include: standardisation and harmonisation of methods for sampling, identification, validation and analyses of data, collection of data on alien freshwater species, including field surveys, preparation of species lists and prioritisation, preparation of data fact-sheets for priority species. Field surveys are conducted in the Danube River and Black Sea basins (Bulgaria, Romania and Croatia), Aegean Sea basin (Bulgaria), and Adriatic Sea basin (FYR Macedonia and Croatia).

**The Spiny-cheek crayfish (*Orconectes limosus*)** originates from North America. It has been reported in the ESENIAS region from Croatia, Serbia and Romania. In June 2015, it was recorded for the first time in a tributary of the Danube River in Bulgaria. This species has been reported to decrease the indigenous crayfish populations in Europe through competition for resources and by acting as a vector for crayfish plague.



**The Black bullhead (*Ameiurus melas*)** is native to Central and North America. In the ESENIAS region it was reported from Albania, Italy, Croatia, Serbia, Romania and Turkey. In 2013, the species was found for the first time in Bulgaria (Srebarna Lake). In 2015-2016, abundant populations of the black bullhead were recorded in new localities along the Danube River and inland reservoirs in North-West Bulgaria. Impacts, such as competition (for food and/or space) with native species, and predation on native species have been reported in Europe.



**The Chinese (Amur) sleeper (*Percottus glenii*)** is found in the Danube River basin in Croatia, Serbia, Bulgaria and Romania.

**WG5: Data collection, analysis, standardisation and harmonisation on alien terrestrial invertebrate species (IBER-BAS, Bulgaria)**

The WG5 tasks include: standardisation and harmonisation of methods, collection of data on alien terrestrial invertebrate species based on published data and field surveys, preparation of lists, prioritisation, and preparation of data fact-sheets and maps for priority species.

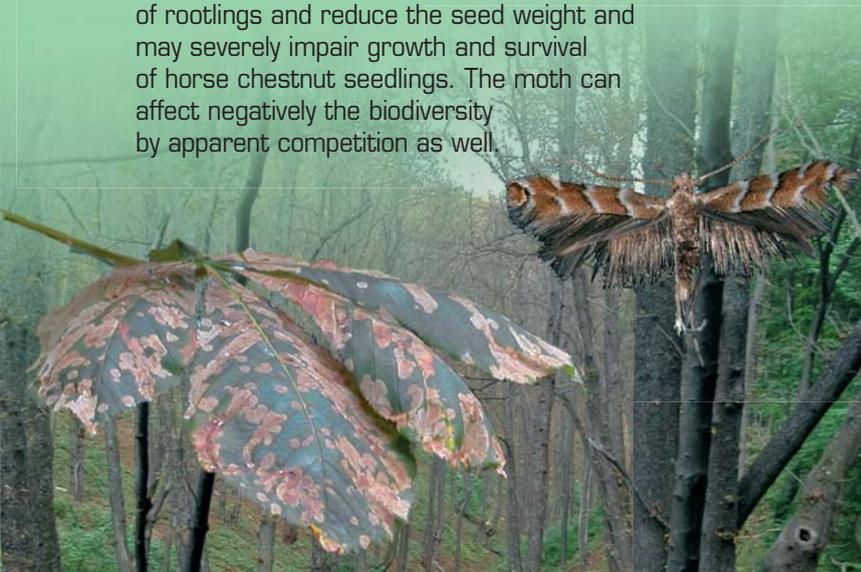
**The Multi-coloured Asian lady beetle, or Harlequin ladybird (*Harmonia axyridis*)**

has spread in Europe at a very fast rate. It has established in the ESENIAS countries, occupying different habitats, but developing exclusively on plants heavily infested by aphids. More than 50 arthropod species are detected as a prey of this beetle, therefore it is considered with strong negative impact on biodiversity. The species is dominant in the coccinellid complex, and currently because of strong competition a replacement of native coccinellid *Adalia bipunctata* by the harlequin ladybird is reported in many areas of Europe.



**The Horse chestnut leafminer (*Cameraria ohridella*)**

is native to the Western Balkans where the horse chestnut tree (*Aesculus hippocastanum*) is endemic and still a few natural stands can be found. In the rest of Europe it is considered non-native. Three-four overlapping generations of this moth a year are the reason for premature total defoliation of horse chestnut trees in all infested areas. A heavy infestation by the moth may alter the growth of rootlings and reduce the seed weight and may severely impair growth and survival of horse chestnut seedlings. The moth can affect negatively the biodiversity by apparent competition as well.



**WG4: Data collection, analysis, standardisation and harmonisation on alien plant and fungi species (UNS PMF, Serbia)**

The ESENIAS region is among the richest in alien plant and fungal species in Europe. The main tasks of WG4 are: to compile a list of alien plants and fungi for the ESENIAS region; to prioritise species mainly considering their impact and feasibility of their management; to collect data about the distribution and impact of priority species based on literature and field surveys; to prepare fact sheets for 30 plant and 5 fungal species of priority for the region.

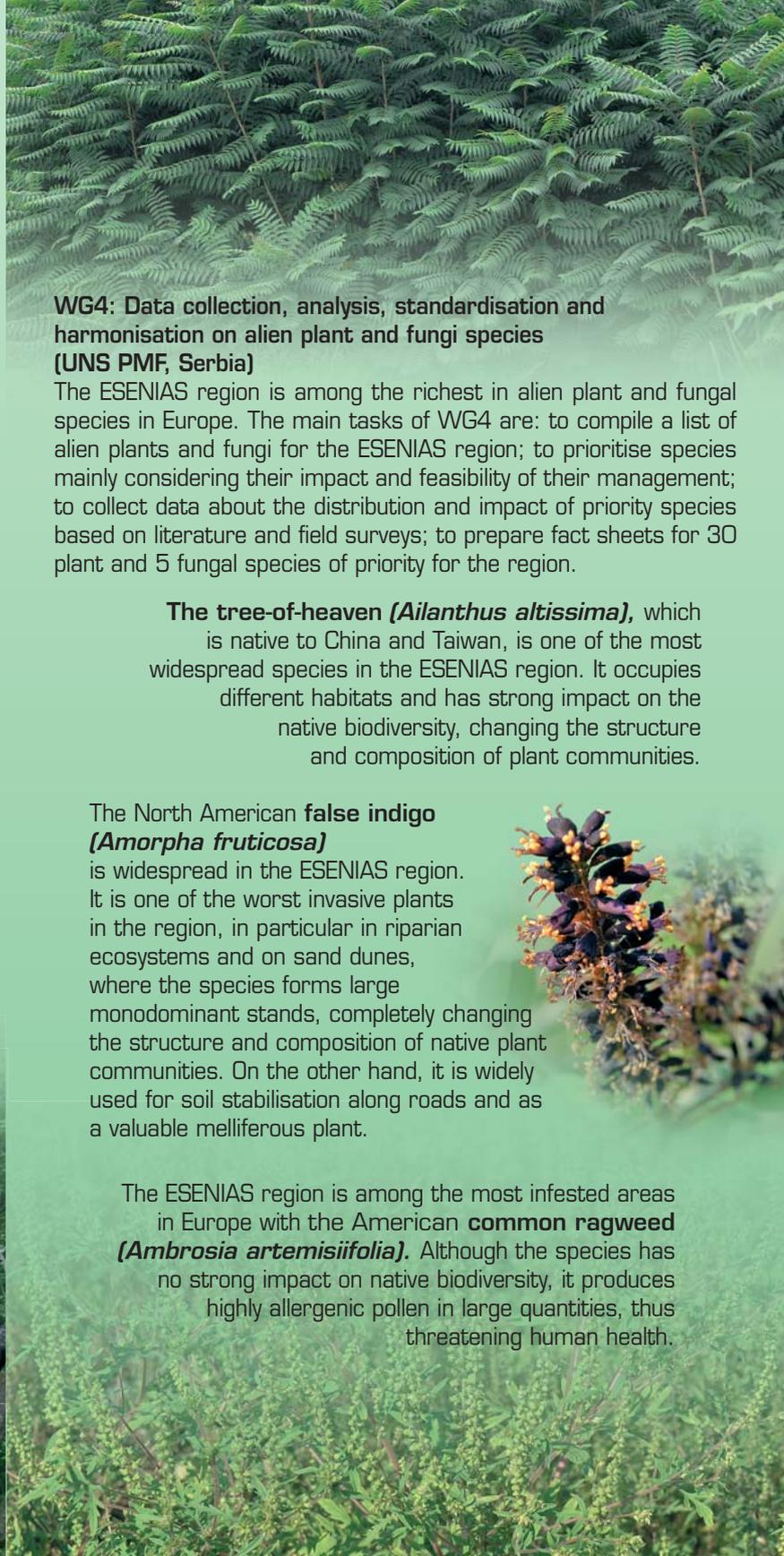
**The tree-of-heaven (*Ailanthus altissima*)**, which is native to China and Taiwan, is one of the most widespread species in the ESENIAS region. It occupies different habitats and has strong impact on the native biodiversity, changing the structure and composition of plant communities.

**The North American false indigo (*Amorpha fruticosa*)**

is widespread in the ESENIAS region. It is one of the worst invasive plants in the region, in particular in riparian ecosystems and on sand dunes, where the species forms large monodominant stands, completely changing the structure and composition of native plant communities. On the other hand, it is widely used for soil stabilisation along roads and as a valuable melliferous plant.



The ESENIAS region is among the most infested areas in Europe with the American **common ragweed (*Ambrosia artemisiifolia*)**. Although the species has no strong impact on native biodiversity, it produces highly allergenic pollen in large quantities, thus threatening human health.



**WG6: Data collection, analysis, standardisation and harmonisation on alien terrestrial vertebrate species (UOC, Romania)**

The WG6 aims at standardisation and harmonisation of methods, collection of data on alien terrestrial vertebrate species through review of published sources and field surveys, preparation of a list of alien species, prioritisation, and preparation of data fact-sheets and maps for priority species. The following groups are included: amphibians, reptiles, birds and mammals.

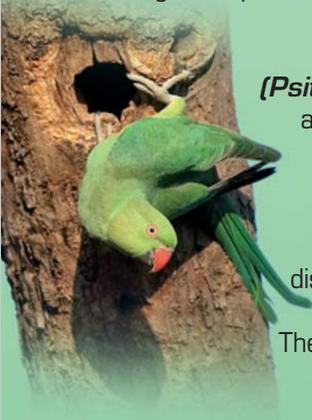
**The Red-eared slider**

*(Trachemys scripta elegans)* is native to southern United States and northern Mexico. As a popular pet in Europe, this species has been commonly released in nature. In Bulgaria it was found in ponds nearby big cities, but also far from settlements. The species has been reported to compete directly for food and space with native freshwater turtles, including some endemic and endangered species, and to transmit parasites.



**The Rose-ringed Parakeet**

*(Psittacula krameri)* is one of the most invasive alien bird species in the world, invading Europe in the past few decades from their warmer native range (India and Africa). It has begun to pose problems to society (particularly in urban areas), such as noise disturbance, displacement of wildlife, human health risks and increasingly as an agricultural pest. The species was reported in the ESENIAS region from Bulgaria, Croatia, Greece and Turkey.



**The Coypu (*Myocastor coypus*)** is native to South America. Due to escapes and releases from fur farms there are now large feral populations in Europe. It has been reported in the ESENIAS region from Albania, Bulgaria, Croatia, FYR Macedonia, Greece, Romania, Serbia and Turkey. The coypu burrowing and feeding activities lead to the destruction of river banks and dykes, erosion of coastal habitats, and thus, to indirect impact on native plant, insect, bird and fish species.



**WG7: IAS research, management and legislation review (IBER-BAS, Bulgaria)**

The WG7 tasks aim at preparation of IAS expert and institution registers, review of IAS research activities and preparation of lists of projects and publications, analysis of management practices, as well as review of IAS legislation and guidance in the ESENIAS countries.

**WG8: Capacity building (IBER-BAS, Bulgaria)**

The tasks on capacity building will be achieved by study visits, and short visits to leading institutions, EU bodies and international organisations dealing with IAS. IAS training courses and seminars will be organised for the main stakeholders in Bulgaria and the ESENIAS region, including a training course on 'Impact of invasive alien species on biodiversity and ecosystem services in extreme environments'.

**WG9: Awareness raising (NMNH-BAS, Bulgaria)**

Awareness raising will be achieved through the ESENIAS website, which will be updated and maintained in order to improve the efficiency between stakeholders and to provide open access to the new generated information and data sharing. An early warning tool will be developed, based on alert lists and species alerts, which will be published regularly on the ESENIAS website. A permanent IAS exhibition will be created at the National Museum of Natural History in Sofia.

**WG10: Networking and dissemination of project results (DU, Turkey)**

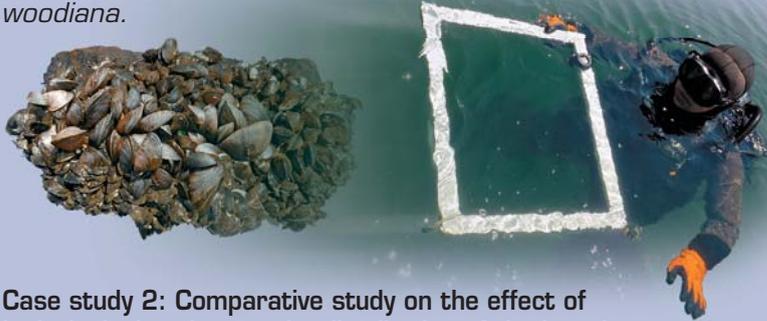
Collaboration within ESENIAS and with other networks will be developed through organisation of ESENIAS meetings and short visits. Project results will be disseminated by joint publications, presentations at scientific forums, and publication of information materials.



## CASE STUDIES

### Case study 1: Biological and ecological traits of invasive alien freshwater mussels in Bulgaria (Bulgaria – Italy)

The main aims are to study the distribution and biological traits in relation to environmental parameters of invasive alien mussels in Bulgaria. An understanding of invasive alien species distribution patterns, and IAS biological and ecological traits is essential to gain insight into ecological processes in freshwater ecosystems and to guide ecosystem management strategies. Data on the following species will be collected and analysed: *Dreissena bugensis*, *Dreissena polymorpha*, *Corbicula fluminea*, and *Anodonta woodiana*.



### Case study 2: Comparative study on the effect of hydrological regime on the distribution of the invasive diatom *Didymosphenia geminata* in extreme environments (Icelandic rivers and lakes, and Bulgarian high-mountain lakes) (Iceland – Bulgaria)

A comparative study on the effect of hydrological regime and water chemistry on the distribution of the invasive diatom *Didymosphenia geminata* (Didymo) in extreme environments (Icelandic rivers and Bulgarian high-mountain lakes) has been carried out.

*Didymosphenia geminata* is a diatom species particularly abundant in cold, oligotrophic fresh waters. It was first discovered in the northern hemisphere. In Iceland, Australia, New Zealand and Chile it is considered as an invasive species. Although it does not present a significant human health risk, it can have negative impact on stream habitats, hampering fishery and degrading the recreational value of streams. The study will be carried out in the Elliðaár River, Lake Elliðavatn and the tributaries Suðurá and Hólmsá in Iceland, and the groups of lakes Sedemte Rilski Ezera and Urdini Ezera in Rila Mountains, Bulgaria.



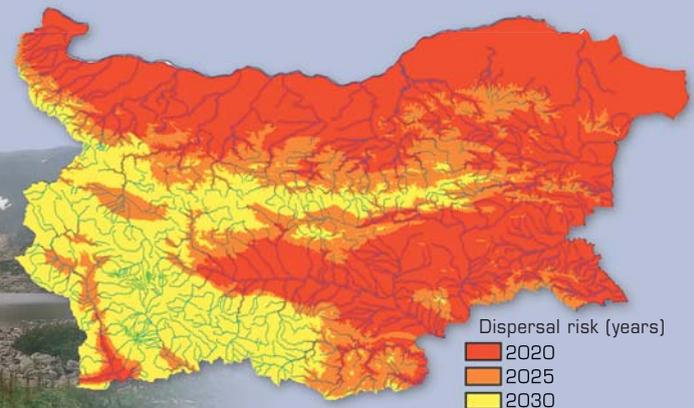
### Case study 3: Assessment of the impact of alien species on the biodiversity and endemism of ancient Balkan lakes (Lake Ohrid case study) (FYR Macedonia – Bulgaria)

The case study aims to assess the distribution, quantitative characteristics and impact of alien species on the biodiversity and endemism in Lake Ohrid catchment. The study will cover the following groups: diatom algae, macrophyte vegetation, benthic macroinvertebrate fauna, and fish communities. The samples are collected from Lake Ohrid, Lake Prespa, Sateska River, Crn Drim River, Lake Debarsko, Clobocica Reservoir and Radika River.



### Case study 4: Estimating dispersal routes for IAS (Romania – Bulgaria)

Circuitscape approach can model the dispersal capacity of invasive alien species throughout the landscape at regional to local scales. This approach relays on circuit theory using current flow as a surrogate of dispersal measure. The current is induced from focal nodes and simulates the dispersal of individuals throughout the landscape classes to which we assign different resistance values. In this respect, the input data needed are: *i.* a layer with focal nodes that are known to act as sources of IAS dispersal, and *ii.* a layer with landscape resistance to each species dispersal. The output is a map of dispersal probability that can be validated using logistic regression. The presence – absence dataset of each modeled species is required in order to evaluate the predictive performance of the models. The dispersal map can be used to identify areas that are at high risk to be colonised in the near future and can be included in mitigation strategies for IAS spread.





### Project Promoter:

Institute of Biodiversity and Ecosystem Research,  
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BULGARIA



### Project Partners:

Executive Environment Agency, Ministry of  
Environment and Water (ExEA), BULGARIA



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