Transferability and Replicability Plan

LIFE INVASAQUA

AQUATIC INVASIVE ALIEN SPECIES OF FRESHWATER AND ESTUARINE SYSTEMS:
AWARENESS AND PREVENTION IN THE IBERIAN PENINSULA

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Transferability and Replicability Plan

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Aquatic Invasive Alien Species of Freshwater and Estuarine Systems: Awareness and Prevention in the Iberian Peninsula

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LIFE INVASAQUA - Aquatic Invasive Alien Species of Freshwater and Estuarine Systems: Awareness and Prevention in the Iberian Peninsula

LIFE17 GIE/ES/000515

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LIFE INVASAQUA, SIBIC and IUCN-Med developed two website portals, Aquatic Invasive Alien Species of the Iberian Peninsula (https://eei.sibic.org/) and IBERMIS (http://www.ibermis.org/) where technical reports and supplementary data are freely available.

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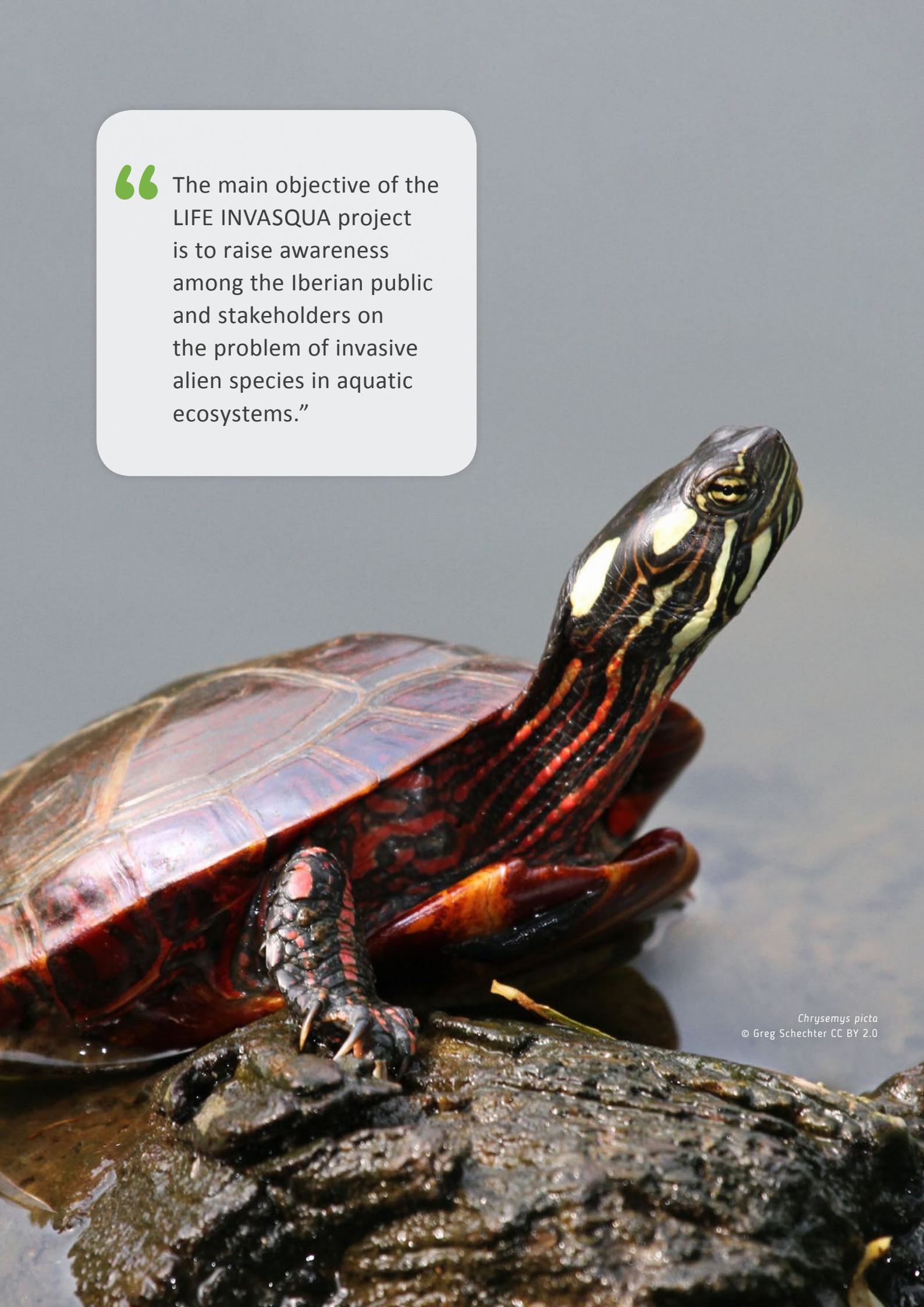

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Abstract

Replicability and transferability plans are a key instrument to contribute to the capitalisation and continuity efforts of a given project by collecting and valorising practices, methodologies and actions already successfully implemented as part of the project. This report presents tangible results and lessons learned mainly during the implementation of the LIFE INVASAQUA project (LIFE17 GIE/ES/000515, 2019-2023), as well as 20 other EU LIFE projects and 7 other projects and initiatives working on addressing the impacts of invasive alien species (IAS) at the European level. The key elements of the list of tangible results achieved during the implementation of the INVASAQUA project have been selected among all the results because of their potential to be transferred and replicated in other projects and initiatives working on communication and awareness raising and IAS. The lessons learnt have been compiled to help improve the implementation of future projects of this kind.

Objective

The objective of this Transferability and replicability plan is to ensure that the LIFE INVASAQUA project results can be transferred and replicated in other initiatives, projects, contexts and locations, thus maximising project impact and its long-term sustainability. It Identifies the key elements of the project that have the greatest potential for transfer and replication. These may include technologies, methodological approaches, best practices, scientific knowledge, collaboration models, among others.

ACRONYMS AND ABBREVIATIONS

ASPEA	Portuguese Association of Environmental Education (*Associação Portuguesa de Educação Ambiental*, in Portuguese)
CSIC	Spanish National Research Council (*Consejo Superior de Investigaciones Científicas*, in Spanish)
EASIN	European Alien Species Information Network
EICAT	Environmental Impact Classification for Alien Taxa
EN	English (language)
ES	Spanish (language)
EU	European Union
EWRR	Early Warning and Rapid Response
IAS	Invasive Alien Species
IUCN	International Union for Conservation of Nature
IUCN-Med	IUCN Centre for Mediterranean Cooperation
MNCN	National Museum of Natural Sciences (*Museo Nacional de Ciencias Naturales*, in Spanish)
MOOC	Massive Online Open Course
NGO	Non-governmental organisation
PT	Portuguese (language)
SIBIC	Iberian Society of Ichthyology (*Sociedad Ibérica de Ictiología*, in Spanish)
UMU	University of Murcia

Branta canadensis © Daniel D'Auria

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INTRODUCTION

The LIFE INVASAQUA project

The “Aquatic Invasive Alien Species of Freshwater and Estuarine Systems: Awareness and Prevention in the Iberian Peninsula” (INVASAQUA) is a knowledge transfer project developed in Spain and Portugal and funded by the European Union LIFE Programme (LIFE17 GIE/ES/000515). It is coordinated by the University of Murcia and involves eight other partners from the Iberian Peninsula: EFEverde (Agencia EFE’s environmental news and journalism platform), the International Union for Conservation of Nature Centre for Mediterranean Cooperation (IUCN-Med), the National Museum of Natural Sciences- Spanish National Research Council (MNCN-CSIC), the Iberian Society of Ichthyology (SIBIC), University of Navarra, University of Santiago de Compostela, University of Évora and the Portuguese Association for Environmental Education (ASPEA).

It began on November 1, 2018 and was officially launched on November 13 and 14, 2018 with an inaugural meeting in Murcia (Spain); it will end on October 31, 2023. In these five years, the partners have worked to increase communication and dissemination of information on freshwater IAS and to facilitate knowledge sharing on successful environmental solutions and practices by developing cooperation between stakeholders. Find out more at: www.lifeINVASAQUA.com/en.

Video presentation of the project (click to view). ©INVASAQUA

Project launch event in Madrid, 2018. ©INVASAQUA

Dissemination of some of the materials produced by the INVASAQUA project,
during one of the events in which the partners have participated. ©INVASAQUA

1.1. OVERALL PROJECT OBJECTIVES

The main objective of the LIFE INVASQUA project has been to raise public and stakeholder awareness of the problem of invasive alien species (IAS) in aquatic ecosystems in the Iberian Peninsula, through information, communication and training campaigns, and by developing key tools to improve an efficient early warning and rapid response (EWRR) framework for the management of new IAS in freshwater and estuarine habitats. The ultimate goal is to reduce the introduction and spread of IAS in the Iberian Peninsula by increasing public and stakeholder awareness and making effective tools available.

1.2. SPECIFIC OBJECTIVES

- Support and facilitate the implementation of the European Union (EU) Regulation on IAS by engaging and creating synergies between knowledge building and management stakeholders, creating priority lists of aquatic IAS and strategic management guidelines at the Iberian level, as well as discussion spaces to increase knowledge transfer.
- Improve the Iberian capacity for EWRR by increasing awareness and training key target groups, through training and information campaigns with key stakeholders.
- Raise public awareness and involve the general public and relevant interest groups in monitoring activities, by developing communication and awareness activities through volunteering campaigns, citizen science, events with students or itinerant exhibitions across the Iberian Peninsula.

1.3. THE NEED FOR A REPLICABILITY AND TRANSFERABILITY PLAN

Beyond the contractual obligations of the LIFE INVASAQUA project (LIFE17 GIE/ES/000515), the project recognises the need for replication and transfer of project results to other contexts/entities/regions for the same, similar or even different purposes. This will contribute to conservation efforts by using practices, methodologies and actions already successfully implemented as part of this project.
For a better understanding of the plan, we clarify two important concepts:

- Replication: it means that the same methods, techniques, prototypes or practices developed and/or used in the project are used again in the same way and for the same purposes by other entities.
- Transfer: it means that the methods, techniques, prototypes or practices developed and/or used in the project are used in a different way or for a different purpose.

This document sets out a list of actions needed to replicate the LIFE INVASAQUA project (LIFE17 GIE/ES/000515) and includes applicable recommendations to prepare the ground for the implementation of the project interventions elsewhere. As well, it will serve as a guidance document throughout the implementation of other LIFE projects to integrate transferability and replicability actions into preparatory, conservation and dissemination actions.

Methodology 2

Callinectes sapidus © Jeremy Thorpe CC BY NC SA

Group of participants in the event "Exchanging Experiences on Invasive Alien Species Projects in Europe", held in Malaga (Spain). ©INVASAQUA

For the development of the transferability and replicability plan, several internal data analysis processes were carried out by the different institutions involved in LIFE INVASAQUA, following the project's own implementation structure.

At the same time, information on the experiences of other LIFE projects from different parts of Europe that also work with IAS was included, based on the material collected during a face-to-face event on "Exchanging Experiences on Invasive Alien Species Projects in Europe", held on 25 and 26 May 2023 in Malaga (Spain). The document thus generated integrates experiences from numerous European LIFE projects and other initiatives working on the issue.

Actions involved: 3
tasks, tangible results and lessons learned

Nymphaea mexicana © Boonlong

The implementation structure of the LIFE INVASAQUA project is divided into 10 Actions, which in turn contemplate 41 tasks. Below (Table 1) we present the tangible results from a general approach, as well as the lessons learned during the execution of the project, as part of the information that we consider necessary to be transferred and potentially replicated by other stakeholders working with IAS.

Some examples of materials developed by the project. Codes of conduct for different stakeholders (above) and various technical documents such as recommendations and species lists (below). ©INVASAQUA

Table 1. List of tangible results achieved during the implementation of the LIFE INVASAQUA project (2019-2023).

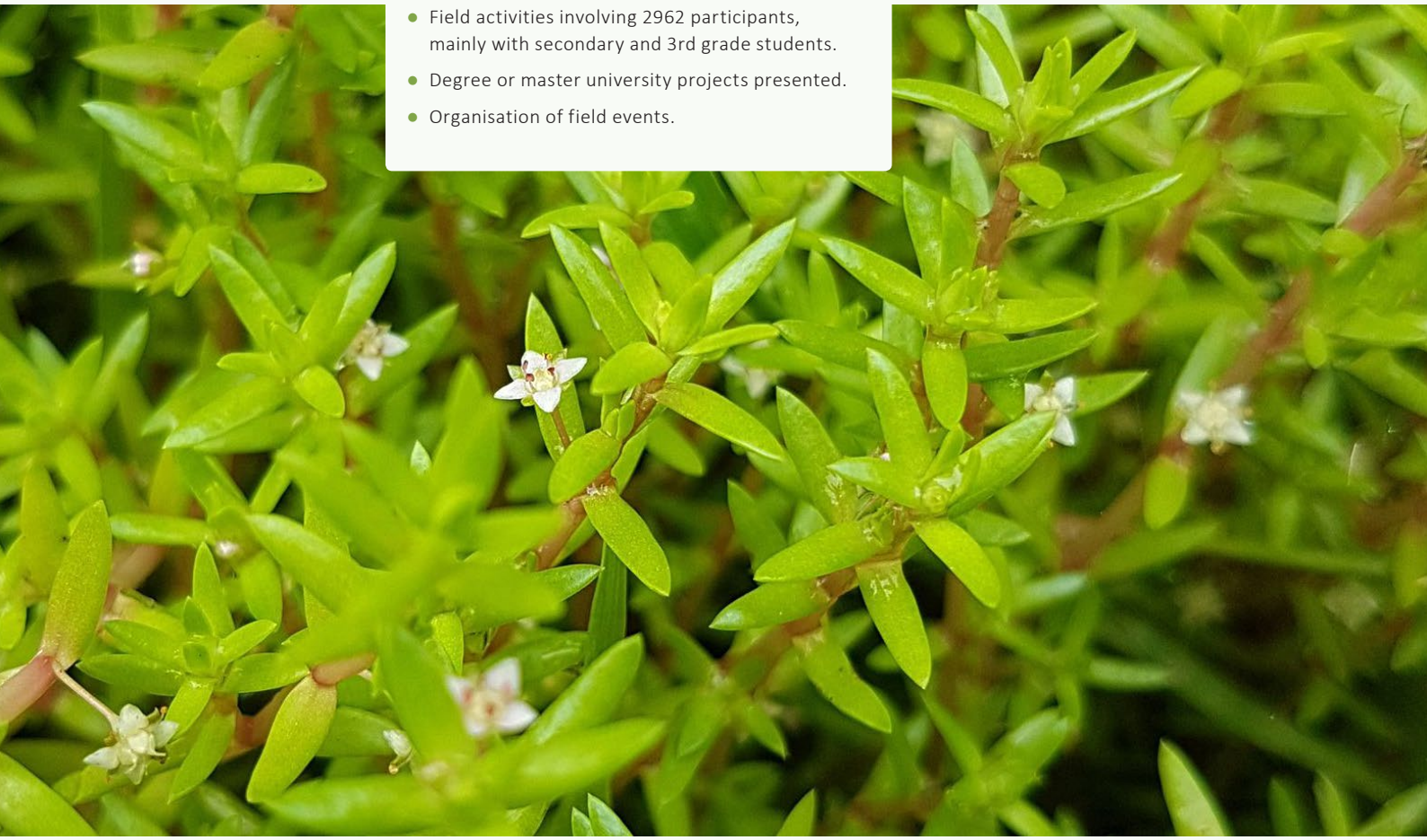
PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
A.1. Communication plan	**A.1.1.** Baseline information about perception and knowledge of aquatic IAS in Iberian society **A.1.2.** Development of the project/ general communication plan	• The goals were achieved, with the Iberian Peninsula general public baseline knowledge addressed. • Some of the notable and useful information in the preliminary analysis conducted on perceptions and communication concerning IAs was: - Only 29 articles on the IAS topic were found on the internet, and from these only 5 were on social media. - In Portugal the number of pages was lower than expected, considering the 4.5 times smaller population. In the literature 32 items were found regarding IAS. For legislation regarding IAS, 28 items were found, 7 at European and 21 at country level (6 Portugal; 15 Spain). From Portugal, one of these items was the transposition in 2019 of the European legislation. - Species with associated uses (e.g. for fishing) are much more often searched on the internet than species with very high impacts (e.g. zebra mussel). • Creation of online surveys (questionnaires), in long (full, extended) and short versions (the latter used, for example, in activities with young people), or targeting specific society strata. ▪ Project surveys, full version (4935 answered in total) -In Spanish: https://n9.cl/x8fww -In Portuguese: https://n9.cl/wks4d ▪ Short project surveys (701 answered in total) -In Spanish: https://n9.cl/s1w4n -In Portuguese: https://n9.cl/sxqwm ▪ Socio-economic surveys (598 answered in total) https://www.1ka.si/LIFEinvasaqua The questionnaires have been disseminated mainly during events organised by the project or with mailings to specific stakeholders. The full versions are also available on the project website: http://www.lifeINVASAQUA.com/recursos/ • Creation of the brand image of the project in a consensus process with the rest of the partners who made suggestions and sent feedback on the different proposals made. • Creation of the project communication plan, a coordinated and planned methodology for the development of dissemination and communication activities and materials. • Communication strategy for the “Check, Clean and Dry” campaign (*Revisa-Limpia-Seca* (ES)/*Veja-Lave-Seque* (PT) campaign).	• IAS species knowledge seems connected with its use in some socio-economic activities, for example in the case of *Silurus glanis*, for angling. • There is generally low awareness of the impacts of IAS and of the species themselves, even of IAS with severe impacts (e.g. *Dreissena polymorpha*). • There appears to be an imbalance between how information about invasive species is conveyed on the Internet in Portugal and Spain. There seems to be a greater dissemination of knowledge about IAS on the Internet in Spain than in Portugal, with, for example, a greater number of web pages in proportion to the population of the country. • It appears there is more interest in the uses of IAS and those species that are exploitable than in the impacts of the species. • Thus, efforts were made to increase the contents in Portuguese and make the negative effects of IAS known in the communication plan. • Mobile applications such as WhatsApp groups we useful to strengthen communication and internal coordination between partners. This has also facilitated communication between the project partners in order to encourage content on networks or the dissemination of the different contents generated. • Establishing a fixed communication section in the monthly general meetings ensured a common adaptive strategic approach for communication actions. The monthly meetings have also served to reinforce the interaction between partners and improve the flow of information on upcoming events turned into information events for example. • Regular and complementary communication meetings were implemented to enhance coordination between the different partners, since the way a university, a museum, an NGO or a media outlet communicate is not the same. The principles are the same but the techniques and approaches vary, depending on the information, the audience addressed or the entity that seeks to be replicated. • To reach society at large, one of the best ways is journalistic information. In this sense, the importance of having specialised journalists and media is an added value. If we want the media to include IAS issues in their news agenda, it is not enough for the entities to generate communications and information, since this has been done until now. One of the key tools is the generation of information elaborated with journalistic criteria and language, plurality of sources and varied and attractive topics. • A useful tool to be used when disseminating the information is the creation of a database to identify certain actors in sectors of interest.

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
A.2. Diagnosis of the situation & development of EWRR tools	**A.2.1.** Capacity building, identify information and communication needs and formats **A.2.2.** Initial engagement and training to develop tools for the EWRR framework	• Design of the web database *Carta ibérica de Invasoras* (Iberian IAS Map) by the company Anet.es (also in charge of the design of the web platform IBERMIS, developed as part of INVASAQUA as well; see below in B4 actions), based on an initial database where data on priority IAS for the project, observations of these in the territory, entry pathways or bibliographic references were collected. • Development of a protocol to harmonise data on Iberian aquatic IAS for institutions to integrate data into European and global databases. • Design of the database on compatible Darwin and Plinian Core. • 60 experts from Spain and Portugal have prepared an updated List of IAS introduced or established (naturalised) in Iberian inland waters together with a List of potential aquatic IAS (Oliva-Paterna et al., 2021a and 2021b). These reference lists include 306 IAS present in the Iberian Peninsula and 272 potentially invasive species. • From these Lists of established and potential species, through prioritisation of taxa, a Black list and alert list have subsequently been prepared (Oliva-Paterna et al., 2022) as a horizon scanning exercise. These include 126 taxa present (Black List) and 89 potential taxa (Alert List). • Field guide entitled: *Watch out! Aquatic invaders / Cuidado! Invasoras acuáticas* (Casals and Sánchez-González, 2020; available in Spanish (ES), Portuguese (PT) and English (EN)), with 43 authors involved. It includes 100 fact-sheets on Iberian aquatic IAS belonging to different groups (Algae and plants; Invertebrates; Fishes and Other Vertebrates). 3050 hard-copies were printed (2050 ES, 800 PT, 200 EN). • Training webinars addressed to the project staff: 1) To implement a strategy and develop questionnaires; 2) To develop a Citizen Science Programme. An engaging webinar addressed to the members of the Society of Iberian Ichthyology (SIBIC) was also held. • Mini pocket guide to aquatic invasive alien species that was designed as part of the “Check, Clean and Dry” campaign materials kit: 7800 hard-copies of the pocket guide were printed (ES, PT). • Report: *Application and replicability of the IUCN EICAT standard: case studies on Iberian aquatic invasive alien plants, invertebrates and vertebrates* (unpublished, available on request).	• The website design and technical maintenance company (Anet), as the designer and sole provider of all products, ensures that the web platforms complement each other and are user-friendly. • A large number of scientists and experts in IAS management from Spain and Portugal contributed to the assessment, providing an example of the catalyst effect that the support of LIFE programmes can have. • EICAT methodology can become a good tool for regional management, mainly from the point of view of prevention and evaluation at the level of EU member states.

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
B.1. **Communication & information campaign for decision makers in public authorities, NGOs and the scientific community**	**B.1.1.** Campaign for decision makers, NGOs and the scientific community **B.1.2.** Comprehensive strategy for the management aquatic IAS **B.1.3.** Engagement with EU Authorities	• Web database for *Carta ibérica de Invasoras* (https://eei.sibic.org), which includes records of IAS from various taxonomic groups, images and bibliographic references. This website is linked to the official LIFE INVASAQUA web and the IBERMIS platform. In addition, SIBIC has been included as an EASIN data partner (May 2023) with the addition of the *Carta ibérica de Invasoras* data to the European maps. • The SIBIC2020 conference was held with an online format. Two special sessions on aquatic IAS were organised: workshop 1 on Prevention, control & management of IAS; workshop 2 on Networking on IAS European projects. LIFE INVASAQUA coordinated and also presented both workshops. • In general, attendance to SIBIC2020 was good, mainly due to effort done by the Organising Committee of the Congress due to the difficulty associated with transforming the Congress into a virtual event. • Handbook-Technical Report 1: List of the aquatic alien species of the Iberian Peninsula (Oliva-Paterna et al., 2021a). An updated list of 306 introduced or established alien species in Iberian inland waters (Recorded Alien list). • Handbook-Technical Report 2: List of the potential aquatic alien species of the Iberian Peninsula (Oliva-Paterna et al., 2021b). An updated list of 272 potential aquatic alien species (Potential Alien list). • Development of a freely available online database holding descriptive data for all aquatic alien species included in the lists (578 taxa): http://www.ibermis.org • Handbook -Technical Report 3: Transnational horizon scanning for the aquatic invasive alien species of the Iberian Peninsula – Black and alert final lists. A final Black List included and prioritised 126 established or introduced aquatic IAS and a final Alert List included and prioritised 89 potential taxa not yet present in Iberian inland waters (Oliva-Paterna et al., 2022). (Most technical documents have been produced in Spanish, English and/or Portuguese.) • The project co-organised the VI National Congress and I Iberian Congress on Invasive Alien Species held in Pamplona in April 2022. It has also organised special sessions and workshops on IAS at different congresses (e.g. Restauraríos 2019, SIBIC2020, AIL2020 (Congress of the Iberian Association of Limnology), SIBIC2022 and Restauraríos 2023). • Knowledge transfer events involving management stakeholders.	• Main conclusion of Workshop 1 (Prevention, control & management of IAS): even with a large number of prevention and control experiences concerning aquatic IAS at Iberian level, more coordination between scientists, surveillance agents, decision makers and managers is necessary to seek synergies in the control of IAS. • Main conclusion of Workshop 2: Networking on IAS European projects: LIFE and EU project presentations make it possible for different groups in the audience (public authorities, environment and education professionals, journalists) with a common interest in IAS to connect. We expect new networks and research initiatives on IAS and their control. • Knowledge transfer events have proved to be good for project visibility and also to involve stakeholders in actions. These events provide discussion spaces to seek essential synergies. We believe that these events will help to support the implementation of the EU Regulation on IAS by engaging different actors and creating synergies between knowledge building and management. • At the 2nd INVASAQUA Knowledge Transfer Forum in May 2023, speakers and attendees agreed on the need to increase information on the problem, improve awareness and dissemination of information on IAS, and create networks and synergies between entities and groups involved in their management. Similarly, the focus was placed on research on a local scale, to bring the problem closer to accessible and comprehensible scales, and on the need to increase prevention efforts. All of this will facilitate an improvement in the management of IAS, reducing the cost of any resulting impacts and being able to focus on species that we still have time to eradicate.

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
B.2. Communication, information and training campaign for key target groups in the Iberian Peninsula	**B.2.1.** Publications in journals, blogs & forums **B.2.2.** Online awareness-raising questionnaires **B.2.3.** Codes of conduct & best practices **B.2.4.** Audio-visual films **B.2.5.** Leaflets **B.2.6.** Massive Online Open Courses (MOOCs) **B.2.7.** Training courses (B-Learning). **B.2.8.** Museum-Aquarium exhibition on Iberian IAS **B.2.9.** Pedagogical contents & Teacher training courses **B.2.10.** International Youth Conference on IAS **B.2.11.** Youth Engaging Events on IAS →	• Abstracts/posters in congresses, both in Spain and Portugal. • Non-scientific publications. • Press releases. • 2701 questionnaires, of which 2163 correspond to target stakeholders: Surveillance Agents (84), River & Estuary Users (976), Knowledge Multipliers (51), Education Sector (119), Business and Commercial (16), Media (32), General Public (882). • Development of Strategic Recommendations for the transnational management of invasive fish and crabs (Oficialdegui et al., 2023; Oliva-Paterna et al., 2023). • A series of codes of conduct for different stakeholders: e-commerce, aquarium hobby/fish-keepers, aquaculture, zoos and aquariums, surveillance agents, works and environmental studies, state and regional authorities, and local authorities. • Short videos disseminated on social media. • Production, printing and dissemination of REVISA-LIMPIA-SECA / VEJA-LAVE-SEQUE campaign materials: 5 types of leaflets, 5 posters and a sticker together with the banners for the website and social media, focussing on anglers, estuary users, aquatic sports, marinas and irrigation agriculture. • Organisation of three IAS Youth Congresses with more than 300 participants. • Organisation of more than 80 training events, including four MOOCs courses, in which more than 2600 people have participated, mainly technicians from local or regional authorities, surveillance agents (environmental enforcement professionals, such as the Spanish Nature Protection Service (SEPRONA), etc.), museum or zoo and aquarium workers, environmental educators, teachers and students. The MOOCs, which were taught by experts, had a high level of discussion and participation between the Invasaqua trainers and students. Participants not only followed the course, but also took part in other Invasaqua actions, such as surveys or newsletter subscriptions. • The itinerant exhibition *¡Cuidado! Invasoras Acuáticas*, (Watch out! Aquatic Invaders) created by the National Museum of Natural Sciences - Spanish National Research Council (MNCN-CSIC) of Madrid, available in both Spanish and Portuguese, was inaugurated at the MNCN and has since travelled to >20 different locations throughout the Iberian Peninsula. The exhibition has already exceeded 190,000 total visits. • The project has also launched an ambitious citizen science programme focused on the Iberian Peninsula and led by the IUCN-Med, which combines the IBERMIS platform with the mobile application "Invasive Alien Species in Europe" (see below). →	• Specific for the campaign "Stop IAS Trade" (Stop Comercio Invasoras): promoting the code of conduct through specific campaigns targeting the stakeholders (suppliers and consumers of exotic species) was an efficient way to disseminate its contents and involve different entities interested in the topic. In addition, it was launched during the Christmas period 2021 to try to raise awareness among consumers and prevent the purchase of IAS as Christmas presents. • Co-production of materials involving the target group in the revision of the contents – as we did for the zoos and aquariums and e-commerce codes of conduct – was a fruitful experience, promoting stakeholder participation and increasing content quality and usability of the documents. The e-commerce code of conduct was supported by more than 60 entities through the campaign "Stop Comercio Invasoras" (Stop IAS Trade). →

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
B.2. Communication, information and training campaign for key target groups in the Iberian Peninsula	**B.2.12.** Field work project on IAS **B.2.13.** University student projects **B2.14.** Events with NGOs and River & Estuary users	• Teachers' training course. • A guide on aquatic invasive species (in the three languages; Casals and Sánchez-González, 2020) or campaigns such as *Revisa-Limpia-Seca* (Check-Clean-Dry) and *Stop Comercio Invasoras* (Stop IAS Trade). Aimed at teachers, two booklets, one in PT (online version for now), and ES (online and printed) are available. For the Spanish printed version, a distribution campaign has been launched and since the first promotion on social media, requests were received from environmental education centres, institutes and schools to receive printed copies. This guide will be also presented in the Education Section of the next conference of the "Asociación Española de Ecología Terrestre" (Spanish Association of Terrestrial Ecology), in October 2023. • More than 40 conferences held in which more than 2300 experts have participated and which aim to develop information aimed at improving and/or elaborating strategic lines for the management of aquatic invasive species. • IAS Master Project Contests. • IAS Degree Project Contest. • IAS Photograph Contests. • Kahoot games in ES and PT, level 1 and level 2, as well as other on-line initiatives such as the "Escape room Aventura invasoras". • Field activities involving 2962 participants, mainly with secondary and 3rd grade students. • Degree or master university projects presented. • Organisation of field events.	



Crassula helmsi © A Emmerson CC BY NC

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
B.3. Information and communication campaign for the general public (citizens) in the Iberian Peninsula	**B.3.1.** Communication campaign through the media **B.3.2.** Communication campaign in trains and airports **B.3.3.** Training seminars on IAS for the media **B.3.4.** Celebration of awareness events under global Initiatives **B.3.5.** Student video contests	• Production of different types of content on the impact of aquatic IAS to increase awareness and encourage society to take measures to prevent their deliberate or accidental spread: ▪ News focused on aquatic IAS and Interviews/ Press releases on outstanding information on IAS (>620 items; on the EFEVerde platform, which have also been covered by other media on several occasions) ▪ Radio slots ▪ Multimedia reports ▪ LIFE INVASAQUA seminar "Comunicar para concienciar" ▪ World Fish Migration Days ▪ World Rivers Day events ▪ European Researchers Night events (2020, 2021, 2022) ▪ International Day of Women and Girls in Science events (e.g. in the 2020 edition) ▪ Three editions of the Iberian Short Films Contest "Invasive Exotic Species of Fresh Water and Estuarine Systems: Awareness and Prevention" (in total, 25 videos in competition, 11 schools and 51 students): - 2019: 15 videos in the competition from 5 schools, and a total of 32 participating students; - 2022: 7 videos in the competition from 3 schools, and a total of 11 participating students; - 2023: 3 videos in competition from 3 different schools, and 8 participating students.	• In the Iberian Short Film Contest, there were not as many participants as expected because the objective was to make the videos outdoors, and this was difficult with the restrictions due to the COVID pandemic.

Participants at a bioblitz event in Cádiz (Spain).
©A.López Rodríguez/Sociedad Gaditana de Historia Natural (SGHN)

Materials distributed during the event in Brussels 2023.
©INVASAQUA

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
B.4. Awareness and engaging people in collecting IAS Data	**B.4.1.** Tools for engaging (App and Web platform) **B.4.2.** Multimedia material for training **B.4.3.** Awareness and Engaging campaign (Voluntary networks)	• Collaboration with the European Alien Species Information Network (EASIN) of the EU Joint Research Centre to use and promote the use of the application EASIN, already developed by this Centre. As part of the project, an Iberian module has been developed with the inclusion of 118 new sheets of IAS of interest for the Iberian Peninsula. • Development of the IBERMIS platform (https://ibermis.org/), to compile existing information on IAS, serve as a resource for citizen science, collect available useful resources (both developed by the project and other initiatives), including a map-viewer with records from the EASIN database and the *Carta ibérica de Invasoras*. It will remain active for at least 5 years after the project ends, maintained by IUCN. • Co-organisation, together with 10 organisations external to the project, of 12 participatory/citizen science activities and 2 fishing competitions to collect data on IAS (bioblitz). With >440 direct participants and about 300 indirect participants. Promoted the use of the EASIN app and project materials, as well as information on IAS and their impacts, among participants (mainly general public, NGO volunteers and school students). Some 6 other side events were held (exhibitions, documentaries, round tables and talks on the subject).	• Ideally, existing resources developed previously should be used, improving or adapting them if possible (such as the use of the pre-existing EASIN app and the development of a new Iberian module). Although it is necessary to study and properly assess the limitations that this may potentially entail (e.g. registration system in the app hampered by European data protection regulations, which makes it somewhat complicated for users and may discourage its use). But on the other hand, this has allowed a very interesting and valuable synergy with the EASIN of the European Commission and the sharing of data and feeding data into the European database. • The promotion of bioblitz or citizen science events, in which observation and data collection on IAS is carried out, in collaboration with other entities such as NGOs, scientific societies, consultancies or fishing associations, is very useful for involving these external entities in the project, which in turn help us to raise awareness of the project and the subject among the general public, their network of volunteers or the schools in the municipalities where they work. These observation and data collection events are an effective way to raise awareness about IAS in a very active and practical way.

Participants at a bioblitz event in the area of Foz do Sousa (Portugal) (left) and poster prepared to announce the event. ©Associação de Proteção dos Rios Sousa e Ferreira (APRISOF)

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
C. Monitoring of the project and the effectiveness of tools developed	**C.a.** Monitoring metrics of project visibility, communication efforts & tools applicability **C.b.** Monitoring trends in society and key target group perceptions of aquatic IAS **C.c.** Socio-economic impact of the project **C.d.** Completion of the project Key Performance Indicators (KPIs)	• Events & Activities. A sheet template was developed to incorporate data of each activity or event of the project, in a standardised way. General data and metrics were obtained: type of event (in at least 11 categories); partners involved, date, location and duration; stakeholders involved, including a general description of the stakeholders and involved institutions; number and type of attendees (real number and/or estimates according to the key target groups of the project). • Publications & Media. Metrics of publications (type, involved partners, etc.), news, interviews or media highlights, radio slots, multimedia reports, audio-visuals, etc., were obtained. • Website & Social media. Metrics of visibility were evaluated over time: number of visitors, visit times, number of unique visitors, downloads from the website, followers (Twitter, Facebook, LinkedIn, Instagram), impressions, number of page views (project video and audio-visuals films). • Qualitative and quantitative metrics (indicators) directly obtained from materials (e.g. leaflets, field guide, codes of conduct and best practices, on-line courses, audio-visuals, etc.) and tools (web platforms, technical-reports produced, apps, etc.) which are related to awareness, training, information and applicability of the EWRR framework. • Baseline knowledge or initial data to compare knowledge and perceptions on aquatic IAS in the Iberian Peninsula were obtained and data from surveys were included in the analysis.	• The activity sheet helps to track events and activities, and to characterise them. This provides important information to evaluate the effectiveness of the project in terms of awareness raising, dissemination and training. It also helps to keep track of the number of people with whom the project has worked directly, segmented into interest groups. • Tracking website data makes it easier to observe trends in the interest generated by the project and the subject matter. This makes it easier to give visibility to the project's actions and resources. Social networks, especially Twitter, allow for increased dissemination of materials and information. They are a very important tool to reach the general public in a simple way. • Quantifying the number of materials delivered makes it easier to see which groups you need to work with more by sending more material. You also learn for which key sectors you need further work to reach them with your resources.

Project stand at the Science Fair, Faculty of Biology, University of Murcia (Spain). ©INVASAQUA

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED
D.1. General Communication and dissemination of the project and its results	**D.1.1.** Project website **D.1.2.** Communication campaign through media **D.1.3.** Notice boards **D.1.4.** Development of tools and materials **D.1.5.** Development of public participation activities **D.1.6.** Development of communication and training activities	• Development of the project website (available in Spanish, Portuguese and English): http://www.lifeINVASAQUA.com/. • News on the project progress and activities. • News focused on project highlights (milestones). • Radio slots. • Almost 100 videos have been produced by the project. Most of them are hosted on the EFEVerde YouTube platform (some others are hosted by other channels). These videos have accumulated more than 43000 views. The videos on IAS with great impact, such as catfish, water hyacinth and blue crab, are the ones with the most views. We see it as a positive thing to make the videos available on open access platforms to facilitate their dissemination and viewing. In addition, it allows them to be consulted for a long time after the project is finished. • Publications in national/regional media outlets. • Participation in national/regional TV and radio channels. • Notice boards placed at strategic dissemination points in the general offices of all partners. • General brochure with project information produced in 6 languages, printed and available on the project website. • Other promo material such as roll ups or specific brochures created. • Promotional videos of the project in ES, PT and EN. The videos were posted on the YouTube platform. The video with the most views is the one in Spanish. The number of views has been growing steadily throughout the project. The video has been disseminated on social networks and screened at training and project presentation events. • A series of merchandising materials have been produced: pens, cloth bags, notebooks, leaflets, badges and refillable bottles. In total, more than 40000 project materials have been distributed. It was preferred to allocate economic resources to these less expensive materials (e.g. instead of t-shirts) in order to have a greater quantity to be used at events. • Presentations of the project in local events. • E-mailing list to disseminate information. • A total of 20 online newsletters have been sent throughout the project. The number of subscribers increased with each event held, but the feedback (open rate, click-through rate) from the newsletter did not grow at the same speed. This demonstrates the difficulty in creating attractive content for the audience, even those knowledgeable of the topic of IAS. It is necessary to improve the message and increase the visual resources to make the information more attractive. • Social networks (Twitter, Facebook, LinkedIn, Instagram, YouTube) have been one of the main means of communication to raise awareness and disseminate information about the IAS in the project. We have had a huge impact through our social networks, but at times we have not been able to reach all audiences. It is necessary to keep the message understandable and simple, and increase the capacity to transmit information across wider audiences. In addition, even given the Iberian nature of the project, efforts should be made separately for Spain and Portugal when promoting information through social media since the preferred platforms are different (Portuguese audiences use Facebook more while Spanish audiences use Twitter more).	• E-mailing lists are a useful strategy when directing campaigns to target groups. • Promotional videos of the project: the three videos (in the three languages) have a total of more than 2100 views, so the result is satisfactory. Although it has been an underused resource, it should have been shown in many more activities and events.

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED

D.2.

Replicability and trans-ferability: dissemination of the results and lessons learned

D.2.2.

Networking & discussion spaces with other projects

A highlight of the networking events held:

- SIBIC International Congress held in 2020 and 2022.
- Iberian Congress on River Restoration "RestauraRíos" 2019, organised by the Iberian River Restoration Center (CIREF).
- RestauraRíos 2023.
- Iberian Limnology Congress 2020, organised by the Iberian Association of Limnology (AIL).
- Event "Exchanging Experiences on Invasive Alien Species Projects in Europe", Malaga (Spain), May 2023.
- Event "Addressing IAS in Europe. The relevance of transnational cooperation and stakeholder engagement", Brussels (Belgium), September 2023.

- The Event "Exchanging Experiences on Invasive Alien Species Projects in Europe" was very positive, facilitating the exchange of knowledge and lessons learned between projects and participants, and reinforcing cooperation. During the event, participants expressed that holding such events is very important for knowledge transfer and increasing impact across LIFE projects. They expressed the need to consider funding LIFE projects even after they have finished in order to give continuity to specific actions that have proven to be effective.

Event on "Addressing Invasive Alien Species in Europe: The relevance of transnational cooperation and stakeholder engagement", held on September 8 2023 in Brussels (Belgium). ©INVASAQUA

PROJECT ACTIONS	TASKS	TANGIBLE RESULTS	LESSONS LEARNED

E.1.

Project Management and Monitoring of Project Progress

E.1.1.

Project Management

- Partnership agreements signed.
- Establishment of the Action Coordinators, Steering Group and Expert Committee.
- Management plan.
- Technical management meetings.

Awareness-raising and citizen science event. ©INVASAQUA

Meeting of project representatives with the Spanish ministry responsible for environment and watershed management. ©INVASAQUA

Activities organised in the context of the World Rivers Day in Portugal. ©ASPEA

Drawing competition with schoolchildren on invasive alien species. ©INVASAQUA

As a summary, since October 2018, more than 420 entities from different sectors of interest have collaborated in activities organised by the INVASAQUA project. The project has participated in more than 560 events, including both initiatives promoted by the project itself and participation in activities promoted by other organisations. These events were quite diverse in nature and had a significant reach, with the direct participation of more than 200,000 people. Among all of them, the touring of the exhibition "Watch out! Aquatic Invaders" (*¡Cuidado! Invasoras Acuáticas*), developed by the MNCN, has been the most popular, with more than 190,000 visits.

Based on our experience, Information, education and awareness-raising are key to making society aware of the problems posed by IAS and providing it with the necessary tools to make informed decisions and take responsible action. We believe that the LIFE INVASAQUA project, through the development of tools that improve the early warning and rapid response framework, as well as the organisation of the large and varied number of activities and events carried out to date, is achieving the following:

- Improved effectiveness of IAS management, by updating management tools and facilitating the development of strategic lines of action.
- Reduced impact of IAS on aquatic ecosystems. This reduction should be brought about by increasing the training, perception and awareness of key groups (environmental monitoring, aquaculture, sport and professional fisheries, NGOs, water sports, etc.).
- Increased awareness of the general public about IAS issues, thus reducing the spread and negative impacts of aquatic IAS in the Iberian Peninsula.

Poster of the short film contest on EEI in Portugal, 2019-2020 edition. ©INVASAQUA

4

Ailanthus altissima
© Luis Fernández García

INVASAQUA Event

"Exchanging Experiences on Invasive Alien Species Projects in Europe": lessons learned

From the 25 to 26 of May 2023, in the city of Malaga (Spain), the event “Exchanging Experiences on Invasive Alien Species Projects in Europe” was organised by IUCN-Med in the context of the LIFE INVASAQUA project. The event, also streamed online, brought together 64 participants directly involved in 20 EU LIFE projects, in 7 other projects related to IAS prevention, and in other initiatives on the topic (see Appendix A). Participants represented 42 organisations, including NGOs, governmental bodies, businesses, universities, research centres, protected areas and the media. During the two-day event, attendees had the opportunity to participate in different presentations and dynamics, in order to share information, lessons learned and foster collaboration.

Among the activities, participants took part in a group discussion about their lessons learned in communication, awareness, citizen science and knowledge transfer in the fight against the impacts of IAS. As a result, we present a summary table (Table 2) with lessons learned in each of these areas.

Event on “Exchanging Experiences on Invasive Alien Species Projects in Europe”, held on May 25 and 26 2023 in Malaga (Spain). ©INVASAQUA

Working group session at the event “Exchanging Experiences on Invasive Alien Species Projects in Europe” in Malaga (Spain). ©INVASAQUA

Table 2. Lessons learned from 20 LIFE projects and 7 other projects from other funding sources, working on IAS issues, which participated in the INVASAQUA event "Exchanging Experiences on Invasive Alien Species Projects in Europe" (Malaga, Spain, May 2023), in relation to 4 proposed topics (direct transcription of the conclusions of the working groups).

WORK GROUP #	TOPICS			
	COMMUNICATION	AWARENESS	CITIZEN SCIENCE	KNOWLEDGE TRANSFER
1	**POSITIVE** • Stakeholder mapping and keyholder messages are useful. • Present positive messages. • Benefit outcomes (mention ecosystem services). **NEGATIVE** • Too many stakeholders involved as objective. • Different language and culture (barriers), values.	**POSITIVE** • Follow the leader. • Involve stakeholders in doing actions. • Include social activities (e.g. food & drinks). **NEGATIVE** • Conflict of interest between stakeholders. • "Heavy" words (better to avoid them).	**POSITIVE** • Social media reach. • Effective tools (user friendly). • Clear objectives. **NEGATIVE** • Misunderstanding of the messages. • Not sharing feedback. • Non-friendly tools.	**POSITIVE** • Simply messages (best practices). • State different activities (animations, videos, etc.). **NEGATIVE** • Approach too academic. • Need for collaboration (scientific, administrative).
2	**POSITIVE** • The actions are effective if policy-makers are involved from the beginning. • Use a variety of tools. • If it reaches a big audience, positive feedback back. • Works well with knowledge multipliers (schools, museums). • Involvement of stakeholders in co-creation. **NEGATIVE** • It requires proper training. • Lack of communication experts. • Lack of communication between experts and the media. • Depends on taxonomic groups and stakeholders. • Iconic species grab more attention. • No one solution for everything.	**POSITIVE** • Simple and practical messages work. • Regarding if results are seen. • Works better if it's related to other issues. (climate, economics, health). **NEGATIVE** • Economic interests. • Species/stakeholders. • Time perception / area or habitat. • Iconic species.	**POSITIVE** • Reuse already existing apps. • Public willingness to report (not only IAS). • Fast way of getting a lot of information. **NEGATIVE** • Success depends on species/stakeholders. • Data quality (pictures, etc.). • Preferences for other ways of reporting (Facebook, etc.). • Difficulty depending on the habitat (e.g. underwater).	**POSITIVE** • Once it happens, it spreads fast. • Works well with the educational sector. • Long-term networking. • Positive feedback. **NEGATIVE** • It takes a lot of effort/time. • Difficulty to eradicate misconceptions. • Consistency of terms.

WORK GROUP #	TOPICS			
	COMMUNICATION	AWARENESS	CITIZEN SCIENCE	KNOWLEDGE TRANSFER
3	**POSITIVE** • Engage key partners. • Have professional support (journalists...). **NEGATIVE** • Time consuming and frustrating. • Generate impact to some stakeholders.	**POSITIVE** • Materials that are easily accessible and well received by the general public (such as panels, exhibitions, theatre, etc.) • Professional support. **NEGATIVE** • Reluctance raising (welfare/ethics).	**POSITIVE** • To collect information from stakeholders. **NEGATIVE** • Too many existing mobile apps. • Data bias.	**POSITIVE** • As a lesson learned, to not repeat work done. **NEGATIVE** • Too much information.
4	**POSITIVE** • Project broadcasts had a high penetration among older people and other non-social media users on local TV channels. • National TVs (interviews). • It is important to get the message through the channel that the target audience trusts. • Facebook in Italy works well. **NEGATIVE** • Twitter in Italy is only used by politicians and scientists. • Language barriers (e.g. Spanish news in Portugal). • Social media can create conflicts with certain sectors such as animal activists. • Some species names can be controversial (e.g. those that refer to nationalities based on their origin...).	**POSITIVE** • Surveys can reach a high number of people and can make them think. It's important to make sure you reach the right stakeholders. • If you transmit information on impacts, people will realise the problem. • Focus on what you want to protect, not on what you want to kill. **NEGATIVE** • Difficult to reach the right sector, especially on social media. • Some people might not be interested in changing their perceptions.	**POSITIVE** • App to identify invasive plants in Spain. • It transfers and improves knowledge. • People might feel like they are part of the solution. **NEGATIVE** • Apps can cause user fatigue (if there are many apps). A solution can be to use an existing app. • Generally, it is easier to collect data on plant species than animals (e.g. it's not so easy to upload a picture).	**POSITIVE** • It works best if people work together and with first-hand sensory experiences (touch, etc.) and biometric experiences. • Involving children is very positive, they then transfer the information to parents. **NEGATIVE** • The message can be manipulated. Attention! • People might soon forget the message. • If the message is not adapted to the target audience, it won't work.

WORK GROUP #	TOPICS			
	COMMUNICATION	AWARENESS	CITIZEN SCIENCE	KNOWLEDGE TRANSFER
5	**POSITIVE** • Advantages of creative and face to face communication. **NEGATIVE** • Too often done without real objectives. • On sensitive topics, very conscious wording is necessary.	**POSITIVE** • People have to be actively involved, not merely transmitting information. • Long term relationships with local communities.	**POSITIVE** • Works well with scholars, students and retired people. • Supports awareness raising. • Helps find the pathways. • Valuable data collection when funding is missing. **NEGATIVE** • Limited reliability of IAS identifications. Tools that help identify and validation by experts could help to increase reliability. • To ensure motivation in the long term. • Difficulty to motivate locals.	**POSITIVE** • In bilateral processes, the participation of stakeholders is continuous. **NEGATIVE** • In unilateral processes, it is a one shot. The solution is the creation of a platform / network. Other stakeholders / policy makers are not reached.
6	**POSITIVE** • Importance of building networks. • Press releases help gain interest from the media, if done at the right time. • Search for a topic of interest. • Develop a training day for journalists (and other communications stakeholders). • Video clips work! (play on emotion). **NEGATIVE** • Difficulty to convince some stakeholders in case of conflict of interest. • Nature conservation through “killing things” is not easy to explain. • Too much information in general (hard to be heard, diffusion).	**POSITIVE** • It’s important to step into the shoes of the different professionals. • “We need you” slogans work. • Bringing people in the field works. • Choose good examples. **NEGATIVE** • Need to avoid the anthropogenic view in the message (stick to the facts). • More difficult with some taxonomic groups. • Cultural appropriation of IAS (e.g. black locust in songs).	**POSITIVE** • Rapid, easy, fun and free applications available. • Feeds awareness raising and general interest. **NEGATIVE** • Too many apps. • Not always possible to incorporate. • Not always relevant. • Difficult to find volunteer validators, or to find funds to cover their costs.	**POSITIVE** • Cross the bridge between scientists, managers, technicians and decision makers. **NEGATIVE** • Missing trans-disciplinary research.

5

Key elements

that have the potential to be transferred and replicated from the results and lessons learned from the LIFE INVASAQUA project

Lepomis gibbosus © Bernard Dupont

In addition to the lessons learned that participants expressed in terms of communication, awareness raising, citizen science and knowledge transfer in the fight against IAS impacts (Table 2), from the set of tangible results presented in Table 1 by the LIFE INVASAQUA project, key elements considered to have the potential to be transferred and replicated to other initiatives and projects have been selected. They have been grouped into 4 areas: 1) Technologies & tools, 2) Methodological approaches, 3) Scientific knowledge and 4) Collaboration Models. The results are presented in the following table (Table 3):

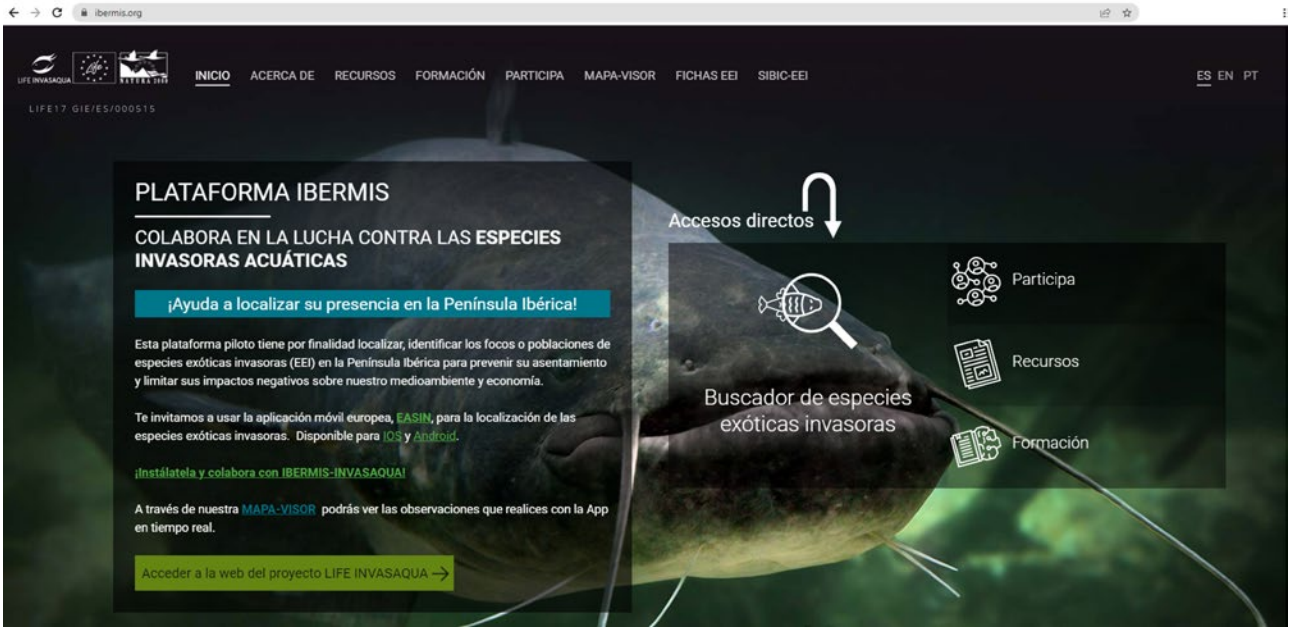
Table 2. Lessons learned from 20 LIFE projects and 7 other projects from other funding sources, working on IAS issues, which participated in the INVASAQUA event Exchanging Experiences on "Invasive Alien Species Projects in Europe" (Malaga, Spain, May 2023), in relation to 4 proposed topics (direct transcription of the conclusions of the working groups).

AREA	KEY ELEMENT	POTENTIAL TO BE TRANSFERRED AND REPLICATED
Technologies & tools	IBERMIS Platform	It is a repository of available resources on IAS (databases and websites, guidelines, manuals and codes of conduct, training materials, publications, etc.), both produced by the INVASAQUA project and from other sources (e.g. from national ministries such as the Spanish Catalogue of Invasive Alien Species, IUCN Global invasive species database, InvaNET or the List of alien species of EU concern. It is a hub of open IAS sources. It incorporates a map-viewer with records of freshwater IAS (from the EASIN and SIBIC invasive list databases), and species factsheets. It also hosts training courses for different stakeholders whose structure can be replicated and used by other initiatives. The multifunctional platform can serve as a model for new emerging IAS projects.
	Surveys and questionnaires	They can be implemented after the end of the project for research purposes (e.g. comparison of awareness or economic impact before and after). They can be tested with additional stakeholder types. Templates can be adapted for other IAS groups. They can also be compared to other tools to analyse social perspectives.
	INVASAQUA web resources	It is a good platform for collecting news and resources on aquatic IAS. The web has been fed with additional sources and other webs. The website will remain operational for an undetermined period of time.
	Carta ibérica de Invasoras Web Platform	The information contained can be updated and transferred to European databases regularly. It directly links to the IBERMIS platform to visualise geographical data. The web platform can serve as a model for other biodiversity platforms and it is a scientific tool for policy-making actions.
	The Iberian module for the EASIN mobile application	The local catalogue experience has been tested in different parts of Europe and the Iberian module has been the most used so far. The module can be maintained and serve as a model for other local catalogues in Europe, including the activities in which it has been used the most (bioblitzs, volunteering, contest). The data collected feed into the IBERMIS and European databases.

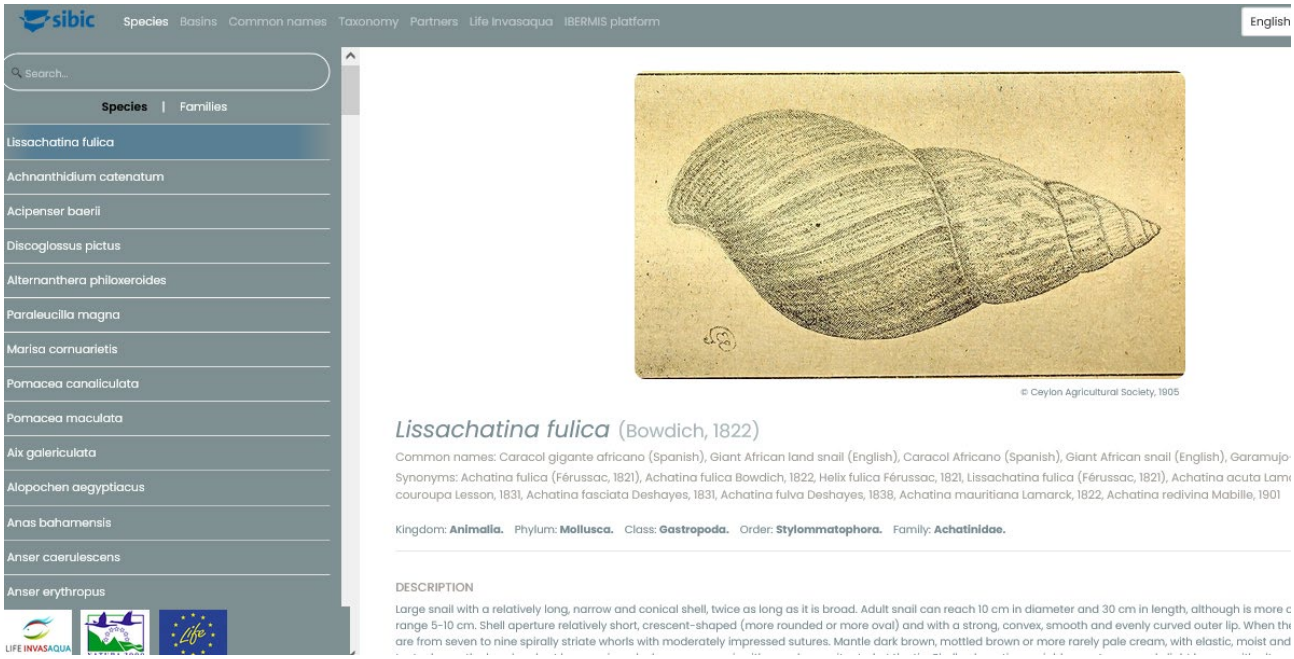
AREA	KEY ELEMENT	POTENTIAL TO BE TRANSFERRED AND REPLICATED
Methodological approaches 	Identification Guide "Watch out! Aquatic Invaders": Guide to the identification of invasive alien species (selection of the most relevant ones) in freshwater ecosystems of the Iberian Peninsula (Casals and Sánchez-González, 2020).	The IAS guide developed during the project (in English, Portuguese and Spanish) is hosted on other websites and the format can be replicated for other species groups.
	Mini pocket guide to selected aquatic IAS that was designed as part of the "Check, Clean and Dry" campaign (ES, PT).	It contains basic information on relevant aquatic IAS selected for the campaign and the pocket format is user friendly and replicable for other species groups and usable in different types of events and projects.
	Iberian Peninsula general public baseline knowledge assessment.	It serves as a starting point to identify needs and guide survey design; it can be considered by other IAS starting projects.
	Participation in congresses	Participation in congresses (from local events to international conferences) is essential to transfer the results of the project in the after-LIFE period, enhance networking, identify further needs on the topic and keep the interest of society. This can be replicable by any other project.
	Knowledge transfer events involving management stakeholders	The format (networking, meeting, workshop…) can be replicated after LIFE actions and by other starting IAS projects. Events can be replicated by request of management stakeholders. Information and materials produced during the project to this end can be transferred in new events.
	Field events	The format can be replicated in local and global events (e.g. Iberian Week on IAS, Rivers World Day). The method can be also replicated (e.g. IAS data collection with mobile app, IAS removal). Project materials available for field events can be printed and distributed by other organising entities and projects.
	Media interventions	Communication in different formats (Press releases, Non-scientific publications, Radio slots, Publications in national / regional medio outlets and TV, etc.) has been essential to raise awareness and interest in society. Updated knowledge can be transferred after the end of the project to the media and the approach can be replicated by other IAS starting projects.
	Notice boards placed in strategic dissemination spots on the general offices of all the partners	As printed versions of all materials are available during and after the project this can be easily replicated by other starting IAS projects bringing attention to it and promoting interest in the project.
	Training events, including MOOC courses and educational guides	Training can be replicated under request by groups of interest. Online materials used are available to share with groups of interest. MOOC courses format can be replicated by other experts to communicate about different IAS groups. MOOCs can be used as training for starting IAS projects. Educational guide contents can be transferred to teachers and schools and the format can serve as a model for other educational materials on environmental issues.

AREA	KEY ELEMENT	POTENTIAL TO BE TRANSFERRED AND REPLICATED
Methodological approaches	Promotional material	Materials such as brochures, roll ups and merchandising can be useful in after LIFE actions and be shared with other IAS projects campaigns. The format can be replicated by other IAS starting projects.
	E-mailing list	The method can be replicated in other IAS starting projects as essential communication and promotion of the project activities based on newsletter subscriptions.
	Itinerant exhibition "Watch out! Aquatic invaders"	The exhibition can be shared after the end of the project under request by interested entities. Other entities can add their logos, print and use the exhibition in their own activities (e.g. river basin authorities).
	Communication campaigns: Clean, Check and Dry and Stop IAS Trade	The campaigns can be repeated seasonally. New partners can support the campaigns, adding their logos, printing and reusing the materials in their own activities. The format and the sources can be replicated and reused in other campaigns by starting IAS projects.
Scientific knowledge	The Environmental Impact Classification for Alien Taxa (EICAT; IUCN, 2020)	The methodology, categories and criteria have been presented and tested in several IAS conferences and workshops organised in the context of the project. It has also been introduced to university students of the partners consortium as part of the educational curriculum.
	IAS database (*Carta ibérica de invasoras*) with updated and visible information of approx. 233 taxa, with 1648 bibliographic references, 1215 web references, 653 images (of 241 taxa) and 21894 records collected. Among them, the group with the largest number of records is the group of fishes, with more than 6000. It contains tables with multiple fields related to Species, Records, References, Habitats, Pathways, Introduced Basins, Web Pages and Images.	The prioritisation criteria to include species in the data bases and to make a record visible can be replicated by other databases on biodiversity. The database format and approach can be replicated by other IAS starting projects. The information contained can be periodically transferred to European databases. The information contained can be complemented and updated being a scientific tool for policy making.
	Prioritisation lists and Black and Alert lists of IAS (Oliva-Paterna et al., 2022)	The updated information contained can regularly support policy making on IAS. Prioritisation lists can be live documents to be revised and updated periodically. The criteria to select species can be tested in other projects working on freshwater and estuarine IAS. The horizon scanning exercise approach used for the Black and Alert lists can be replicated by other IAS starting projects in different areas and/or be replicated in the Iberian Peninsula to monitor the evolution of IAS presence and distribution.
	Strategic recommendations for transnational management of specific groups of IAS (Oficialdegui et al., 2023; Oliva-Paterna et al., 2023)	The scientific and management criteria to select recommendations can be replicated and adapted to work at regional and shared-basins level. The working groups and survey activities to define the contents and recommendations can be transferred to other scientific groups and replicated for other groups of species.

AREA	KEY ELEMENT	POTENTIAL TO BE TRANSFERRED AND REPLICATED
Collaboration models	Created the project communication plan, a coordinated and planned methodology for the development of dissemination and communication activities and materials.	The communication plan created before the start of the project helps to guide this kind of project until the end. The communication plan can be replicated and transferred by other IAS starting projects focusing on communication and knowledge management.
	Panels of experts	The composition of panels of experts was essential to prioritise criteria and to select scientific information. The work format (workshops, meetings, surveys to evaluate documentation, etc) is highly recommended and can be transferred and replicated by other starting projects working on specific IAS groups as well as on management and policy making.
	Co-production of knowledge	Processes involving stakeholders in evaluating and complementing documents such as codes of conduct is highly recommended to involve the target sector and ensure the quality and usability of the materials. This approach can be easily replicated (through meetings, surveys, endorsement campaigns) by other projects working with stakeholders.
	Co-organisation of transnational activities and events	This approach enhances networking among projects and entities and makes the topic visible to a higher extent. Transnational co-organization is a highly enriching collaboration that can be replicated by other bordering countries and shared river basins involving different stakeholders and the public. The results, materials and methods reached for the Iberian Peninsula can be transferred to interested entities and countries to replicate the experience.



The IBERMIS web platform. ©INVASAQUA



Carta de ibéricas de invasoras (Map of IAS) web platform, detail of the factsheet of one of the species in the database. ©INVASAQUA

At the opening of the National Congress on IAS, Navarra (Spain). ©INVASAQUA

Dates and participation data in the annual editions of the Iberian Week on Invasive Species. ©INVASAQUA

Training day for law enforcement officers (SEPRONA) (Spain). ©INVASAQUA

Itinerant exhibition “Watch out! Aquatic Invaders” at the National Museum of Natural Sciences, Madrid (above) and at Valencia station (below) (Spain). ©INVASAQUA

Image of the development of one of the MOOC courses. ©INVASAQUA

Infographic designed for the Check/Clean/Dry and Stop IAS Trade campaigns. ©INVASAQUA

During the implementation of the project, in its last years, several events have been organised to promote and facilitate the transfer of knowledge, information and resources developed to key actors, mainly those responsible for IAS management and decision making. The most relevant, already mentioned earlier in the document (and whose videos are available), have been the INVASAQUA Knowledge Transfer Forums and the networking event on "Addressing Invasive Alien Species in Europe: The relevance of transnational cooperation and stakeholder engagement", the latter held in Brussels in September 2023, in which the key results of the project and the potential for transfer and replication of the project materials were presented to transnational project representatives and to national and EU authorities. We hope that this document will help to ensure that the main elements presented here can be further transferred and replicated in similar initiatives.

After its completion, the project will keep the species lists and databases alive (updated) during the project or as part of the After-LIFE Plan. Some of the actions will continue such as the organisation of transnational events (e.g. Iberian Week of Invasive Alien Species) by partners of the consortium. The itinerant exhibition will continue running at the local level and together with other materials (e.g. codes of conduct) will be available for other entities and projects to print and use for their own purposes and actions. Additional educational actions (distribution of copies of the educational guides and training for teachers and students) will take place during the after-LIFE period. Since there is no specific budget for publishing new updated versions of the materials, partners will explore possibilities to do so.

Procambarus clarkii © Javier Oscoz

Procyon lotor © Arthur Chapman CC BY-NC-SA 2.0

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More information and resources available at:

https://ibermis.org/

https://lifeinvasaqua.com/

https://eei.sibic.org/

Eichhornia crassipe
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Appendix A.

LIST OF PROJECTS PROVIDING INFORMATION

Table A1. LIFE projects (in alphabetical order) that provided information on lessons learned.

PROJECT	OBJECTIVE	COUNTRY(IES) WHERE IT IS IMPLEMENTED	WEBSITE
LIFE ASAP (LIFE15 GIE/ IT/001039)	The reduction of the introduction rate of invasive alien species (IAS) on Italian territory and the mitigation of its impacts.	Italy	www.lifeasap.eu
LIFE ATIAS (LIFE18 NAT/ GR/000430)	To establish an early detection and rapid eradication system for IAS in Northern Greece.	Greece	www.lifeatias.gr
LIFE-CLAW (LIFE18 NAT/ IT/000806)	To conserve and enhance the stock of the endangered crayfish (*Austropotamobius pallipes*) in North-Western Apennine area of the Italian regions Emilia Romagna and Liguria, by a long-term conservation programme.	Italy	www.lifeclaw.eu
LIFE CONTRA Ailanthus (LIFE19 NAT/ HR/001070)	To establish control of Ailanthus (*Ailanthus altissima*) in protected habitats of Natura 2000 sites and cities of Mediterranean Croatia.	Croatia	www.lifeailanthus.hr
LIFE GREEN4BLUE (LIFE18 NAT/ IT/000946)	To improve the balance of all the functions that the network of artificial canals provides to the territory by increasing their function as ecological corridors, thus supporting biodiversity and the connection between the wetlands of the Natura 2000 Network.	Italy	www.lifegreen4blue.eu
IdroLIFE (LIFE15 NAT/ IT/000823)	To produce a significant improvement of the status of aquatic species (Ann. II Habitat Directive) in Natura 2000 sites of Verbano Cusio Ossola, through concrete interventions of conservation and improvement of the blue corridors of Toce and San Bernardino rivers.	Italy	www.idrolife.eu/en
LIFE Ilhas Barreira (LIFE18 NAT/ PT/000927)	To assess the resilience of the Barrier Islands to climate change, the status of the populations of Audouin's gull (*Ichthyaetus audouinii*) and Little tern (*Sternula albifrons*), and the impact of fishing on the Balearic shearwater (*Puffinus mauretanicus*).	Portugal	www.lifeilhasbarreira.pt
LIFE INVASAQUA (LIFE17 GIE/ ES/000515)	To increase the awareness of the Iberian public and groups interested and involved with the problem of IAS on aquatic ecosystems. In addition, the project aims to develop tools to improve an efficient early warning and rapid response management (EWRR) framework for new IAS that may appear in freshwater and estuarine habitats.	Portugal and Spain	www.lifeinvasaqua.com
Finvasive LIFE (VieKas LIFE) (LIFE17 NAT/ FI/000528)	To educate and communicate efforts to reduce the unintentional spread of invasive alien species, to control and eradicate from the wild invasive alien plant species of EU concern and to develop environmentally friendly alternatives to synthetic herbicides.	Finland	https://www.sll.fi/viekas-life-en/

PROJECT	OBJECTIVE	COUNTRY(IES) WHERE IT IS IMPLEMENTED	WEBSITE
LIFE KANTAURIBAI (LIFE21 NAT/ES/101074197)	To improve the conservation status of species and habitats linked to the river ecosystem in 15 Natura 2000 Network sites in rivers and tributaries that flow into the Bay of Biscay in 5 river basins shared by 3 regions (Navarre, Gipuzkoa and Aquitaine).	France and Spain	www.gan-nik.es/es/proyectos-europeos/kantauribai
LIFE medCLIFFS (LIFE20 NAT/ES/001223)	To improve the current management of invasive alien invasive plant species (IPAS) that threaten the conservation of the floristic diversity of the Mediterranean cliff habitat of Community interest.	Spain	www.lifemedcliffs.org/es/
LIFE LETSGO GIGLIO (LIFE18 NAT/IT/000828)	To improve the quality and natural character of the ecosystem present on Giglio Island, protecting its habitats and species.	Italy	www.lifegogiglio.eu
LIFE LIMNOPIRINEUS (LIFE13 NAT/ES/001210)	To improve the conservation status of aquatic species and habitats of European interest in the high mountains of the Pyrenees.	Spain	www.lifelimnopirineus.eu
LIFE MICA (LIFE18 NAT/NL/001047)	To reduce the coypu (*Myocastor coypus*) and Muskrat (*Ondatra zibethicus*) population to a manageable size in order to prevent damage to waterways, biodiversity and plant life.	Belgium, Germany and the Netherlands	www.lifemica.eu
LIFE PREDATOR (LIFE21 NAT/IT/PREDATOR)	To combat the spread and further introductions of European catfish (*Silurus glanis*) in Southern Europe, where it is an alien invasive species.	Czech Republic, Italy and Portugal	www.lifepredator.eu
LIFE RESQUE ALPYR (LIFE20 NAT/ES/000369)	To recover mountain aquatic habitats, improving the conservation of several target habitats/species in four Nature 2000 sites from the alpine biogeographical regions of the Pyrenees (Spain) and the Alps (Italy).	Italy and Spain	www.liferesquealpyr.eu
LIFE RIPARIAS (LIFE19 NAT/BE/000953)	To optimise the management of invasive alien species in river areas and ponds across regional borders.	Belgium	www.riparias.be
LIFE STOP Cortaderia (LIFE17 NAT/ES/000495)	To implement a common and transnational strategy to combat the pampa grass (*Cortaderia selloana*) throughout the Atlantic Arc, from Portugal to France, passing along the entire Cantabrian coast.	Portugal and Spain	www.stopcortaderia.org
LIFE STREAMS (LIFE18 NAT/IT/000931)	The recovery and conservation of populations of native Mediterranean trout (*Salmo cettii*).	Italy	www.lifestreams.eu/?lang=en
LIFE 3n-Bullfrog (LIFE18 NAT/BE/001016)	To find a sustainable method to stop the spread of the American bullfrog (*Lithobates catesbeianus*) in Flanders.	Belgium	www.natuurenbos.be/bullfrog

Fundulus heteroclitus © Brett Albanese CC BY NC ND

Dreissena polymorpha © Bj.schoenmakers

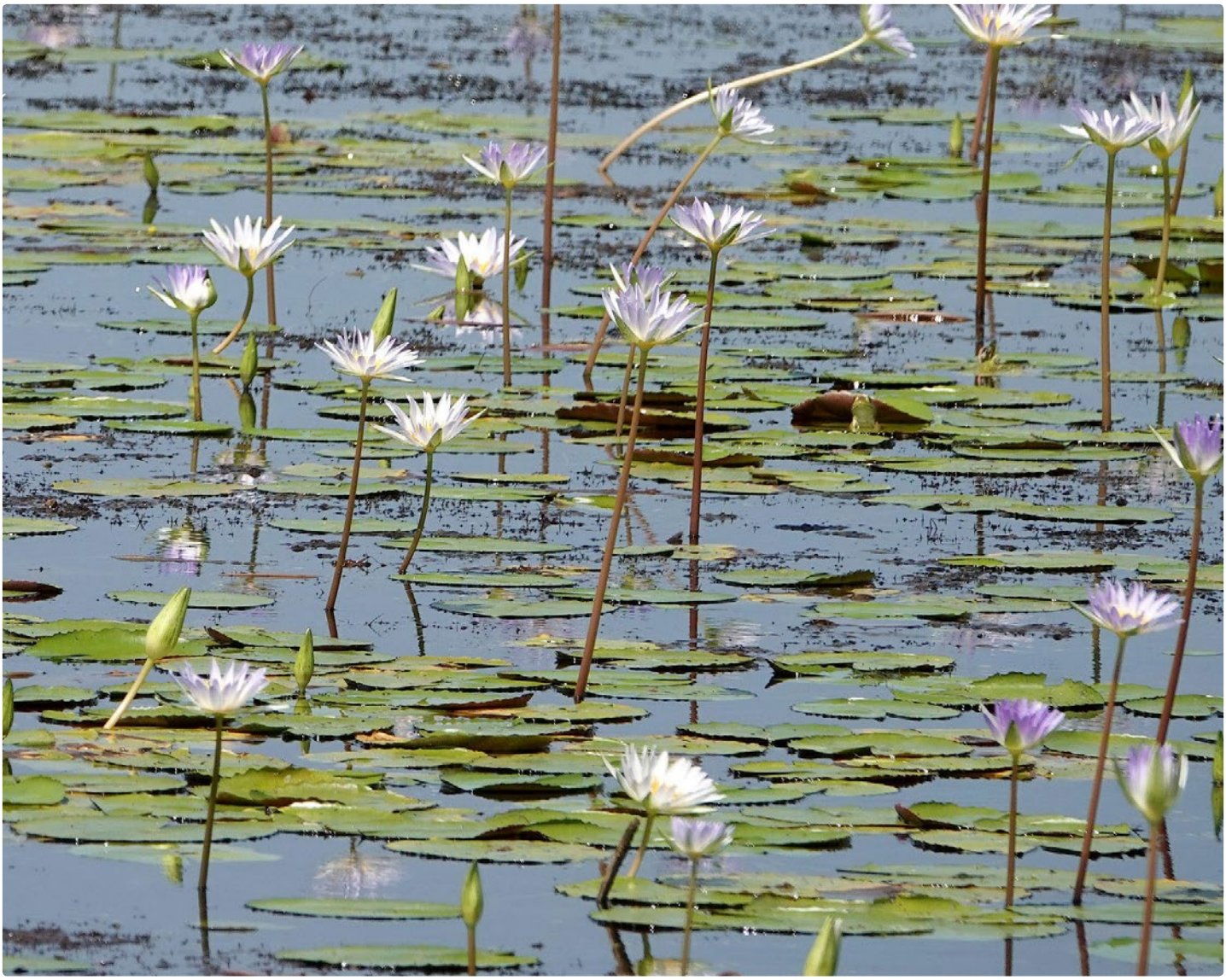
Silurus glanis © Peter Pfeiffer

Callinectes sapidus © Canal Mar Menor

Table A2. Other (non-LIFE) projects (in alphabetical order) that provided information on lessons learned.

PROJECT	OBJECTIVE	COUNTRY(IES) WHERE IT IS EXECUTED	WEBSITE
FLUVIATILIS (Next Generation EU funding)	The conservation and rehabilitation of river ecosystems by increasing their resilience to climate change and the provision of ecosystem services through river stewardship.	Spain	www.fluviatilis.net
INTERREG Sava TIES	To find an effective solution for permanent eradication of IAS, to reduce habitat fragmentation and to improve the connectivity of the transnational ecological corridor.	Bosnia and Herzegovina, Croatia, Serbia and Slovenia	www.interreg-danube.eu
INTERREG INVALIS	To improve their environmental policies, by supporting policy measures for the prevention, early detection and control of IAS.	Spain, Portugal, Greece, Romania, Italy, France, Latvia	https://projects2014-2020.interregeurope.eu/invalis/
InvBlue (project financed by national and regional research funds)	To assess the current population status of three invasive alien species: the American blue crab (*Callinectes sapidus*), the Bastard trout (*Cynoscion regalis*) and the Pistol shrimp (*Alpheus sp.*) in the Gulf of Cadiz, and their potential effects on native fauna and the ecosystem.	Spain	https://invblue.csic.es/
Rugulopteryx (project funded by the Spanish Ministry of Environment and the University of Malaga)	To identify the spatio-temporal windows of vulnerability to the invasion of *Rugulopteryx okamurae* of Spanish species and marine protected areas, based on distribution modelling approaches and field studies.	Spain	www.uma.es/sala-de-prensa/noticias/la-uma-lidera-un-estudio-para-ayudar-prevenir-y-controlar-la-expansion-del-alga-asiatica/
Sorelló, Estudis al Medi Aquàtic S.L.	Company specialising in the provision of technical-scientific consultancy services for the management and conservation of inland aquatic species and ecosystems.	Spain	www.sorello.net
TerIAS (Turkish government project)	To address threats from invasive alien species in terrestrial areas and inland waters.	Türkiye	www.teriasturk.org/

Poecilia reticulata © Gerlos CC BY ND



Nymphaea mexicana © Terry MP CC BY NC

LIFE INVASAQUA

Aquatic Invasive Alien Species of Freshwater and Estuarine Systems: Awareness and Prevention in the Iberian Peninsula

What is LIFE INVASAQUA

A European project that seeks to tackle aquatic invasive alien species (IAS) in Spain and Portugal by increasing public and stakeholder awareness. It will contribute to improve IAS management and reduce their environmental, societal, economic and health impacts through information campaigns and the exchange of successful management solutions and practices.

How has it been achieved?

Creating priority lists of IAS and strategic management guidelines at the Iberian level to support and facilitate the implementation of the EU Regulation. Implementing training and information campaigns with key stakeholders. Developing communication and awareness activities through volunteering campaigns, citizen science, events with students or travelling exhibits across the Iberian Peninsula.

Coordination

UNIVERSIDAD DE MURCIA

Associate beneficiaries

sibic Sociedad Ibérica de Ictiología

USC Universidade de Santiago de Compostela

IUCN

aspea

Universidad de Navarra

Universidade de Évora

MARE

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CSIC Consejo Superior de Investigaciones Científicas

mncn museonacionalcienciasnaturales

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