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# FCT Fundação para a Ciência e a Tecnologia

MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

## Relatório de Progresso

[Relatório de Progresso Lacrado com Sucesso a 27-10-2019]

**Relatório de Progresso validado com sucesso e lacrado em 2019/10/27!**

### Informação:

Qualquer dúvida relacionada com o preenchimento do Formulário de Relatório de Progresso, por favor consulte o link "Notas e Informações", Relatórios Científicos de Progresso.

### Atenção:

- A sessão expira ao fim de **20 minutos** de inactividade!
- O formato da data a utilizar é **dd-mm-yyyy**

## Formulário Relatório de Progresso - Componente Científica

### Relatório de Progresso nº 1

#### Período a que o relatório diz respeito:

Data de início: 01-08-2018

Data de fim:

### 1. Identificação do Projecto

**Referência do Projecto:** PTDC/CTA-AMB/29105/2017

**Investigador Responsável:** Christos Gkenas

**Instituição Proponente:** FCIências.ID - Associação para a Investigação e Desenvolvimento de Ciências (Fciências.ID)

**Data de Início:** 01-08-2018    **Data de Fim:** 31-07-2021

**Financiamento Concedido:** € 236.187,46

### 2. Resumo dos Trabalhos Desenvolvidos e Desvios à Proposta aprovada

#### Resumo dos trabalhos

Descreva de forma breve as actividades desenvolvidas **no período em apreço** e os resultados alcançados. Referia-se em concreto às tarefas que tiveram execução no período a que o relatório respeita.

During the first year of the project ISO-INVA (01 August 2018 – 31 July 2019), Tasks 1, 2, 3 and 4 as defined in the working plan of the project were initiated following the predicted timeline.

Task 1: Long term changes in community trophic structure

This task aims to quantify food web changes in food webs in the Lower Guadiana Basin (LGB) over the past 30 years, based on Stable Isotope Analysis (SIA) of museum - archived and contemporary fishes.

During the first year of the project, we created a database of archived specimens in the Museu Nacional de Historia Natural e da Ciencia (MUHNAC) collected in the LGB since 1976. Overall, 15695 Individuals were cataloged by species, year, month and local of collection. From these, we focused on specimens of nine species collected in summer (June - August), and selected two periods for analysis (Table 1). The first period (1978 -1986), representing the initial stages of establishment of non-native fishes, included 1121 individuals, of native species. The second period (1999-2004), representing the spread and integration of non-native fishes, included 3102 individuals, mainly of non-native species. Overall, the final data set for analysis included 6

native (*Anaeryps hispanica*, *Cobitis paludica*, *Iberochondrostoma lemmingii*, *Pseudochondrostoma willcommi*, *Squalius pyrenaicus* and *Squalius alburnoides*) and 3 invasive species (*Lepomis gibbosus*, *Australoheros facetus*, *Micropterus salmoides*). Further, we will select a subsample of 20 individuals of each species at adult stage per period accounting for up to 300 samples for SIA.

#### Task 2: Environmental and Invader effects on the food web structure

This task aims to examine changes in trophic diversity in contemporary assemblages associated with biological invasions and environmental variability, based on SIA.

We conducted a pilot survey of fish and habitats in the LGD (28 April to 2 May) to establish a sampling network covering longitudinal gradients in abiotic and biotic conditions. Sampling site locations were defined based on (i) the likelihood of reducing to pools during summer drought, (ii) ease of access and (iii) proximity to sites covered during historical collections.

Between 2 and 20 of July we sampled 37 sites across the LGD (Figure 1), for productivity, habitat conditions, basal resources and fish.

- Filtered and unfiltered water samples were collected, kept in ice and latter deep frozen (-20°C) for dissolved organic carbon and N-NH<sub>4</sub>, and P-PO<sub>4</sub> analyses. Water filters were preserved in liquid nitrogen for chlorophyll a analysis.

- Habitat conditions were assessed from temperature, dissolved oxygen, pH, conductivity, turbidity, depth, substrate, canopy and human impact.

- Samples of riparian leaves, periphyton and submerged and emerged macrophytes were collected in the stream channel and margins. Zooplankton samples were collected using a 100 µm mesh net. Benthic macroinvertebrates were sampled using kick netting, counted and identified to order and family or species when possible. Additional individuals were collected from coarse substrates and water column.

- Fish were sampled using electrofishing, identified to species and counted. Whenever available at least 30 individuals of each species were measured for total length and weighted, and assigned to life-stages based on size distributions and literature information. For SIA, pelvic fin clips were removed from young-of-the-year (YOY), juveniles and adult fishes. At the end, native fishes were returned to the stream and non-native fishes were euthanized.

Samples for baseline resources and fishes were kept on ice, and later deep frozen (-20°C) for SIA, and are listed in Tables 2 and 3, respectively.

#### Task 3: Intraspecific functional influences in trophic structuring

This task aims to identify the functional traits of non-native fishes that impact the trophic structure of recipient assemblages.

Samples for analysis were selected from fish collected in Task 2. From the overall collections for each species, we selected for morphological analysis 2 - 14 YOY, 1 - 13 juveniles and 1 - 10 adults. Overall, analyses will include 303 individuals of 22 species (Table 3) and will focus on morphological traits associated to food acquisition and locomotion.

#### Task 4: Public awareness about Fish Invasions

This task aims to enhance understanding of the ecological impacts of invasive fishes through public awareness and outreach.

During the first year of the project we prepared the logo of ISO-INVA (Figure 2) and started building a website to disseminate our findings and host downloadable information including publications, technical reports and press releases. Also, we created social media pages in Twitter (<https://twitter.com/IsoInva>) and Facebook <https://www.facebook.com/isoinva/> to advertise project activities.

To meet the expected achievements of the project, we presented a poster about the ISO-INVA in the 15th European Ecological Conference and published a paper about niche divergence between two non-native fishes in the LGB, in Knowledge and Management of Aquatic Ecosystems.

### Desvios à Proposta Aprovada

Se tiver havido desvios à proposta aprovada, quer do ponto de vista científico como financeiro, aponte os desvios e justifique-os. Se teve dificuldades na execução do plano de trabalhos aprovado, identifique-os e indique de que modo pretende ultrapassá-los. Se no período em apreço tiver informado a FCT sobre alteração orçamental inter-rubricas (necessitem ou não de autorização por parte da FCT), indique aqui o motivo.

There were no substantial deviations to the scientific working plan, tasks and calendar. Nevertheless, some minor adjustments were included mainly in tasks 1 and 2, which are described and justified below.

Task 1: After analyzing the collection of museum-archived specimens, we decided to add 2 native species to the species list presented in the initial application: *S. alburnoides* and *S. pyrenaicus*. Considering that the numbers of museum-archived native species were generally low, the inclusion of these new species will balance the native assemblages and will have no significant additional costs in the budget for SIA.

Task 2: Instead of sampling 20 sites in two consecutive years, we decided to sample around 40 sites in 2019 only. This way it was possible to capture the longitudinal gradient of environmental variability in an extreme dry year, and avoid the risks associated with high inter-annual variability in rainfall conditions in Mediterranean riverscape, without significant deviations in the budget for missions.

However, some financially deviations were introduced in the budget of the project, which are listed and justified below:

- Following the guidelines of the Principal Contractor after the update of the salary index of PhD researchers to level 33, we informed and were authorized by FCT to reduce the PhD contract predicted in the project from 36 to 30 months, starting on 1st of April 2019. This left an amount of 6.124,91 € available in the budget line "HUMAN RESOURCES".

- Moreover, given that the experience of the PI in SIA was limited, he was authorized by FCT to attend the course "Survivor's Guide to Stable Isotope Ecology 2019" in Sicily, Italy. The participation in the course had a fee of 1.1280 € that was covered with supplement in the budget line "HUMAN RESOURCES".

- To improve the monitoring of water temperature, which is a key driver of feeding activity and metabolism in fish, we requested and were authorized by FCT to purchase 40 data loggers. This has implied a transfer of 2.400 € from the line of "MISSIONS" to "ACQUISITIONS OF OTHER GOODS AND SERVICES". However, during the pilot survey in the LGB, we realized that several stream sections were already dry. Therefore, we decided to order only 20 temperature loggers to cover the LGD. This left an amount of 1.148,18 € available in the budget line "ACQUISITIONS OF OTHER GOODS AND SERVICES".

- Because Tasks 2 and 3 provided larger samples of fish, macroinvertebrates, zooplankton, periphyton and water than expected, we required and were authorized by FCT to purchase a freezer to store and maintain samples in good condition until SIA processing. This has implied a transfer of 500 € from the budget line of "ACQUISITION OF OTHER GOODS AND SERVICES" to "SCIENTIFIC INSTRUMENTS AND EQUIPMENT".

### Equipa de Investigação

Nome	Cargo Função	Tarefas	%Tempo	Dt Entrada	Dt Saída	Desistiu
<b>Christos Gkenas</b>	Inv. Responsável	Long term changes in community trophic structure *** Environmental and Invader effects on the food web (...) *** Intraspecific functional influences in trophic str(...) *** Public awareness about Fish Invasions	65%			
<b>Cucherousset Julien</b>	Investigador	Long term changes in community trophic structure *** Environmental and Invader effects on the food web (...) *** Intraspecific functional influences in trophic str(...) *** Public awareness about Fish Invasions	35%	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<b>Joao Andre Evaristo de Matos Gago</b>	Investigador	Environmental and Invader effects on the food web (...) *** Public awareness about Fish Invasions	10%	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<b>Maria Filomena de Magalhaes</b>	Investigador	Long term changes in community trophic structure *** Environmental and Invader effects on the food web (...) *** Intraspecific functional influences in trophic str(...) *** Public awareness about Fish Invasions	25%	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
<b>Maria Judite Silva Cardoso Alves</b>	Investigador	Long term	10%	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

		changes in community trophic structure *** Public awareness about Fish Invasions				
<b>Filipe Manuel Vidas Ribeiro</b>	Co-investigador Responsável	Long term changes in community trophic structure *** Environmental and Invader effects on the food web (...) *** Intraspecific functional influences in trophic str(...) *** Public awareness about Fish Invasions	25%	<input type="text"/>	01-08-2018	<input checked="" type="checkbox"/>

### 3. Publicações

Apenas para o período a que respeita o Relatório de Progresso, indique trabalhos apresentadas ou aceites para publicação ou apresentação, e trabalhos submetidos no período a que o relatório respeita.

A informação pretendida neste campo é inserida em formato livre. Para cada publicação deve ser indicada a seguinte informação:

- Descrição, contendo os seguintes elementos:
  - Em livros ou monografias: autor(es), título, número e/ou identificação da edição, número do volume, lugar da publicação, número de páginas;
  - Em revistas científicas: autor(es), título, título da revista, lugar da publicação, número do volume, número da primeira e última página;
  - Em artigos ou abstracts de comunicações científicas ou outras participações de índole científica em congressos internacionais ou nacionais: autor(es), título do artigo ou comunicação, nome da publicação, volume, número de páginas;
- Estado, indicando a situação:
  - Publicado/Apresentado;
  - Aceite para publicação/apresentação;
  - Submetido.

Nos trabalhos aceites para apresentação ou publicação, a data de aceitação deve ser indicada no campo descrição.

**Nota em 22-11-2011:** Para os trabalhos que tenham sido publicados ou apresentados deve ser indicado o URL onde o mesmo possa ser consultado, devendo este URL ser mantido pelo mesmo período do dossier de projecto.

#### Exemplos:

- Aceite - I. Santos, J. Rodrigues, "Non linear control design of a team of autonomous vehicles", aceite (Dezembro de 2008) para apresentação na IEEE Conference on Control Systems, Madrid, Espanha, Maio de 2009. URL: <http://www.xpto.xpto.pt>
- Publicado - A. Silva, P. Oliveira, "Social behaviour of a dog colony in extreme conditions", Journal of Animal Behaviour, Elsevier, Vol. 2, Nº3, pp.373-395, September 2009. URL: <http://www.xpto.xpto.pt>
- Apresentado - V. Santos, J. Rodrigues, "Medical image segmentation for endoscopy applications", Proc. of the International Conference on Medical Imaging, Pittsburgh, USA, March 2009, pp. 304-312. URL: <http://www.xpto.xpto.pt>
- Submetido - M. Santos, P. Oliveira, "Comparative Analysis of Elephant Populations", submetido (Fevereiro de 2009) para apresentação na International Conference on Veterinary Studies, S. Paulo, Brasil, Novembro de 2009.

**Nota em 01-02-2017:** Chama-se a atenção para a necessidade absoluta do cumprimento das Normas de Informação e Publicidade disponíveis para consulta em [http://www.fct.pt/apoios/projectos/docs/Normas de Informação e Publicidade 2016.pdf](http://www.fct.pt/apoios/projectos/docs/Normas_de_Informação_e_Publicidade_2016.pdf) para projetos OE, e para projetos cofinanciados pelo FEDER disponíveis nos sites dos Programas Operacionais responsáveis pelos financiamentos.

Gkenas, C., Magalhães, M.F., Cucherousset, J., Orjuela, R.L. & Ribeiro, F. (2019). Dietary niche divergence between two invasive fish in Mediterranean streams. Knowledge and Management of Aquatic Ecosystems, 420: 24. URL: <https://www.kmae-journal.org/articles/kmae/abs/2019/01/kmae190031/kmae190031.html>

Gkenas, C., Cucherousset, J., Ribeiro, F., Gago, J., Alves, J., Martelo, J., Magalhães, M.F. (2019). ISO-INVA: Quantified food web dynamics in invaded stream communities. 15th European Ecological Federation, 29 July - 2 August 2019, Lisbon, Portugal (Poster presentation). URL: [https://eeflisbon2019.org/en/content/programme-overview/abstract\\_book/book.html](https://eeflisbon2019.org/en/content/programme-overview/abstract_book/book.html)

#### 4. Indicadores de Realização Física

Neste quadro deve indicar os valores referentes ao período a que corresponde o Relatório de Progresso.

Neste quadro deve apenas indicar concretizações efectivas. Não indique publicações submetidas para publicação, nem teses que ainda não tenham sido discutidas.

Indicadores	Quantidade realizada
<b>A - Publicações científicas</b>	
<b>51 - Publicações científicas em domínios científicos enquadráveis na RIS3</b>	<input type="text" value="0"/>
Livros ou capítulos de livros	<input type="text" value="0"/>
Artigos em revistas internacionais	<input type="text" value="1"/>
Artigos em revistas nacionais	<input type="text" value="0"/>
<b>B - Comunicações</b>	
Comunicações em encontros científicos internacionais	<input type="text" value="1"/>
Comunicações em encontros científicos nacionais	<input type="text" value="0"/>
<b>C - Relatórios</b>	<input type="text" value="0"/>
<b>D - Organização de seminários e conferências</b>	<input type="text" value="0"/>
<b>E - Formação avançada</b>	
<b>52 - Pedidos de patentes europeias (EPO)</b>	<input type="text" value="0"/>
Teses de doutoramento	<input type="text" value="0"/>
Teses de mestrado	<input type="text" value="0"/>
Outras	<input type="text" value="0"/>
<b>F - Modelos</b>	<input type="text" value="0"/>
<b>G - Aplicações computacionais</b>	<input type="text" value="0"/>
<b>H - Instalações piloto</b>	<input type="text" value="0"/>
<b>I - Protótipos</b>	<input type="text" value="0"/>
<b>J - Produtos</b>	<input type="text" value="0"/>
<b>K - Produções/criações artísticas</b>	<input type="text" value="0"/>
<b>L - Processos inovadores</b>	<input type="text" value="0"/>
<b>M - Bases de dados curadas</b>	<input type="text" value="0"/>
<b>N - Integração do conhecimento em atividades de formação superior</b>	<input type="text" value="0"/>
<b>O - Patentes</b>	

Patentes EPO	<input type="text" value="0"/>
Outras patentes	<input type="text" value="0"/>

### 5. Ficheiros Anexos (opcional)

Neste item poderá incluir, apenas se entender como estritamente necessário, ficheiros com formato PDF, que tenham sido referidos no relatório, por exemplo, gráficos, esquemas, fotografias.  
O conjunto dos ficheiros (em número máximo de cinco) ou o arquivo comprimido a submeter não poderão ultrapassar 10MB.

Nome	Ponto do RP	Descrição
<a href="#">Table 1.pdf</a>	<input type="text"/>	Table 1
<a href="#">Table 2.pdf</a>	<input type="text"/>	Table 2
<a href="#">Table 3.pdf</a>	<input type="text"/>	Table 3
<a href="#">Figure 1.pdf</a>	<input type="text"/>	Figure 1
<a href="#">Figure 2.pdf</a>	<input type="text"/>	Figure 2
	<input type="text"/>	Figure 1