Postdoctoral fellow search

Title of the project: Ecosystem services, invasive alien species and agronomy. Can we abandon agricultural land for native biodiversity and ecosystem services if the risk of invasion is high?

Financed by: National Science Centre Poland, project number: Sonata - 2021/43/D/NZ9/02990

Where: Polish Academy of Sciences, Institute of Nature Conservation in Krakow, Poland
Salary: 10000PLN/month brutto brutto
For how long: 2 years (24 months)
opportunity to apply for your own research grant affiliated with the same institute
Starting date: 1 October 2023

International collaboration: 1 week visit in Australia (prof. Hugh Possingham's Lab)
1 week visit in China (prof. Johannes Knops Lab)
Conferences: 1 international conference in Oceania or North America
Professional development: advancing skills in: supervising PhD student
own research grant writing
publishing in high impact journals
communication skills & soft skills development
advanced stats and data visualization
Work environment: you will be part of a collaborative, friendly, dynamic, diverse research group that also valuates work-life balance
Fun: lab retreats etc.☺
Head of the project: Magdalena Lenda, PhD lenda@iop.krakow.pl

Project in collaboration with
prof. Hugh Possingham from University of Queensland, Brisbane, Australia
https://scholar.google.com.au/citations?user=lSYOB3cAAAAJ&hl=en
prof. Johannesem Knopsem z Xi'an Jiaotong Liverpool University in Suzhou, Jiangsu, China.
https://scholar.google.com/citations?user=wQzqO0MAAAAJ&hl=en

Deadline for application:
submission of documents to the head of the grant:
12.08.2023
interviews: 14-16.08.2023

Required documents: diploma, CV, letter of intent, reference letter from 1 scientist, 3 contacts (email addresses) to scientists who had worked with you & some more, check official call soon

Who are we searching for?
Your qualifications:
- advanced skills in Python and R (we will test your skills during interview)
- excellent written and spoken English (certificate or leading author in at least 5 publications

in English or at least 2 year experience as postdoc in any English speaking country)
- proven by publication record ability to write and publish articles in quality, ideally, medium high impact peer-reviewed scientific journals (IF equal or higher than 4, as it would be still early career scientist up to 7 years after completing PHD)
- proven by publications ability to perform advanced statistical analyses
- experience in advanced GIS analyses
- proven by publications or education experience in mathematical modelling
- any teaching record would be much appreciated
- any experience in talking or writing about science to public would be much appreciated
- basic knowledge about economy
- knowledge in land sharing/land sparing models
- knowledge in Species Distribution Models

What will you do?
Postdoc will mostly work on the topic: "Land sparing is the best strategy only in regions where agriculture encroaches into pristine and intact areas, but land sharing is better in areas already highly altered by agriculture such as cultural landscapes" -
this topic will require following activities and duties:

- systematic review and metanalyses
- **advanced spatial and statistical analyses in Python and R**
- advising PHD student,
- supervising statistical analyses in PHD thesis of PHD student,
- participating in data collection in field on birds, pollinators, spiders, ants
*most of such data will be collected by field assistants, PhD student and the PI
* extra money secured in this project to cover costs of travels in field and help of field assistants
- leading training workshops teaching advanced statistics and modelling relevant to project tasks for all members of the group.
- building mathematical models urgent in the project (land sharing/sparing and the economy one).
*with help provided from qualified economist
- advanced GIS analyses
- writing your own manuscripts
- you will be encouraged to develop and work on your scientific ideas as side projects
- you will be encouraged to write your own research grant

Questions?
More info about the grant you can get from the head of the project:
email: lenda@iop.krakow.pl

Background information
Aim of the project: An increasing demand for food production is one of the main concerns in and nature conservation and agronomy. There are modern theoretical strategies in spatial conservation landscape planning, attempting to solve the problem of feeding 9 billion people by 2050 and preserving biodiversity. One of them is the land sharing or land sparing framework proposed by

researchers from Cambridge University in the Science magazine in 2005. Two concepts from classic landscape ecology were proposed to resolve this problem: 1) land sparing and 2) land sharing (Green et al. 2005). Land sparing involves intensifying agriculture in cropland and protecting intact, natural, or restored areas (so-called spared land). Land sharing involves improving the quality of the agricultural landscape by increasing crop mosaic area that is extensively managed; thus, it may be suitable for many wild species. Should we use land sparing which assumes intensification of agriculture on one hand and protection of intact remnant areas or release areas from agriculture and leave it for the natural succession? Or should we improve the quality of the agricultural landscape for biodiversity by increasing the share of more extensively managed crops in the mosaic (land sharing)? The land sharing/sparing dilemma has been mostly studied in intact, pristine, and tropical forests. Recent studies in such forests suggest that land sparing is a better strategy for sustaining species diversity and for agricultural production (Phalan et al. 2011; Kamp et al. 2015). However, in the Anthropocene, few pristine intact areas are remaining on Earth to be spared. Therefore, in many regions where human-wildlife relationships have been established in cultural landscapes with long agricultural traditions, new areas for nature conservation could be created from abandoned post-agricultural land. There are some ideas, such as the newly proposed "rewilding" strategy in Europe to set new areas for nature conservation by agricultural land abandonment or using previously abandoned post-agricultural land (Navarro 2012; Sylven 2015; Pereino et al. 2019). The European Union (EU) has also advised abandoning at least 5% of farmland for conservation purposes ("Greening policy"). Not all such ideas propose buffer zones to control the colonisation of invasive species, especially since sometimes areas for nature conservation may be too small to create buffer zones. In my project, we adapt the land sharing/sparing concepts to a fully managed landscape, which could be previously abandoned or is abandoned for nature conservation, as proposed in the "rewilding" and "greening" strategies. Thus, in this proposal, I define land sparing as the intensification of agriculture in cropland and abandonment of fields for nature conservation, and land sharing as increasing the crop mosaic area that is extensively managed. This definition is well established in the literature (Kamp et al 2015). Many studies have shown that abandoned agricultural land or land set-aside is highly threatened by the invasion of alien plant species that often create monocultures (Lenda et al. 2021). Such species disturb the natural succession (Gusev 2015) and decrease biodiversity (Moroń et al. 2009; Skórka et al. 2013). This is important because biodiversity in agricultural ecosystems has practical functions in ecosystem services, such as pollination, pest control, and nutrient cycling. Invasive alien plant species colonise abandoned farmland globally (Cramer et al. 2008) but the risk of plant invasions has never been addressed in the land sharing/land sparing conceptual framework. I predict that land sharing may be a profitable policy for sustaining biodiversity when the risk of invasion is high. This could be because land management practices may prevent biodiversity by damaging populations of invasive alien species. The land sparing policy may be a threat to biodiversity if invasion risk is high, because spared land, which in this project refers to abandoned post-agricultural land, may be colonized by alien species. They may remain uncontrolled in early invasion stages; thus, alien invasive species may benefit from the land sparing strategy. Therefore, the aim of this project is to verify which strategy—land sparing or land sharing—is better for biodiversity, conservation of nature, and yield production in regions under varying risk of invasion of alien species.

The main questions to be addressed in the project

The aim of this project is to verify which strategy—land sparing or land sharing—is better for biodiversity conservation and yield production in regions under varying risk of invasion of alien plant species.

Main hypothesis: If the invasion risk is high, land sharing is a better strategy for protecting biodiversity and ecosystem services than land sparing, allowing effective control of invasive species via fieldwork (data will be collected in field)

2. Is land sparing the best strategy only in regions where agriculture encroaches into pristine and intact areas, and land sharing - better in areas already highly altered by agriculture such as cultural landscapes?
To answer that question, we will perform systematic reviews and meta-analysis.

Recruitment
1. An open competition which will include:
- CV
- please attach a contact (e-mail address) to 3 people with whom you worked (e.g. the supervisor and members of his team or people from any previous work (bachelor's, master's, ornithological camps, nature valuation)
- cover letter
- the supervisor's opinion
- interview with the head of the project (Magdalena Lenda)
- testing your skills in Python and R
- an interview with the search committee
- your questions to us

Required documents
- diploma (PhD degree in biology/archeology/ecology or similar)
- confirmation of the knowledge of English at least at B2 level
- driving license (for inspection, please do not send scans)
- CV
- letter of motivation
- supervisor's opinion please send it to the grant manager at the following address: magdalena.lenda1@gmail.com
* by submitting the documents, you agree to the processing of your personal data for the purposes of the competition. You can withdraw your documents and data at any time, you have the right to see them at Magdalena Lenda's file. Data of unsuccessful candidates will be deleted from e-mail, computers and storage media.

References

Kamp J, Urazaliev R, Balmford A *et al.* 2015. Agricultural development and the conservation of avian biodiversity on the Eurasian steppes: a comparison of land-sparing and land-sharing approaches. *J Appl Ecol* **52:** 1578-1587. https://doi.org/10.1111/1365-2664.12527

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Lenda M, Skórka P, Kuszewska K, *et al.* 2021. Misinformation, internet honey trading and beekeepers drive a plant invasion. *Ecol Lett* **24:** 165-169. https://doi.org/10.1111/ele.13645

Pe'er G, Dicks LV, Visconti P, *et al.* 2014. Agriculture policy EU, agricultural reform fails on biodiversity. *Science* **344**; 1090-1092. https://doi.org/10.1126/science.1253425

Perino A, Pereira HM, Navarro LM, *et al.* 2019. Rewilding complex ecosystems. *Science* **364:** eaav5570.

Phalan B, Onial M, Balmford A, *et al.* 2011. Reconciling food production and biodiversity conservation: Land sharing and land sparing compared. *Science* **333:** 1289-129