



Action CA18107 - *CLIMBATS*

Climate change and bats: from science to conservation

Action overview

Bats and climate change

Queensland flying fox species
decimated by record heatwave

'As far as we know, [the spectacled flying fox] has never suffered
heat deaths before,' ecologist says



The Guardian
International edition

Global Change Biology
Global Change Biology (2010) 16, 561–576, doi: 10.1111/j.1365-2486.2009.02021.x
**Predicted impact of climate change on European bats in
relation to their biogeographic patterns**

Mammal Review
Mammal Rev. 2012
REVIEW
The impact and implications of climate change for bats

ECOLOGY LETTERS
Ecology Letters, (2013) 16: 1258–1266
PRIMARY RESEARCH ARTICLE
**The shaping of genetic variation in edge-of-range populations
under past and future climate change**

WILEY
Global Change Biology

doi: 10.1111/ele.12158

Structure of COST Action CA18107

- 2018-2023
- 28 Countries
- S Africa
- 54% Inclusiveness Target Countries
- Deliverables: articles, maps, monitoring guidelines, training schools
- Involvement of stakeholders
- Involvement of young researchers: **STSM**

CTRY *	Title	Firstname	Lastname
 IT	Prof	Danilo	Russo
 PT	Dr	Hugo	Rebelo
 AT	Dr	Sasan	Fereidouni
 DE	Dr	Christian	Voigt
 DK	Dr	Ostaizka	Aizpurua
 DK	Dr	Antton	Alberdi
 ES	Dr	CARLES	FLAQUER SANCHEZ
 ES	Mr	Xavier	Puig-Montserrat
 EE	Dr	Jaan	Lira
 MD	Dr	Victoria	Nisteanu
 MD	Mr	Vlad	Caldari
 FR	Dr	Christian	Kerbiriou
 FI	Dr	Thomas	Lilley
 UK	Dr	Orly	Razgour
 UK	Prof	Fiona	Mathews
 EL	Dr	Panagiotis	Georgiakakis
 EL	Dr	Stefanos	Nastis

Climbats: Main challenge



- *Challenge 1*

Use modelling to **categorize European bats according to their response to future climate change. Identify regions** where bats more seriously affected by climate change

- *Challenge 2*

Design **monitoring network** (researchers + stakeholders) to track changes in bat distribution, and consider demography as further factor to track in the future, to detect early warning signals and implement conservation

- *Challenge 3*

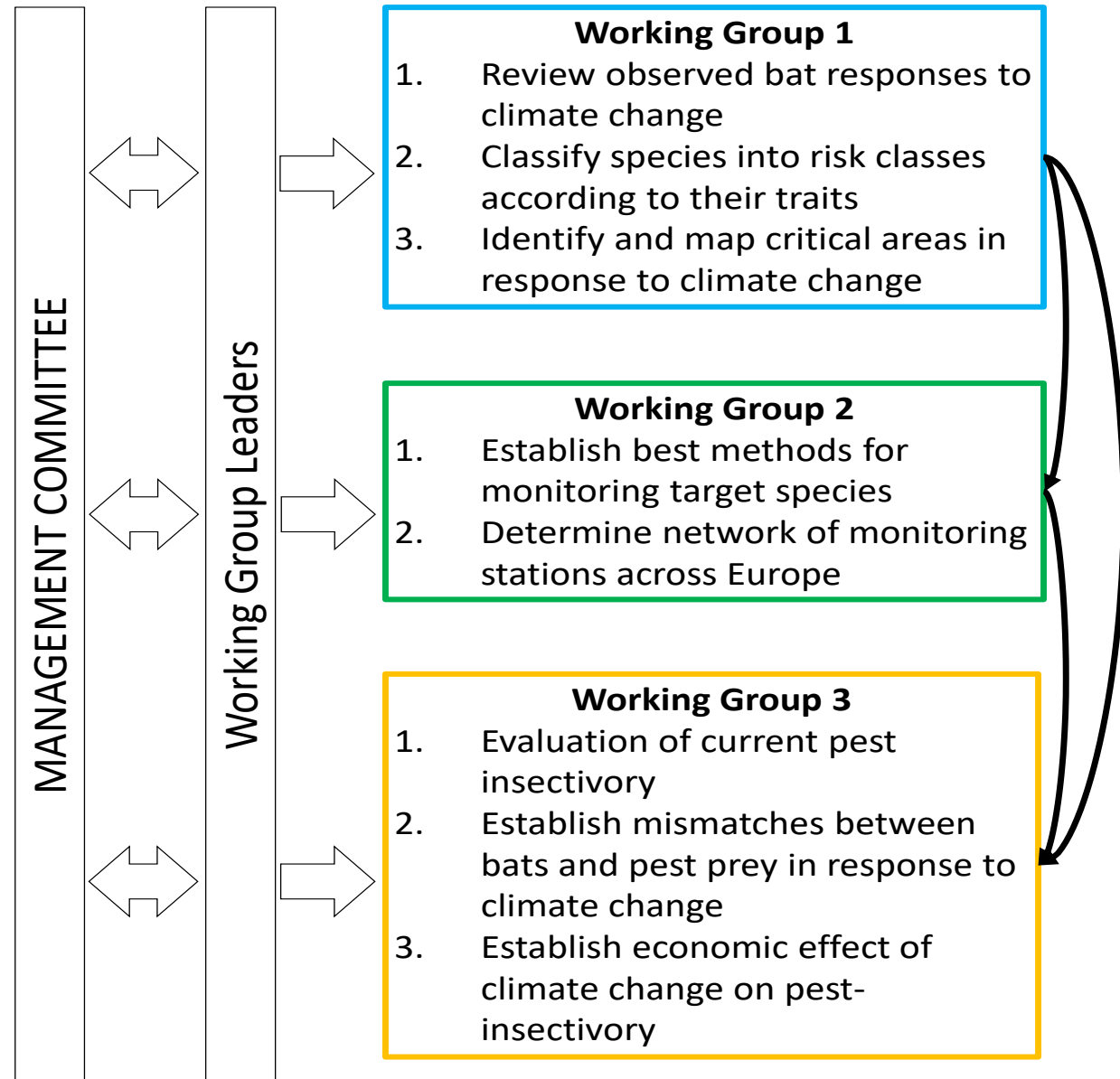
Provide **economic assessment of insectivory in farmland** for selected bat and pest species

Working groups

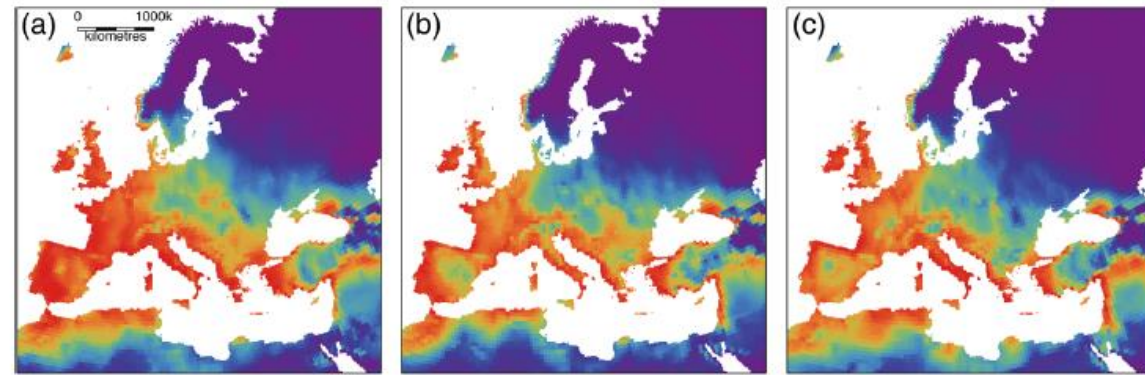


- WG1: Quantify **current and future effects** of climate change on bats
- WG2: Establish strategies and criteria to develop a **network to monitor responses** of bats to climate change
- WG3: Evaluate the **effects** of climate change **on the ecosystem services** provided by bats

Pert chart



WG1 – task 1



- Review and summarize observed responses of bats to climate change

- **Activities:**

Identify life-history traits that make bat species vulnerable to climate change

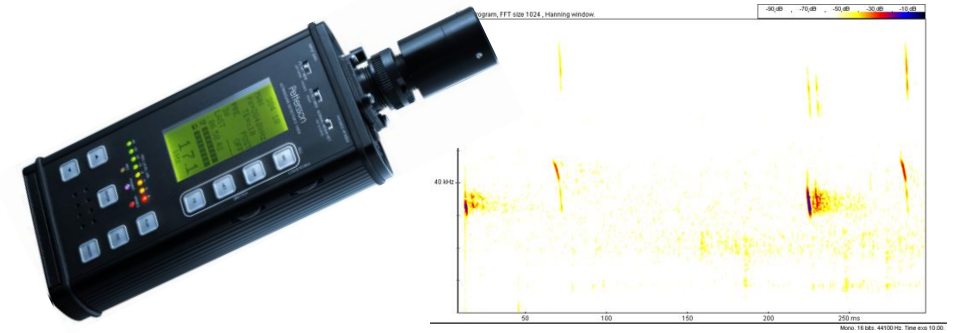
Estimate species-specific climate hazard and summarize observed responses to recent changes in climatic conditions

WG1 – task 2

- **Use Species Distribution Models to forecast future impacts of climate change on the distributions of European bats and predict new scenarios of interspecific interactions**
- **Activities:**
 - Generation of **SDMs**
 - Inferences at the **community level**
 - Identification of **critical areas**

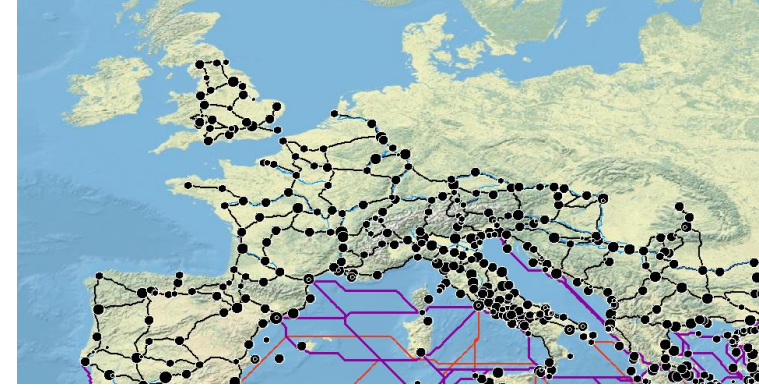


WG2 – task 1



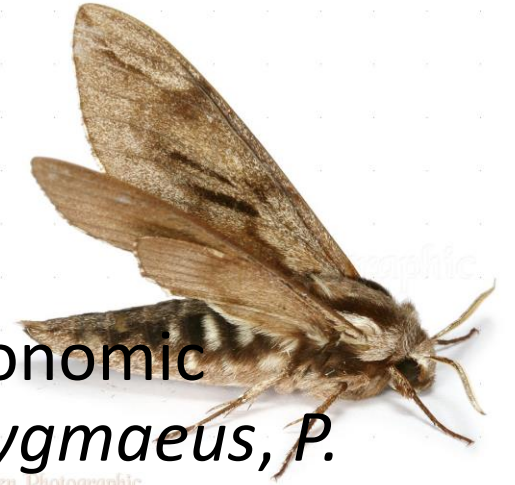
- **Establish best methods to monitor target species** identified by WG1 and develop protocols for use by non-academic institutions. Work together with nature protection authorities, reserve personnel, relevant governmental agencies, and wildlife rehabilitation centres
- **Activities:**
- Selection of **methodological approaches**
- Explore further options to design feasible ways of monitoring some **demographic variables** of the target species to complement range shift surveillance

WG2 – task 2



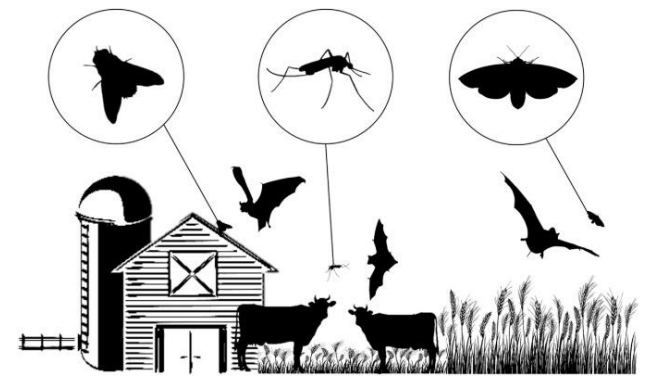
- **Task 2. Determine the monitoring network** and optimize monitoring based on different scenarios and according to species conservation status at a European level
- **Activities:**
- **Develop multiple designs** with different engagement scenarios. Monitoring effort allocated to each species as a function of the species conservation status at European level

WG3 – task 1



- Value of insectivory across Europe evaluated through economic approaches for **six focal bat species**: *M. schreibersii*, *P. pygmaeus*, *P. kuhlii*, *T. teniotis*, *P. austriacus*, and *R. ferrumequinum*. **Pest insects** considered: *Agrotis ipsilon*, *A. segetum*, *Peribatodes rhomboidaria*, *Autographa gamma*, *Peridroma saucia*, *Prays oleae*, *Chilo suppressalis* and *Thaumetopoea pityocampa*
- Use environmental assessment and evaluation techniques to provide **economic assessment of pest suppression**. Costs vs. benefits comparison of bat-based vs chemical-based control option; assess the environmental costs of pesticide use, and also the conservation costs

WG3 – task 2



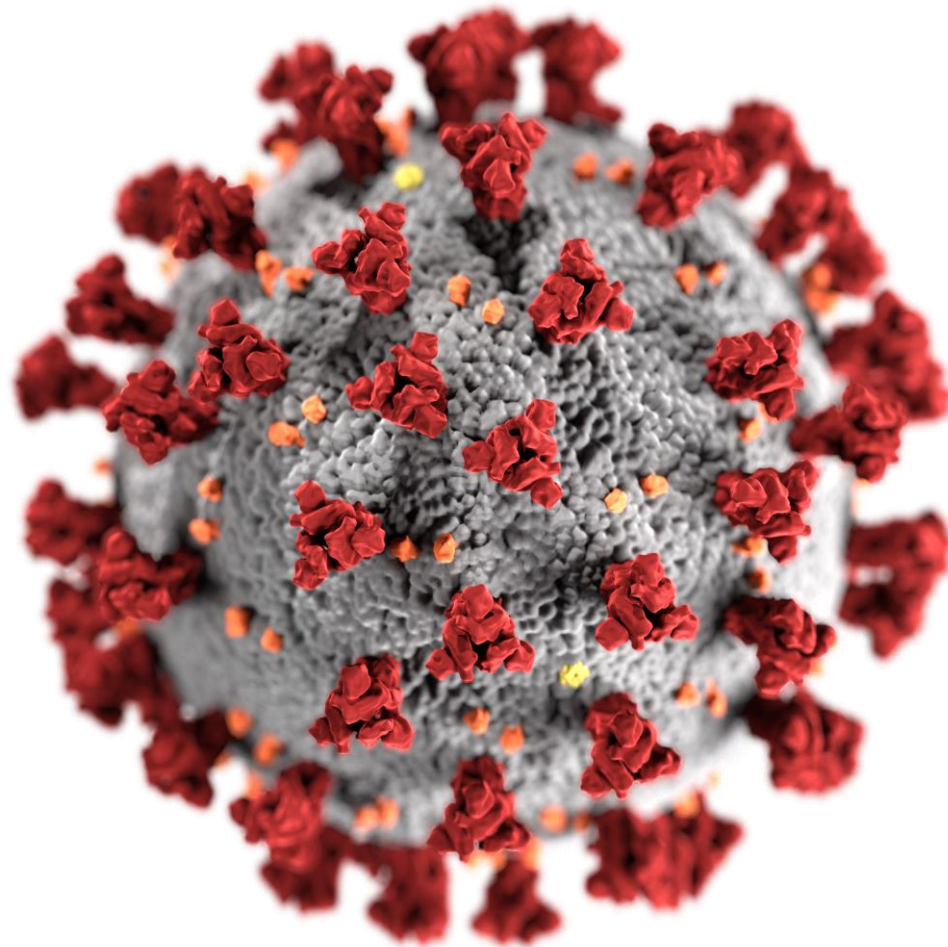
- Establish whether **distribution mismatches** will occur under climate change **for focal bat and insect species**. Check **degree of coverage of predicted areas of mismatch** by monitoring network (WG2)
- **Activities:**
- Use **SDMs** for target bat species (WG1), and generate future distributional models for agricultural pest prey **to identify climate change-driven range mismatch**
- Overlay monitoring network sites (WG2) with regions of future predator-prey mismatch to check **effectiveness of the monitoring design** (make adjustments if needed)

WG3 – task 3

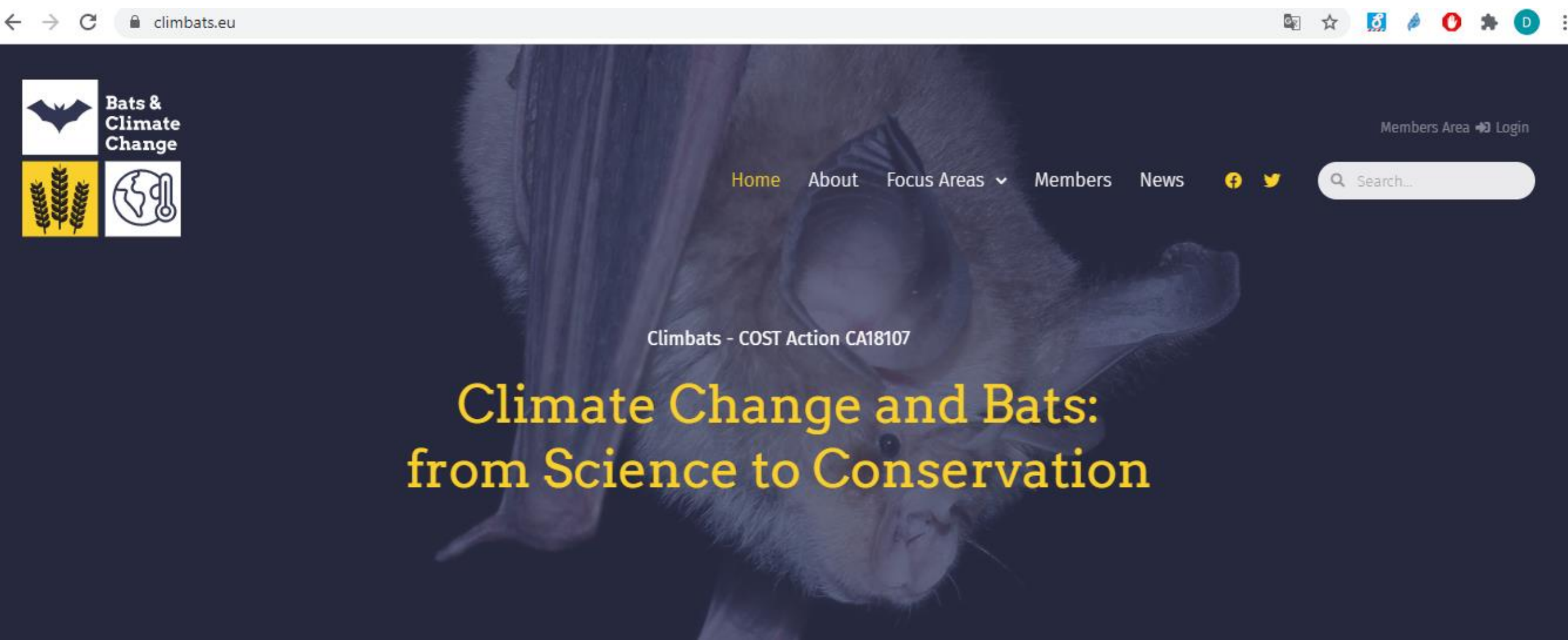
- Establish **economic consequences** of climate change-driven mismatches between predator and prey for target species
- **Activities:**
- Use **environmental evaluation techniques for economic assessment of future services provided by bats** (inputs to agricultural production and agricultural pest control). Carry out Cost-Benefit Analysis as in Task 1, this time with climate-change temporal dimension



Unexpected problems...



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