EKLIPSE

Knowledge & Learning Mechanism
on Biodiversity & Ecosystem Services

The impacts of artificial Electromagnetic Radiation on wildlife (flora and fauna)

Request & Requester

The initial request was submitted by **Buglife**, a UK organisation devoted to the conservation of all invertebrates:

What are the impacts of artificial electromagnetic radiation on invertebrates?

Reframing of the request by EKLIPSE:

- Initially limited to the impacts on invertebrates, the scope was extended to **include vertebrates and plants** (but excluding humans, and some EMR types like light).
- An **Experts Working Group** was set up to provide a knowledge overview from the most recent publications, as **background document** to the web conference.
- The objectives of the web conference were set to the **identification** of **knowledge gaps** & **research and policy needs**.

Background

Electromagnetic Radiations (EMR) are used extensively, with uses **expanding in terms of range of frequencies and volume of transmissions**. There is a need to ensure that EMR do not cause **biodiversity decline**, reduce the amenity value of the countryside or **impact negatively important ecosystem services** (such as pollination and pest control). Better understanding and awareness of environmental risks from EMR can lead to the development, promotion and implementation of **adequate and timely policy solutions**.

Expert Working Group

Matt Shardlow – requester, CEO Buglife

Prof Mario Babilon – expert in Nuclear Physics and Computer Science

Dr Erich P. Malkemper – expert in Sensory Biology and Magnetoreception

Dr Benoît Stockbroeckx – expert in Electrical Engineer and EMF exposure

Dr Thomas Tscheulin – expert in Population Ecology of invertebrates

Dr Adam J. Vanbergen – expert on invertebrates, species' interactions and anthropogenic disturbances

Prof Alain Vian – expert in Plant Physiology and EMR impacts

Estelle Balian – biologist and Science-Policy officer for EKLIPSE

Lise Goudeseune – environmental scientist and Science-Policy officer for EKLIPSE

Methodological Approach

- Compilation of list of recent **publications** relevant to the topic (147, from which 97 used in analyses).
- Selection of the **Experts Working Group** comprising technical experts as well as ecology/biology experts.
- Design of a **analytical grid** by the Experts Working Group to structure the work according to:
  - EMR types (15 categories)
  - Taxonomic groups (invertebrates, vertebrates, plants)
- **Analyses of the research papers:**
  - Outline of the current knowledge.
  - Confidence assessment (quality, reliability) of studies.
  - Identification of knowledge gaps and research needs.
- **Web conference** with participants from different backgrounds and countries, identification of knowledge gaps, research and policy needs.
- **Publication of two reports**:
  1. Current knowledge overview.
  2. Report of the web conference.

Main Findings

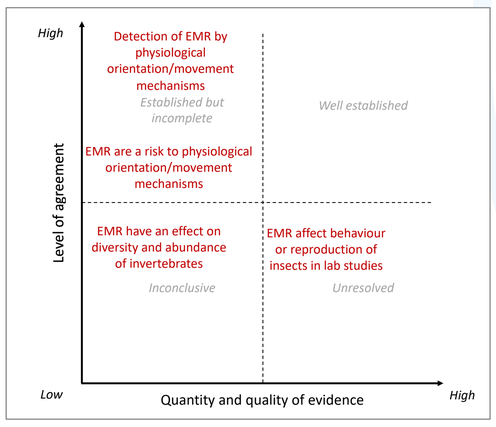

Fig. 1 Confidence assessment for **Invertebrates** *(Dr. Tscheulin)*

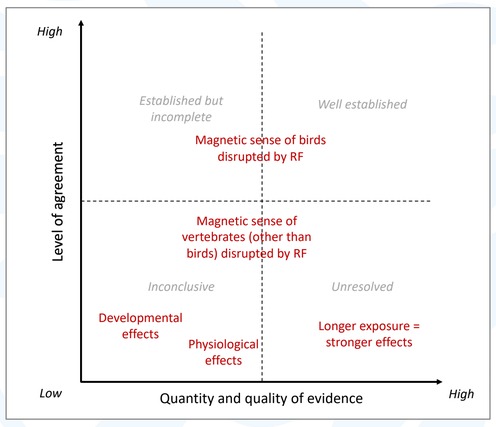

Fig. 2 Confidence assessment for **Vertebrates** *(Dr. Malkemper)*

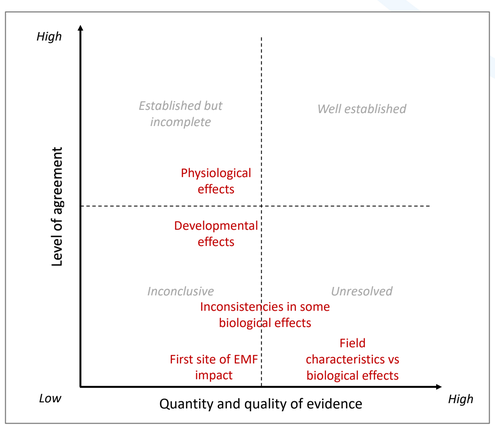

Fig. 3 Confidence assessment for **Plants** *(Prof. Vian)*

Research needs & policy recommendations:

- Standardised and controlled technical set-ups for the experiments and monitoring of exposure levels.
- Some species or families are being understudied, and the interactions at different levels are not well known.
- Inclusion of observations from local people; citizen science; collaborations between areas of expertise or institutions.
- Allocation of more funding to research on the topic.
- Importance of bringing together different stakeholders (not only scientists) and set up advisory groups.
- Application of precautionary principle; safe limits to EMR exposure; no EMR sources in nature reserves/wildlife areas.

Horizon 2020
European Union Funding
For Research & Innovation
Grant agreement 690474