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Mapping the distribution of the Eurasian Hoopoe *Upupa epops* and the Pine Processionary Moth in Lebanon based on a Citizen Science approach

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Background

- The Pine Processionary Moth (PPM) *Thaumetopoea wilkinsoni* is the most significant pine defoliator in the Mediterranean region.
- In Lebanon PPM attacks pine trees, the most widespread species in the country's coniferous forests.
- The Eurasian Hoopoe *Upupa epops* adopts a diverse diet consisting of insects, arachnids, crustaceans, reptiles and more.
- In Lebanon, only the Hoopoe is able to feed on PPM larvae buried underground as they pupate at a depth of 5-20 cm.
- Lebanon is a bottleneck site for migratory birds with 404 bird species and 15 global Important Bird Areas (IBA).
- The density of illegal killing of birds in Lebanon is extremely high, estimated at 528,000–924,000 individuals per year.



Figure 2. Photograph of PPM



Figure 1. Photograph of Eurasian Hoopoe

Objective

Our study aims to quantify a potential correlation between the distribution of the Eurasian Hoopoe and PPM populations by:

- Mapping the distribution of the two species
- Assessing the damage caused by the PPM

Materials & Methods

Data Collection

This study is based on a Citizen Science approach, a useful methodology in ornithology that allowed us to collect data from all parts of the country through a non-selective sampling:

- A detailed, cross-sectional, non-anonymous, Google Form in English and Arabic, with spatio-temporal questions related to the Eurasian Hoopoe and the PPM sightings in Lebanon.
- Passive data mainly from Facebook (the most used social media platform in Lebanon), where keywords were entered into the search engine and spatio-temporal filters were applied to identify relevant posts.
- Personal communications with ministries, municipalities, hunters, bird-watchers, photographers, hikers, scientists and nature-lovers occurred over the phone.
- eBird, a user-friendly online database programme that documents observations of different bird species.

Creating Distribution Maps

The collected data were all visualized on ArcMap and the IBA and Responsible Hunting Areas (RHA) layers were overlaid with the distribution of the two species.

Assessing Moth Damage

We conducted an independent samples t-test comparing the varying PPM damage per cadastral unit, with an arbitrary continuous index ranging from 0 (no damage at all) to 1 (all the trees are severely damaged), between two groups (within or outside IBAs).

Results

- A Visual overlap between the two species.
- An important Eurasian Hoopoe density in all RHAs.
- A high PPM damage outside IBAs.
- A lower PPM damage in IBAs.

References:

Barbaro L. & Battisti A., 2011. Birds as predators of the pine processionary moth (Lepidoptera: Notodontidae). *Biological Control* 56: 107-114. | Battisti A., Bernardi M. & Giraldo C., 2000. Predation by the Hoopoe (*Upupa epops*) on pupae of *Thaumetopoea pityocampa* and the likely influence on other natural enemies. *BioControl* 45: 311-323. | Brochet A., Van Den Bossche W., Jbour S. Ndag'ang'a P., [...] & Butchart S., 2016. Preliminary assessment of the scope and scale of illegal killing and taking of birds in the Mediterranean. *Bird Conservation International* 26: 1-28. | MoA Ministry of Agriculture, 2005. National Forest and Tree Assessment and Inventory. Ministry of Agriculture, Beirut, Lebanon. | MoE Ministry of Environment, 2014. Field guide to the soaring birds in Lebanon. Dar Bilal for Printing and Publishing, Beirut, Lebanon. | Raine A., Hirschfeld A., Attard G., Scott L., [...] & Driskill S., 2021. The international dimension of illegal bird hunting in Lebanon. *Sandgrouse* 43 (2): 230-240. | Ramadan-Jaradi G. & Itani F., 2019. Birds of Lebanon a Photographic Guide to 404 Species. Association for Bird Conservation in Lebanon, Beirut, Lebanon.

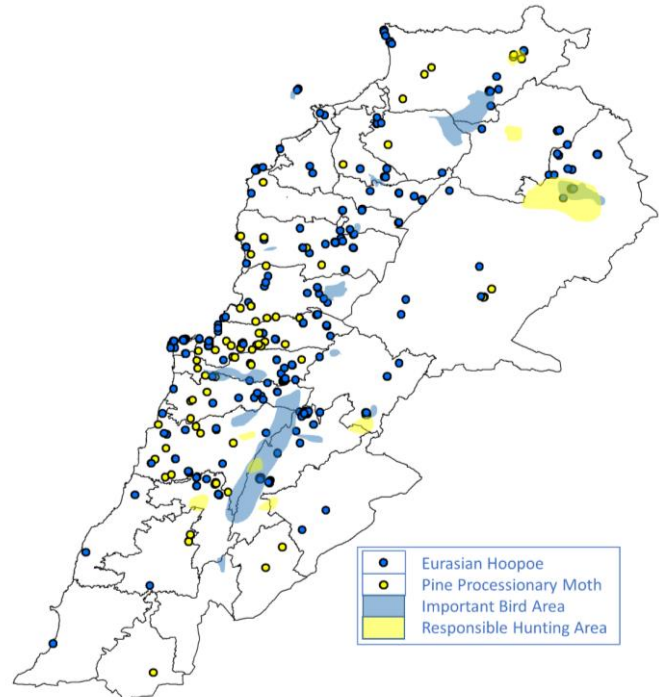


Figure 3. Eurasian Hoopoe, PPM, RHA and IBA distribution in Lebanon as recorded from 2017 to 2022

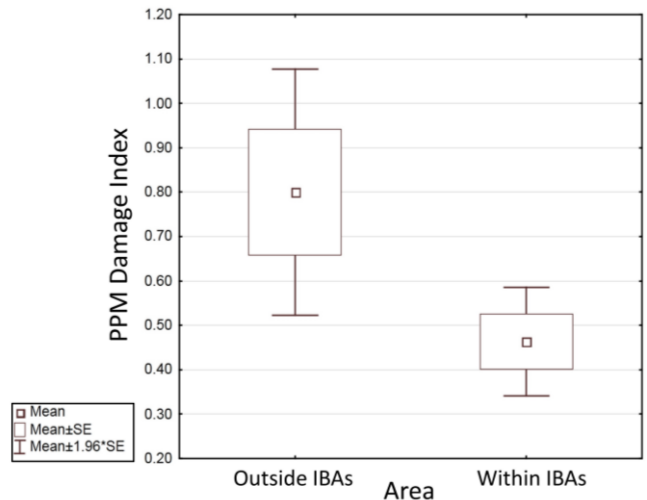


Figure 4. Means (\pm SE) of PPM damage index in Casas within versus outside IBAs

Discussion & Conclusion

We found that the varying PPM damage between cadastral units was linked to IBAs, highlighting the importance of multiple birds, including the Eurasian Hoopoe, as natural predators of this pest and calling for their conservation. As understudied species in Lebanon, this paper sets the path for future researchers willing to work on similar crucial research in the context of climate change to reveal the underlying relation between the two species.

