Data Article

A georeferenced dataset of nocturnal macrolepidoptera: A tool for forest management and biodiversity conservation

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ABSTRACT

In this paper we provide a georeferenced dataset of raw data concerning occurrence and abundance of nocturnal macrolepidoptera, an insect group largely recognized as a good ecological indicator of forest ecosystems. Data have been collected by using light traps located in 15 beech and 20 Calabrian black pine forest lots, 20 of which included in Natura 2000 sites. The sampling was carried out monthly lasting from May to late October 2019 and 2020 in order to cover the entire period during which favourable conditions for adult monitoring occurred, and to encompass phenological changes occurring across seasons in moth diversity. The dataset is composed by a total of 42,834 individuals belonging to 363 species. Due to the relatively small attractive radius of used light traps (about 25 m), georeferenced lepidopteran data can be easily correlated to any kind of spatial environmental variables and forest attributes and to their temporal variations being useful to quantify also the effects of long-term ecological drivers.

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Specifications Table

| Subject                  | Biodiversity                                      |
|--------------------------|---------------------------------------------------|
| Specific subject area    | Species richness and abundance of forest Lepidoptera communities |
| Type of data             | Table                                             |
| How the data were acquired | Data has been collected by using UV LED light traps [1]. |
| Data format              | Raw                                               |
| Description of data collection | Data have been collected in 35 georeferenced sites located in pine and beech forests of the Sila National Park, Calabria region, South Italy (Table 1). Traps have been activated one night per month from the sunset to the sunrise under weather conditions favourable to the moth activity (Table 2). Specimens have been sorted, identified to species level, and counted in the laboratory (Supplementary material). |
| Data source location     | Research Centre for Forestry and Wood Rende, Cosenza Italy |
| Data accessibility       | Direct link to the dataset: https://data.mendeley.com/datasets/db7kwbxjyr/1 |

Value of the Data

- Georeferenced datasets concerning biodiversity and abundance of insects in protected areas of the Mediterranean Basin are very rare and difficult to obtain mainly because of the specialisation needed to identify specimens to species level in hyper-diverse taxa.
- Entomologists, ecologists, and conservationists who investigate forest diversity and changes of forest ecosystems could be really interested in such datasets that can also be used by extrapolating data to study population dynamics and distribution of individual species.
- The georeferenced dataset we provided can be used in other studies devoted (i) to compare the community structure of insects of different geographic areas, (ii) to evaluate temporal changes of communities in the same sites as response, for example, to climate change, (iii) to carry out studies of landscape ecology. Entomologists can also use these data to (iii) assess changes in the populations of defoliator species.

1. Data Description

This study includes abundance data of moths belonging to the so-called Macrolepidoptera, an insect group largely used as ecological indicator of forest ecosystems [2–4]. They were sampled in 35 georeferenced sites of the Sila National Park, South Italy (Table 1). Fifteen sites were in a beech forest and 20 in a Calabrian black pine forest. Two Habitat Directive sites were interested by sampling, namely the Special Areas of Conservation Pinete del Roncino (site code: IT9330117) and Colle del Telegrafo (site code: IT9330128). Sampling covered the territory of three municipality, all included in the Catanzaro Province, Italy, at an altitude comprised between 1170 and 1620 metres above the sea level (Table 1). Within sites we found a minimum of 36 and a maximum of 168 species, and a minimum of 389 and a maximum of 3360 individuals (Table 1).

Sites were sampled six times. Pine forests were sampled in 2019 and beech forests in 2020 (Table 2). We provided exact sampling nights in order to facilitate the recovering of weather conditions, moon stages, and other parameters that can affect moth captures, useful for future studies. For example, very favourable conditions occurred during the sampling of May 2020 in beech forests when we collected more species and individuals than in June (Fig. 1). In this study there is only data from one year for each type of forest and this fact can apparently limits the usefulness of this data for spatio-temporal ecological analysis. However, it has been demonstrated that beta-diversity is stable across years [5] allowing us to evaluate changes amongst communities also in years that experienced different weather conditions.
| Site   | Forest type      | Habitats Directive sites | Località       | Municipality | Altitude (m) | Latitude - Longitude | Number of species | Number of individuals |
|-------|------------------|--------------------------|----------------|--------------|--------------|----------------------|-------------------|----------------------|
| SL_Fa1| beech forest     | none                     | Tempone        | Taverna      | 1595         | 39.1325°N - 16.5650°E| 168               | 3360                 |
| SL_Fa2| beech forest     | none                     | Tempone        | Taverna      | 1590         | 39.1276°N - 16.5674°E| 164               | 1957                 |
| SL_Fa3| beech forest     | none                     | Tempone        | Taverna      | 1580         | 39.1311°N - 16.5708°E| 148               | 2269                 |
| SL_Fa4| beech forest     | none                     | Tempone        | Taverna      | 1550         | 39.1291°N - 16.5727°E| 139               | 1516                 |
| SL_Fa5| beech forest     | none                     | Tempone        | Taverna      | 1580         | 39.1278°N - 16.5812°E| 108               | 2405                 |
| SL_Fa6| beech forest     | none                     | Colle del Telegrafo | Taverna | 1580         | 39.1200°N - 16.5918°E| 117               | 1581                 |
| SL_Fa7| beech forest     | IT9330128                | Colle del Telegrafo | Taverna | 1570         | 39.1217°N - 16.5969°E| 114               | 2611                 |
| SL_Fa8| beech forest     | none                     | Colle del Telegrafo | Taverna | 1590         | 39.1171°N - 16.5958°E| 97                | 1201                 |
| SL_Fa9| beech forest     | none                     | Colle del Telegrafo | Taverna | 1620         | 39.1167°N - 16.6003°E| 123               | 1890                 |
| SL_Fa10| beech forest       | none                      | Colle del Telegrafo | Taverna | 1615         | 39.1176°N - 16.6019°E| 119               | 1853                 |
| SL_Fa11| beech forest       | none                      | Colle del Telegrafo | Taverna | 1610         | 39.1106°N - 16.6064°E| 112               | 1940                 |
| SL_Fa12| beech forest       | none                      | Tirivolo       | Taverna      | 1580         | 39.1028°N - 16.6197°E| 126               | 2648                 |
| SL_Fa13| beech forest       | IT9330128                | Capitano       | Taverna      | 1560         | 39.0975°N - 16.6197°E| 36                | 471                  |
| SL_Fa14| beech forest       | none                      | Calistro       | Zagarise     | 1575         | 39.0894°N - 16.6260°E| 91                | 789                  |
| SL_Fa15| beech forest       | none                      | Villaggio      | Zagarise     | 1540         | 39.0766°N - 16.6353°E| 99                | 806                  |
| SL_Ro1| pine forest       | none                      | Fiume Buturo | Zagarise     | 1208         | 39.0784°N - 16.5735°E| 103               | 707                  |
| SL_Ro2| pine forest       | IT9330117                | Fiume Simeri  | Zagarise     | 1170         | 39.0841°N - 16.5749°E| 75                | 397                  |
| SL_Ro3| pine forest       | IT9330117                | Fiume Simeri  | Cannapia     | 1213         | 39.0859°N - 16.5777°E| 132               | 1078                 |
| SL_Ro4| pine forest       | IT9330117                | Cannapia      | Albi         | 1223         | 39.0831°N - 16.5809°E| 115               | 942                  |
| SL_Ro5| pine forest       | IT9330117                | Cannapia      | Albi         | 1273         | 39.0815°N - 16.5850°E| 90                | 534                  |
| SL_Ro6| pine forest       | IT9330117                | Cannapia      | Albi         | 1247         | 39.0773°N - 16.5865°E| 92                | 556                  |
| SL_Ro7| pine forest       | IT9330117                | Coturelle     | Albi         | 1259         | 39.0734°N - 16.5891°E| 133               | 1031                 |
| SL_Ro8| pine forest       | IT9330117                | Coturelle     | Albi         | 1215         | 39.0707°N - 16.5910°E| 144               | 1022                 |
| SL_Ro9| pine forest       | IT9330117                | Coturelle     | Albi         | 1195         | 39.0671°N - 16.5919°E| 125               | 1092                 |
| SL_Ro10| pine forest       | IT9330117                | Coturelle     | Albi         | 1184         | 39.0658°N - 16.5967°E| 88                | 389                  |
| SL_Ro11| pine forest       | IT9330117                | Roncino       | Taverna      | 1270         | 39.0863°N - 16.5860°E| 117               | 846                  |
| SL_Ro12| pine forest       | IT9330117                | Roncino       | Taverna      | 1268         | 39.0910°N - 16.5867°E| 114               | 913                  |
| SL_Ro13| pine forest       | IT9330117                | Roncino       | Taverna      | 1275         | 39.0969°N - 16.5810°E| 121               | 954                  |

(continued on next page)
Table 1 (continued)

| Site   | Forest type | Habitats Directive sites code | Habitat code | Locality | Municipality | Altitude (m) | Latitude - Longitude | Number of species | Number of individuals |
|--------|-------------|-------------------------------|--------------|----------|--------------|--------------|----------------------|-------------------|----------------------|
| SL_Ro14 | pine forest | IT9330117                    | SL_Ro14      | Roncino  | Taverna      | 1262         | 39.0947°N - 16.5902°E E | 113               | 670                  |
| SL_Ro15 | pine forest | IT9330117                    | SL_Ro15      | Roncino  | Taverna      | 1235         | 39.0895°N - 16.5911°E E | 99                | 560                  |
| SL_Ro16 | pine forest | IT9330117                    | SL_Ro16      | Roncino  | Taverna      | 1363         | 39.0878°N - 16.5977°E E | 96                | 581                  |
| SL_Ro17 | pine forest | IT9330117                    | SL_Ro17      | Roncino  | Taverna      | 1375         | 39.0853°N - 16.5989°E E | 106               | 689                  |
| SL_Ro18 | pine forest | IT9330117                    | SL_Ro18      | Roncino  | Taverna      | 1432         | 39.0865°N - 16.6041°E E | 84                | 718                  |
| SL_Ro19 | pine forest | IT9330117                    | SL_Ro19      | Roncino  | Taverna      | 1454         | 39.0793°N - 16.6067°E E | 103               | 737                  |
| SL_Ro20 | pine forest | IT9330117                    | SL_Ro20      | Roncino  | Taverna      | 1449         | 39.0832°N - 16.6104°E E | 106               | 1121                 |

Table 2

Exact sampling nights for each site.

| Site code | Sampling nights |
|-----------|-----------------|
| SL_Fa1    | 2020-05-18      |
| SL_Fa2    | 2020-05-18      |
| SL_Fa3    | 2020-05-18      |
| SL_Fa4    | 2020-05-18      |
| SL_Fa5    | 2020-05-18      |
| SL_Fa6    | 2020-05-18      |
| SL_Fa7    | 2020-05-18      |
| SL_Fa8    | 2020-05-18      |
| SL_Fa9    | 2020-05-18      |
| SL_Fa10   | 2020-05-18      |
| SL_Fa11   | 2020-05-18      |
| SL_Fa12   | 2020-05-18      |
| SL_Fa13   | 2020-05-18      |
| SL_Fa14   | 2020-05-18      |
| SL_Fa15   | 2020-05-18      |
| SL_Ro1    | 2019-05-30      |
| SL_Ro2    | 2019-05-30      |
| SL_Ro3    | 2019-05-30      |
| SL_Ro4    | 2019-05-30      |
| SL_Ro5    | 2019-05-30      |
| SL_Ro6    | 2019-05-30      |
| SL_Ro7    | 2019-05-30      |
| SL_Ro8    | 2019-05-30      |
| SL_Ro9    | 2019-05-30      |
| SL_Ro10   | 2019-05-30      |
| SL_Ro11   | 2019-05-30      |
| SL_Ro12   | 2019-05-30      |
| SL_Ro13   | 2019-05-30      |
| SL_Ro14   | 2019-05-30      |
| SL_Ro15   | 2019-05-30      |
| SL_Ro16   | 2019-05-30      |
| SL_Ro17   | 2019-05-30      |
| SL_Ro18   | 2019-05-30      |
| SL_Ro19   | 2019-05-30      |
| SL_Ro20   | 2019-05-30      |
Fig. 1. Distribution across time of species richness and abundance of individuals in sampled forest types.

The complete list of species, their abundance as number of individuals, and presence in sampled forest sites is reported in Supplementary material. Species are grouped by Family and listed in alphabetical order. Nomenclature follows Karsholt and van Nieukerken Lepidoptera [6] with exceptions for few recently recognized species (*Hylaea mediterranea* [7], *Nothocasis rosariae* [8], *Tephronia theophilaria* [9], *Hoplodrina alsinides* [10]). The total number of individuals and the total number of sites where a species has been collected are also reported (Supplementary material).
2. Experimental Design, Materials and Methods

Sampling sites have been chosen in order to be (i) representative of vegetal cover and structure of investigated forest types, (ii) easy to reach by operators but far enough from roads to minimise the effects on moth communities, and (iii) not visible from passing cars.

Sites were georeferenced and traps have been settled in the same points six nights per year from May to October with about 4 weeks of interval. Sampling nights have been chosen during weather conditions favourable to moth activity, i.e. temperature near or higher than the mean of the period, no or low wind, no or light rain, one week before or after the new moon occurrence [3].

Moths have been collected using light traps equipped with UV LEDs (315–400 nm, light angle 120°) as those illustrated in Infusino et al. [1], powered by a 15 A and 12 V battery, and with ethyl acetate as killing agent.

Traps worked simultaneously in each forest type, with very few exceptions due to technical problems (Table 1). Light traps were settled and turned on before dusk, then unsettled the morning after. Collected specimens were put in small jars with blotting paper and few drops of ethyl acetate and taken to the Wildlife management and forest biodiversity laboratory of the Research Centre of Forestry and Wood, Rende, Italy. Only specimens within traps have been considered.

Sorting, identification of species and counting of individuals have been carried out in the laboratory. Identification has been carried out by comparing specimens with those in the research collection of the laboratory and with available iconography concerning European moth fauna. Most difficult species needed extraction of genitalia for correct identification following the protocol in Berio [11]. Voucher specimens have been stored in the laboratory collection of Lepidoptera.

Ethics Statements

The authors declare that the present work did not include experiments on human subjects and/or animals.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT Author Statement

Stefano Scalercio: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft, Supervision; Carlo Di Marco: Methodology, Investigation; Nicola Puletti: Conceptualization, Methodology, Funding acquisition.

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Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.dib.2022.107882.

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