Monitoring of insects with public participation (MIPP; EU LIFE project 11 NAT/IT/000252): overview on a citizen science initiative and a monitoring programme (Insecta: Coleoptera; Lepidoptera; Orthoptera)

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Abstract
The LIFE project "MIPP" - Monitoring of Insects with Public Participation (11 NAT/IT/000252) is focused on selected insect species (five Coleoptera, three Lepidoptera, one Orthoptera), all included in the annexes II and IV of the Habitats Directive (HD) 92/43/EEC. One important aim is a *citizen science* initiative where every person may become a citizen scientist and collect faunistic data on the above species throughout Italy. Another objective of the project MIPP is the development of standard methods for monitoring the conservation status of the five target beetle species. One innovative method employed is a sniffer dog ("Osmodog"), trained to find the rare and endangered hermit beetle, *Osmoderma eremita*, which lives in veteran, hollow trees. The dog detects the strong smell of mature peach produced by adult males and an odor produced by the larvae. Another objective of the project MIPP is the dissemination of topics such as HD, Natura 2000, importance of dead-wood, Life projects, insect monitoring and conservation.

Key words: Habitats Directive, *Osmoderma eremita*, sniffer dog, invertebrate monitoring, biodiversity conservation.

Project presentation

The Life project "MIPP - Monitoring of Insects with Public Participation" (LIFE11 NAT/IT/000252) has as its major beneficiary, the Italian National Forest Service, Rome/National Centre of Forest Biodiversity "Bosco Fontana". It will last five years (2012/2017), by involving five associated beneficiaries: Sapienza University of Rome, Roma Tre University, Italian Ministry of the Environment, Lombardy Region and the Council for Agricultural Research and Economic Analysis, Florence. The main objectives of the MIPP project are: 1) to develop efficient and low impact monitoring methods for the surveillance of the conservation status of five Italian flagship species of saproxylic beetles (Coleoptera): *Osmoderma eremita* s.l. (see Audisio et al. 2009), *Lucanus cervus* (Linnaeus, 1758), *Cerambyx cerdo* Linnaeus,

1758, *Rosalia alpina* (Linnaeus, 1758), *Morimus asper/funereus* s.l. (see Solano et al. 2013), all listed in the Annexes II and IV of the Habitats Directive (HD); 2) to involve citizens (e.g., excursionists, bikers, wildlife lovers, etc.) in the collection of data on nine rare and endangered insect species included in HD [the five beetle species listed above, three species of Lepidoptera: *Zerynthia* (*Zerynthia*) *polyxena/cassandra* s.l.; *Parnassius apollo* (Linnaeus, 1758); *Lopinga achine* (Scopoli, 1763); and one Orthoptera: *Saga pedo* (Pallas, 1771)]; 3) to disseminate scientific and conservation issues to both children and adults, such as HD, Natura 2000, importance of dead-wood, Life projects, insect monitoring and conservation. Some actions of the project are focused on a sniffer-dog ("Osmodog") which is being trained for detecting the rare hermit beetle *Osmoderma eremita* (Scopoli, 1763). Males of *O. eremita* s.l. emit a characteristic fruity odour similar to ripening peach, which is a sexual pheromone, attractive to females. This chemical is used to bait specific traps for the monitoring of adults (Larsson et al. 2003; Chiari et al. 2014). Also the larvae seem to emit a genus-specific smell, which cannot be perceived by humans, but is detectable by dogs (Mosconi et al. unpublished data). Recently, dogs have been used to find pests and invasive invertebrate species of Coleoptera (Nakash et al. 2000; Hoyer-Tomiczek & Sauseng 2013), Hemiptera (Pfiester et al. 2008; Rolón et al. 2011), Hymenoptera (Lin et al. 2011) and Isoptera (Zahid et al. 2012). However, sniffer dogs are only rarely involved in nature conservation projects, e.g. surveying of some taxa, such as bumblebees (Waters et al. 2011). Employing trained dogs in zoological research can provide several advantages, such as a reduction of field efforts and costs for sampling, a reduction in disturbance to species as destructive sampling can be avoided (Zahid et al. 2012). Moreover, Osmodog is the main disseminating vehicle of the project and appears in the website ***www.lifemipp. eu***, social network, popular articles in newspapers and magazines, comic strips, radio and TV programs, and in other education activities. So far Osmodog has been proven to attract a large audience to the project. The project is testing the monitoring methods in five protected areas managed by the National Forest Service: the Casentino forests (Tuscany/Emilia Romagna), the Bosco Fontana Forest (Lombardy), the Tarvisio forest (Friuli-Venezia Giulia), the Bosco della Mesola forest (Emilia-Romagna), and the Castel di Sangro forests (Abruzzo). These areas are part of the Italian Natura 2000 network (SCIs and SPAs), and the data gathered will be used to produce a standard protocol for application at national level. In fact, the manuals containing the standard monitoring protocols of the five main target beetle species will be published in 2017, updating those recently summarized by Trizzino et al. (2013).

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