been structured with a global approach in which these species are considered useful tools for the conservation of biodiversity in general. Our intention is to move away from the excessive attention on emblematic species in order to make sure we address the origin of the pressures that have made the populations of these species vulnerable in Europe and the Mediterranean biogeographic region.

The philosophy of the project is based on the positive and negative experiences of mpa's both in Spain and worldwide. Our global goal is to get the local "users" of this maritime region, and specially the fishermen, to appreciate and understand that MPAs can benefit them as mechanisms for the conservation of biodiversity and regeneration of natural resources.

Ten years of work on site have resulted in the establishment of good relations with several of the fishermen brotherhoods of the region. Six of these brotherhoods have in fact signed the LIFE Nature project proposal in support of the Spanish Cetacean Society. Even if this may seem a minor detail with respect to the long list of relevant authorities that are also integrated in the project, it actually constitutes the key part of it as it makes the global goal of the project realistic.

The project will be developed at three levels

• *1. Management*

The main outcome of the project will be a management plan for the conservation of the target species and their habitats. The main relevant authorities are integrated in the project and have signed their compromise to adopt and implement the necessary measures established by the Spanish Cetacean Society. The Spanish Cetacean Society will on the other hand work on the identification of all the possible "stakeholders" in order to implicate them in the design and management of MPAs.

Some specific management actions will be developed in cooperation mainly with the six fisherman brotherhoods that have agreed to carry out the project. These include actions as:

— cooperation with the long-lining fleet to find solutions to the problem of sea turtle by-catch (studying migration routes with satellite tracking, recovering sea turtles to extract hooks, developing a communication system with the long-lining fleet to reduce the number of sea turtles caught.

— recovery and recycling of plastic debris caught by bottom trawlers.

— develop alternative economic activities in support of traditional fisheries traditional fishing tourism, wooden boat building courses, etc.).

• *2. Monitoring*

Following up from research carried out on cetacean populations in the region since 1992, the Spanish Cetacean Society will work on developing a monitoring programme that can supply the management schemes with the necessary feedback to adapt to the requirements of the conservation of the species and their habitats. In addition, the development of different types of research within the monitoring plan should allow to establish cost – effective monitoring tools that could be used also in similar projects in other maritime regions of Europe.

• *3. Public awareness*

Public awareness will be developed at different levels. An educational programme for schools will be developed in order to contribute to the cultural change required to make a long lasting change in the way we treat our marine ecosystems. Specific courses will be developed for fishermen, navigators and maritime authorities in order to implicate them directly in the management schemes. For the general public, the project will develop a series of activities as conferences, itinerant exhibitions and volunteering programmes.

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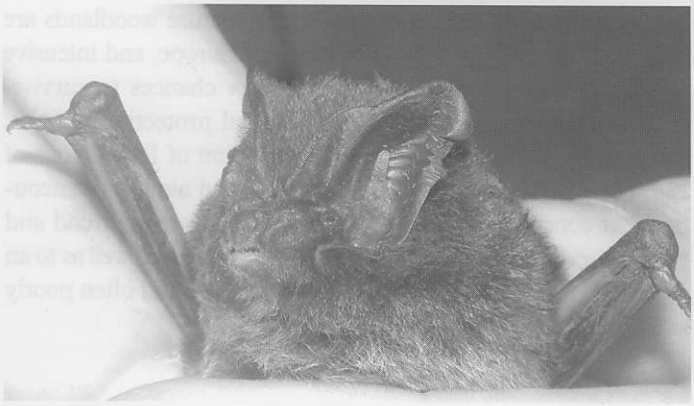
Dead trees mean life to Italian barbastelle bats

Should a biodiversity championship take place among living mammals, no doubt bats (order Chiroptera) would feature among the winners: with about 1 100 species, they are outnumbered only by rodents. Many bats are seriously threatened at a global scale, and European species too are put in danger by human action altering preferred foraging habitats and roosting sites. Bat protection represents a major issue for conservation biologists and organisations devoted to environmental preservation. Detailed knowledge of bat roosting and foraging preferences is needed to develop effective conservation strategies.

Although most people know that bats shelter in caves as well human-made structures such as buildings, bridges etc., few imagine that many species roost in trees. The barbastelle (*Barbastella barbastellus*) is among the rarest European bat species. Because its roost trees have been often overlooked, the barbastelle has long been described as roosting mainly in buildings in summer. Modern technology has provided bat researchers with a new powerful tool, minute radio-tags which may be temporarily fixed to the bats with a non-toxic glue: such devices emit radio-signals allowing the investigators to track the bats to their feeding grounds and roosts. The procedure is completely harmless to the bats, which display a fully normal behaviour soon after tagging. Thanks to precious collaboration from colleagues Luca Cistrone (Università della Tuscia, Viterbo, Italy), Gareth Jones (Bristol University, U.K.) and Stefano Mazzoleni (Università di Napoli Federico II, Italy), I have recently investigated summer roost selection in a tree-dwelling population of barbastelle. The study, about to be published (Russo *et al.*, in press), took place in one of the most spectacular wilderness areas of the central Italian Apennine: the Abruzzo, Lazio and Molise National Park. Funding was provided by the Park authorities



Picture 1. A barbastelle bat close-up (photo G. Jones).

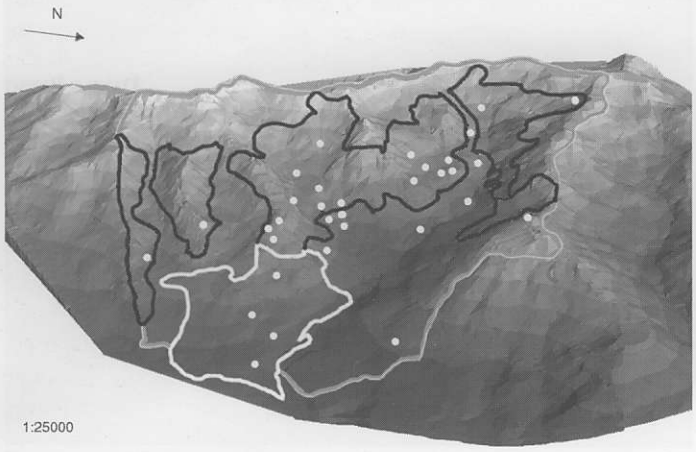
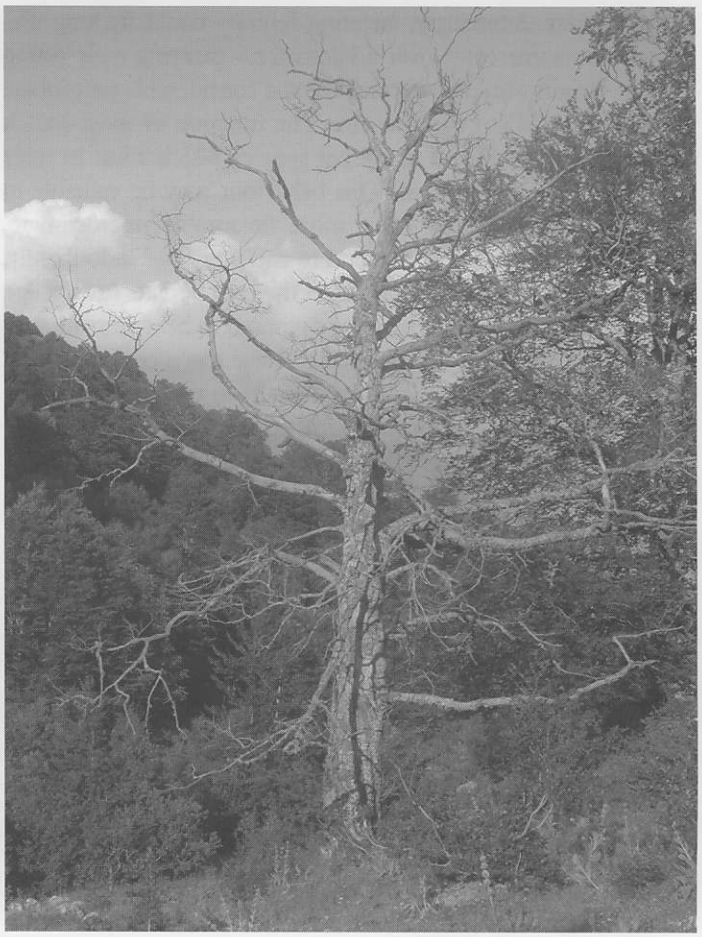


Figure 1. A digital terrain model of the study area (700 ha) showing the location of barbastelle roost trees (white dots). Areas surrounded by a black line = unmanaged woodland; white line = shelterwood-harvested woodland; grey line = pasture+woodland. Most roosts occurred within the unmanaged woodland area.

Picture 3. Erecting a mist-net near a cattle trough to capture drinking barbastelles (photo G. Jones).



Picture 2. Barbastelle nursery colonies typically roosted in dead beech trees (photo G. Jones).

and the Nando Peretti Foundation. Over 30 barbastelles, mostly lactating females, were caught at night at their favourite drinking sites (cattle troughs), radio-tagged and tracked to their roosts. All the study subjects roosted in trees – mostly dead beeches; none used buildings, although these were common in the nearby urban areas. Roost trees mainly occurred in areas of unmanaged beech woodland, among the best preserved forest sites of the study area. It was somewhat surprising to see that preferred roosts consisted of a fragile piece of loose bark, delimiting a narrow space where up to about 20 lactating females sheltered with a cluster of tiny juveniles. Roost cavities were taller, and more frequently facing south, than a sample of random cavities in trees of the same area. This was probably because they were more easily warmed by the sun. A warm roosting environment is important to nursing females: lactation requires the bats to maintain homoeothermy, and high ambient temperatures help the bats to control their body temperature with reduced energy expenditure.

The barbastelles frequently moved from one roost to another, and over a week a given bat could use several trees, even a different

one each day. Amazingly, lactating females could fly long distances – in some cases over a kilometre – carrying their young (whose weight would have constituted a considerable percentage of the mother's!) to the new site. The function of roost-switch behaviour, occurring in many bat species which roost in trees or rock crevices, is unclear. This behaviour may be valuable to avoid predation, search for a more favourable microclimate, disrupt parasite cycles or respond to social needs. Undoubtedly, by travelling between alternate trees the bats update -knowledge of roost locations, so that they are prepared to head immediately for another tree should they need to leave the roost because of an approaching predator, sudden damage to roost structure etc. In such circumstances, moving without hesitation to a better site may make the difference between life and death.

Our study shows that barbastelle protection requires the preservation of large areas of untouched woodland. Dead trees, often removed by traditional forestry practices in Italy and elsewhere because erroneously deemed harmful to woodland, should be retained. Barbastelles need large numbers of dead trees since these bats frequently switch roost and form small summer colonies (averaging a dozen individuals) scattered over large woodland areas. Old living trees must be preserved too as they will replace the dead ones which are continuously destroyed by mechanical and biological agents. Today, mature woodlands are progressively rarer in Italy, as in much of Europe, and intensive forest management gives barbastelles few chances to survive. It is hoped that international and national protection policies, such as the "Agreement on the Conservation of Populations of European Bats" recently ratified by Italy and aiming to encourage bat conservation in Europe, will help invert the trend and ensure survival of old forests, home to barbastelles as well as to an astonishing number of other fascinating, fragile and often poorly known creatures.

For more information, read :

— Russo, D., Cistrone, L., Jones, G. and Mazzoleni, S., 2004. Roost selection by barbastelle bats (*Barbastella barbastellus*, Chiroptera: Vespertilionidae) in beech woodlands of central Italy: consequences for conservation. *Biological Conservation*, 117: 73-81.

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