Comment

Apparent extinction or insufficient sampling?: comment on ‘Deforestation and apparent extinctions of endemic forest beetles in Madagascar’

Hanski et al. (2007) did an interesting study to examine apparent extinctions in a group of ca 60 endemic forest-dwelling Helictopleurini dung beetles in Madagascar. They compared historical samples collected during 1875–1990 (51 species sampled at 126 distinct sites) with their own collections from an extensive sampling during 2002–2006 (33 species sampled at 61 sites: 29 species previously recorded and 4 new ones). Based on this, they suggested that the 22 species not collected by them appear to be extinct and related this finding to regional forest loss. On reviewing the number and location of the sites sampled by Hanski et al. and considering the lack of information about their sampling effort, it seems that their conclusions are not sufficiently supported.

The number of localities visited by Hanski et al. during 2002–2006 is half of the number of historical localities (61 and 126, respectively) and additionally, not all sites sampled by them were historical. When the sites visited by the authors are compared with those of the 21 apparently extinct species (with the exception of Helictopleurus undatus because it was analysed separately), it is evident that at least 16 sites where the apparently extinct species occurred were not sampled (figure 1). Despite the lack of sampling at those sites, the authors assume that species are no longer present there. Given the restricted distribution of most of the apparently extinct species (15 of the 21 species were only known for one or two sites), an intensive sampling in those sites, even if there is no longer any primary forest there, would be necessary to assume apparent extinction. Because many forest-dwelling species can survive in secondary vegetation or transformed habitats—though often in lower abundances (e.g. Gardner et al. 2008)—the search for target species should extend to transformed habitats, small fragments of forest and their surroundings.

Regarding the lack of information about sampling effort applied per site, it is not possible to estimate whether all localities visited by the authors were satisfactorily sampled and thus to eliminate the possibility that failure to collect apparently extinct species is owing to insufficient sampling. Hanski et al. collected 4880 individuals from 61 sites over five years and indicate that larger samples are from nine sites and smaller samples are from the remaining 52 sites. However, in addition to not reporting what ‘larger’ and ‘smaller’ mean (e.g. average, maximum and minimum values), they do not indicate the sampling effort (number of traps in this case) invested per site and if such an effort allowed detection of all (or a high portion of) species present. Because the probability of detecting a species in the field is strongly related to the sampling effort involved, it is important to evaluate whether the sites studied have been sufficiently sampled (Colwell & Coddington 1994). This is particularly relevant when rare or elusive species are involved in the study or when abundance of a target species varies considerably in space or time. Multi-annual or multi-season sampling periods increase the probability of detecting species with these characteristics and reduce the risk of considering local extinction when the target species is really present (MacKenzie et al. 2004). Methods such as species accumulation curves or non-parametric estimators may be useful approaches to calculating the completeness of the samples (Gotelli & Colwell 2001).

The study of Hanski et al. addresses a global problem: forest loss and its link to species extinction. Indeed, they reported an apparent extinction of more than 40 per cent of endemic Helictopleurini dung beetles in Madagascar. However, the absence of sampling in sites where apparent extinct species were previously collected, as well as the lack of information about sampling effort invested on the study sites, does not eliminate the possibility that the results reported are owing, at least partially, to methodological gaps.

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