



Bringing Bugs back to LIFE: action for threatened invertebrates

Background notes prepared by Neemo LIFE team

Aim of the meeting

Since 1992 the LIFE programme has supported many projects which benefit invertebrates listed in Annex II and Annex IV of the Habitats Directive. In 2011 a LIFE platform meeting on terrestrial invertebrates was held in the UK to share experience. An immediate outcome of the meeting was the opening up of the LIFE programme to species listed in the IUCN Red Lists of threatened species.¹

Now, it is time to review how well LIFE has targeted actions for threatened invertebrates and to consider what more could the programme do to support these sometimes forgotten species groups.

As well as the IUCN European Red Lists of butterflies, dragonflies and saproxylic beetles discussed at the first platform this second meeting will also consider all other IUCN European Red Lists and IUCN Red Lists. The focus will be on terrestrial invertebrates.

The LIFE platform meeting will address the following questions:

- What type of projects do we need to improve the conservation status of Habitats Directive and IUCN Red List threatened invertebrates?
- What is the best way to target the overlooked groups?
- How can we address the ecological, taxonomic and biogeographical knowledge gaps?
- Would a focus on umbrella species improve the overall situation for invertebrates?
- Are habitat restoration projects adequately targeting invertebrate species?
- Can invertebrate assemblages be used as an indicator of habitat quality?
- What features of landscape scale approaches specifically address the needs of invertebrates?
- How do we plan for long-term monitoring?

The discussions and outcomes of the meeting will be considered by the European Commission and EASME in developing ideas for the next LIFE Regulation.

Background

Invertebrates are difficult to target through direct conservation action, due to the vast number of species involved (maybe 10,000 threatened species in Europe). In some cases where species are highly threatened, it may be relevant to undertake species protection, recovery or re-introduction but for the majority of species it will be habitat security and conservation (appropriate management) which will support biodiversity richness and ecosystem health.

¹ [The LIFE multiannual work programme for 2014-2017](http://ec.europa.eu/environment/nature/conservation/species/redlist/index_en.htm) invites projects targeting threatened species that are not included in the annexes of the Habitats Directive but that have a status of 'endangered' or worse in the European Red Lists (http://ec.europa.eu/environment/nature/conservation/species/redlist/index_en.htm) or in the IUCN Red List for those species that are not covered by the European Red Lists (<http://www.iucnredlist.org/>).

For butterflies it is agricultural land use which has the biggest impact on the species across Europe, for saproxylic beetles the management of ancient forests and the associated decaying wood is important and for terrestrial molluscs maintaining groundwater dependant habitats is crucial.

There are several studies and programmes for assessing the status of species and determining conservation priorities for invertebrates at pan-European level (most studies distinguish between European and EU 27/EU 28). The relevant modern background comes from the listing of species in the appendices of the Bern Convention and the listing of species in the annexes of the Habitats Directive. These lists were based on best available knowledge at the time, and despite some additions with EU enlargement, were, from today's perspective, neither complete (i.e. knowledge from all countries) nor comprehensive (some groups having very limited information).

The result is that the species lists in the Convention and the Directive are 'skewed'. For example there are no bees, wasps or ants listed in the annexes to the Habitats Directive. And within 'favourite groups' (butterflies, dragonflies etc) there have become 'favourite species' (marsh fritillary etc). However, there is evidence to show that the focus on a relatively small number of species has led to benefits at the habitat scale. Perhaps a combination of landscape scale approaches and single species 'rescue' work may give the best overall results.

A recent review of the diversity and conservation of European dragonflies² confirms the geographic mismatch between protected species listed in the Habitats Directive and threatened species listed in the IUCN Red Lists. Of 16 species of Odonata in the Habitats Directive only 3 are currently considered threatened at the European scale according to the 2010 European Red List. The authors of the report add, however, that *"we judge that the species currently listed in the Habitats Directive are good indicators of the habitat quality of threatened habitat types. It seems that their inclusion in the Habitats Directive has helped their recovery and ensured the protection of their habitats. These species are indicators of habitat integrity and should remain listed in the Annexes even if most are no longer threatened"*.

The issue of concern to the authors of the IUCN Red List for Dragonflies is that there are several other species, assessed as threatened by IUCN criteria, which they argue should be added to Annex II of the Habitats Directive to give them legal protection and the establishment of Special Areas of Conservation. In addition to the 16 species in the Annexes of the Habitats Directive the review authors recommend the addition of a further 15 endangered species.

The review for dragonflies (Kalkman *et. al.* 2018) also highlights the geographical skew between over-representation of central, western and north-eastern European species and under-representation of Mediterranean species (where most of the IUCN threatened species are found). The differences are explained in part by an improving situation in western Europe and a worsening situation in southern Europe since the adoption of the Habitats Directive in 1992. The Habitats Directive was developed from lists prepared in the 1970s and 1980s when habitat destruction, eutrophication and acidification were prevalent in western and central Europe.

Current position

The knowledge of the status of European invertebrates comes from several specialist groups and sources including:

² Kalkman, V.J., Boudot, J-P, Bernard, R., De Knijf, G., Suhling, F. And Termaat, T. (2018). Diversity and conservation of European dragonflies and damselflies (Odonata). *Hydrobiologia* (open access publication)

1. The IUCN Species Survival Commission (SSC) Specialist Groups including those for bumblebees, butterflies, dragonflies, grasshoppers, ladybirds, molluscs and spiders & scorpions
2. Initiatives from NGOs such as the publication of the *Red Data Book of European Butterflies* in 1999³ for the Council of Europe leading to identification of *Prime Butterfly Areas of Europe: priority sites for conservation*⁴ designed to help target conservation effort.
3. Publication of the *European Strategy for the Conservation of Invertebrates* by John R Haslett published by the Council for Europe under the auspices of the Bern Convention.
4. The IUCN European Red List initiative

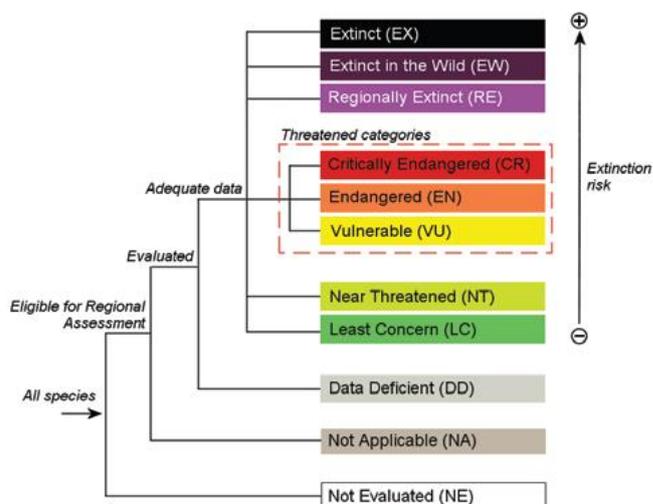
IUCN European Red List initiative

The IUCN European Red List initiative is closely aligned to the LIFE programme. IUCN has worked closely with the European Commission to publish European Red List reviews of key groups⁵. Those published to date are:

1. [European Red List of Saproxyllic Beetles \(2010\)](#)
2. [European Red List of Dragonflies \(2010\)](#)
3. [European Red List of Butterflies \(2010\)](#)
4. [European Red List of non-marine Molluscs \(2011\)](#)
5. [European Red List of Bees \(2014\)](#)
6. [European Red List of Grasshoppers, Crickets and Bush-crickets \(2016\)](#)

The reports review the conservation status of each group to identify those species which are most **threatened** and to make recommendations for future work including survey, monitoring and conservation activity.

The European Red List reviews are able to check the current opinion of European experts with the priorities given in the annexes of the Bern Convention and Habitats Directive. European Red Lists complement the reporting under the Habitats Directive as they usually address all species in a specific taxonomic group (or a sub-set) not just those protected by EU legislation.



³ Van Swaay, C.A.M. & Warren, M.S. (1999) Red Data book of European butterflies (Rhopalocera). Nature and Environment, No. 99, Council of Europe Publishing, Strasbourg

⁴ Edited by van Swaay, C. and Warren, M (2003) and published by National Reference Centre for Agriculture, Nature and Fisheries. Ministry of Agriculture, Nature Management and Fisheries, Wageningen, The Netherlands.

⁵ See <http://ec.europa.eu/environment/nature/conservation/species/redlist/>

The IUCN Red List Criteria classifies species solely on the basis of their relative extinction risk. Threatened categories include Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). The approach differs to that in the Habitats Directive where 'unfavourable conservation status' has a broader definition.

The summary information below is taken from the IUCN European Red List information on the European Commission web pages:

Saproxylic beetles

The current IUCN European Red List provides an assessment for 693 species of saproxylic beetles. In 2008, following a two-year project, a total of 436 species was assessed. In 2017, an additional 257 species were assessed. Overall, 17.9% and 21.7% of species are considered threatened in Europe and in the EU 27/28, respectively. For almost one quarter of the species in Europe, there was not enough scientific information to evaluate their risk of extinction and they were assessed as 'data deficient'. In EU27/28, 1.1% of species have been assessed as Critically Endangered, 9.3% as Endangered and 6.9% as Vulnerable with 13.5% Near Threatened. In Europe, 12.9% (89 species) of saproxylic beetle populations are thought to be in decline, while 33.3% are considered stable (229 species), and 3.6% (25 species) are increasing. For half the species (345 species), the population trend is unknown, and 14.8% of these (51 species) are threatened.

The intermediate latitudes of central Europe clearly stand out as areas of high species richness. Biodiversity hotspots seem to be located in mountainous areas such as the Pyrenees, Alps and Carpathians.

Logging, tree loss and wood harvesting are by far the greatest threats to both threatened and non-threatened saproxylic beetles, affecting more than half the species, including 76 threatened species. This highlights the importance of European forests and other landscapes with trees for the continued survival of these deadwood-dependent species. Tree loss refers to the threats of tree age structure gaps, loss of ancient and veteran trees, degraded landscapes that are unfriendly to tree growth, and indiscriminate felling for spurious health and safety reasons.

One of the problems in the EU is that the outstanding conservation value of semi-open wood pasture systems with veteran trees is currently neither specifically recognised in the Common Agricultural Policy, nor in Annex I of the Habitats Directive. Even within Natura 2000 sites specifically designated for wood pastures or saproxylic beetles, eligibility rules for CAP payments are promoting management practises that are leading to a transformation of wood pastures into either woodland or grassland, thereby destroying the essential vegetation mosaic beetles require.

The Red List for saproxylic beetles highlights the discrepancy between the Habitats Directive annexes on one hand and expert opinion on the other: the species most commonly targeted by LIFE are in the categories 'near threatened' and 'least concern' (i.e. were they not on the Habitats Directive they would not qualify for LIFE funding). Of the endangered species only eight are on the annexes of the Habitats Directive and only the *Osmoderma* species have been targeted by LIFE (although *Osmoderma ermita* is listed as near threatened).

For saproxylic beetles it might be concluded that LIFE has not yet been directed at the most threatened species in Europe. But can or should projects be developed for these species? Or would they benefit from habitat management projects which include prescriptions to favour their particular niche? The IUCN report does not identify particular species or locations where

conservation action is urgent; rather it focuses on improved survey and monitoring, awareness raising and greater conservation value placed on 'old growth' forests.

Butterflies

Overall, about 9% of European butterflies are threatened in Europe, and 7% are threatened at the EU27 level. A further 10% of butterflies are considered Near Threatened. These figures represent minimum estimates as trends are poorly known in many countries.

About a third (31%) of European butterfly populations are in decline, 4% are increasing and more than half of the species are stable. For the remaining 10%, the current information is too limited to define their population trend. Almost a third of the butterfly species (142 species) are endemic to Europe. The highest diversity of butterflies is found in mountainous areas in Southern Europe, mainly in the Pyrenees, the Alps and the Balkans mountains.

The most threatened species are in southern Europe with the main threat being the loss of habitat or habitat connectivity due to changes in agriculture either through intensification or abandonment. Other threats are climate change, fires and tourism development.

Butterfly populations suffered significant declines in the 20th century, but, in many cases, the reduced populations are now relatively stable so although they do not feature on lists of 'threatened' species the potential population is much greater than the current population. This is an example of where Red Lists only focus on the relative risk of extinction (a narrower definition than unfavourable conservation status) rather than the potential for expansion of species through improved agriculture practice etc.

The IUCN review highlights conservation measures such as protection and management of habitats, species action plans, monitoring, improved land management policies and revising legislation, adding species as necessary. The most pressing actions are to establish a good baseline, to identify areas to be conserved, to identify threats and to strengthen the network of experts.

There are 31 butterfly species listed on Annex II and IV of the Habitats Directive of which 12 are 'threatened' and five are 'near threatened'. The review notes that *"most of the Habitats Directive species listed that are not included in the current Red List are still declining in parts of their range, or have suffered historical declines and are still in need of conservation effort. Many are also valuable indicators of important habitats and their conservation will bring wide biodiversity benefits"*.

Butterflies have specific food and habitat requirements at different stages of their life cycle and serve as an excellent indicator of the status of the ecosystems. They are especially sensitive to changes in habitat management such as grazing patterns or changes in forestry practice. The major drivers of butterfly habitat loss and degradation are related to agricultural intensification, the improvement of flower-rich grasslands, drainage of wetlands, and intensification of livestock grazing. While agricultural intensification tends to take place on more productive land, the decline of traditional patterns of agriculture on more marginal areas leads to abandonment of land and to the subsequent invasion of shrubs and trees.

Dragonflies

Twenty-one (15%) of the 137 assessed (sub)species of European dragonflies are threatened in Europe, with 2% being Critically Endangered, 4% Endangered and 9% Vulnerable. An additional 15

species are considered Near Threatened. A similar pattern is seen in the EU 27 with 16% of the species threatened.

Most of the threatened species are confined to parts of southern Europe and especially the southern Balkan Peninsula, Crete and the Iberian Peninsula show high percentage of threatened species. Currently, the main threat to European dragonflies is desiccation of their habitats due to the increasingly hot and dry summers combined with intensified water extraction for drinking and irrigation. Other important threats to species living in running waters are water pollution and the construction of dams and reservoirs.

16 European dragonfly species are listed in the annexes to the Habitats directive but of the 22 threatened species identified in the IUCN report only 3 are on the annexes. The mismatch is partly explained by the focus in the 1980s on the problems facing western European species, several of which have now recovered and are no longer considered threatened.

Half of the European species have a stable population trend; about a quarter of them are declining and about one tenth are increasing. The threats to European dragonflies vary regionally and over time. The conservation status of dragonflies in Central and Northern Europe has improved in recent decades, and is now generally considered to be good. In the Mediterranean region, the threats to dragonflies are, however, increasing rapidly. The smaller distribution areas of most Mediterranean dragonflies, combined with these increasing threats, make that most threatened dragonflies are currently found in the Mediterranean Basin.

Fifteen out of the 22 threatened species are dependent on running water. All of these species are confined to the Mediterranean. They are impacted by the increasing demand for water for irrigation and for consumption by the growing (tourist) population, as well as by the increased frequency and duration of hot and dry periods.

Non-marine molluscs

Of some 2,000 species of freshwater and terrestrial molluscs assessed in the study⁶ 44% of freshwater molluscs (373 species) and 20% of terrestrial molluscs (246 species) are threatened in Europe. At the EU 27 level 50% of freshwater molluscs (273 species) and 21% of terrestrial molluscs (235 species) are threatened. A further 9% of freshwater and 15% of the selected terrestrial molluscs is considered Near Threatened at the European level. More than 90% of European molluscs are endemic. There is a lack of good population trend data and a vast majority of the species have unknown population trends (83% for freshwater molluscs and 53% for terrestrial snails), while, in both cases, less than one percent show an increasing trend.

The main threat to terrestrial molluscs is the loss and degradation of habitat. For the freshwater species this is due to water pollution and over-abstraction of water. For the terrestrial molluscs the main problems are related to urbanisation, agricultural improvements, tourism and recreation activities, wildfires and infrastructure construction.

The LIFE platform meeting will focus more on terrestrial molluscs. For the terrestrial molluscs studied in EU27 20.7% are threatened: 4.6% Critically Endangered, 4.3% Endangered and 11.8% Vulnerable.

⁶ The total number of species in Europe is c. 3,400

39 mollusc species are listed on Annex II and IV of the Habitats Directive of which 21 are Threatened, 1 Near Threatened, 1 Extinct, 1 Data Deficient and 8 of Least Concern. Seven remaining species have not been assessed according to IUCN methodology. The majority of conservation actions have been directed at six of the Annex II species; *Margaritifera margaritifera* (freshwater pearl mussel), *Unio crassus* (thick shelled river mussel) and four species of *Vertigo* snails.

The IUCN report highlights that molluscs are an under-protected group and proposes that threatened IUCN Red List species should be added to Annex II of the Habitats Directive to allow designation of Special areas of Conservation. Some species would benefit from a landscape approach and multi-taxon species conservation plans. Examples given include ancient forest faunas, marshlands, limestone pavement, ancient lakes and large rivers.

Bees

There are no bee species in the annexes of the Habitats Directive. The IUCN Red List review assessed all bee species native to Europe or naturalised before AD 1500- a total of 1,965 species. Overall, 9.2% of bee species are considered threatened in Europe and at EU27 level 9.1%. A further 5.2% and 5.4% of bees are considered near threatened in Europe and EU27 respectively (101 species at both levels). However the review notes that for 56.7% of species in Europe (1,011 species) and 55.6% in EU27 (1,048 species) there is insufficient information available to assess their status.

For population trends of European bee species, 7.7% (150 species) of the species have declining populations, 12.6% (244 species) are more or less stable and 0.7% (13 species) is increasing. The population trends for 1,535 species (79%) remains unknown. A high proportion of threatened bee species are endemic to either Europe (20.4%, 400 species) or the EU 27 (14.6%, 277 species), highlighting the responsibility that European countries have to protect the global populations of these species. Species richness increases from north to south in Europe, with the highest species richness being found in the Mediterranean climate zone. Almost 30% of all the species threatened at the European level are endemic to Europe.

The main threat to European bees is habitat loss as a result of agriculture intensification (e.g., changes in agricultural practices including the use of pesticides and fertilisers), urban development, increased frequency of fires and climate change.

Grasshoppers, crickets and bush-crickets

All 1,082 species were evaluated. Taking into consideration the 10% of data deficient species the best estimate is that 28.5% of the species in Europe and 30.6% in the EU28 are threatened. A further 13.9% (149 species) and 13% (128 species) are considered Near Threatened in Europe and in the EU 28, respectively.

Looking at the population trends of European species, 30.2% (325 species) have declining populations, 7.6% (82 species) are believed to be more or less stable and 3.2% (34 species) are increasing. However, the population trends for the majority of species (59%, 634 species) remain unknown.

Of 739 species endemic to Europe, 231 (31.3%) are threatened, highlighting the responsibility that European countries have to protect the global populations of these species. Overall, the European areas with the highest diversity of species are found in southern Europe, especially in the

Mediterranean region and the Balkans. The greatest concentration of threatened species is found along some Mediterranean coasts and Mediterranean mountain blocks.

The main threats are habitat loss from agriculture (intensification, overgrazing, use of fertilisers), land abandonment, wildfires and tourism development/ urbanisation. The majority of European species (c. 74%) occur in grassland and shrubland, most of which were traditionally grazed by livestock. Transformation of grassland into cropland is probably the most detrimental change.

The report concludes that *“Orthoptera play important roles in the ecosystem such as being part of the food chain and prey to many vertebrate species. They are good indicators of land use intensity, which makes them one of the most important invertebrate groups for environmental monitoring and assessment”*.

The contribution of LIFE-Nature

The LIFE-Nature programme has supported many projects which directly or indirectly benefit invertebrate species listed in the Habitats Directive and IUCN Red Lists and provide benefits to invertebrate population through habitat management.

The best known single species invertebrate projects, such as those for the more charismatic species, have value beyond their immediate project by showing that it is possible to win EU funding and that the success of wider habitat management can be measured by the indicator value of invertebrates.

Although direct action for invertebrates is only a small component of LIFE there will be unreported benefits for invertebrate communities arising from many projects. Unfortunately, the eligibility rules of LIFE to date means that projects have seldom been able to support general invertebrate surveys, even where these can be used as a measure of habitat quality.

The search of the LIFE database finds 173 projects under the category ‘invertebrate’ and 70 projects under the category ‘mollusc’. However, when compared with the list of species on Annex II and Annex IV of the Habitats Directive (i.e. all species eligible for LIFE funding) it is clear that less than half of these species have benefitted directly from LIFE funding and that much of the support has gone to a smaller number of frequently targeted species.

Group	Annex II and IV species	No of species targeted by LIFE	% of total
Coleoptera	38	9	24%
Lepidoptera	51	17	33%
Odonata	16	8	50%
Mollusca	16	6	37%

The most popular target species are:

Group	Species	IUCN category	No of projects (NB one project may target several species)
Coleoptera	Cerambyx cerdo	NT	8
	Lucanus cervus	NT	13
	Osmoderma ermita	NT	12
Lepidoptera	Rosalina alpina	LC	8
	Eriogaster catax	DD	5
	Euphydryas aurinia	LC	19

	Lycaena dispar	LC	11
	Lycaena helle	LC	6
	Maculinea nausithous	NT	5
	Maculinea teleius	VU	6
Odonata	Coenagrion mercuriale	NT	6
	Leucorrhinia pectoralis	LC	13
Mollusca	Margaritifera margaritifera	CR	20
	Unio crassus	VU	10
	Vertigo moulinsiana	VU	7
	Vertigo angustior	VU	6
	Vertigo geyeri	LC	2
	Vertigo genesii	LC	1

Opportunities

The LIFE ‘platform’ meeting provides an opportunity to explore how future LIFE co-financing based on IUCN Red Lists, habitats and species listed under annexes I, II and IV of the Habitats Directive and wider biodiversity opportunities (e.g. for stepping stones and corridors) can improve the conservation status of invertebrates within the European Union.

There are synergies and differences between the IUCN approach (based on relative risk of extinction) and the Habitats Directive approach (based on the goal of favourable conservation status). The IUCN Red List report on butterflies discusses extinction risk versus conservation status.

In the IUCN methodology to be classed as ‘vulnerable’ (the lowest of three IUCN threatened categories) a species must undergo a reduction in population size of at least 30% over ten years or three generations. The authors state *“it is difficult to claim that a species experiencing a decline of this magnitude is maintaining its population, that its range is stable, and that it remains a viable component of the habitat. Crucially, however, this does not mean that the opposite is true: species that are not threatened by IUCN Red List Criteria do not necessarily have a Favourable Conservation Status”*. This is also the view of the European Commission in *“the fact that a habitat or species is not threatened (i.e. not faced by any direct extinction risk) does not necessarily mean that it has a favourable conservation status”*.

The Annex II and IV species targeted by LIFE have often fallen in to the ‘near threatened’ or ‘least concern’ categories of the IUCN lists. But, this is perhaps the situation where LIFE can be most valuable, addressing the needs of species before they move towards a threatened category. It is likely that, without LIFE, several of the species would now be in a worse condition.

Themes for discussion

The LIFE platform meeting provides an opportunity for species experts and LIFE project beneficiaries to meet with the Commission to discuss how the LIFE programme can deliver more for the conservation of invertebrates.

For the meeting four key themes have been selected. These will be supported by focused field visits, introductions in plenary session and moderated workshops which will also allow a number of projects to present their views on the theme.

These themes are:

- The species approach: where a project will focus on the specific conservation needs of an endangered or Annex II species aiming to secure favourable conservation status
- The habitats approach: where invertebrates are either a direct or indirect target of conservation aimed at the restoration of an Annex I habitat type or where invertebrates may be used in monitoring as a measure of habitat quality
- A focus on people: where invertebrates are a key element of project communication, in citizen science projects and in education work
- Invertebrates as essential enablers: where invertebrates support soil processes, recycling of organic material, food-chains and ecosystem health.

The platform meeting will encourage discussion in the field, in the working groups and in the feedback sessions. The ideas and suggestions arising from the meeting will be considered by the European Commission in developing the next LIFE programme.