focus




# LIFE and Europe's reptiles and amphibians

*Conservation in practice*

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**Joaquim Capitão**
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*European Commission*

Reptiles and amphibians (collectively known as herpetofauna) are not only one of the most diverse groups of vertebrates in Europe, they are also among the most colourful, as the many excellent photographs in this publication illustrate.

Sadly, many herpetofauna species are also among the most threatened in the EU, their decline brought about by habitat change and destruction, invasive alien species – such as the red-eared slider (*Trachemys script elegans*), which competes with the native European pond turtle for food and basking spaces – and the growing impact of climate change.

Snakes, toads and turtles are often killed out of fear or superstition, while a further threat comes from the illegal trade in herpetofauna species for use as pets, food and medicine.

The EU Wildlife Trade Regulations, which implement the provisions of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), are a cornerstone of Community policy to prevent the trade of endangered amphibian and reptile species such as the loggerhead turtle (caretta caretta).

As a contracting party to the Convention on Biological Diversity (CBD), the European Community has taken decisive steps to fulfil its commitments and to meet the target defined by the Heads of State and Government, to halt biodiversity loss by 2010. In May 2006, the European Commission adopted a Communication on Biodiversity and an Action Plan that defines priority actions to meet this target. Many of the objectives, targets and actions are directly relevant to the conservation of reptiles and amphibians.

The Habitats Directive is the main piece of legislation ensuring the protection of Europe's herpetofauna. Annexes II, IV, and V of the Habitats Directive include 53 amphibian and 87 reptile species (see pp. 53-56).

The Marine Strategy Framework Directive and Water Framework Directive are other key policy interventions that can have a positive effect on Europe's reptiles and amphibians (see pp. 5-7).

Since its beginning, the Commission's environment and nature funding programme, LIFE, has been contributing to projects with actions directly targeting reptiles and amphibians, or targeting the habitats in which they are found. This brochure presents a selection of such projects that have received LIFE co-funding since 1992. These projects have variously focused on habitat restoration actions, captive breeding and reintroduction programmes and measures to safeguard the species in the wild (including awareness-raising).

Looking to the future, it is hoped that Member States will take advantage of new opportunities for the funding of projects dedicated to reptile and amphibian species under the Commission's LIFE+ programme.

**Joaquim Capitão**

# Europe´s reptiles and amphibians – **status and threats**

Photo: LIFE00 NAT/EE/007083

**EU's herpetofauna has been in decline in recent decades, partly through direct killing out of fear or superstition. It continues to face significant threats from habitat change and destruction, invasive alien species and the growing impact of climate change.**

Amphibians and reptiles (collectively known as herpetofauna) represent one of the most endangered groups of vertebrates in Europe. Nearly a quarter of amphibians and almost 20% of reptiles species are considered threatened in Europe (IUCN, 2009).

Reptiles and amphibians are found in a range of habitats in Europe, their occurrence is determined by climate and vegetation structure. Although amphibians are linked to wet habitats, they also can be found in drier places, particularly in the Mediterranean area, or in very special habitats, such as the cold, dark caves in the Dinaric area that are home to the endangered olm (*Proteus anguinus*). Conversely, while reptiles are associated with warm and sunny locations, they can also be found in wet and cold habitats - the European common lizard (*Lacerta vivipara*) is able to survive freezing conditions over winter in the Arctic parts of Finland and Sweden, making it the most northerly lizard species in the world. Reptiles also thrive in open seas in the case of the marine turtles (see pp. 41-49).

## THREATS

Reptiles and amphibians have declined rapidly in both numbers and range in recent decades. The causes are:

- **Direct killing**, including elimination of snakes or toads because of superstitions, or killing by collectors for trade.
- **Habitat change or destruction** through building development, forestry, intensive agriculture and mineral extraction. There are now far fewer habitats available for these species, and what remains is often in small and isolated patches. Much of the habitat has become less suitable through destruction or transformation: from drainage and water pollution, to the loss of both traditional management and natural processes that used to keep habitats open.
- **Climate change** (see box, p.4).
- **Introduction of alien species** (see box, p.3).
- **Diseases**, such as the chytrid fungus, an emerging, particularly virulent, pathogen responsible for amphibian declines worldwide. The chytrid fungus affects the skin and nervous system of adult amphibians and the mouthparts of their larvae, and it is fatal for many species.

## CONSERVATION STATUS

In 2007, Member States (MS) delivered the first comprehensive information on the conservation status[1] of the habitats and species of Community interest in the first round of full reporting according to Article 17 of the Habitats Directive. The results[2] show that more than two-thirds of the amphibians species assessed by the MS by biogeographical region (104) included in the Annexes of the Habitats Directive have an unfavourable conser-

*1 The concept used here is in relation to Favourable Conservation Status as defined in the Habitats Directive (Article 1e for habitats and Article 1i for species)*
*2 The web-based Article 17 Technical Report (2001-2006) http://biodiversity.eionet.europa.eu/article17*

## ALIEN HERPETOFAUNA

Occasionally, reptile or amphibian species originating from other parts of the world are found in the wild in Europe. Most are escaped or deliberately released pets such as the common slider (*Trachemys scripta*) or the American bullfrog (*Rana catesbeiana*). Many of these established, non-native populations have a restricted range and only a limited impact on other wildlife. However, threats are posed by escaped American bullfrogs through rapid breeding, potential competition with, or predation of native species and spread of disease (particularly the chytrid fungus). Another threat to endemic herpetofauna comes from introduced predator species such as the American mink, and, especially on islands (e.g., Madeira, Azores, Canary Islands), from rats and the release of domestic species such cats.

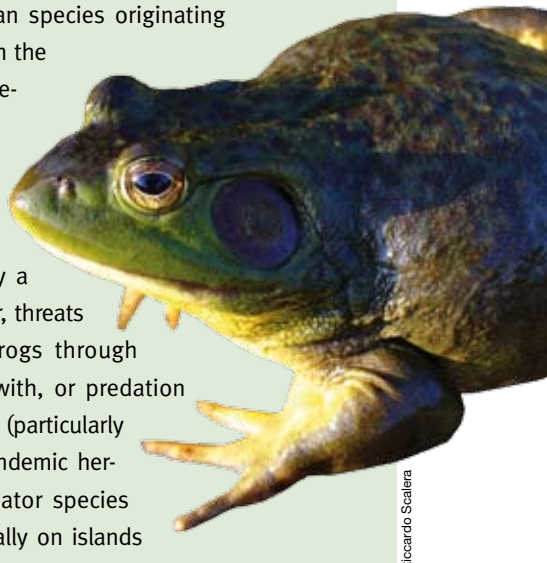


Photo: Riccardo Scalera

## THE IMPACT OF CLIMATE CHANGE

There is mounting empirical evidence that climate change is already having various impacts on amphibians and reptiles. Long-term studies of European herpetofauna show a tendency to earlier breeding in many species. The decline of some species has also been linked to changed climatic conditions.

A recent study (2006)* on the impact of climate change on amphibian and reptile species in Europe concluded that, "Most European species of amphibians and reptiles modelled in this study would be projected to lose suitable climate space by 2050. This would conditionally support the hypothesis that climate change might have caused or – more rigorously – cause further decline of herptile species (particularly amphibians) in the future."

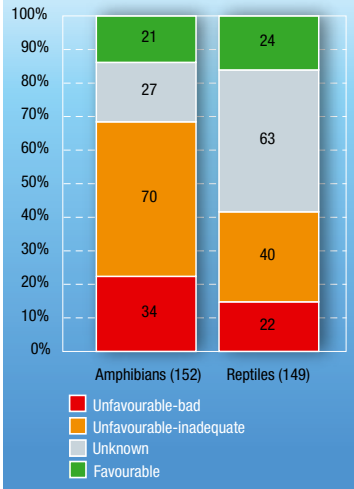
While reptiles have developed adaptations to cope with water scarcity, all European amphibians require moist habitats and, with few exceptions, open water for reproduction. Species will become threatened by climate changes particularly in regions where water and humid habitats are already scarce and expected to become even drier. As wetland habitats disappear, aquatic and semi-aquatic species will suffer declines.

** Araújo, Thuiller, and Pearson (2006) "Climate warming and the decline of amphibians and reptiles in Europe", Journal of Biogeography 33: 1677-1688*

*All herpetofauna species, such as the green lizard (*Lacerta viridis*), are to some extent facing pressure from climate change.*

Photo: LIFE00 NAT/A/007055

**Figure 1: Assessment of conservation status of species***




**the number in brackets indicates the number of assessments in each group, and the numbers in the bars indicate the number of assessments*

*Assessment of conservation status of amphibians and reptiles species included in the Annexes of the Habitats Directive in the Members States by biogeographical region. For example, Germany for* Bombina variegata *had to produce three assessments, one for each biogeographical region (Atlantic, Alpine and Continental).*

vation status. Furthermore, some 40% of the reptile species assessed present an unfavourable conservation status, although the MS did not provide enough data to assess the conservation status of 63 of the 149 reptile species.

Also, more recently the IUCN, on behalf of the European Commission, produced European Red Lists to determine the relative risk of extinction of Europe´s amphibian and reptile species. According to the list, 27 species of reptiles and 19 amphibian species are facing a higher risk of extinction in Europe (i.e., they are listed as Critically Endangered, Endangered and Vulnerable). The IUCN categories and the three classes used for assessing the conservation status are clearly related and are based on interpretations of similar data; however, it is not possible to give an exact correspondence in all cases. Nevertheless, both assessments provide an overall picture of the status of the species and are a useful conservation management tool.

**Figure 2: Amphibians (83 species assessed)**

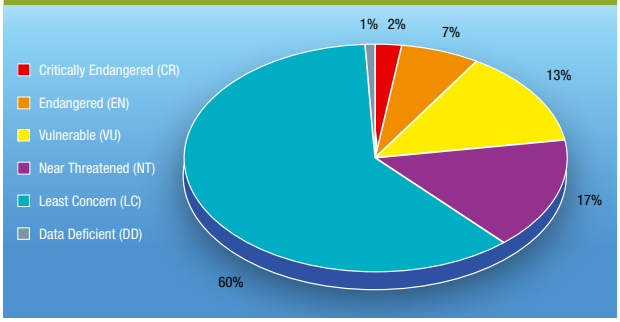
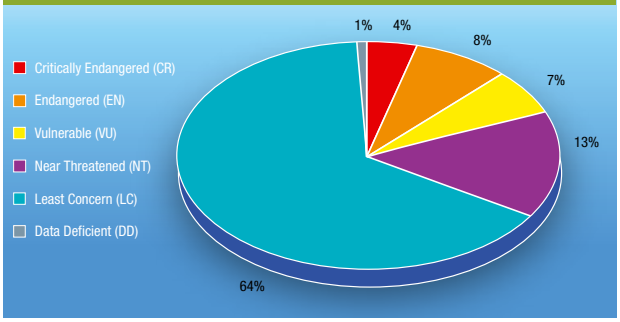



**Figure 3: Reptiles (139 species assessed)**




*Source: IUCN 2009. European Red List of Amphibians and Reptiles. http://ec.europa.eu/environment/nature/conservation/species/redlist*

# Amphibian and reptile conservation in Europe – EU biodiversity policy

**The European Union has adopted a number of policy tools, such as the Birds and Habitats Directives and the EU Biodiversity Action Plan, geared towards conservation of endangered species, including amphibians and reptiles.**

The Habitats Directive, adopted in 1992, together with the earlier Birds Directive, is a cornerstone of EU nature conservation policy. It is also a key component of the EU Biodiversity Action Plan, which aims to halt the decline of biodiversity in the European Union by 2010 and beyond.

The Habitats Directive is built upon two pillars: the Natura 2000 network of protected sites (which also includes sites under the Birds Directive) and a strict system of species protection. Its objective is that a set of over 200 habitats and 1 000 species will reach and maintain what is defined as 'favourable conservation status' so that their long-term future will be secured. The Directive´s annexes list this set of habitats and species of Community interest in need of different forms of protection. Annexes II, IV, and V of the Habitats Directive include 53 amphibian and 87 reptile species (see pp. 52-56).

The Habitats Directive specifies (Article 11) that the habitats and species of Community importance must be monitored by the Member States to provide a clear picture of their actual conservation status and trends. Under Article 17, Member States have to provide reports on the monitoring every six years, to cover the implementation of the Directive. The latest Article 17 report, covering 2001-2006, is the first to include conservation status assessments of the habitats and species of Community interest. It also shows for the first time the conservation status of the herpetofauna (reptile and amphibian) species (see p. 4) and urges conserva-

Photo: LIFE06 NAT/E/000199

*Annexes of the Habitats Directive include 53 amphibian and 87 reptile species, such as the giant lizard of la Gomera (*Gallotia bravoana*)*

Photo: LIFE04 NAT/NL/000201

*The Florida common slider (*Trachemys scripta*) can wipe out amphibian species in good conservation status habitats*

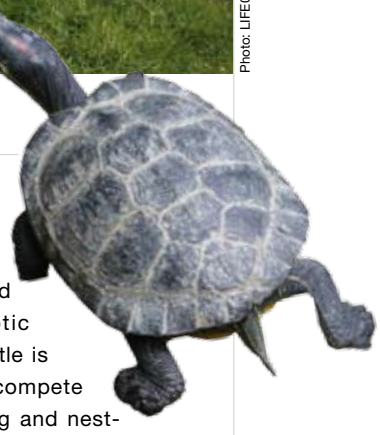
tion measures from the Member States. Combined with the recentlly released European Red List of amphibians and reptiles, produced by IUCN and on behalf of the European Commission, Article 17 reports give a detailed and comprehensive picture of the status of Europe herpetofauna, and are a useful input into the implementation and fulfilment of the Habitats Directive and other EU Biodiversity policy.

## OTHER POLICY INITIATIVES

While the Habitats Directive is the main bidodiversity policy document, other cross-cutting policies influence the conservation of EU´s herpetofauna.

## INVASIVE ALIEN SPECIES (IAS)

As previously stated, some IAS are threatening Europe's herpetofauna. For example, the common slider (*Trachemys scripta*) feeds on several species including amphibians and reptiles, small mammals and birds. The exotic semi-aquatic turtle is also known to compete for food, basking and nesting sites with indigenous turtles, particularly with the endangered European pond turtle (*Emys orbicularis*).



## AMPHIBIANS AND REPTILES: EU WILDLIFE TRADE REGULATION

Amphibians and reptiles are taken from the wild and sold commercially as food, pets, and traditional medicines. Trade of a small number of high-profile or commercially important amphibian and reptiles species (such as *Caretta caretta* or *Chamaleo chameleon*) is internationally regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Although the European Community is not a Party to CITES, its provisions are implemented in the EU through a set of Regulations known as the EU Wildlife Trade Regulations*. Although, the import of exotic and "trendy" species into the EU is more significant than their export or internal trade, there are endangered species included in the EU Wildlife Trade Regulations, CITES and Habitats Directive annexes that are exported or "traded" internally, including the tortoises *Testudo graeca* and *Testudo hermanii*, the common chameleon (*Chamaeleo chamaeleon*) and the critically endangered Cyclades Blunt-nosed viper (*Macrovipera schweizeri*).

** Council Regulation (EC) No. 338/97 on the protection of species of wild fauna and flora by regulating trade therein (the Basic Regulation) and Commission Regulation (EC) No 865/2006 laying down detailed rules concerning the implementation of Council Regulation (EC) No 338/97 (the Implementing Regulation)*

*The Mediterranean chameleon (native to Cyprus, Malta and Greece) and often traded between Europe and North Africa is included in Appendix II of CITES*

The import of *T. s. elegans* has been banned throughout the EU since 1997 under the Wildlife Trade regulations. However, other replacement taxa have been found being traded since then. An information campaign aimed at raising public awareness of the risk posed by dumping pets in the wild is considered a priority by the EU 6th Framework Programme for Research DAISIE project.[1] In some countries (e.g., Italy, Spain, France), live specimens abandoned by pet lovers are disposed of in rescue centres and zoological gardens. As a result of these EU-wide issues, the Commission is now preparing, in two stages, a strategy on invasive species.

The Commission adopted on 3 December 2008 a Communication[2] presenting policy options for an EU Strategy on Invasive Species. In the Communication, the Commission examines the evidence regarding the ecological, economical and social impact of invasive species in Europe, analyses the effectiveness of the current legal situation for tackling this problem and describes four possible options for a future EU strategy.

The Communication also highlights measures that can be put in place immediately, including a Europe-wide early warning system to report on new and emerging species.

*1 SIE European Invasive Alien Species Gateway (http://www.europe-aliens.org)*
*2 http://ec.europa.eu/environment/nature/invasivealien/index_en.htm*

## COMMON AGRICULTURE POLICY AND HERPETOFAUNA

Grassland ecosystems are among the most species-rich habitats in Europe and they support important herpetofauna species. However, the modernisation of many EU agricultural practices has put some reptile species dependent on grassland habitats, notably the meadow viper (*Vipera ursinii*), on the verge of extinction.

Various EU policy approaches introduced over the past decade can, however, assist farmers in undertaking the necessary work involved in conserving grassland herpetofauna (e.g., CAP Pillar III – Agri-Environment measures) For example, the management of the traditional grazed "puszta" that supports the meadow viper (See pages 37-40).

## WATER FRAMEWORK DIRECTIVE (WFD)

The life-cycle of amphibians and some reptiles depends on water. The Water Framework Directive protects all waters – rivers, lakes, coastal waters, and ground water. The implementation of this Directive along with the Habitats Directive will contribute greatly to securing the conditions needed by water-dependent herpetofauna throughout the life-cycle by improving water quality and integrating Natura 2000 sites into river basin management plans.

## EU MARITIME POLICY, FISHERIES AND SEA TURTLES

*Green turtle (*Chelonia mydas*)*

The Marine Strategy Framework Directive (adopted in June 2008) establishes the framework to protect more effectively the marine environment across Europe. This includes the implementation of Natura 2000 in the marine environment and fostering the integration of environmental concerns into the Common Fisheries Policy (CFP). The Directive is an important contribution to the achievement of good environmental status of Europe's seas under the Marine Strategy. This Directive is an important tool in the integrated protection of migrant marine species, such as the sea turtles that use both costal areas for reproduction and offshore areas for feeding and migration.

Almost all sea turtle nesting sites in the EU are included in Natura 2000 sites. Sometimes these areas are also included in an ICZM (Integrated Coastal Zone Management) plan, e.g., the LIFE project "ICZM: Demonstration Actions in the National Marine Park of Zakynthos" (**LIFE00 ENV/GR/000751**). However, the feeding areas and migration routes of sea turtles are not protected and are severely impacted by fishery by-catch and sea pollution, especially non-degradable plastics. The CFP includes several measures to limit the environmental impact of fishing. Among them is the protection of non target species such as sea turtles. In 2007, the Commission released a Communication** on preventing by-catch and, thus securing the conservation of non fishing targeted species including sea turtles. LIFE co-funding has been successfully used to test approaches that integrate the demands of commercial fishing with the needs of sea turtle conservation (see pp. 41-43).

** http://ec.europa.eu/environment/water/marine/index_en.htm*
*** http://ec.europa.eu/environment/water/marine/index_en.htm*

Photo: LIFE04 NAT/D/000028

**The LIFE programme has co-funded almost 60 projects targeting Europe's endangered reptiles and amphibians, with notable success.**

# LIFE's contribution to **EU Herpetofauna conservation**

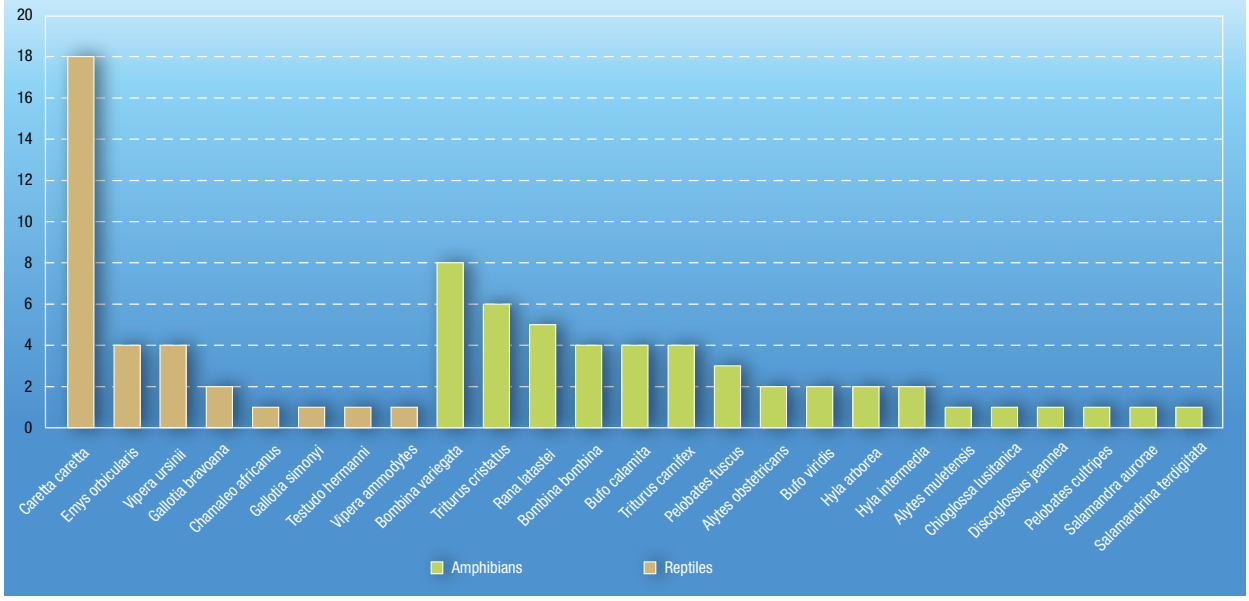
From 1992-2007, a total of 1 028 projects received EU co-funding under the LIFE-Nature component of the LIFE programme. Up until 2006, 59 of these projects had directly targeted the conservation of herpetofauna listed under the annexes of the Habitats Directive, although some projects had indirectly targeted amphibians or reptiles species with conservation actions in a broader context – for example, under habitat actions, Natura 2000 network site management plans, or more general actions.

Although Annex II and Annex IV of the Habitats Directive include 53 amphibian and reptile species, only 25 species have been directly targeted by LIFE project actions. The species that has been most frequently included in projects has been the loggerhead turtle (*Caretta caretta*) with 18 projects, mainly in Greece, Italy, Spain and Portugal (see Fig 1). This is not surprising as the turtle is an emblematic and well-known reptile species and considered a conservation 'poster boy', making it easier to find support and establish partnerships for a LIFE project proposal. With some exceptions – e.g., *Vipera ursinii, Bombina* and *Triturus cristatus* – amphibians and some of the other reptiles are not well known and do not have enough project proposals.

Under LIFE+ Nature and Biodiversity, projects targeting amphibian and reptile species within and outside Natura 2000 may be financed. 'LIFE+ Nature' will co-finance best practice or demonstration projects contributing to the implementation of the Birds and Habitats Directives, more specifically species in Annex II; and 'LIFE+ Biodiversity' will co-finance innovative or demonstration projects contributing to the implementation of the objectives of the Commission's 2006 Communication "Halting the loss of biodiversity by 2010 – and beyond".

More than two-thirds of the projects that have targeted amphibians and reptiles have been concentrated in Italy, Spain and Greece. This is to be expected, as the largest number of reptiles and amphibians is located in the Mediterranean biogeographical region. In addition, Italy and Greece are home to the

Figure 1: **Herpetofauna species targeted by number of LIFE projects**




*Source: LIFE projects database (2009)*

Photo: LIFE04 NAT/D/000028

*Several LIFE projects' actions have included active awareness-raising among stakeholders such as farmers (pictured with the German project's Bombina van)*

main nesting sites of *C.caretta* in the EU and thus, as shown in figure 1, the bulk of the projects.

## HERPETOFAUNA PROJECT ACTIONS

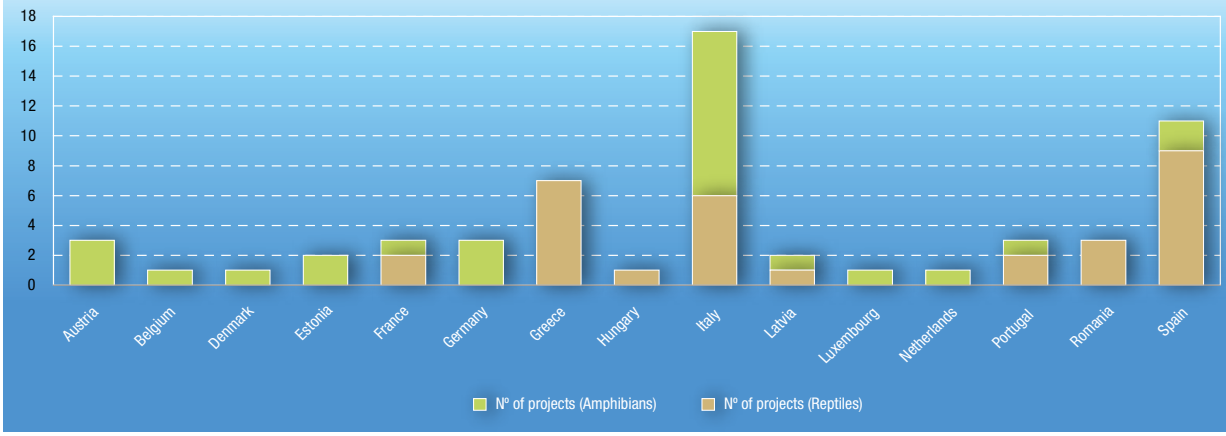
Effective conservation of reptiles and amphibians requires a number of different approaches. LIFE projects actions targeting these species had as a general objective to eliminate the threats and to improve the conservation status of the species and their habitats, in order to ensure the long-term viability of the targeted species' populations. For most of the projects, the areas were already defined as Natura 2000 sites, although, in many cases without management plans or correct knowledge of the range, abundance or ecology of the species. The implementation of the management plan is usually needed, for example, for maintenance of water table levels in ponds, and mowing or grazing of grasslands habitats. As a result, LIFE often provided resources to implement management plans for the Natura 2000 sites and improved knowledge of the targeted species.

By implementing these management plans and raising-awareness, some projects (particularly in new Member States) played an important role in enforcing the legal protection provided by the Natura 2000 site. In some cases, for some highly endangered species, projects established emergency *ex-situ* conservation actions, such as the establishment of captive breeding centres as a population recovery measure (see pp. 39-40).

LIFE project actions vary considerably, depending on the characteristics of the targeted species. But in general, the projects include:

- **Preparatory actions**: such as the preparation of surveys, mapping of the species range, definition of reproduction protocols for *ex-situ* actions,

Figure 2: **LIFE projects by country**




*Source: LIFE projects database (2009)*

Photo: LIFE00 ENV/GR/000751

*The loggerhead turtle (*Caretta caretta*) has been the herpetofauna species most often targeted by LIFE projects*

genetic analysis, etc. These actions help to further knowledge of the targeted species and set out improved conservation measures. This is the case with the genetic studies of the *Bombina bombina* populations in the Baltic region in order to identify the correct reintroduction areas (**LIFE04 NAT/D/00028**), or the survey of nesting areas of *C.caretta*;

- **Land or rights acquisition**: to ensure the protection of amphibian and reptile populations and conservation of their habitats in certain locations. This is sometimes the only option in order to secure the habitat of certain species with restricted distribution areas, such as the *Vipera ursinii* (see pp. 36-40);
- **Direct conservation actions**: for the conservation of species and their habitats. This includes the recovery of degraded areas by habitat restoration (pond restoration, grassland management and tree cover removal, establishment of nesting areas, beach illumination control, etc.). In some cases (e.g. the giant lizard of La Gomera and the Hungarian meadow viper) the action involved the creation of a reproduction centre for a particular species. These are the only captive breeding centres in the EU targeting European endemic reptiles with the objective of reintroduction in the wild;
- **Alien species eradication**: this includes both the eradication of alien plant species through habitat restoration actions and/or the elimination of competing species such as the *Trachemis scripta*, or predators.
- **Monitoring**: includes scientific monitoring during the project period and after-LIFE in order to assess the longer-term impacts of the project actions. Some projects also included species surveillance with satellite tags or radio tracking, for example, to assess the migration routes and nesting places of the Atlantic populations of *C. caretta*.
- **Networking and governance**: several projects organised expert meetings on herpetofauna conservation and established contacts with other LIFE project beneficiaries both at a national and European level. For example, the Hungarian Meadow viper LIFE project established contacts with all the projects targeting *V.ursinii* in Europe. Moreover the project results were crucial for the elaboration of the Action Plan for the Conservation of the Meadow Viper (*Vipera ursinii*) in Europe commissioned by the Standing Committee of the Bern Convention. LIFE funding also played an important role in the establishment of partnerships between stakeholders, managers and scientific personnel, resulting in the establishment of management and conservation plans with local support and providing future sustainability for the conservation of reptiles and amphibians and their habitats within the Natura 2000 network.
- **Awareness-raising**: A number of projects produced leaflets, monographs or manuals. Projects also implemented traineeship schemes and raised awareness among local stakeholders (farmers, environmental agents, etc), schools and the general public. These project actions helped to improve awareness of these sometimes completely unknown species and the importance of their conservation. These actions were also crucial for the demystification of the connotations that certain reptiles and amphibians have in rural areas, for example the myths about the power of the poison of vipers or the deadliness and magic powers of toads.

*Digging or restoring ponds was one of the most common actions taken by LIFE projects to improve amphibian habitats*

Photo: LIFE04 NAT/IT/000167

This brochure shows examples of successful project actions that have been implemented all over Europe and that have made a major contribution to the conservation and knowledge of species.

# AMPHIBIANS

Amphibians, cold-blooded creatures that metamorphose from juvenile water-breathing forms to adult air-breathing forms, make up a significant part of Europe's endangered biodiversity. Species of frogs, toads, salamanders and newts are facing a noticeable worldwide decline, while little is known about the status of caecilians (salamanders etc.).

However, LIFE co-funding is helping to reverse the decline of such emblematic species as the fire-bellied toad (*Bombina bombina*) and the great crested newt (*Triturus cristatus*).

# Amphibians: **LIFE lays the groundwork**

**LIFE Nature has contributed much to the conservation of Europe's amphibian species, particularly through establishing methodologies that can be exported as best practice to other conservation programmes.**

Although the number of LIFE Nature projects targeting amphibians that are included in the Annexes of the Habitats Directive has been relatively low compared with the number of projects targeting mammals, the project actions have had a key impact. In most cases LIFE projects have set up methodologies and action plans and worked to develop basic knowledge of the target species. This has been allied with actions designed to transfer the knowledge gained to other amphibians and other places around Europe.

Project actions have set out to overcome the various threats that amphibian populations have been facing and can be summarised as follows:

- Proposal/redefinition of the limits of Natura 2000 network sites (this applies in most cases to new Member States). Distribution data collected by the projects have provided detailed information that has been used to establish new conservation areas in the sites and helped in the elaboration of site management plans;
- Assessing the conservation status of species – some LIFE projects produced data that were used by Member States to report the conservation status of the species under Article 17 of the Habitats Directive. One example is the case of the midwife toad (*Alytes obstetricans*) in the Netherlands. Data gathered by the LIFE project AMBITION – Amphibian Biotope Improvement in the Netherlands (**LIFE04 NAT/NL/000201**) – was used as a basis for the reporting of the conservation status (bad) and future prospects (inadequate but improving) of the species;
- Habitat management actions designed to conserve the full range of plant and animal species characteristic of a particular amphibian habitat. These actions sometimes involve habitat restoration actions, when the habitats are considered unsuitable for the target amphibian species;
- Captive breeding and species reintroduction programmes.

Photo: Lars Briggs, Amphi Consult / LIFE04 NAT/D/000028

*Habitat restoration for amphibians was one of the main actions of LIFE projects (picture -planting wetland plants on Bombina ponds)*

## HABITAT RESTORATION

The majority of LIFE projects targeting amphibian species included actions focused on restoration of habitats. The common factor in all these habitats is water, even when, as in Mediterranean areas, it cannot be present all year round. Thus, the habitat restoration actions have to be adapted to local circumstances, and normally involve management of both water and dependent vegetation. Typical restoration actions include:

- Encouraging an increase in habitat-specific vegetation by the propagation of water or grasslands plants – sometimes using plant nurseries for subsequent restoration;
- Eradication of alien invasive species – elimination of both plants and animals that affect the habitats and amphibian species or that directly predate on the target amphibians, such as alien fish, mammals or other amphibians;
- Erosion control;
- Restoration of hydrological features (permanent and temporary ponds, channels, dike restoration, etc) and water quality;
- Provision of ecological corridors between populations.

Such actions are explained in more detail in the case studies on the following pages. In addition to the featured LIFE Nature projects, others that have targeted the restoration of amphibian habitats include:

- **LIFE04 NAT/IT/000167** - Aurora System - active presentation of *Salamandra atra aurorae* and other amphibians
- **LIFE98 NAT/IT/005095** - Urgent actions for the conservation of Common Spadefoot *Pelobates fuscus insubricus*
- **LIFE00 NAT/IT/007233** - Pelobates project in the Ticino Valley Natural Park of Piedmont
- **LIFE96NAT/L/003195** - Conservation of four endangered species of amphibians in Luxembourg.

## CLIMATE CHANGE ADAPTATION

LIFE Nature has also supported actions that increase communities' resilience and thus reduce the sensitivity of amphibian species to climate change. These actions include habitat restoration, establishment of corridors and reintroduction programmes.

# LIFE and **the fire-bellied toads**

**Since 1996, more than 40 LIFE Nature projects have been implemented in Europe whose actions have targeted either directly or indirectly the conservation of two rare species of fire-bellied toads: *Bombina bombina* and *Bombina variegata*.**

Europe is home to three endangered species of small, warty toads, commonly known as fire-bellied toads: *Bombina bombina, Bombina variegata* and *Bombina pachypus* – The two former are listed in Annex II of the Habitats Directive, i.e., they are species requiring special consideration. The third species was believed to be a subspecies of *B. variegata* when the Habitats Directive was being drawn up, but today should also be included as a species. The Bombina are known for their melodic call and for the brightly-coloured red- or yellow and black patterns on their undersides, which are intended to scare off predators. Most predators will rarely try to eat more than one fire-bellied toad, as it has poison glands in its skin, which make it taste very unpleasant. These can also cause allergic reactions in humans.

Fire-bellied toads (especially *Bombina bombina*) are strongly bound to water: spending the whole summer in ponds. *Bombina bombina* is a lowland species and bound to larger, shallow, sun-exposed ponds with a large variation in aquatic plants, whereas *Bombina variegata* is a highland species typically connected to small, temporary, poorly-vegetated ponds. The two species cross-breed and form unique and genetically and ecologically stable hybrids at the border of lowland and highland zones, for example in southern Poland between Krakow and the lower part of the Carpathian mountains.

Breeding ponds for *Bombina bombina* have to have good water quality, ideally with sunny banks surrounded by low-lying vegetation, whereas *Bombina variegata* can tolerate relatively more shade. The species are active in daytime as well as at night and their periods of activity stretch from March to September/ October. The mating season is between April and July when, on warm sunny days and evenings, the distinctive call can be heard. Calls are used to mark the male Bombinas' territory and also to attract females. Floating plants are favourite calling places.

From September/October to April the fire-bellied toad hibernates under stone walls and hedges, in coastal cliffs or forest undergrowth. It is therefore important that such places exist near the ponds.

Download the call of the male Bombina from the website of the project **LIFE04 NAT/D/000028** at: www.life-bombina.de.

*LIFE project manager holding a fire-bellied toad (*Bombina bombina*)*

Photo: LIFE04 NAT/D/000028

## THREATS

Among over 40 LIFE Nature conservation projects that have included actions targeting Bombina are several dedicated fire-bellied toad projects located in Germany, Italy, Latvia, Lithuania, Sweden and Denmark. The threats are similar in all countries:

- Decline in their optimal habitats – small ponds or temporary floodings (free of major predators, especially fish, which eat the tadpoles) and their surrounding vegetation – due to drainage and filling in of ponds;
- Decline in areas of grazed pasture/numbers of grazing animals; and increased use of fertilisers and pesticides. The best breeding ponds dry up at the end of summer, killing the fish and reducing the numbers of insect predators that can hunt tadpoles the following spring. Like so many species the fire-bellied toad is especially endangered at the edges of its distribution.

Typical LIFE project actions to improve the habitat and/or populations of Bombina include:

- Habitat management actions: aimed at creating optimum conditions for the reproduction and survival of fire-bellied toads: creation of shallow ponds with

abundant aquatic weeds, removal of drainage systems and re-instatement of extensive year-round grazing with cattle and horses, creation of hibernation sites close to the ponds;

- Genetic analysis: research carried out at a number of universities and other research facilities to provide information on the current genetic status of the populations and to examine ways of improving their long-term survival chances;
- Population management: through the collection of fertile eggs, which after hatching are reared from tadpoles to metamorphosed frogs, 'toadlets' in indoor aquaria and in net cages in ponds. The toadlets are then released at the existing sites, or in the area of reserve populations, as a genetic copy to reduce the risk of extinction of a small original population. Genetic studies are also being used to determine which populations need genetic reinforcement from other populations.

In 2002, a network of Bombina experts from partner Baltic region countries was established during a one-year LIFE starter project "Bombina bombina - A Baltic Conservation Strategy" (**LIFE02 NAT/ST/D/000006**). It was led by the German beneficiary, the regional foundation Stiftung Naturschutz, Schleswig-Holstein. The expert network developed a new international project to bring together scientific Bombina expertise at several project sites in the northern countries. On the basis of this project, the "LIFE-Bombina" project was developed (**LIFE04 NAT/D/00028**). For more on this initiative and on two other LIFE Nature projects targeting this species in the Baltic region, see pages 15-18.

Restoration measures for *B. variegata*, were included in the "N.EC.TO.N" (New Ecosystems on the Noce river) wetlands project (**LIFE97 NAT/IT/004089**) located in the alpine valley of La Rocchetta, a site of Community importance in the Trentino Region of northern Italy. The 1997-2000 project carried out habitat restoration work to improve the ecological quality of the 74 ha site. Among the key actions targeting amphibians, in particular *B. variegata*, were naturalisation works along the banks of the Noce River and over surrounding wetlands to recreate more favourable habitat conditions for the fire-bellied toad and other rare or threatened species.

A 2004-2009 LIFE Nature project in south-eastern Latvia (**LIFE04 NAT/LV/000199**), is also implementing a reintroduction programme for *B. bombina*, as part of its overall objective to implement a management plan for the protection of habitats and species of Community importance for the whole 53 000 ha Razna Nature Park – the country's second largest protected area, containing various types of lakes, ponds, streams and wetland habitats. As the project nears completion, most of the works foreseen for *B. bombina* have been successfully implemented. Four ponds (one more than originally anticipated) have been restored and, according to the beneficiary, they are already proving suitable for the reintroduced species. The project has also produced a very good video on *B. bombina*.

## YELLOW-BELLIED TOAD

*Bombina variegata* – an entirely European species which occurs as several geographically divided subspecies. It occurs mostly in mountain regions. It is also the smallest species, rarely growing to more than 4.5 cm; it seems to prefer cooler, more shaded environments than *B. bombina* The grey-brown back is covered with tiny spiked tubercles giving a rough texture in between which are hundreds of tiny pores. The head is more pointed than in other species and overall this toad has a distinctly pear-shaped body. The belly colouration ranges from a vivid orange-yellow to a pale lemon depending on the subspecies and black, grey or dark blotches are either very evident or totally absent.

## FIRE-BELLIED TOAD

*Bombina bombina* – an entirely European species occurring exclusively in lowlands. Although a small toad it is slightly larger and more stockily built than *B. variegata* with the forearms in particular being quite muscular. This toad enjoys long periods of sun basking, but is rarely if ever found far from water. Its back is usually very dark, almost black, although it is able to alter its colour according to its surroundings. The warty tubercles covering the back and head tend to be much smoother and more rounded than *B. variegata* and pores cannot be seen by the naked eye. As its common name suggests, its belly is a fiery red colour interspersed with black or grey blotches. In some species, particularly where bloodworm (*Chironomus sp.*) daphnia and other water crustacea are absent from ponds, the belly tends to be an orange or paler yellow colour. Such freshwater crustaceans contain a naturally occurring substance known as canthaxanthin – a red carotene pigment, which gives the toads their vivid red belly colouration.

## APENNINE YELLOW-BELLIED TOAD

*Bombina pachypus* - this species lives exclusively in Italy south of the Po valley. The upper side is greyish with rounded tubercles, somewhat like in *B. bombina*. The belly has large yellow spots as in *B. variegata*.

Photo: H. Drews



# Managing fire-bellied toads in the Baltic region

**LIFE-Bombina is an international project targeting the northernmost populations of the fire-bellied toad *Bombina bombina* in the Baltic regions of Denmark, Sweden, Latvia and Germany. The project has successfully brought together a large number of partners, fostered good cooperation with stakeholders, and together with universities, is exploring innovative conservation techniques using genetic analysis. Also noteworthy is its excellent public relations work, including the 1st European Bombina Song Contest.**

The fire-bellied toad (*Bombina bombina*) was once a common inhabitant of the agricultural landscape around the Baltic Sea, but recent intensification and land consolidation in the arable fields have affected it severely. The sunny pools it vitally needed were filled in to make way for productive land, or else the fields they were in were abandoned so that the pools became overgrown and shaded. Natural protection for the toads´ hibernation during the wet and cold wintertime was cleared away, so these animals have become an easy prey for any predator. While overall numbers of the toads underwent a severe decline during the last decades, not all populations suffered to the same extent. Individual circumstances on site gave no clear indication of the reasons for such different population trends.

*A fire-bellied toad calling*

Photo: Christoph Herden

An earlier LIFE project (**LIFE99 NAT/DK/006454**) obtained basic information on the reasons for fire-bellied toads', decline and tested some of the habitat and population management actions needed to stop this decline and stabilise populations. However, many uncertainties still remained. Given the distribution of the species in different EU countries and the fact that it was facing similar threats in all those countries, the German beneficiary, the publicly-owned regional nature conservation foundation, "Stiftung Naturschutz Schleswig-Holstein", brought together Bombina conservation groups from Schleswig-Holstein, Denmark, Swe-

den and Latvia to find best practice solutions. Using a combination of habitat and population management techniques, the project is targeting an improvement of the conservation status of populations of the fire-bellied toad at 27 project sites within Natura 2000 areas.

## BOMBINA CONSERVATION STATUS IN PARTICIPATING COUNTRIES

**In Denmark,** towards the end of the 1980s, there were only just over 500 adult specimens left and action had to be taken quickly to prevent the extinction of the species, including the protection of the most important core areas and the implementation of a major breeding programme aimed at introducing new specimens into existing populations. These measures were partly successful, but the remaining eight populations were still so small – there were only 1 200 specimens left at the time of the launch of the LIFE project (1999) – that they were threatened by unforeseen natural events, random changes in the population's demographic structure and increasing in-breeding. Led by the beneficiary, Fyn County, the LIFE project (**LIFE99 NAT/DK/006454**) targeted seven of the species' eight existing locations in the country (each isolated and restricted to an individual island). Its overall aim was to consolidate *B. bombina* in Denmark. One objective was that all existing populations should increase in numbers of adults towards a goal of at least 1 000 individuals.

*A network of restored and newly dug ponds for* B. bombina

The LIFE project was largely successful in establishing and stabilising populations of highly threatened fire-bellied toads in some of the core areas in Denmark, but at the same time it exposed other weak areas in species management. This remained one of the main objectives to be addressed by the current project.

**In Germany**, in the region of Schleswig-Holstein (project location) some populations are close to extinction. The number of spawning territories with more than 20 callers has fallen by some 32% (28 to 19) in the period 1980-2000.

**In Sweden**, the species became extinct in 1960. A re-establishment scheme was carried out from 1983 to 1985. Juvenile fire-bellied toads from three Danish populations were released in four different regions in southern Sweden. At two of the four sites, the newly established populations did not develop sufficiently, but two populations increased rapidly and have started to colonise ponds in the surrounding landscape since 1990.

### 'PERFECT' BOMBINA POND

During the first Danish LIFE project a score system was developed in order to evaluate the quality of ponds for Bombina. On the basis of its experiences, the beneficiary, concluded that the ideal pond should satisfy a foraging area of 10-30 m² per adult toad, corresponding to a total need of up to 30 000 m² of pond area for a viable population of around 1 000 individuals. For newly-created ponds, it also concluded that it is preferable to wait three years from when a pond has been created or restored, before introducing the toads, so that that for example, there is enough pond life as a food resource. This system is now being used in the follow-up project.

*A perfect pond - shallow water is ideal for early egg laying*

**In Latvia**, the fire-bellied toad only survives in two small populations (less than 50 animals). Both populations are situated within Natura 2000 sites: one (south of Bauska) is located in an area of intensively farmed arable land; the other population (south of Daugavpils) is in a woody area where farming has more or less been abandoned.

## COMMON THREATS

Project manager, Hauke Drews, a biologist and Bombina expert, says there are a number of specific reasons for the sharp decline of the species. These include:

- Conversion of traditional grazing grasslands into arable land, resulting in the filling in of many natural ponds;
- Increased use of chemical pesticides or fertilisers, which causes eutrophication of ponds.
- Another reason is that the fire-bellied toad does not hibernate in water – preferring instead to hibernate in nearby forests. "Unfortunately, this activity takes place in autumn, coinciding with harvest time when there are lots of machines around – causing important losses of the toads."
- A fourth "very important source of losses" is that in springtime, the toads migrate back to the ponds and have to cross these arable fields a second time – at a time of year when farmers are also putting down fertiliser.

*Fire-bellied toads on a surveying net in a restored pond*

The first Danish LIFE project also discovered that risks exist of total loss of the genetic material present in the original population. Danish bombina expert, Lars Briggs, of "Amphi Consult" consultancy (project partner) explains: "As in the Galapagos Islands, each population has developed individually over thousands of years and while these are not separate species or sub-species, they could have local adaptations and differences, which might be important genetically. Rather than mix the populations, we decided to make eight copies of those populations."

*A new breeding pond with wet vegetation in Avernakoe, Denmark*

## HABITAT RESTORATION ACTIONS: GETTING FARMERS ON BOARD

To combat threats linked to habitat degradation and agricultural practices, a range of habitat improvement actions are being implemented. The first Danish LIFE project developed some of the techniques that have been further improved in the new project. These techniques not only include specific habitat restoration activities but also farmer-oriented actions.

**Digging and restoring ponds and hibernation sites**: The team is focusing in particular, on developing a network of ponds, with hibernation sites close by (e.g., strategically placed stone piles) so that the toads do not need to cross the 'danger-zone' fields.

**Encouraging more conservation-oriented farming**: Considerable efforts were made to persuade local farmers to make use of the EU's agri-environmental subsidies during the first Danish LIFE project.

Now under this new LIFE project, hardy whole-year grazing animals are also being used to secure and maintain pools for the toads in grassland habitats. This idea of managing sites by small herds of cattle developed by the German partner has also successfully been transferred to Denmark. Under the system, the farmers are provided with the cattle from public money, but 'pay-back' some years later with offspring of the animals of the same age and breed, which are then made available to other interested 'Bombina' farmers.

## RAISING AWARENESS: 1st EUROPEAN BOMBINA SONG CONTEST

Even the most talented advertising or public relations executive would be hard-pressed to come up with a publicity idea good enough to be featured on a country's main national (evening) TV news programme. Remarkably, a German LIFE Nature beneficiary has achieved this feat with no previous ad or PR experience – gaining widespread European press, radio and TV coverage for the 1st European Bombina Song Contest, held in May 2007.

The idea to present the calling of different populations of B. bombina and to let the audience vote on the best 'songs' (similar to the popular, televised Eurovision Song Contest) was dreamed up by Britta Küper, a member of the international 'Bombina LIFE' project. Now working for beneficiary, Stiftung Naturschutz in Schleswig-Holstein, Ms Küper previously worked in Brussels, and says this experience gave her the idea of promoting a European contest: "We wanted to do something that would also promote the pan-European objectives of the Bombina LIFE project, and that would be fun," she says. The beneficiary successfully repeated the event in May 2009.


*TV crew at the Bombina Song Contest during the vote count*

## GENETIC ANALYSIS: IMPROVING LONG-TERM SURVIVAL CHANCES

One of the aims of the first Danish LIFE project was that for every surviving population, a duplicate, or "mirror" population would be established to form a reserve population. During the project more than 22 000 toadlets were released back into the original and reserve sites. Genetic research was used to check mixed populations to find out whether

*Nature guide tour for children at a Bombina pond in Germany*

they were genetically fitter than the original populations. One idea was that Sweden's (originally Danish) Bombina could possibly be used in Denmark for a reintroduction programme.

In this new LIFE project, a study has been carried out by Prof. Ralph Tiedeman of the University of Potsdam to shed more light on the different populations and their genetic variations and relationships. This information is being used in Denmark to evaluate the conservation strategy of using reserve populations as genetic copy for threatened original populations. In Germany historical colonisation was analysed and management units of Bombina metapopulations were defined. Based on this genetic survey site specific management recommendations for the population management were developed and are being implemented during the project on all sites.

## POPULATION MANAGEMENT

The first Danish LIFE project served to test population management techniques that have been adjusted and are being further developed in this new project. These population management techniques (applied to all sites) aim at securing the survival of the more threatened populations. Measures include:

- collecting eggs from the source population;
- rearing the eggs in breeding centres or on site in cages to young metamorphosing frogs, or 'toadlets'; and
- releasing the toadlets into the source populations (supportive breeding), or at the new site of the reserve populations, or mixed populations based on genetic surveys.

## NETWORKING

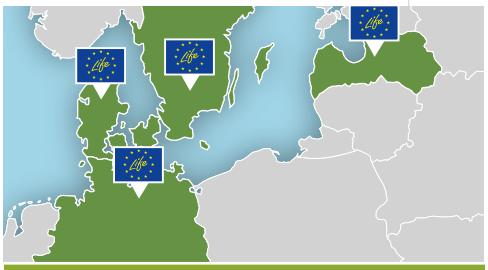
A key aspect of the new project is the international networking between the partners, through actions such as pond construction (where surveys by the Danish team help locate ideal ponds and have assisted Latvian partners in digging new ponds) and also through annual workshops around the Baltic Sea.

## CONCLUSIONS

At the time of writing (early spring 2009) the partnership project still had several months to run, as it closes at the end of December. But it was already clear that its main objectives i.e., to find the best practical solutions via exchange of experiences and implementation of best practices in the management of Bombina populations in the partner countries will be met. Over 120 ponds have been dug or restored, more than 21 000 eggs have been collected and over 23 000 young Bombina have been released into the wild in the sites in Denmark, Germany and Latvia. Increasing numbers of calling males have been recorded at nearly all sites.

A report on the project's genetic analysis will feature among the main published outputs. A scientific paper presenting the main findings is currently being prepared by the University of Potsdam. Among its main findings are: (i) the discovery of three new markers for *B. Bombina*, (ii) an evaluation of state of breeding, and (iii) conclusion that the Danish supportive breeding programme and reserve population-concept is a "good concept for rescuing small populations".

*LIFE project team*

## DENMARK

**Project number:** LIFE99 NAT/DK/006454

**Title:** Consolidation of *Bombina bombina* in Denmark

**Beneficiary:** Fyn County

**Contact:** Lars Briggs

**Email:** lb@amphi.dk

**Period:** Feb-1999 to Aug-2003

**Total budget:** €818 000

**LIFE contribution:** €398 000

## GERMANY

**Project number:** LIFE04 NAT/DE/000028

**Title:** Management of fire-bellied toads in the Baltic region

**Beneficiary:** Stiftung Naturschutz Schleswig-Holstein

**Contact:** Hauke Drews

**Email:** drews@sn-sh.de

**Website:** www.life-bombina.de

**Period:** Apr-2004 to Dec-2009

**Total budget:** €2 266 000

**LIFE contribution:** €1 064 000

# Protecting the great crested newt in the Eastern Baltic

**This LIFE Nature project restored habitats used by the great crested newt (*Triturus cristatus*) in Estonia and Finland, drawing on the lessons learned from earlier restoration activities in Denmark.**

The great crested newt (*Triturus cristatus*) is found widely across Europe but has suffered from habitat decline over large parts of its range, which is why the species is listed in Annex II of the Habitats Directive. The problems it faces include the loss of ponds and other small bodies of water, overgrowth of freshwater habitats and the introduction of fish that feed on newt eggs and larvae. For hibernation, the newt is dependent on terrestrial habitats that may be negatively affected by commercial forestry and intensive agriculture.

Estonia and Finland harbour small and isolated populations of the newt along the north-eastern border of its range. The main aim of this LIFE project was to ensure the long-term viability of the small and fragmented populations of *Triturus cristatus* in Estonia and Finland, and its specific genetic traits.

Previous experience with habitat restoration for newts and other amphibian species in Denmark, which is being supplemented by the restoration of 12 "demonstration ponds" in Vejle County (Denmark) during the LIFE project, is to provide the basic model for the project actions in Finland and Estonia.

*Great crested newt (*Triturus cristatus*)*

## APPLYING THE LESSONS

The project aimed to draw on many of the lessons learned in Denmark, while adjusting the habitat management and restoration techniques developed to the regional and local conditions found in Finland and Estonia. The main issue in Denmark is the impact of intensive farming, whilst in north-eastern locations it is the lack of appropriate management of semi-natural grasslands and forest habitats, which is the main cause of the great crested newt's decline.

The project therefore concentrated on the restoration and protection of a network of suitable habitats targeting 95-97% of the species' populations in Estonia and Finland. The main action was to ensure there were enough ponds. The LIFE project targeted the restoration or creation of some 240 small bodies of water in Estonia and another 28 in Finland.

As of December 2007, 236 ponds had been created in Estonia and 14 in Finland, as well as all 12 'demonstration ponds' in Denmark. Monitoring indicated that 96 of the new Estonian ponds had been colonised by *Triturus cristatus* and seven of the Danish ponds. New populations of the species have also been found in Finland.

To safeguard hibernation habitats, the LIFE Nature project targeted the restoration of surrounding semi-natural grasslands and forests. In Estonia, this would involve signing management agreements with a large number of private landowners for implementation of restoration activities. As of end-2007, a total of 251 management agreements had been inked in Estonia and 1 424 ha of land was under management.

In Finland, where fewer landowners were involved, restoration activities had been carried out on 2 518 ha of land.

A further aim of the project was to use the experience it gained to produce a best-practice guide and countrywide action plans for the great crested newt. A national action plan for Estonia for 2007-2012 was approved in August 2007 and is currently being implemented by the Estonian State Nature Conservation Centre. Action plans have also been drawn up for 2007-2012 for Finland and Vejle County in Denmark.

Furthering the international scope of the project, dissemination activities will also involve experts from Latvia and Lithuania.

ESTONIA

**Project number:** LIFE04 NAT/EE/000070

**Title:** Protection of *Triturus cristatus* in Eastern Baltic Region

**Beneficiary:** The Ministry of the Environment of the Republic of Estonia

**Contact:** Voldemar Rannap

**Email:** voldemar.rannap@ic.envir.ee

**Website:** http://www.envir.ee/harivesilik

**Period:** Jun-2004 to Dec-2008

**Total budget:** €736 000

**LIFE contribution:** €368 000

Photo: Justin Toland



# Fulfilling LIFE's AMBITION in the Netherlands


**The LIFE Nature AMBITION project – Amphibian Biotope Improvement in the Netherlands – has taken crucial steps towards both encouraging metapopulations* for five endangered amphibian species and preventing isolation and thus genetic erosion.**

Amphibians rely on the presence of small wetlands and small landscape features such as hedges, ditches and small pockets of woodland. The large-scale rural land consolidation schemes in the Netherlands have done away with many of these habitats, with the result that the amphibians, too, are rapidly disappearing. In addition to habitat destruction, other threats come from isolation (genetic erosion), lowering of groundwater levels, acidification and eutrophication, inadequate conservation measures, and the introduction of fish.

In the 1990s, the Dutch environmental NGO, RAVON, which specialises in research into herpetofauna and fish, began developing action plans for four of the most vulnerable amphibian species – the European tree frog (*Hyla arborea*), the common spadefoot (*Pelobates fuscus*) and a joint action plan for the yellow-bellied toad (*Bombina variegata*) and the midwife toad (*Alytes obstetricans*). These laid the groundwork for the LIFE AMBITION project, which, in addition the above-mentioned four species, also targeted another endangered species, the great crested newt (*Triturus cristatus*).

For the LIFE Nature project, RAVON was a partner to the project beneficiary, Staatsbosbeheer, the Dutch State Forestry Service. Teamleader, RAVON, Ronald Zollinger, explains the scale of the threat facing the five target species:

- ***Bombina variegata***: "In 1964, the yellow-bellied toad was found in 80 locations in the Netherlands; by 2000, it was only found in five locations."
- ***Triturus cristatus***: "This species is not as scarce as Bombina being found in around 1 000 km$^2$ of habitat. However, it has declined since 1990."
- ***Alytes obstetricans***: "Within the Netherlands, the midwife toad is only found in the south. Between 1980 and 2000 it was found in a 70 km$^2$ area; but from 2001-2004 it was only found in 33 km$^2$.
- ***Hyla arborea***: "Before 1984 the European tree frog was found in 198 locations; between 1990 and 2000, the species was only observed in 35 locations."
- ***Pelobates fuscus***: "Prior to 1990, the common spadefoot had a range of 111 km$^2$; between 1990 and 2008, the species' range was just 36 km$^2$.

** A metapopulation is a group of conspecific populations that exist at the same time in different places (source: Oxford Dictionary of Ecology).*

## HABITAT RESTORATION ACTIONS AND RECOVERY PLANS

The national recovery plans drafted prior to AMBITION laid out a four-step approach to restoring the populations of these endangered species and improving the state of conservation of their habitats: 1) secure a population; 2) increase a population; 3) connect populations (provide ecological corridors between the populations); 4) create a metapopulation structure.

The beneficiary, together with RAVON and other project partners such as the conservation NGO Natuurmonumenten and the provincial landscape foundations of Overijssel, Gelderland and Limburg, selected 14 subsites (see map below) where small-scale conservation works would be carried out to protect the existing amphibian populations and expand their habitats. Through the protection of present core habitats and habitat restoration/development in adjacent areas it was hoped to be able to create corridors or migration zones to join together isolated populations with the ultimate goal of developing viable metapopulations of the five target species.

"We tried to combine Natura 2000 sites with the range where the species occurred," explains Mr. Zollinger. "It is very important to follow a strategy – you must focus on the actual population."

*Map of AMBITION project sites*


Photo: Jelger Herder

*Surveying a restored pond for amphibian species*

The project actions included digging of ponds, restoration of ditches and planting or removal of hedges (depending on their impact on particular species). At Geuldal in Limburg province, steps were taken to increase a population by connecting clusters of pools and improving terrestrial habitats.

Despite the logistical challenges posed by a multi-site, multi-species project, the AMBITION team successfully completed all the designated project actions by the end of 2008.

## ENCOURAGING RESULTS

Whilst it is still too early to assess the full impact of many of the project actions, already there are positive signs. For instance, says Mr. Zollinger, "There has been a population increase of *Hyla arborea* in the years we have been running the programme." Between 1997 and 2007/8, the population of active calling males grew sevenfold. In some project sites, such as Achterhoek, the range of the European tree frog has also increased. "Northeast Overijssel is now more or less a metapopulation for the great crested newt and treefrog," notes Mr. Zollinger. One helpful factor in this region is a clay soil layer that does not allow groundwater to evaporate, creating natural pools of stagnant water.

Another excellent outcome is the fact that in one area where *Bombina variegata* was almost extinct (one known individual), there are now some 40 yellow-bellied toads.

The AMBITION project illustrates how restoration actions and monitoring can enter into a positive feedback loop, as Mr. Zollinger explains: "We discovered if you make large reproduction sites with shallow banks, the eggs develop more quickly…This kind of reproduction site works far better than the small pools." And it is not only the target species that profit from this discovery: "More organisms will benefit from the shallow banks of the ponds than when the banks are steep," says RAVON's Wilbert Bosman.

## AWARENESS-RAISING: SPREADING THE WORD

AMBITION has made significant efforts to publicise its actions, including setting up a project website, erecting information panels at each project site, hosting

*Great crested newt (*Triturus cristatus*): a species targeted by the project*

Photo: Jelger Herder

Photo: Maaike Pouwels

## The midwife toad

*Alytes obstetricans* is part of a genus of frogs in the Discoglossidae family that are found in most of Europe and northwestern Africa. These toad-like frogs are notable for their approach to parenting: "The midwife toad is a very emancipated species," explains Wilbert Bosman of RAVON. "The female never goes to water: the male carries the eggs, goes in the water for five minutes and the larvae swim out. Both males and females call ('croak') and the species mates on land."

Another notable feature of *Alytes* is its back, which is covered with small warts. These warts give off a strong smelling poison when the toad is handled or attacked. A midwife toad's poison has been known to kill an adder within hours.

Photo: Jelger Herder

## European tree frog

*Hyla arborea* is a small frog that typically grows to 30-40 mm in length, and rarely more than 45 mm. It is the only member of the tree frog family (Hylidae) indigenous to mainland Europe. The species is known to favour sunny forest edges – it likes to 'sunbathe' in blackberry bushes – bushy heaths, wet dune pans, wet scrubland and extensively used meadows and parks with ponds rich in submerged vegetation and lacking in predatory fish.

## Common spadefoot

*Pelobates fuscus* is a species of toad of the family Pelobatidae, native to an area extending from central Europe to western Asia. The toad, which is typically light grey to beige-brown in colour, is known for its defence mechanisms, which include a very loud 'alarm' call and the ability to emit a noxious secretion that smells not unlike garlic. For this reason the common spadefoot is sometimes known as the 'garlic toad'. The male of the species typically grows to 65 mm in length, while females on average measure some 80 mm.

excursions, press conferences and a workshop (attended by researchers from Belgium, France, Germany and UK), as well as participating in international conferences (for instance in Valencia, Spain in May 2008). The project team was also keen to involve members of the public in its actions: "We had nearly 50 volunteers in the south of the country helping us to count the midwife toads," comments Mr. Bosman proudly.

### LESSONS FROM LIFE

For project manager, Staatsbosbeheer, Roelof Heringa, "The hardest thing with this kind of project is to keep everyone going in the same direction and keep everyone alert after two, three, four years." Despite the presence of six partners and several funding streams, Mr. Heringa is pleased to be able to say that "We have succeeded (so far) in meeting the administrative challenges."

For Mr. Zollinger, while the AMBITION project was a success, it was perhaps a little too ambitious: "Next time maybe we will have fewer sites in fewer provinces. But in the end we are still happy that we started the project." As well as the obvious benefits to the amphibians ("Most of the species have shown improvement in response to the actions") there have been spin-offs for other local conservation projects: "Even projects we are not involved with," says Mr. Zollinger. "That's important: the snowball effect."

And, while the LIFE project may have ended, the work to secure the future of the endangered frogs, toads and newts continues. For instance, RAVON is currently investigating the metapopulation structure of *Triturus cristatus* in the Oldenzaal area (Overijssel). "This LIFE project is just one of a lot of projects," explains Mr. Zollinger. "We hope to get spin-offs from the LIFE project."

### THE NETHERLANDS

**Project number:** LIFE04 NAT/NL/000201

**Title:** Amphibian Biotope Improvement in the Netherlands

**Beneficiary:** Staatsbosbeheer (Dutch State Forestry Service)

**Contact:** Roelof Heringa (Staatsbosbeheer), Ronald Zollinger (RAVON)

**Email:** r.heringa@staatsbosbeheer.nl, r.zollinger@ravon.nl

**Website:** www.life-ambition.com

**Period:** Jun-2004 to Dec-2008

**Total budget:** €1 303 000

**LIFE contribution:** €651 000

# Restoring amphibian habitats in Valencia

**LIFE is helping to preserve a network of 55 small freshwater ponds to improve the conservation status of eight amphibians in the region of Valencia.**

As a result of the widespread abandonment of traditional management practices, the small inland freshwater bodies of the Valencia region are rapidly disappearing. Small freshwater bodies are vital habitats for a range of threatened amphibians as well as some rare plant and animal species.

## STAKEHOLDER INVOLVEMENT

A preliminary inventory of water bodies of interest was created in 1998, with a view to the protection of their biodiversity. The inventory of more than 4 600 water bodies was based on interviews with environmental managers and field visits, and highlighted the need for restoration, protection and management interventions in some areas. These included Mediterranean temporary ponds and petrifying springs with tufa formations, which are prioritised by the European Community.

Such sites are home to rare amphibians such as the Spanish painted frog (*Discoglossus jeannea*), a priority species for the European Community, as well as the midwife toad (*Alytes obstetricans*), the natterjack toad (*Bufo calamita*) and the western spadefoot (*Pelobates cultripes*), a toad which is only found on the Iberian peninsular and in southern France. The LIFE project is focusing on eight species, drawing up a management plan for two, as well as plans for individual habitat types.

*Spanish painted frog (*Discoglossus jeanneae*)*

The 'management plan for reserves of fauna for amphibians' includes both limitations on how sites can be used (e.g. limits on traffic and unauthorised site modifications) and a list of conservation actions to be undertaken (e.g. annual monitoring of amphibian populations; selective dredging; restoration of aquatic and bank vegetation; and installation of fencing).

## PROJECT ACTIONS HAVING AN IMPACT

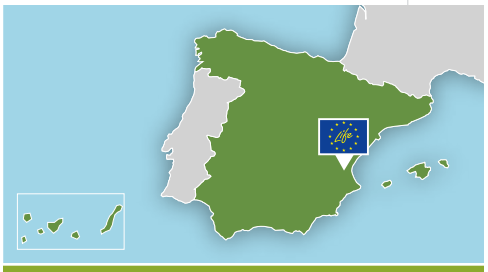
Habitat restoration to date has included cultivating hydophitic and helophylic plants, eradicating invasive species, erosion control and the restoration of hydrological features.

At Balsa de la Carrasquilla in the Sierra de Enguera SCI, *Bufo bufo* was sighted 15 days after the first rain following restoration work on a pond. *Pleurodeles walti* will colonise the pond eight months later. A newly-formed temporary pond in the Sabinar de Alpuente SCI was immediately colonised by the natterjack toad (*Bufo calamita*).

Existing ponds have been restored at Charca de Valladinos (Sierra de Enguera), Navajo de la Zorra, and Fuente Juanblanquilla (both Sabinar de Alpuente). Both *Pelodytes punctatus* and *Alytes obstetricans* were observed to have colonised these habitats within a few weeks of the recovery work.

*Male midwife toad (*Alytes obstetricans*) carrying the eggs*

Preliminary conclusions of the LIFE project include the fact that the Spanish painted frog requires shallow waterbodies a few cm deep, while species with longer hydroperiod demands, such as the Iberian green frog, the common midwife toad and the common toad only colonise permanent ponds.



SPAIN

**Project number:** LIFE05 NAT/E/000060

**Title:** Restoration of priority habitats for amphibians

**Beneficiary:** Consellería de Medio Ambiente, Agua, Urbanismo y Vivienda.- Dir. Gral. de Gestión del Medio Natural

**Contact:** Doña Mº Angeles Centeno

**Website:** www.lifeanfibios.com

**Period:** Oct-2005 to Dec-2010

**Total budget:** €1 048 000

**LIFE contribution:** €524 000



**This LIFE Nature project restored seven Sites of Community Importance (SCI) of particular relevance for amphibians in the province of Bologna, establishing a captive breeding programme in the process. Long-term management of the sites was ensured through agreements with private landowners.**

# **Captive breeding and site restoration** in Bologna

The SCIs, which contain a wide range of habitats such as dry heaths, grasslands on calcareous substrate and calcareous screes, are home to many species of Community interest: amphibians (*Salamandrina terdigitata*), bats (*Myotis myotis*, *Myotis biythi*, *Rhinolophus euryale*) and birds (*Falco biarmicus, Falco peregrinus, Pernis apivorus*). The morphological diversity of the province gives rise to a great variety of microclimates, which has an impact on the habitats.

*One of the 98 ponds restored by this LIFE project*

Human activities, however, pose a threat to the conservation of the sites. The impact of roads and the tapping of ponds and pools for agricultural purposes have led to a widespread reduction of biodiversity, in particular of amphibian species.

The LIFE Nature project drew up and applied an action plan containing guidelines for the management of the seven sites (a total area of some 20 000 ha). Specific management plans were drawn up for at least two sites and agreements were reached with private landowners for the management of ponds for at least 10 years. The project restored 98 ponds in total, targeting

*School children observing amphibians' eggs as part of an awareness campaign at the Amphibian Centre*

amphibians of EU interest such as the spectacled salamander (*Salamandrina terdigitata*) or the southern crested newt (*Triturus carnifex*).

## CENTRE AT THE CENTRE

The project also set up an amphibian breeding and study centre, located in Pianoro, on the banks of the Savena River. It is divided into an indoor section located within an old school building, specially renovated during the project, and an outdoor section consisting of a series of existing pools that were enlarged and optimised during the project.

Activities of the centre included small interventions for the restoration and improvement of amphibians' habitats, monitoring of amphibian populations and the establishment of a database for the organisation of data generated by the monitoring activity. In the pSCIs Gessi Bolognesi and Contrafforte Pliocenico, monitoring activity was directed at the reproductive sites of two species listed in Annex II of the Habitats Directive, the yellow-bellied toad (*Bombina variegata*) and the spectacled salamander (*Salamandrina terdigitata*). One breeding pair of *Bombina* was found in each of three sites. As a result of the temporary nature of each of these sites, the beneficiary collected the toad-spawn and transferred it to the aquarium at the amphibian centre to ensure its development.

In 2001, 30 yellow-bellied toad tadpoles were bred and, in winter 2001/2002, 12 young specimens (six male, six female) reached sexual maturity, becoming available for future captive breeding or reintroductions. In 2002, the first 100 eggs were laid and some 70 tadpoles developed.

In the summer of 2002, 10 sexually mature *Bombina* specimens were released in the origin sites, while the remaining 20 specimens were kept in the centre as breeders. During 2002, an average of 20 eggs was collected from each reproductive site and from two additional sites (one in Tuscany and one in Romagna) and 53 animals reached the metamorphosis stage.

Despite the outbreak of a mycosis affecting some of the young *Bombina variegata* specimens in 2001, the centre has continued its captive breeding activities. The centre has also carried out many awareness-raising actions, including holding seminars and public meetings, and producing publications, videos, and a website.

The amphibian centre continues to thrive thanks to the support of specific funding from the province of Bologna and Pianoro commune.

ITALY

**Project number:** LIFE98 NAT/IT/005133

**Title:** Peregrine

**Beneficiary:** Provincia di Bologna

**Contact:** Dr Marta Bettini

**Email:** bettini@provincia.bologna.it

**Website:** http://www0.provincia.bologna.it/ambiente/pellegrino/pellegrino/home.html

**Period:** Aug-1998 to Sept-2004

**Total budget:** €1 332 000

**LIFE contribution:** €666 000

# REPTILES

Many of Europe's reptiles face threats to their existence, from direct killing in the case of feared species such as snakes and lizards, to bycatch from commercial fishing in the case of sea turtles.

Although the LIFE programme has not targeted all the reptile species included in the annexes of the Habitats Directive, it has made a major contribution to the improvement of the conservation status of reptiles in Europe and thus to realising the requirements and objectives of the Directive.

In particular, LIFE has helped the Hungarian meadow viper to recover from the verge of extinction, led to the discovery of a long-thought extinct giant lizard species in the Canaries Islands and been the main financial resource available for the conservation of loggerhead turtles in EU waters.

REPTILES

# LIFE, captive breeding, reintroduction and habitat restoration for reptiles

**LIFE Nature has helped conserve and reintroduce some of Europe's most threatened reptile species through a combination of monitoring, captive breeding and habitat restoration activities.**

LIFE projects targeting reptiles have included many of the same types of actions and have normally targeted either highly endangered reptile species with very small populations in restricted areas, or species with very specific requirements such as sea turtles. Common features of the projects have included:

- Preparatory actions - Monitoring and assessment of the status of the wild populations. This basic information was then used to define habitat restoration actions or the captivity breeding methodology (genetic studies and population surveys);
- Habitat restoration (grasslands restoration, cleaning of beaches, etc);
- Construction of captive breeding facilities;
- Networking with other projects;
- Awareness campaigns.

Photo: LIFE06 NAT/E/000199

*Giant lizard of La Gomera, Canaries – LIFE helped establish a captive breeding programme for the species*

Some reptile conservation activities funded by LIFE have focused on reintroducing highly endangered reptiles species into the wild in places where they formerly existed. These projects normally involved captive breeding (*ex-situ* reproduction) followed by reintroduction to the wild in previously restored and secure locations with suitable habitats (see box).

*Ex-situ* conservation is not without difficulties, being more costly than *in-situ*

## COMMON METHODOLOGY OF THE CAPTIVE BREEDING PROJECTS

1. Definition of methodology for collecting individuals for the captive reproduction programmes. These actions normally involved genetic studies to ensure the genetic variability of the initial captive breeding population and reduce inbreeding, which is a recurrent problem that LIFE projects have to face when the founder population is too small.
2. Establish the location of the captive breeding facility (usually not too far away from the location where the individuals were collected) followed by the construction of physical structures that replicate habitats in the wild, which in the case of reptiles takes the form of terrariums.
3. Establishing breeding methodologies. These actions typically were conducted in partnership with the universities and zoos that provided technical expertise to the project.
4. Assessment and survey of possible locations for reintroduction after securing a viable number of individuals for the success of the reintroduction.
5. Habitat restoration and elimination of threats, and management of the reintroduction locations.
6. Monitoring and tracking of reintroduced individuals – either through written surveys, telemetry or satellite tagging.

conservation and possibly leading to the loss of genetic diversity.

At the EU level, the main reptile reintroduction programmes have been funded by LIFE in partnership with local stakeholders and institutions such as zoos and universities. These institutions have the expertise, and knowledge of local factors, that can make the difference between the success or failure of a project. They also have the long-term ability to monitor reintroduced populations and to manage habitats sustainably after a project ends.

## LIFE PROJECTS AT WORK

LIFE projects on reptiles have mainly focused on lizards, turtles and vipers.

Several LIFE projects have focused on the giant lizards in the Canary Islands (see pp. 30-35). The giant lizard of La Gomera (*Gallotia bravoana*), a lacertid (wall lizard) species found on the island of La Gomera, was facing extinction, but thanks to a pair of LIFE projects, (**LIFE02 NAT/E/008614** and **LIFE06 NAT/E/000199**), a recovery plan was drawn up for *Gallotia bravoana*. This action led to the implementation of a captive breeding programme that has helped the giant lizard population on the island to double since 2001 (61 lizards in captivity). The first captive lizards are expected to be reintroduced to the wild this year.

Another giant lizard is found elsewhere in the Canary Islands on El Hierro. The giant lizard of El Hierro was once present throughout much of the island and on the small offshore Roque Chico de Salmor, but its numbers declined to only being present in a few small areas on the cliff tops, where there is little vegetation. It was restricted to the southern end of the Risco de Tibataje in la Fuga de Gorreta, located between Guinea and the Paso del Pino (an area of some 4 ha), until a LIFE project (**LIFE97 NAT/E/004190**) reintroduced the species to the Roque Chico de Salmor. Further reintroductions have taken place at El Julan and at la Dehesa.

Photo: LIFE02 NAT/E/008614

*Giant lizard hatching at the captivity centre*

The locations proved more suitable habitats than expected, and reintroductions have continued after the project in El Julan, where 200 lizards were released in late 2000. Today, El Julan is the most likely place to host a new viable wild population of lizards. The breeding programme's techniques and methods were refined, and specialised staff hired for the breeding centre. As a consequence, the breeding rate increased to 100 lizards per year, with an almost 95% rate of successful egg hatching. Such efforts ensure the maintenance of a healthy captive population of the species.

The reintroduction programme for the European pond turtle was carried out at the southern end of Lake Bourget in France, between 2000 and 2002 (**LIFE99 NAT/F/006321** – see pp.48-49). The release of 35 adult turtles in three groups was very successful, resulting in nesting behaviour and high rates of survival. The success of this project provides the basis for further reintroduction programmes at other favourable sites around the lake.

Reintroduction programmes have also been developed in Eastern Europe. A project in Hungary (**LIFE04 NAT/HU/000116**) attempted to arrest the severe decline in the population of the Hungarian meadow viper (*Vipera ursinii rakosiensis*) – see pp. 39-40. It set up a conservation centre to breed vipers collected from threatened populations and reintroduce them later to previously restored habitats. The reproduction centre aims to eliminate problems such as inbreeding that arises from small isolated populations. This project highlights an important consideration common to all reintroduction programmes: the need to ensure that the environment into which species are reintroduced sustain a viable population – for example, reintroduced individuals are not likely to become immediately the victim of predation.

Habitat conservation and management were central to the Romanian reintroduction LIFE project (**LIFE00 NAT/RO/007171** – see pp. 46-47). The Iron Gates Natural Park is home to the endangered Hermann's tortoise (*Testudo hermanni*), and the project helped develop a management plan for the park, ensuring its legal protection. Moreover, the inventories of species and habitats performed during the project contributed to the proposal of Natura 2000 sites in the area – one pSCI and two SPAs. Six new nature reserves were also proposed and established during the project, and the first steps towards the project area being designated a MaB Biosphere Reserve were taken.

These actions formed a sound basis for the reintroduction of Hermann's tortoise: some 250 tortoises were released while 73 individuals were kept in the rescue centre. Sustainable local populations were reached, and the project beneficiary plans to use the rescue centre for the monitoring of species and habitats.

The following pages show successful project actions targeting reptiles species in the EU. The project actions helped to improve the conservation status of the targeted species by eliminating threats, boosting the wild populations by reintroduction plans and restoring habitats, and securing nesting sites.

*The Hungarian meadow viper is another LIFE-targeted species bred in captivity*

Photo: LIFE04 NAT/HU/000116

REPTILES: LIZARDS

# Giant lizards of the Canary Islands

Photo: LIFE06 NAT/E/000199

*La Gomera giant lizard (*Gallotia bravoana*)*

**Many islands in the world support their own unique reptile species, and the Canary Islands are no exception. In fact the archipelago supports its own genus of lizards, the Gallotia of the Lacertidae family of wall lizards, which includes eight endemic species and two recently rediscovered giant lizards*. In a series of projects featured over the following pages, LIFE has targeted the conservation of two of these critically endangered species – the giant lizards of El Hierro (pp. 29-30) and La Gomera (pp. 31-32).**

** the El Hierro giant lizard (rediscovered in 1974), La Gomera giant lizard (1999), the 2007 rediscovery of the La Palma giant lizard (G.auaritae) is not fully confirmed*

The lizards from the genus Gallotia are lacertids (wall lizards) unique to the Canary Islands. This group of lizards has been evolving on the islands since they were formed 20 million years ago, and all species have a common African ancestor. The endemic species and subspecies of the Gallotia genus have a number of characteristics that make them unusual in the lizard world: they are wholly or mostly plant-eaters or and several species have grown to a giant size thanks to the lack of predators in their island habitats (see table 1).

With exception of the Gran Canaria giant lizard, all the other lizards are considered critically endangered by IUCN. Their decline probably started up to 2 000 years ago with the arrival of humans on the Canaries. Today, the surviving populations of giant lizards present very reduced genetic variability and are under threat by predation by introduced species (particularly feral cats and rats) and by human activities (tourism and agriculture).

Table 1: **Canary Islands giant lizards**

| Island | Scientific name | Annex Habitats Directive | LIFE project | Estimated individuals in the wild | Observations |
|---|---|---|---|---|---|
| **El Hierro** | Gallotia simonyi | II (* priority species) | LIFE94 NAT/E/001238 (1994-1996)<br>LIFE97 NAT/E/004190 (1997-2000) | 200 before the projects<br>300-400 including the individuals reintroduced under the LIFE projects | Rediscovered in 1974 |
| **La Gomera** | Gallotia bravoana | II (* priority species) | LIFE02 NAT/E/008614 (2002-2005)<br>LIFE06 NAT/E/000199 (2006-2010) | 20 before the projects. Today estimated at 160 adults (plus the one in the captivity centre) | Listed in Annex II as *G.simonyi* as previously was described as such. Rediscovered in 1999 |
| **Gran Canaria Giant Lizard** | Gallotia stehlini | IV | Not targeted | Abundant species | |
| **Tenerife Speckled Lizard** | Gallotia intermedia | Not included | Not targeted | 500 | The smallest of the giant lizards |

# Helping **the El Hierro giant lizard to survive**

**The giant lizard of El Hierro (*Gallotia simonyi*), an emblem for the Canary Islands, was, until recently, considered to be one of the European reptiles most threatened with extinction and one of the most threatened reptiles in the world. LIFE support, in particular in the development of a management plan and a captive breeding programme for the species, has been crucial to improving its chances of mid-term recovery and survival.**

*Gallotia simonyi* was once present in most of El Hierro, the smallest of the Canary Islands (278 km$^2$) located in the extreme southwest of the archipelago. First considered extinct, the species was rediscovered in 1974, in a very small area, 'Fuga de la Gorreta'. Its population was estimated in the 1970s at approximately 1 500 individuals. A first management plan was approved in 1985, but very little was known about the species or of the suitable management measures needed to ensure its future survival.

LIFE Nature supported two projects focusing on conservation of the species, which by the launch of the first project had dwindled to only around 200 individuals existing in a barely adequate habitat. The first project, "Programme for the restoration of Hierro giant lizard *Gallotia simonyi* "(**LIFE94 NAT/E/001238**) was run by the NGO 'Asociación Herpetológica Española' – the Spanish Herpetological Society, working in close collaboration with the regional government.

This project sought to gain knowledge and to develop a management plan for the recovery of the species. It also introduced a captive breeding programme. The second project, "Reintroduction of El Hierro giant Lizard in its former natural habitat" (**LIFE97 NAT/E/00419**) was implemented directly by the regional government. It aimed to re-establish a viable population of the giant lizards in the wild through the release of animals bred in captivity.

*The el Hierro giant lizard (*Gallotia simonyi*) in the captive breeding centre*

## EL HIERRO GIANT LIZARD

A priority species listed in Annex II of the Habitats Directive, the giant lizard of El Hierro is also a wall lizard species, endemic to the island of El Hierro. It was thought to be extinct, until it was rediscovered in 1974. Approximately 0.6 m long, it is a stocky reptile with a broad head and pronounced jowls (flesh under the lower jaw). It is dark grey to brown in colour, with two rows of pale orange patches running along its sides. The belly is mostly brown with orange to red colouration towards the centre. Female young adults have grey backs with four rows of blackish patches and two rows of orange-green marks on the side. Older individuals are mainly black with some grey. The lizard is omnivorous. It eats plants – notably *Senecio kleinia* (Spanish name 'verode') a flowering plant endemic to the Canary Islands and lavender (*Lavandula abrotanoides*) – as well as insects. Mating begins in May and the 5 to 13 eggs are laid from June until the end of August. Their eggs hatch after 61 days.

Originally occurring over a large part of the island, its population was down to around 200 individuals before the LIFE projects and its distribution range was restricted to a zone barely exceeding 2 ha. This zone is located on an almost inaccessible cliff where the Canary Islands' government has designated two Sites of Community Interest to represent the species in the Natura 2000 network.

Aside from the implementation of the recovery plan through the captive breeding programme and the release of individuals in suitably prepared habitats, the main management actions for both projects consisted of the control of possible predators (mainly cats and rats) and competitors for food (goats and other lizards). Both projects focused on raising general awareness on the island of this critically endangered species.

### CAPTIVE BREEDING

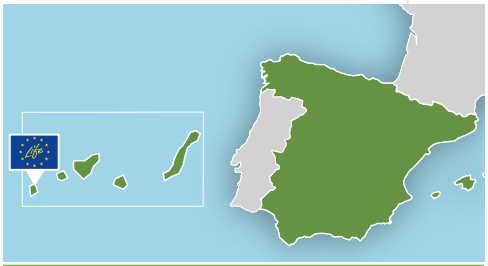
With the aid of LIFE support since 1994, the conservation status of the species has improved – albeit from an initial, extremely unfavourable status. Three reintroductions have been carried out at three different SCIs (sites of Community interest): on the islet 'Roque Chico de Salmor', in'El Julan' and in 'La Dehesa'. These reintroductions have continued after LIFE in La Dehesa', where 200 lizards were released in late 2000 and a subsequent management-monitoring-reinforcement plan is also ongoing.

Table 1: **Breeding rate of Gallotia simonyi (lizards/yr)**

| Year | Newborns |
|---|---|
| **1995** | 97 |
| **1996** | 89 |
| **1997** | 75 |
| **1998** | 39 |
| **1999** | 101 |
| **2000** | 34 |
| **2001** | 51 |
| **2002** | 40 |
| **2003** | 33 |
| **2004** | 46 |
| **2005** | 57 |
| **2006** | 53 |
| **2007** | 0 |
| **2008** | 100 |

The breeding programme's techniques and methods were refined over the course of the projects and experienced staff hired for the breeding centre. The centre has a protocol for feeding, raising and mating of animals that has proved to be particularly successful. Plants (kitchen garden and those found in their natural habitat) and animals (crickets, mice and worms) are supplied at different stages. A regular veterinary control is also carried out by a specialist from Barcelona. The objective of the mating programme is to achieve the most suitable genetic crosses and have the largest genetic pool to avoid inbreeding (low genetic variability). Eggs are artificially incubated in incubators.

As a consequence, the breeding rate has increased steadily (see Table 1) with new lizards born every year, with the exception of 2007 (see below). This work is helping to ensure the maintenance of a healthy captive population of the lizards and allows for the continuation of the reintroduction plan to guarantee the survival of the species in the wild.



SPAIN

**Project number:** LIFE97 NAT/E/004190

**Title:** Reintroduction of El Hierro giant Lizard in its former natural habitat

**Beneficiary:** Gobierno de Canarias - Consejería de Política Territorial

**Contact:** Miguel Ángel Rodriguez

**Email:** mrodriguez@el-hierro.org

**Website:** www.gobiernodecanarias.org

**Period:** Sep-1997 to Feb-2000

**Total budget:** €465 000

**LIFE contribution:** €279 000

SPAIN

**Project number:** LIFE94 NAT/E/001238

**Title:** Programme for the restoration of Hierro giant lizard *Gallotia simonyi*

**Beneficiary:** Asociación Herpetológica Española (NGO)

**Period:** Nov-1994 to Dec-1996

**Total budget:** €667 000

**LIFE contribution:** €500 000

**The giant lizard of La Gomera (*Gallotia bravoana*) was thought extinct for 500 years, until the surprise discovery of a few individuals by Spanish biologists in 1999. Tourism, agriculture and predation by feral cats threatened to return the rediscovered lizard to the list of extinct species. Thankfully, two LIFE projects have helped staunch the possibility of the reptiles disappearing forever.**



# The return of **the giant lizard of La Gomera**

During the implementation of the project for the recovery of the El Hierro giant lizard (**LIFE97 NAT/E/004190**), the Government of the Canary Islands surveyed the whole archipelago to ensure an accurate census of giant lizards. As a result of this survey, and to the great surprise of the scientists involved, the giant lizard of La Gomera, was found in the Risco de la Mérica, La Gomera, in 1999. Long considered extinct, a population of no more than 20 individuals was found living close to a tourist area of the island (Valle del Gran Rey). Historically the lizard declined through overgrazing, hunting, and predation by introduced species, notably cats and rats. Nowadays the main threats are predation by cats; rock falls within its very restricted range; and overgrazing (mainly goats).

In 2002, a LIFE project – "Recovery plan for the giant lizard of La Gomera" (**LIFE02 NAT/E/008614**) – set out to draft and implement a recovery plan for the species and to set up a captive breeding programme.

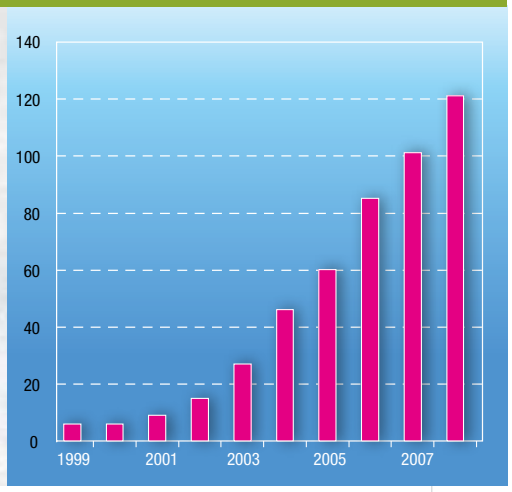
## CAPTIVE BREEDING: ENSURING THE GIANT LIZARD´S SURVIVAL

After assessing the status of the only known population of *Gallotia bravoana*, the project team drew up a plan for the recovery of the species aiming to: (i) increase the size of its population until there were enough individuals to ensure its conservation; and (ii) to guarantee its future viability in its natural environment, by eliminating the main threats. The giant lizard´s only chance of recovery was to implement a captive breeding programme similar to the one that was introduced for the El Hierro lizard (see pp. 31-32). The knowledge gained from that programme was transferred to La Gomera. The *Gallotia bravoana* programme started in 2003 with just eight individuals (five males and three females) in a modern and fully-equipped captive breeding centre. Although the funds for constructing the centre came from the European Agricultural Fund for Rural Development (EAFRD), most of the "nursing" equipment was funded by LIFE.

The 2002 LIFE Nature project was remarkably successful – 53 individuals were bred in captivity by the project's end. This success has continued: the captive breeding centre held more than 120 individuals by the end of 2008 (see Fig. 1).

While the captive breeding programme has had its successes, there have also been some setbacks – for example, the birth rate has been lower than foreseen. Only the initial founder females continue to reproduce and the average number of eggs per lay is fewer than that achieved in the captive breeding programme of El Hierro (four versus 10). Moreover, the newborns

Figure 1: **Evolution of the number of individuals in the captive breeding centre**



*Despite some setbacks, the number of lizards born in the centre has been increasing steadily*

are almost all males. This results in a reduced number of individuals available to start the expected reintroductions (releases need a higher rate of females as these lizards are polygamous- one male breeds with several females).

There are a couple of possible explanations for this lower birth rate:

- The reproduction programme in El Hierro started with a much bigger initial population (some 1 000 individuals versus the 20 individuals of La Gomera). This could mean that *Gallotia bravoana* is already suffering from inbreeding processes that lead to fewer egg-lays. According to the project technician (who formerly worked for the captive breeding programme in El Hierro), this situation had already been seen with lizards from El Hierro: animals that were genetically closed produced reduced outputs;
- In 2005, many animals became ill after inhaling polluted air from a nearby water-treatment plant. It is a possibility that females born in that year were rendered sterile.

In any case, the beneficiary is very concerned about this situation and is trying to test different procedures. For instance, it has contacted technicians from the El Hierro captive breeding programme who provided specific advice on food supply, incubation periods, etc.

## SECURING THE HABITAT FOR REINTRODUCTION

In parallel with the breeding centre actions, the 2002 LIFE project had the objective of selecting places for future reintroductions, and to secure the current wild population and reintroduction places by eliminating the threats to the lizard. This largely meant the control of feral and domestic cats by trapping. In close collaboration with the town council of Valle del Gran Rey, local vets and the NGO Pro Gomera Animal, the beneficiary designed a suitable programme whereby cats were neutered, chipped and, if they had no owner, taken out of the municipality. Traps are placed in the dispersal areas from this town and the number of cats captured has significantly diminished. As a consequence of these actions, the natural population of the target species has increased notably. With a lack of predators, the original nuclei has engaged in augmented breeding. It was also found that this nuclei is starting to disperse around the Risco de la Mérica forming different subpopulations. In addition, a new small colony has been found in the area of Quiebracanillas (a few hundred metres away from the original colony). Therefore, the best current estimates give a figure of around 160 individuals in the wild.

*This captive-born lizard was released into the wild in 2008, once the habitat had been secured*


*A story book for children on the Giant lizard*

The 2002 LIFE project also built up knowledge about invader predators on islands, thanks to an important collaboration with another LIFE project targeting the control of invasive vertebrates on Spanish and Portuguese islands (**LIFE02 NAT CP/E 000014**).

Following on from "Recovery plan for the giant lizard of La Gomera", a second LIFE project – "Programme for the recovery of Gallotia bravoana and its distribution area" (**LIFE06 NAT/E/000199**) – was launched in 2006. Its main objectives are to continue the conservation strategy started by the earlier project and to release into the wild some of the lizards bred in captivity. To achieve this, the ongoing project is targeting: (i) the reconditioning the habitat areas selected for the release of the reptiles (for example by fencing the areas); (ii) implementing in at least two stages, experimental releases into the wild of lizards born in captivity; (iii) protecting the already known populations from the effects of the main threats (especially from predators); and (iv) reinforcing the captive breeding programme begun by the initial project.

At present most of the above actions are running as planned. Notably, the phased release into the wild of some male lizards bred in captivity has begun. In August 2008, as a trial, six males thought to have the best chance of survival were released at the Los Órganos en Vallehermoso site on the islet of Roquillo. Project technicians are optimistic that the adaptation capacity of the species will lead to the establishment of viable new lizard populations on the island. The LIFE project, which ends in January 2010, still hopes to carry out reintroductions this year. The areas where this will take place have been fenced in preparation.

## RAISING AWARENESS

Both LIFE projects have not only built up good knowledge of the status of *Gallotia bravoana* and of its distribution, they have also undertaken extensive awareness-raising activities, including TV, radio and press campaigns, workshops and scientific papers. School children have been successfully targeted and, since 2001, more than 100 talks have been given to children of all ages. Other pedagogical activities include a teacher training programme and a travelling exhibition with support material (story book and exercises, DVD, leaflets, etc). Moreover, in the last five years, school children also have visited the breeding centre. Every year, school children celebrate Lizard Day, with activities including a special song, competitions and other demonstrations.

An awareness campaign including direct mail and local radio advertisements is ensuring that pet owners in Valle Gran Rey know about the sterilisation campaigns and free marking of cats.

Furthermore, the island's buses have been plastered with enormous murals of the giant lizard with the aim of raising awareness all over the island, particularly among tourists. This has proved very popular and the lizard buses have become a symbol of the island.

*Buses with the giant lizard have become a symbol of the island*


## SPAIN

**Project number:** LIFE02 NAT/E/008614

**Title:** Recovery plan for the giant lizard of La Gomera

**Beneficiary:** Consejería de Medio Ambiente y Ordenación Territorial. Gobierno de Canarias

**Contact:** Juan Carlos Moreno

**Email:** jmormorj@gobiernodecanarias.org

**Period:** Jan-2002 to Dec-2005

**Total budget:** €1 267 000

**LIFE contribution:** €449 000

## SPAIN

**Project number:** LIFE06 NAT/E/000199

**Title:** Programme for the recovery of Gallotia bravoana and its distribution area

**Beneficiary:** Excmo. Cabildo Insular de la Gomera

**Contact:** Casimiro Curbelo Curbelo

**Email:** presidencia@gomera-island.com

**Website:** www.gigantedelagomera.org

**Period:** Aug-2006 to Jan-2010

**Total budget:** €894 000

**LIFE contribution:** €488 000

# LIFE and **European vipers**

**Habitat loss and persecution driven by fear have placed several European vipers on the verge of extinction. LIFE has been helping to reverse the sharp decline in numbers of these symbolic species, especially in Eastern European Member States.**

Europe is home to a high diversity of reptiles, especially the Mediterranean basin. Of all the reptiles, snakes, particularly venomous ones such as the vipers (Viperidae) evoke perhaps the strongest reactions. However, these species are also extremely rare: almost all EU vipers are considered highly endangered (see Table 1).

The main threats to vipers come from habitat destruction caused by intensive agriculture or urban sprawl; illegal capture for commerce and venom extraction; and more recently, climate change. A recent study (2008) prepared by the Standing Committee of the Bern Convention (Climate Change Impacts on European Amphibians and Reptiles) pointed out that *Vipera ursinii* and *V.seoanei* are likely to suffer most from climate change (mainly because of habitat change and prey availability reduction) and should receive priority in management and policy. As a result all vipers included in the annexes of the Habitat Directive are considered as being in an unfavourable conservation status (2007[1]), and some of them are on the verge of extinction with less than 1 000 individuals in the wild.

Photo: Bálint Halpern

*Hungarian meadow viper (*Vipera ursinii rakosiensis*)*

*1 2007 assessments of conservation status for species and habitats, as reported by Member States according to the provisions of Article 17 of the Habitats Directive*

Table 1: **Vipers in the Annexes of the Habitats Directive**

| Scientific name | Annex Habitats Directive | Distribution in the EU | IUCN (2007) |
|---|---|---|---|
| *Macrovipera schweizeri* (Vipera lebetina schweizeri)* | II | EL | Endangered |
| *Vipera ammodytes* | IV | IT, AT, SI, EL | Not evaluated |
| *Vipera seoanei* | IV | PT, ES, FR | Least concern |
| *Vipera ursinii* except *Vipera ursinii rakosiensis* | II, IV | FR, IT, RO, EL | Endangered |
| *Vipera ursinii rakosiensis** | II, IV | HU, RO | Endangered |
| *Vipera xanthina* | IV | EL | Least concern |

**Priority for conservation*

Since 1992, four LIFE Nature projects have targeted conservation of the meadow viper *Vipera.ursinii* and its subspecies *V.ursinii* ssp. *rakosiensis*. The other seven snakes included in Annex II of the Habitats Directive have yet to be directly targeted by LIFE. Some projects have however indirectly targeted Annex II and IV snakes species, in particular *Vipera ammondytes* and *Coronella austriaca*, through habitat restoration or site specific management.

Nevertheless, LIFE has been, according to Member States, the main financial resource for the fulfilment of the Habitat Directive regarding the *V.ursinii* species conservation status requirements and the fulfilment of the objectives of the Bern Convention *V.ursinii* European species action plan[2].

*2 Action Plan for the Conservation of the Meadow Viper (Vipera ursinii) in Europe (http://www.coe.int/t/dg4/cultureheritage/Conventions/Bern/T-PVS/sc26_inf21_en.pdf)*

## THE MEADOW VIPER (*VIPERA URSINII*)

The meadow viper (*Vipera ursinii*) is a post-glacial period relic species that occurs as a series of isolated populations in restricted areas of southern and central Europe. This viper is the smallest of the European vipers and rarely exceeds 60 cm. Although venomous, it is virtually harmless to humans. The subspecies are all morphologically similar and have the typical viper-like appearance (triangular head) and a dorsal zigzag and other dark markings on a lighter background. Meadow viper populations are very highly fragmented and are confined to two distinctly different habitat types – three of the five currently recognised subspecies are only found in mountain habitats, while the other two subspecies prefer lowland steppe grassland (see distribution map). All five subspecies have been suffering severe declines, which have been very significant for the lowland steppe subspecies (Hungarian meadow viper subsp.*rakosiensis*) resulting already in the extinction of the species in Austria. Hence this subspecies is now considered to be one of the most endangered snakes in Europe. The species decline has largely been caused by direct habitat destruction and fragmentation. Lowland populations in particular have suffered huge losses through agricultural reclamation of their steppe grassland habitats and now some small isolated populations show evidence of loss of genetic diversity and severe inbreeding. Moreover, these snakes suffer from illegal collection and persecution.

The meadow viper has been targeted by several LIFE projects, the *V.ursinii* by one French project, the *moldavica* subspecies by a Romanian project, and the *rakosiensis* subspecies by projects in Hungary and Romania.

*Distribution map (2008) of the* Vipera ursinii *complex with the five recognised subspecies and LIFE projects targeting the populations*


Source: Adapted from Bálint Halpern (2008)

### LIFE AND THE MEADOW VIPER

The first LIFE project targeting the meadow viper, more specifically the Moldavian meadow viper subspecies (*V. ursinii* subsp *moldavica*) started in 1999 in Romania. The project - **LIFE99 NAT/RO/006404** "In situ" conservation of the Romanian Meadow Viper (*Vipera ursinii*) – aimed at the conservation of the meadow viper populations at the Danube delta. The population found in the Perisor area (estimated at some 1 800 individuals) is probably the only viable population of the Moldavian subspecies left in Europe, as the Ukrainian population is now considered to belong to the *Vipera renardi* species.

The major threats to the species come from the poor management of its habitat, which has been subjected to overgrazing, the presence of predators such as pigs and pheasants, and illegal capture.

The LIFE project achieved some notable results, the main ones being the improvement of the knowledge of the viper populations in the area through a series of surveys; and the preparation and

*Horned viper (*Vipera ammodytes*) in Austria*

Photo: LIFE00 NAT/A/007055

Photo: Bálint Halpern

*Lataste's Viper (*Vipera latastei*) – Although not included in the annexes of the Habitats Directive, it is considered vulnerable in Europe by the IUCN*

approval of a management plan for the conservation of the species. However, this management plan was not effectively implemented and the populations not monitored. On a more positive note, the Danube Delta Biosphere Reserve Authority declared the area where the main viper population is found (Perisor) a strictly protected area, while it was also agreed to enlarge the second most important area for the species (Saraturi).

The critical condition of Hungarian meadow viper populations (*V.ursinii* subsp. *rakosiensis*) led to the establishment of a LIFE project – **LIFE04 NAT/HU/000116** – that was set in place in 2004 by MME Birdlife Hungary with the objective of recovering and restoring the habitats of the two remaining highly endangered Hungarian populations (see pp. 43-45). A key achievement of this project was the creation of the Hungarian Meadow Viper Conservation Centre. This started with 10 adult individuals, collected from five different populations, and by the end of four successful breeding periods the centre had a total of 161 vipers.

In 2002, a population of the Hungarian meadow viper *V.ursinii* subsp. *rakosiensis* was unexpectedly discovered in Transylvania. After preliminary studies, it is estimated that there are some 300-400 specimens in a dense population on a relatively small core area of about 30-40 ha. This constitutes some half of the total European population, with the other half located in Hungary in two separate areas in eleven small populations. As a result, a Romanian project (**LIFE05 NAT/RO/000158**) was put in place targeting this other known viable Hungarian meadow viper population. The Transylvanian project is still ongoing and will be completed in 2009.

## FRENCH V.URSINII POPULATIONS

In France, populations of *V. ursinii* are known to exist in just 12 localities (with unconfirmed sightings in three other localities). Its total range is some 9 000 ha, of which 5 750 ha is included in the Natura 2000 network. The French populations are highly isolated from other European populations (the closest of which are found in Italy, in the Central Appennines), and they constitute the western edge of the species' range. Thus, their current situation increases both their risk of extinction, and the potential value of conservation measures.

ARPE, a public authority based in Aix-en-Provence that brings together the Region and the Departments of Provence Alpes Côte d'Azur, implemented a LIFE project – **LIFE06 NAT/F/000143** – due to finish in 2011. The project's objectives are:

- To protect and restore the viper's habitat and increase its viability;
- To limit the development of recreational activities that could have a negative impact on its habitat in the mountain zones where the viper is found;
- To limit the illegal collecting and deliberate destruction of vipers in these natural populations; and
- To encourage better management and protection of *V. ursinii* populations in France.

The project will also carry out a series of monitoring, mapping and genetic analysis actions, as well as clearing some 350 ha of forest, overgrown forest clearings and grasslands. Site surveillance will be improved, a technical management guide drafted and communication actions carried out. This project is also liaising closely with the Hungarian LIFE project.

# Saving Hungary's vipers from extinction

**LIFE Nature has given the Hungarian Meadow Viper an important boost. This project's actions are crucial to the long-term conservation of the most endangered snake in Europe.**

The "puszta" plains south of Budapest conceal a rare and endangered species: they are one of only two remaining locations in the world where the Hungarian Meadow Viper may be found. The global population of *Vipera ursinii rakosiensis* is estimated to be around 500 individuals and restricted to three populations: one in Romania (only discovered in 2002) and the other two in Hungary. This subspecies was formerly widespread on the Hungarian Plain and, as recently as the 1950s, it was still very common. Today, however, the Hungarian Meadow Viper can only be found in two main areas:

- Hanság, close to the Austrian border, where the meadow viper populations are restricted to small patches of grasslands left over from intense conversion to agriculture and forestry on an enormous scale.
- Kiskunság, south of Budapest, where the remaining populations of *V. ursinii rakosiensis* survive in an area of highly fragmented lowland habitats (post-glacial sand dunes and meadow-steppe grasslands-puszta) in the Kiskunság National Park.

In 2004, the Hungarian Ornithological and Nature Conservation Society (MME Birdlife Hungary), together with Kiskunság National Park Directorate and Duna-Ipoly National Park Directorate set in motion a LIFE project with the short-term objective of preventing the extinction of the Hungarian meadow viper and the long-term objective of securing the conservation of this small venomous snake. The project consisted of several actions, with the main ones being:

- The creation and operation of a Hungarian Meadow Viper Conservation Centre;
- Viper surveys on potential and former sites and habitat monitoring and genetic studies;
- Grasslands habitat restoration by reconversion of previous forested areas into viper-suitable habitats;
- Public awareness campaigns.

## THE VIPER CONSERVATION CENTRE

The need for the implementation of a captive breeding centre was initially raised in the 1990s, when the continuous decline in numbers of meadow vipers was first observed. The main objective of the Hungarian Meadow Viper Conservation Centre is to breed vipers collected from threatened populations and at later stage to reintroduce them to the wild in suitable habitats and secured areas.

The conservation centre was established in 2004 on the site of an old farm owned by Kiskunsag National Park. The project beneficiary is now responsible for running the centre.

The viper breeding programme started in 2004 with 10 adult vipers, collected from four different populations in Kiskunság National Park. The breeding pairs were kept inside 3x3 m wired enclosures where they were able to breed in conditions replicating semi-natural viper grassland habitat.

In order to reduce the possibilities of inbreeding depression, genetic screening of all the individuals was implemented by the project. Thanks to genetic methods it was possible to identify the ancestors of newborn individuals, thus allowing the creation of larger breeding groups while still keeping control over breeding lineages. Moreover, the project established a viper identification methodology using photographs of each viper's head – the scales and markings are unique to each individual.

At the breading centre, a higher percentage of newborn vipers and juveniles reach maturity than in the wild thanks

*Wired enclosures for viper reproduction and hibernation at the viper conservation centre*

*Artificial burrows developed by the project for hibernation in winter*

to a steady supply of crickets to feed on and a lack of predators.

The project also developed an artificial burrow that can serve as a hiding and wintering place for vipers. Most of the juveniles are kept and fed in temperature-controlled rooms over winter. This accelerates the growing process by up to one year compared with juveniles that winter in burrows in the enclosures.

Successful captive breeding took place every year for the duration of the LIFE project. As of end-2008, the centre had 388 Hungarian meadow vipers. The centre also provided an opportunity to increase knowledge about the reproduction, behaviour and ecology of this shy species. Budapest Zoo supplied both veterinary support and the vipers' food supply: crickets.

*Grassland grazing dependent habitat is crucial to the viper´s survival and reintroduction*

## SNAKE CENSUS

The project monitored and surveyed the wild meadow viper populations in Hungary and Romania in order to assess the species' conservation status and to find new populations. In 2007, together with the beneficiary of the Romanian LIFE project – **LIFE05 NAT/RO/000158** (see pp.36-38) – a monitoring programme was started for the Transylvanian viper populations. All monitored individual were measured and photographed for future identification. Blood samples were collected to enable genetic screening and consequent assessment of the genetic "health" of the wild population. This also enables accurate geographic delimitation of rakosinensis subspecies populations from other *V.ursinii* subspecies populations, especially those found in potential contact zones such as the Danube delta (which belong to the moldavica subspecies).

## GRASSLAND RESTORATION

With the support of volunteers, the LIFE project restored to grasslands a 26 ha area of forest that divided two recent viper habitats in the Peszéradacs area. False acacia and pine forests had been planted on this land in the early 1980s, destroying important viper wintering places. On the restored areas it is now possible to observe patches of grassland similar to neighbouring natural grassland. The beneficiary hopes that this restoration action will enable the reconnection of the two divided viper subpopulations.

## COMBATING FEAR AND IGNORANCE

Raising awareness for the conservation of a reptile, especially a venomous snake, is not easy. The project undertook a series of activities to increase acceptance and involve the local population and academia in the species conservation programme. Project volunteers underwent comprehensive training, while dissemination activities included the publication of brochures, leaflets and press releases, the setting up of a regularly-updated website, and public forums and educational presentations. The latter included the development of an innovative 'snake identification kit' for use in schools.

The project also shared knowledge and conservation methodologies with other LIFE projects targeting *V.ursinii*.

## THE FUTURE - VIPER REINTRODUCTION

The success of the captive breeding programme gives a sound base for reintroduction of vipers into the wild. As a result, MME/ BirdLife Hungary together with Austrian partners proposed a LIFE+ project – Conservation of Hungarian meadow viper (Vipera ursinii rakosiensis) in the Carpathian-basin (**LIFE07 NAT/H/000322**) – which started in 2009. The aim of this project is to release at least 400 vipers back into natural habitats, while also carrying out larger scale habitat restoration and conducting a major public awareness campaign to reduce concerns about the risks of reintroducing venomous snakes. The reintroductions are planned for Hungary, with a further aim of identifying options for future introduction of the species into Romania and Austrian areas, where it became extinct last century. Budapest Zoo and Vienna Zoo will partner with the project to boost public support for its actions and a documentary will be produced to increase understanding about the species among a wide audience.

HUNGARY

**Project number:** LIFE04 NAT/HU/000116

**Title:** Establishing the background of saving the Hungarian meadow viper *(Vipera ursinii rakosiensis)* from extinction

**Beneficiary:** MME/ BirdLife Hungary

**Contact:** Bálint Halpern

**Email:** halpern.balint@mme.hu

**Website:** www.rakosivipera.hu

**Period:** Jan-2004 to Dec-2007

**Total budget:** €649 000

**LIFE contribution:** €324 500

# Arresting the decline of Europe's turtles

**Turtle populations in Europe have declined dramatically in recent decades. This includes numbers of pond turtles and tortoises as well as the loggerhead turtle (*Caretta caretta*) in the Atlantic and Mediterranean Sea. Turtles are considered endangered species, whose main threats are fishing – it is often the victim of by-catch – habitat loss and direct killing.**

Turtles (Chelonia) are special reptiles and are one of the oldest reptile groups (they have been around for more than 230 million years) more ancient than lizards and snakes. They are easily identified by the presence of a carapace that protects their body. Human activities are making all Europe's turtles highly endangered: sea turtles from fishery by-catch and terrestrial turtles from habitat destruction and direct killing. All turtles found in the EU are included in Annex II and Annex IV of the Habitats Directive.

## LIFE AND TERRESTRIAL TURTLES

Terrestrial turtles in Europe can be divided into exclusively land tortoises (*Testudo*) and freshwater turtles (*Emys* and *Mauremys*). Several LIFE projects have targeted freshwater varieties, in particular *Emys orbicularis* (see pp.48-49). Although land turtles are present in several Member States, only one project – in Romania – has been dedicated to *Testudo*.

## LIFE AND SEA TURTLES

Five species of marine turtle have been recorded in seas around Europe (see table 1). They can be found in the Mediterranean and mild waters of the Atlantic Ocean. Only two of these species nest on EU beaches, the others lay their eggs on tropical beaches but spend most of their lives at sea, covering large distances in pursuit of jellyfish for food and, thus, reaching EU coasts. Sea turtles are among the largest – they can grow to over 2 m long and may weigh over 900 kg – and longest-living reptiles: individuals have been known to be more than 100 years old.

Turtles face various threats and their populations have been decreasing for a number of decades as a result of incidental catches by fishermen, sea pollution and the impact of tourism on nesting beaches.

Sea turtles are most at risk as juveniles rather than newborn hatchlings. The death of one juvenile means the loss of hundreds or even thousands of eggs. During this stage, a significant population of loggerhead turtles is confined to the 'North Atlantic Vortex', a circular current system looping around the Sargasso Sea and enveloping the archipelagos of Madeira, Canary Islands, Bermuda and the Azores. Their nursery is the open North Atlantic Ocean.

*Loggerhead turtle (*Caretta caretta*)*

Photo: M.Santos LIFE98 NAT/P/005275

Table 1: **Europe's sea turtles**

| Name | Scientific name | EU Nesting areas | Conservation status – 2006 (according to Habitats Directive art. 17 MS reporting) | Habitats Directive | Observations |
|---|---|---|---|---|---|
| **Green Sea Turtle** | *Chelonia mydas* | Cyprus, Spain | Marine Macaronesian – inadequate (U1) | Annex II and IV (* priority species) | Endangered |
| **Loggerhead Sea Turtle** | *Caretta caretta* | Greece, Cyprus, Spain | Mediterranean – Bad (U2) Marine Macaronesian – Bad (U2) | Annex II and IV (* priority species) | Endangered |
| **Leatherback Sea Turtle** | *Dermochelys coriacea* | Not nesting in EU | Marine Mediterranean – Bad (U2) | Annex IV | Critically Endangered |
| **Hawksbill Sea Turtle** | *Eretmochelys imbricate* | Not nesting in the EU | Marine Macaronesian – inadequate (U1) | Annex IV | Critically Endangered |
| **Kemp's Ridley Sea Turtle** | *Lepidochelys kempii* | Not nesting in the EU | Marine Atlantic – unknow (XX) | Annex IV | Critically Endangered |

Many LIFE Nature projects aimed to stabilise – or even increase – population numbers through, among other initiatives, preserving and creating new nesting sites, and by limiting by-catch. Projects have also increased our knowledge of the species, drawn up and implemented management plans and created international networks. Most have focused to some extent on raising awareness of the conservation issue among locals and, in particular, the fishing community. They have sought to educate fishermen on how to address the problem of by-catch. A few projects have even established rehabilitation centres for injured turtles.

*Sea turtles are often injured or killed by fishing gear – LIFE has been supporting several recovery centres around Europe (picture Italy)*

Photo: LIFE03 NAT/IT/000163

Portuguese and Spanish projects in the Atlantic Ocean have made a major contribution towards the preservation of the species. One LIFE project (**LIFE96 NAT/P/003019**) monitored and identified important areas for the turtle and established management plans in cooperation with regional governments. It also gathered scientific information to support proposed areas for inclusion in the Natura 2000 network. The project was the first to deploy dive recording satellite transmitters on turtles.

Another LIFE project focused on the Azores archipelago (**LIFE98 NAT/P/005275**). Its main objective was to draw up and implement management plans for coastal and marine habitats integrated in pSCIs and SPAs, targeting sustainable fishing and tourism (whale-watching). This project also responded to the need to improve our knowledge of the species, and to this end conducted population surveys.

LIFE projects targeting the loggerhead turtle have also focused on the Canary Islands, which straddle the turtle's migration route across the Atlantic. Important feeding and resting areas for the animals are found on the leeward side of Tenerife and Gran Canaria, sheltered from the trade winds and the Canaries current. One project (**LIFE97 NAT/E/004151**) complemented the work of the Madeira project by monitoring a group of 13 turtles by means of tagging and radio-track-

Photo: LIFE04 NAT/E/000059

*Wetland turtles, such as* Emys orbicularis*, also benefited from LIFE project actions*

ing. It obtained valuable information on the species' behaviour, habitat use and movements. The project also built on the work of extending the Natura 2000 network and has become a reference work for addressing the management of marine habitats and species.

## LIFE IN THE MEDITERRANEAN

Mediterranean initiatives have taken a similar approach. Habitats, in particular nesting beaches, have been threatened by increased tourism. On the island of Zakynthos, one project (**LIFE00 ENV/GR/000751**) has raised awareness of the region's importance to the turtle. As well as promoting integrated coastal zone management and sustainable management, it constructed nature trails and demarcation fences, and erected boardwalks, observatories and information panels. Local participation was also encouraged through a voluntary Eco-Management and Audit Scheme (EMAS) initiative to improve the environmental performance of companies.

In the province of Agrigento, on the south coast of Sicily, a LIFE project (**LIFE03 NAT/IT/000163**) targeted two Natura 2000 sites in the Pelagian islands, Lampedusa and Linosa – the last known nesting sites in Italy. As part of its aim to tackle the threats to the loggerhead turtles through raising awareness, it advised local fisherman on how to reduce by-catch through the modification of fishing gear. An earlier project (**LIFE99 NAT/IT/006271**) introduced an information programme aimed at tourists and the local population to restrict access to the beaches used by turtles during the nesting season.

The second Pelagic LIFE project also set up a rescue and veterinary centre – similar centres have also been established in part thanks to LIFE funding in Athens, the Canary Islands and Madeira. Another Italian project (**LIFE04 NAT/IT/000187**) focused on creating a conservation network of five new rescue centres in national parks and marine reserves, identified on the basis of their importance for the presence of the turtle along the Italian coasts (Regional Park of Maremma, in the Tuscany Region; Marine Protected area of Punta Campanella, in the Campania Region; and National Park of Asinara, in the Sardinia Region). A turtle first-aid service was established, with a nationwide toll-free number for reporting accidental catches and for coordinating recovery efforts.

Declining nesting sites in Greece were also the focus of LIFE projects. One project (**LIFE98 NAT/GR/005262**) applied a management project in southern Kyparissia Bay that sought to restore nesting sites. Road construction and building activity and the encroachment of land for tourism and agricultural use had led to the degradation and erosion of important sand dunes and coastal forests. The project also protected the nests with eggs from predation and inundation and prevented hatchlings from suffering disorientation (artificial light disorientates newly hatched turtles that use reflected moon or starlight to navigate their way to the sea).

Disorientation was also a major problem on the island of Crete. In addition, umbrellas and sunbeds impeded access to the back of beaches where the turtles construct nests. As a result, a LIFE project (**LIFE95 NAT/GR/001115**) was carried out to implement a strategy for the sustainable development of tourism and other forms of land use.

The following pages highlight LIFE project actions dedicated to eliminating the threats to turtle populations around Europe and helping those populations to recover.

REPTILES: TURTLES

# Cutting turtle deaths in the Greek seas

**The last LIFE Nature project to be undertaken by Archelon, the Athens-based sea turtle protection society, focused on reducing the mortality rate of the loggerhead turtle (*Caretta caretta*). The project monitored stranded turtles and tracked released turtles, as well as upgrading facilities at a rescue centre and working with fishermen's associations to raise awareness of mortality risks.**

The loggerhead turtle is the only one of the three turtle species in the Mediterranean to nest in Greece. The species faces a threat from commercial fishing, since it is liable to become caught up in fishing nets and hooks, but the scale of the problem can only be estimated. Some 17 000 small vessels (6-12 m long) operate in Greek waters. "If each vessel is responsible for the killing of just one individual a year, then the number is significant," says project coordinator at Archelon, Aliki Panagopoulou. There are also some 3 500 sword fish boats and 400 trawlers working in the project area. "But we don't tell fishermen what to do; they're hard-working people," explains Panagopoulou. "The first important step of the project was to record attitudes and listen to what they have to say because turtles do cause damage to their gear. We aimed to find some common ground."

One of the problems that the organisation encountered was the prejudices that some fishermen have towards turtles. Some think they bring bad luck and strike them on the head, while others believe that it is bad luck to harm a turtle. During the course of the project, 285 fishermen's attitudes were documented, and 25 Memoranda of Understanding were signed by fishermen's associations. The beneficiary also responded to the concerns and needs of the fishermen by producing a leaflet that tells them what to do if they capture a turtle. Says Panagopoulou: "Most of the time, there will be a hook in the mouth, but it's not the hook that causes the damage but the line. Also, comatose turtles shouldn't be immediately thrown back into the seas as they will drown. We outline ways to reduce mortality."

*Protecting the sea turtle's nest*

*Sea turtle hatchlings heading to the sea*

Photo: Georgia Valaoras

One criteria for assessing the impact of conservation measures on population numbers is to count the number of nests, but, as Panagopoulou says, "this is a snapshot of a moment in the past" because it takes 30 years for turtles to reach adulthood. Nevertheless the project tracked areas where most turtle captures occur. By identifying hotspots in Crete, Western Greece, Messiniakos, Argolikos, Rhodes, and Kavala, the beneficiary was able to focus activities in these areas. Two 'first-aid' centres were set up in affected areas – Crete and Amvrakikos in Western Greece.

The Sea Turtle Stranding Network, which incorporates government departments,

Photo: Jon Eldridge

*A sea turtle at the Glyfada rescue centre*

NGOs, fishermen's associations and the port authorities, was responsible for this aspect of the project. It monitored the number of strandings and plotted their geographic distribution. Such monitoring has continued after the project using GIS technology.

## TURTLE REHAB

Injured turtles are brought to the rescue centre at Glyfada, south of Athens, for rehabilitation. During the project 163 wounded turtles were received with nearly half being later released into the sea. "Head wounds are most difficult to heal, but though it may take a long while – the longest we've had is five years – most have a chance of recovery," says Panagopoulou. Costly operations, such as blood analysis, are conducted ex situ as the beneficiary sees little benefit in carrying out such procedures onsite.

*LIFE funding has allowed the centre to construct large outdoor tanks for the turtles*

Photo: Jon Eldridge

The rescue centre, which was set up in 1994, is run by a team of volunteers numbering from four to eight at any one time. Some 50 volunteers stay at the centre every year to ensure its long-term survival. Recent LIFE funding has allowed the centre to construct large outdoor tanks for the turtles, though during the winter the turtles are mostly housed in smaller tanks inside a greenhouse-type structure to maintain the required temperature of the water. LIFE funding also paid for a back-up electricity generator. The centre has also benefitted from the support of the local administration of Glyfada, which provided the land, helped with security and supplies water and electricity free of charge.

Turtles are released in spring to maximise their chance of rehabilitation, but it appears not all turtles readapt to life back in the sea. Some spend too much time on the surface of the water, a practice known as basking, and a specific aim of the project was to introduce tracking of released turtles with satellite telemetry and tagging to assess their progress.

The rescue centre is also a popular spot for school visits. As part of the latest project, the beneficiary upgraded its video materials to DVD and continued its mobile exhibition. The 'Mediterranean Sea Turtles and Fishermen' exhibit, which travels around the community, helps raise awareness among the general public, which is widely supportive of is conservation work, according to Panagopoulou. Other awareness activities include the publication of information leaflets and radio broadcasts.

## FUTURE PROSPECTS

An Action Plan was submitted to the ministries of agriculture, marine management and environment, but it has not been officially acknowledged. "The lack of support from the government is shocking!" believes the LIFE project coordinator.

The beneficiary has suggested that the government compensate fishermen for damage caused by turtles in the form of VAT reductions. It would also welcome new research into the state of fishing stocks to obtain the necessary data to inform sustainable fishing practices. The work of the organisation should be considered in the wider conservational context. "Anything we do affects other species," says Panagopoulou.

The beneficiary would also like to build up a cooperative network with Croatia and Italy in order to share information and best practice. "The Adriatic Sea is responsible for a huge number of caught turtles," notes the project coordinator.

GREECE

**Project number:** LIFE02 NAT/GR/008500

**Title:** Reduction of mortality of *Caretta caretta* in the Greek seas

**Beneficiary:** Archelon

**Contact:** Aliki Panagopoulou

**Email:** aliki@archelon.gr

**Website:** http://www.archelon.gr

**Period:** July-2002 to April-2008

**Total budget:** €1 477 000

**LIFE contribution:** €886 000

REPTILES: TURTLES

# Reintroducing Hermann's Tortoise in Romania

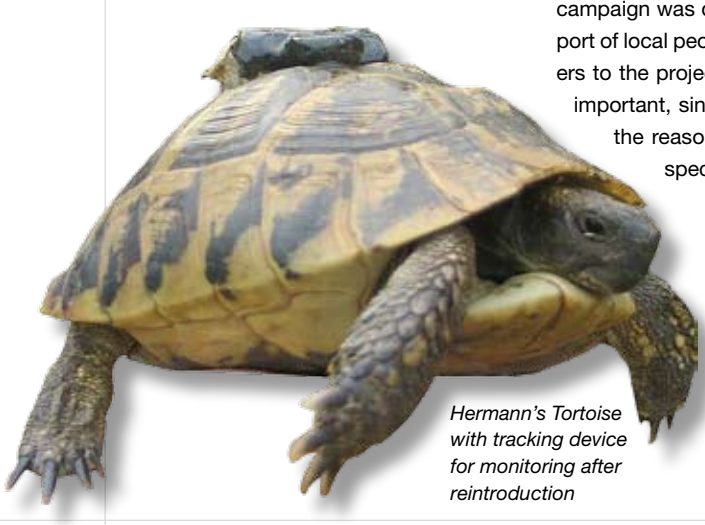
**The Iron Gates Natural Park in south-western Romania hosts species and habitats of European importance. This LIFE Nature project formulated a management plan for the park, contributing to the proposal of Natura 2000 sites in the area. It also successfully reintroduced the threatened reptile species, Hermann's Tortoise (*Testudo hermanni*).**

The Iron Gates Natural Park is located on the left bank of the Danube, close to Romania's border with Serbia. This protected area hosts species and natural habitats of great importance at European level and it is considered an Important Bird Area. The most interesting species present in the area include birds such as *Egretta garzetta, Ardea purpurea* and *Falco naumanni* and two reptiles - *vipera ammodytes* and *Testudo hermanni*. A total of 196 different habitat types have been described on-site, of which 17 are endemic to the area. The main threats to the park are habitat degradation and species decline caused by human exploitation of its natural resources and the lack of a management plan or specific conservation programme for the area.

With the support of LIFE, the beneficiary set out both to draw up a management plan to guide the conservation measures for all the habitats found within the natural park and to take steps to recover the habitats of species of special interest found therein, particularly *Testudo hermanni, vipera ammodytes, Phalacrocorax pygmeus* and *Falco naumanni*. To this end, a bird census was planned, while another key aim was to increase the population of the Annex II listed Hermann's Tortoise through the reintroduction of individuals bred in captivity. An awareness-raising campaign was designed to win the support of local people and other stakeholders to the project's objectives. This was important, since poaching was one of the reasons for the decline of the species.

Photo: Lubos Halada

*Iron Gates – Danube River*



*Hermann's Tortoise with tracking device for monitoring after reintroduction*

## LAYING THE GROUNDWORK FOR NATURA 2000

The Iron Gates project proved to be a great success, reaching all its main objectives. A management plan was elaborated and has been updated twice since the project ended, most recently in June 2008. The plan led to an improved legal status for the most important area of the natural park. In addition, the inventories of species and habitats conducted by the LIFE Nature project played a crucial role in preparing the groundwork for the later declaration of two Special Protection Areas – Danube river from Buzias to Iron Gates (c. 10 000 ha) and Almej mountains and Aihocua (c. 118 000 ha) – and one Site of Community Interest (SCI) – Iron Gates (124 000 ha) – outside the natural park.

## SATNAV FOR TORTOISES

As well as playing an important role in expanding the Natura 2000 network in Romania, the LIFE Nature project successfully established a breeding centre for *Testudo hermanni.* Some 420 tortoise eggs were collected during the duration of the project and 320 individuals were born. Of these, 250 grew to weigh more than 100 g and were released into the wild to strengthen the native population. Five suitable sites were chosen for this release programme.

Monitoring of the tortoise population is ongoing and involves the use of radio tracking and regular counting of individuals. There are also plans to monitor the movement of four individuals using GPS. In addition, a PhD thesis on *Testudo hermanni* is being conducted by a postgraduate student at the University of Bucharest (in collaboration with French scientists).

Results of monitoring indicate that the captive breeding programme has been

Photo: Lubos Halada

*Tortoise eggs in an incubator*

hugely successful. So much so in fact that the programme has been discontinued and the reproduction centre is instead being used as a rescue centre for tortoises confiscated by the police from illegal breeders or found by the public. The centre currently houses 73 rescued specimens and was able to release nine into the wild in 2008. The beneficiary plans to transform the centre for dual use: as a rescue centre for tortoises and a field station for monitoring of species and habitats.

## RAISING AWARENESS

To achieve the aim of increasing awareness of the natural values of the area and the need to protect them among both the local population and tourists, four documentation and information centres were set up and information panels erected at strategic spots. A leaflet campaign was launched with the aim of educating people about the need to preserve both Hermann's Tortoise and the viper species, *vipera ammodytes*. One of the main threats comes from the illegal trade of both species within Romania and across its border. For this reason, the awareness campaign also extended to the border police, who were trained to identify the threatened species, and made aware of the relevant CITES regulations (see pp. 5-7).

This awareness-raising campaign has produced tangible results, including the fact that no cases of illegal killing of *Vipera amodytes* have been reported. Results of the annual bird census indicate that hunting of the bird species targeted by the Iron Gates project has ceased to be a problem.

Thanks to the activities that started during the LIFE Nature project, the Iron Gates Natural Park today employs 17 trained rangers and is now well established in the area. A sign of this acceptance is the fact that local businesses have begun using the Iron Gates logo to market their traditional products.

*Tortoise enclosures in the reproduction centre at Eselnita*


Photo: Lubos Halada

ROMANIA

**Project number:** LIFE00 NAT/RO/007171

**Title:** Iron Gates Natural Park – Habitat Conservation and Management

**Beneficiary:** University of Bucharest, Centre for Environmental Research and Impact Studies

**Contact:** Maria Patroescu

**Email:** Maptroescu@yahoo.com

**Website:** www.portiledefier.ro

**Period:** Jun-2001 to Oct-2004

**Total budget:** € 389 000

**LIFE contribution:** €234 000

# Safeguarding the European pond turtle

**Starting with the Lac du Bourget in France, a number of LIFE Nature projects have taken steps to successfully reintroduce the threatened European pond turtle.**

The European pond turtle (*Emys orbicularis*), also known as the European pond terrapin, is one of the few freshwater members of the order Testudines living in Europe. Olive, brown or black in colour, it offer features bright yellow or gold speckling on its dark carapace and skin, making it sought after by the pet trade. Within Europe, the species is found mostly in central and southern countries, in a wide variety of freshwater habitats, including ponds, lakes, streams and drainage ditches. It only leaves water to bask or nest, preferring large bodies of slow-moving water with nearby lush vegetation and sandy nesting areas.

Despite its wide distribution, *Emys orbicularis* populations are highly localised and often in severe decline. For this reason, the species is included in Annex II of the Habitats Directive and classified as 'near threatened' on the IUCN Red List.

The main threats come from water pollution, habitat destruction caused by changing agricultural practices, and the introduction of the alien species – the red-eared slider (*Trachemys script elegans*), which competes with the European pond turtle for food and basking spaces.

*Lac du Bourget – Habitat restoration*

## LIFE TO THE RESCUE

One of the first projects dedicated to the species to receive LIFE co-funding was at Lac du Bourget in Savoie, the largest and deepest (145 m) lake in France. Since 1982, standardisation of the level of the lake has led to a lowering of the water level and erosion of its banks. Increasing amounts of flotsam and jetsam and unregulated human activities (e.g. mooring) further threatened the European pond turtle's future.

*Typical densely-vegetated shore habitat of the European pond turtle*

The aim of the "Lac du Bourget" project (**LIFE99 NAT/F/006321**) was to test and implement techniques for the restoration of lake eco-systems. The beneficiary drew up a precise cartography of the aquatic vegetation of the lake, the first general inventory of its macrophytes. This survey was then used to identify priority areas for conservation purposes.

The beneficiary planned to extend the area of hydrophytes by 100 ha on 8 km

Photo: LIFE05 NAT/LT/000094

*Habitat restoration (left) and recreation of ponds (right) for* Emys orbicularis *in Latvia*

of lake shore. Areas of shallow water and breakwater systems were set up and 30 ha of low marsh and meadow restored and managed in such a way as to promote the presence of insect species. An operation to reintroduce *Emys orbicularis* was also to be tested.

A total of 37 radio tagged pond turtles were released in marshes in the southern part of the lake. Monitoring has revealed encouraging results. Breeding attempts have been observed in the sand dunes and all 37 individuals wintered in the release ponds. The success of the project led to the creation of a reintroduction strategy for the species.

## TESTING THE STRATEGY

The strategy developed by the "Lac du Bourget" project has been implemented "by two LIFE Nature projects at opposite ends of Europe. In Lithuania, the ongoing project "Protection of *Emys orbicularis* and amphibians in northern European lowlands (**LIFE05 NAT/LT/000094**) is aiming to protect more than 90% of the *Emys orbicularis* individuals in the north European lowlands, by implementing several project actions, as pond digging and restoration, managing habitats with year-round grazing, and supportive breeding (to guarantee the reproductive success of small populations and to release animals for recolonisation of the habitats of extinct populations). The Spanish project "Recovery of the habitat of amphibians and Emys orbicularis in the Baix Ter" (**LIFE04 NAT/ES/000059**) has drawn up a management plan for the reintroduction of the European pond turtle (30 turtles have been reintroduced) after the restoration of the wetlands and elimination of more than 50 alien red-eared terrapins (*Trachemys scripta*).

*European pond turtle (*Emys orbicularis*)*

*Outdoor breeding cage for* E. orbicularis

Photo: LIFE05 NAT/LT/000094

# Further projects focusing on reptiles and amphibians

**The table below provides further examples of LIFE projects focusing on reptiles and amphibians. For more information on individual projects, visit the online database at: http://ec.europa.eu/environment/life/project/Projects/index.cfm.**

| Country | Project Reference | Title | Targeted Species |
|---|---|---|---|
| Austria | LIFE00 NAT/A/007053 | Wild river landscape of the Tyrolean Lech | *Bufo calamita, Triturus cristatus* |
| Austria | LIFE06 NAT/A/000124 | Untersberg-Vorland | *Bombina variegata* |
| Austria | LIFE06 NAT/A/000127 | Life in Upper Drau River | *Bombina variegata, Triturus carnifex* |
| Belgium | LIFE00 NAT/B/007156 | Action Plan for conservation and restoration of three woods in the Flemish Ardennes | *Triturus cristatus* |
| Denmark | LIFE99 NAT/DK/006454 | Consolidation of Bombina bombina in Denmark | *Bombina bombina* |
| Estonia | LIFE00 NAT/EE/007083 | Boreal Baltic Coastal Meadow Preservation in Estonia | *Bufo calamita* |
| Estonia | LIFE04 NAT/EE/000070 | Protection of Triturus cristatus in Eastern Baltic Region | *Triturus cristatus* |
| France | LIFE99 NAT/F/006315 | Preservation and restoration of the habitats of the Ill wetland at Sélestat | *Bombina variegata* |
| France | LIFE06 NAT/F/000143 | Conservation of French populations of Orsini's viper (Vipera ursinii) | *Vipera ursinii* |
| France | LIFE99 NAT/F/006321 | Lake of Bourget | *Emys orbicularis* |
| Germany | LIFE04 NAT/DE/000028 | Management of fire-bellied toads in the Baltic region | *Bombina bombina* |
| Germany | LIFE05 NAT/D/000152 | Rehabilitation of the Baltic coastal lagoon habitat complex | *Bufo calamita, Bufo viridis* |
| Germany | LIFE2002NAT/ST/D/000006 | Bombina bombina - A Baltic Conservation Strategy | *Bombina bombina* |
| Greece | LIFE00 ENV/GR/000751 | ICZM: Demonstration actions in the National Marine Park of Zakynthos | *Caretta caretta* |
| Greece | LIFE02 NAT/GR/008500 | Reduction of mortality of Caretta caretta in the Greek seas | *Caretta caretta* |
| Greece | LIFE92 NAT/GR/013800 | Conservation programme for the Ionian Sea region concerning habitats of species threatened with extinction | *Caretta caretta* |
| Greece | LIFE95 NAT/GR/001115 | Recovery of the Loggerhead Sea Turtle (Caretta caretta) population nesting on Crete | *Caretta caretta* |
| Greece | LIFE97 NAT/GR/004247 | Implementation of management plan for Pylos Lagoon and Evrotas Delta | *Caretta caretta, Chamaleo africanus* |
| Greece | LIFE98 NAT/GR/005262 | Application of Management Plan for Caretta caretta in southern Kyparissia Bay | *Caretta caretta* |
| Greece | LIFE99 NAT/GR/006475 | Conservation management of Amvrakikos wetlands | *Caretta caretta* |
| Hungary | LIFE04 NAT/HU/000116 | Establishing the background of saving the Hungarian meadow viper (Vipera ursinii rakosiensis) from extinction | *Vipera ursinii rakosiensis* |
| Italy | LIFE96 NAT/IT/003060 | Fontane Bianche sources of Lancenigo Programme | *Rana latastei* |
| Italy | LIFE96 NAT/IT/003068 | Proposed sites of conservation importance (SCIs - Bioitaly) environment restoration on the Groane Regional Parc | *Triturus carnifex, Hyla intermedia, Rana esculenta, Rana latastei, Rana dalmatina* |
| Italy | LIFE97 NAT/IT/004089 | N.EC.TO.N Project (New Ecosystems on the Noce River) : urgent action for renaturalisation in the La Rocchetta (Trentino, Italia) | *Bombina variegata* |
| Italy | LIFE98 NAT/IT/005037 | V. Curone - V. S. Croce : protection priority habitats | *Rana latastei, Triturus carnifex, Bombina variegata* |
| Italy | LIFE98 NAT/IT/005095 | Urgent actions for the conservation of Common Spade-foot Pelobates fuscus insubricus | *Pelobates fuscus insubricus* |

| Country | Project Reference | Title | Targeted Species |
|---|---|---|---|
| Italy | LIFE98 NAT/IT/005133 | Peregrine | *Salamandrina terdigitata, Triturus carnifex* |
| Italy | LIFE99 NAT/IT/006253 | Palata Menasciutto : management and conservation of wet woodlands | *Rana latastei* |
| Italy | LIFE00 NAT/IT/007170 | HABIO: Biodiversity protection in Calvana-Monferrato areas | *Salamandrina terdigitata, Bombina variegata pachypus* |
| Italy | LIFE00 NAT/IT/007233 | Pelobates project in the Ticino Valley Natural Park of Piedmont | *Pelobates fuscus ssp.insubricus* |
| Italy | LIFE03 NAT/IT/000112 | Ardeides and Amphibians: habitat conservation in Monticchie Natural Reserve | *Triturus carnifex, Hylaintermedia, Rana latastei, Bufo viridis* |
| Italy | LIFE04 NAT/IT/000167 | Aurora System - active presentation of Salamandra atra aurorae and other amphibians | *Salamandra atra ssp. aurorae* |
| Italy | LIFE03 NAT/IT/000163 | Reduction of the impact of human activity on Caretta and Tursiops and their conservation in Sicily | *Caretta caretta* |
| Italy | LIFE04 NAT/IT/000182 | Preservation and extension of priority habitats damaged from agriculture activity | *Caretta caretta* |
| Italy | LIFE04 NAT/IT/000187 | Tartanet, a network for the conservation of sea turtles in Italy | *Caretta caretta* |
| Italy | LIFE06 NAT/IT/000050 | Urgent conservation measures for biodiversity of Central Mediterranean Sea | *Emys orbicularis* |
| Italy | LIFE97 NAT/IT/004140 | Dune di Piscinas-Monte Arcuentu | *Caretta caretta* |
| Italy | LIFE99 NAT/IT/006271 | Urgent conservation measures of Caretta caretta in the Pelagian Islands | *Caretta caretta* |
| Letonia | LIFE05 NAT/LT/000094 | Protection of Emys orbicularis and amphibians in the north European lowlands | *Bombina bombina, Triturus cristatus* |
| Letonia | LIFE05 NAT/LT/000094 | Protection of Emys orbicularis and amphibians in the north European lowlands | *Emys orbicularis* |
| Luxembourg | LIFE96 NAT/L/003195 | Conservation of 4 endangered species of amphibians in Luxembourg | *Triturus cristatus, Hyla arborea, Bombina variegata* |
| Netherlands | LIFE04 NAT/NL/000201 | Amphibian Biotope Improvement in the Netherlands | *Triturus cristatus, Bombina variegata, Alytes obstetricans, Hyla arborea, Pelobates fuscus* |
| Portugal | LIFE98 NAT/P/005234 | Conservation of four rare species in pSCI (Valongo) | *Chioglossa lusitanica* |
| Portugal | LIFE96 NAT/P/003019 | Conservation support project for North Atlantic Caretta caretta sea turtles | *Caretta caretta* |
| Portugal | LIFE98 NAT/P/005275 | Integrated management of coastal and marine zones in the Azores | *Caretta caretta* |
| Romania | LIFE00 NAT/RO/007171 | Iron Gates Natural Park - habitat conservation and management | *Testudo hermanni, Vipera ammodytes* |
| Romania | LIFE05 NAT/RO/000158 | Saving Vipera ursinii rakosiensis in Transylvania | *Vipera ursinii rakosiensis* |
| Romania | LIFE99 NAT/RO/006404 | "In situ" conservation of the Romanian Meadow Viper (Vipera ursinii) | *Vipera ursinii* |
| Spain | LIFE93 NAT/E/011400 | Recovery plan for the Majorcan Midwife Toad | *Alytes muletensis* |
| Spain | LIFE05 NAT/E/000060 | Restoration of priority habitats for amphibians | *Discoglossus jeannea, Alytes obstetricans, Bufo calamita, Pelobates cultripes* |
| Spain | LIFE00 NAT/E/007303 | Protection of Posidonia grasses in SCIs of Baleares | *Caretta caretta* |
| Spain | LIFE02 NAT/E/008610 | Conservation of cetaceans and turtles in Andalusia and Murcia | *Caretta caretta* |
| Spain | LIFE02 NAT/E/008614 | Recovery plan for the giant lizard of La Gomera | *Gallotia bravoana* |
| Spain | LIFE03 NAT/E/000062 | Conservación de Tursiops y Caretta en La Gomera | *Caretta caretta* |
| Spain | LIFE04 NAT/ES/000059 | Recovery of the habitat of amphibians and Emys orbicularis in the Baix Ter | *Emys orbicularis* |
| Spain | LIFE06 NAT/E/000199 | Program for the recovery of Gallotia bravoana and its distribution area | *Gallotia bravoana* |
| Spain | LIFE94 NAT/E/001238 | Programme for the restoration of Hierro giant lizard Gallotia simonyi | *Gallotia simonyi* |
| Spain | LIFE97 NAT/E/004151 | Project to support the conservation of Caretta caretta and Tursiops truncatus in the Canary Islands | *Caretta caretta* |
| Spain | LIFE97 NAT/E/004190 | Reintroduction of el Hierro Giant Lizzard in its former natural habitat | *Gallotia simonyi* |

# Reptiles and amphibians included in the Habitats Directive (92/43/CE)

The animals listed in the Habitats Directive are classified under different annexes, each with its own level of protection. **Annex II** species demand the highest protection – they are species whose conservation requires the designation of Special Areas of Conservation (SACs). **Annex IV** species are defined as those in need of strict protection. **Annex V** species are those whose taking in the wild and exploitation may be subject to management measures – in the case of amphibians, this includes four species of frogs that are consumed by humans.

| **SPECIES NAME**<br>*denotes priority species for conservation | ANNEX II | ANNEX IV | ANNEX V |
|---|---|---|---|
| **REPTILES** | | | |
| CHELONIA (TESTUDINES) | | | |
| Testudinidae | | | |
| *Testudo graeca* | X | X | |
| *Testudo hermanni* | X | X | |
| *Testudo marginata* | X | X | |
| Cheloniidae | | | |
| **Caretta caretta* | X | X | |
| **Chelonia mydas* | X | X | |
| *Lepidochelys kempii* | | X | |
| *Eretmochelys imbricata* | | X | |
| Dermochelyidae | | | |
| *Dermochelys coriacea* | | X | |
| Emydidae | | | |
| *Emys orbicularis* | X | X | |
| *Mauremys caspica* | X | X | |
| *Mauremys leprosa* | X | X | |
| SAURIA | | | |
| Lacertidae | | | |
| *Algyroides fitzingeri* | | X | |
| *Algyroides marchi* | | X | |
| *Algyroides moreoticus* | | X | |
| *Algyroides nigropunctatus* | | X | |
| *Gallotia atlantica* | | X | |
| *Gallotia galloti* | | X | |
| *Gallotia galloti insulanagae* | X | X | |
| **Gallotia simonyi* | X | X | |

| **SPECIES NAME**<br>*denotes priority species for conservation | ANNEX II | ANNEX IV | ANNEX V |
|---|---|---|---|
| *Gallotia stehlini* | | X | |
| *Lacerta agilis* | | X | |
| *Lacerta bedriagae* | | X | |
| *Lacerta bonnali (Lacerta monticola)* | X | X | |
| *Lacerta monticola* | X | X | |
| *Lacerta danfordi* | | X | |
| *Lacerta dugesi* | | X | |
| *Lacerta graeca* | | X | |
| *Lacerta horvathi* | | X | |
| *Lacerta schreiberi* | X | X | |
| *Lacerta trilineata* | | X | |
| *Lacerta viridis* | | X | |
| *Lacerta vivipara pannonica* | | X | |
| *Ophisops elegans* | | X | |
| *Podarcis erhardii* | | X | |
| *Podarcis filfolensis* | | X | |
| *Podarcis hispanica atrata* | | X | |
| *Podarcis lilfordi* | X | X | |
| *Podarcis melisellensis* | | X | |
| *Podarcis milensis* | | X | |
| *Podarcis muralis* | | X | |
| *Podarcis peloponnesiaca* | | X | |
| *Podarcis pityusensis* | X | X | |
| *Podarcis sicula* | | X | |
| *Podarcis taurica* | | X | |
| *Podarcis tiliguerta* | | X | |
| *Podarcis wagleriana* | | X | |
| Scincidae | | | |
| *Ablepharus kitaibelli* | | X | |
| *Chalcides bedriagai* | | X | |
| *Chalcides ocellatus* | | X | |
| *Chalcides sexlineatus* | | X | |
| *Chalcides simonyi (Chalcides occidentalis)* | X | X | |
| *Chalcides viridianus* | | X | |
| *Ophiomorus punctatissimus* | | X | |

| **SPECIES NAME**<br>*denotes priority species for conservation | ANNEX II | ANNEX IV | ANNEX V |
|---|---|---|---|
| Gekkonidae | | | |
| *Cyrtopodion kotschyi* | | X | |
| *Phyllodactylus europaeus* | X | X | |
| *Tarentola angustimentalis* | | X | |
| *Tarentola boettgeri* | | X | |
| *Tarentola delalandii* | | X | |
| *Tarentola gomerensis* | | X | |
| Agamidae | | | |
| *Stellio stellio* | | X | |
| *Chamaeleontidae* | | | |
| *Chamaeleo chamaeleon* | | X | |
| Anguidae | | | |
| *Ophisaurus apodus* | | X | |
| OPHIDIA (SERPENTES) | | | |
| Colubridae | | | |
| *Coluber caspius* | | X | |
| **Coluber cypriensis* | X | X | |
| *Coluber hippocrepis* | | X | |
| *Coluber jugularis* | | X | |
| *Coluber laurenti* | | X | |
| *Coluber najadum* | | X | |
| *Coluber nummifer* | | X | |
| *Coluber viridiflavus* | | X | |
| *Coronella austriaca* | | X | |
| *Eirenis modesta* | | X | |
| *Elaphe longissima* | | X | |
| *Elaphe quatuorlineata* | X | X | |
| *Elaphe situla* | X | X | |
| *Natrix natrix cetti* | | X | |
| *Natrix natrix corsa* | | X | |
| **Natrix natrix cypriaca* | X | X | |
| *Natrix tessellata* | | X | |
| *Telescopus falax* | | X | |
| Viperidae | | | |
| *Vipera ammodytes* | | X | |
| **Macrovipera schweizeri (Vipera lebetina schweizeri)* | X | X | |

| **SPECIES NAME**<br>*denotes priority species for conservation | ANNEX II | ANNEX IV | ANNEX V |
|---|---|---|---|
| *Vipera seoanni* | | X | |
| *Vipera ursinii (except Vipera ursinii rakosiensis)* | X | X | |
| **Vipera ursinii rakosiensis* | X | X | |
| *Vipera xanthina* | | X | |
| Boidae | | | |
| *Eryx jaculus* | | X | |

| AMPHIBIANS | | | |
|---|---|---|---|
| CAUDATA | | | |
| Salamandridae | | | |
| *Chioglossa lusitanica* | X | X | |
| *Euproctus asper* | | X | |
| *Euproctus montanus* | | X | |
| *Euproctus platycephalus* | | X | |
| *Mertensiella luschani (Salamandra luschani)* | X | X | |
| *Salamandra atra* | | X | |
| **Salamandra aurorae (Salamandra atra aurorae)* | X | X | |
| *Salamandra lanzai* | | X | |
| *Salamandrina terdigitata* | X | X | |
| *Triturus carnifex (Triturus cristatus carnifex)* | X | X | |
| *Triturus cristatus (Triturus cristatus cristatus)* | X | X | |
| *Triturus dobrogicus (Triturus cristatus dobrogicus)* | X | | |
| *Triturus italicus* | | X | |
| *Triturus karelinii (Triturus cristatus karelinii)* | X | X | |
| *Triturus marmoratus* | | X | |
| *Triturus montandoni* | X | X | |
| *Triturus vulgaris ampelensis* | X | X | |
| Proteidae | | | |
| **Proteus anguinus* | X | X | |
| *Plethodontidae* | | | |
| *Hydromantes (Speleomantes) ambrosii* | X | X | |
| *Hydromantes (Speleomantes) flavus* | X | X | |
| *Hydromantes (Speleomantes) genei* | X | X | |
| *Hydromantes (Speleomantes) imperialis* | X | X | |
| *Hydromantes (Speleomantes) strinatii* | X | X | |
| *Hydromantes (Speleomantes) supramontes* | X | X | |

| **SPECIES NAME**<br>*denotes priority species for conservation | ANNEX II | ANNEX IV | ANNEX V |
|---|---|---|---|
| ANURA | | | |
| Discoglossidae | | | |
| *Alytes cisternasii* | | X | |
| **Alytes muletensis* | X | X | |
| *Alytes obstetricans* | | X | |
| *Bombina bombina* | X | X | |
| *Bombina variegata* | X | X | |
| *Discoglossus galganoi (including Discoglossus « jeanneae »)* | X | X | |
| *Discoglossus montalentii* | X | X | |
| *Discoglossus pictus* | | X | |
| *Discoglossus sardus* | X | X | |
| Ranidae | | | |
| *Rana arvalis* | | X | |
| *Rana dalmatina* | | X | |
| *Rana esculenta* | | | X |
| *Rana graeca* | | X | |
| *Rana iberica* | | X | |
| *Rana italica* | | X | |
| *Rana latastei* | X | X | |
| *Rana lessonae* | | X | |
| *Rana perezi* | | | X |
| *Rana ridibunda* | | | X |
| *Rana temporaria* | | | X |
| Pelobatidae | | | |
| *Pelobates cultripes* | | X | |
| *Pelobates fuscus* | | X | |
| **Pelobates fuscus insubricus* | X | X | |
| *Pelobates syriacus* | | X | |
| *Bufonidae* | | | |
| *Bufo calamita* | | X | |
| *Bufo viridis* | | X | |
| Hylidae | | | |
| *Hyla arborea* | | X | |
| *Hyla meridionalis* | | X | |
| *Hyla sarda* | | X | |


# Available LIFE Nature publications

## LIFE Focus Nature brochures

**Nature & Biodiversity: Projects 2007**
(2009 – 63 pp. - ISBN 978-92-79-12257-6)

**Learning from LIFE: Nature conservation best practices**
(2008 - 68 pp. – ISBN 978-92-79-11635-3)

**LIFE and Europe's grasslands: Restoring a forgotten habitat**
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The programme

**LIFE** "**L**'**I**nstrument **F**inancier pour l'**E**nvironnement" / The financial instrument for the environment

**Period covered (LIFE III)** 2000-2006.

**EU funding available** approximately EUR 945 million.

**Type of intervention** co-financing actions in favour of the environment (LIFE projects) in the Member States of the European Union, in associated candidate countries and in certain third countries bordering the Mediterranean and the Baltic Sea.

### LIFE projects

> **LIFE Nature projects** improve the conservation status of endangered species and natural habitats. They support the implementation of the Birds and Habitats Directives and the Natura 2000 network.
> **LIFE Environment projects** contribute to the development of innovative and integrated techniques or methods to support environmental progress.
> **LIFE Third Countries projects** support environmental capacity building and initiatives in non-EU countries bordering the Mediterranean and the Baltic Sea.

**LIFE+** "**L**'**I**nstrument **F**inancier pour l'**E**nvironnement" / The financial instrument for the environment

**Period covered (LIFE+)** 2007-2013.

**EU funding available** approximately EUR 2,143 million

**Type of intervention** at least 78% of the budget is for co-financing actions in favour of the environment (LIFE+ projects) in the Member States of the European Union and in certain non-EU countries.

### LIFE+ projects

> **LIFE Nature projects** improve the conservation status of endangered species and natural habitats. They support the implementation of the Birds and Habitats Directives and the Natura 2000 network.
> **LIFE+ Biodiversity projects** improve biodiversity in the EU. They contribute to the implementation of the objectives of the Commission Communication, "*Halting the loss of Biodiversity by 2010 – and beyond*" (COM (2006) 216 final).
> **LIFE+ Environment Policy and Governance projects** contribute to the development and demonstration of innovative policy approaches, technologies, methods and instruments in support of European environmental policy and legislation.
> **LIFE+ Information and Communication projects** are communication and awareness raising campaigns related to the implementation, updating and development of European environmental policy and legislation, including the prevention of forest fires and training for forest fire agents.

**Further information** further information on LIFE and LIFE+ is available at http://ec.europa.eu/life.

**How to apply for LIFE+ funding** The European Commission organises annual calls for proposals. Full details are available at http://ec.europa.eu/environment/life/funding/lifeplus.htm

### Contact

European Commission – Directorate-General for the Environment
LIFE Unit – BU-9 02/1 – B-1049 Brussels – Internet: http://ec.europa.eu/life

**LIFE Focus / LIFE and Europe's reptiles and amphibians: Conservation in practice**

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