

European Pond Turtle (*Emys orbicularis*) – Lithuania



Conservation status	IUCN Global: Near threatened IUCN EU27: Vulnerable LT: U1 (=)
Protection status	HD: Annex II Bern Convention: Annex II
Population (2007-12)	EU27: > 41,600 – 138,000 individuals LT: Unknown
MS with genuine improvement	LT (sub-reporting level)
Other MS	AT, BG, DE, ES, FR, GR, HU, IT, LV, PL, PT, RO, SI, SK

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Summary: The European Pond Turtle is a widely distributed species in Europe. The species has an unfavourable conservation status and a negative population trend over most of its range. In the Boreal region of the EU, the species condition was assessed as unfavourable-bad during the last two reporting periods. The main pressures stem from human-activities such as changes in farming (drainage, annual ploughing, the use of biocides and the abandonment of extensive grazing systems), forest planting on open ground, and landscape fragmentation as well as predation and climate change-related extreme weather events. In view of these challenges, the species conservation measures taken by two LIFE projects helped improve its status regionally and triggered an increase in its population in Lithuania. The most effective measures were the protection of the species' as eggs and juveniles (as this is when they are most vulnerable in their life-cycle), as well as the improvement of habitat extent and quality and its ecological connectivity. Awareness raising amongst the public contributed to the species' protection but needs to be an ongoing continuous process to conserve the European Pond Turtle in the future.

Background

Status and EU occurrence

The European Pond Turtle (*Emys orbicularis*)¹, also often referred to as the European Pond Terrapin, is found in southern, central, and eastern Europe, in western and central Asia and in north Africa. It has a wide, but very fragmented, distribution in Europe (especially in the Mediterranean region), in the Black Sea and Caspian Sea regions (east to Kazakhstan and Turkmenistan, south to most of Turkey and north-west Iran) and in coastal north-western Africa from eastern Morocco to northern Tunisia (van Dijk and Sindaco, 2004). Within the EU, this turtle is native to the majority of Member States and has survived in seventeen (AT, BG, CZ, DE, ES, FR, GR, HR, HU, IT, LT, LV, PL, PT, RO, SI and SK). The species became extinct in Belgium, the Czech Republic, Denmark, Estonia, Luxembourg and the Netherlands, but has been reintroduced in Denmark and Belgium (Ministry of Environment, 2016; van Dijk and Sindaco, 2004), although not currently successfully in the latter. Populations may be more abundant in the Mediterranean and Caucasus regions, and the distribution range tends to be very small towards its northern extremes (Ministry of Environment, 2016; van Dijk and Sindaco, 2004).

The European Pond Turtle occurs in eight EU biogeographical regions (Alpine, Atlantic, Black Sea, Boreal, Continental, Mediterranean, Pannonian and Steppic), with a marked variation in the species' conservation status across the regions (see Annex 1). The species' status is only favourable in two: Pannonian and Steppic. In the other six regions it has an unfavourable conservation status, with this being unfavourable-bad in the Atlantic, Boreal, and Continental regions over the 2007-12 and the previous reporting periods. Furthermore, in four out of the six regions, it has negative trends, and they are unknown in the other two.

¹ Natura 2000 species code 1220

Due to the significant population declines and widespread habitat loss through much of its range, IUCN have classified the European Pond Turtle as near-threatened globally and in Europe (Tortoise and Freshwater Turtle Specialist Group, 1996; van Dijk and Sindaco, 2004) and, because of widespread habitat loss through much of its range and a more rapid decline at the EU level, as vulnerable in the EU27 (Cox and Temple, 2009).

In the Boreal region, which is the focus of this case study, the European Pond Turtle was reported in two Member States: Lithuania and Latvia. In comparison to Lithuania, only a small range area exists for the species in Latvia (64,700 km² and 800 km², respectively) (EEA/ETC-BD, undated). As no detailed study has been carried out, the exact size of the turtle population in Lithuania is unknown. The Lithuanian Red Data Book (Ministry of Environment, 2007) estimates 500-600 turtles, whilst experts from the Lithuanian Nature Fund estimate that 400-500 individuals were in Lithuania in 2014. The Article 17 report for 2007-2012 indicates that the species occurred in 20 to 30 localities throughout the country (7-20 within Natura 2000 network), but no estimate of numbers is given. Most of these localities host only old, isolated individuals that are surviving due to their longevity (Ministry of Lithuania, 2016). At present only a small part (<10%) of all sub-populations of turtles in Lithuania have the necessary number of individuals (i.e. more than 50) for their survival.

Lithuania's assessment of the conservation status of the European Pond Turtle for 2007-12 reveals that whilst its range was favourable, this was not the case for its population, habitat or future prospects, and therefore its overall conservation status was considered to be unfavourable-inadequate (EEA/ETC-BD, undated). Although the previous assessment for 2001-06 was unfavourable-bad, it was considered that no genuine change in status had occurred, and instead the new assessment was the result of better data. The species' overall trend was therefore also considered to be stable overall. However, evidence provided in 2017 by the Lithuanian nature authorities during the Drivers of Success study revealed that the species has undergone some genuine regional, and sub-reporting level improvements, which have been the result of conservation measures – and hence these are summarised in this case study.

Ecological requirements

The European Pond Turtle is a long-living (80-100 years) semi-aquatic species of freshwater and terrestrial ecosystems (van Dijk and Sindaco, 2004; Ministry of Lithuania, 2016). In Lithuania, the turtle is most commonly found in wetlands (37.5% detection frequency) and less often in lakes (9.4%) and ponds (7.3%) (Ministry of Lithuania, 2016). It often favours small and densely vegetated freshwater or slightly brackish water bodies with slow-flowing or standing water. Lush aquatic vegetation is preferred, e.g. *Potamogeton* species of pondweeds, European White Water Lilly (*Nymphaea alba*), Common Duckweed (*Spirodela polyrhiza*), the Broadleaf Cattail (*Typha latifolia*) and the Sweet Flag or Calamus (*Acorus calamus*) (Ministry of Lithuania, 2016). It also occurs in terrestrial habitats, where most are found in forest (20.8%), meadows (13.5%) and less often in yards and gardens (3.1%) and on roads (2.1%). When found in dry meadows typical plant species include Mouse-ear Hawkweed (*Hieracium pilosella*), Wormwood (*Artemisia scoparia*) and Goldmoss Stonecrop (*Sedum acre*). Typically, the vegetation cover reaches 30-90%. The species is susceptible to disturbance, and therefore it selects secluded water bodies. When on land, it prefers shrubs and trees at a certain distance from the water body to be able to shelter from enemies and protect itself from dehydration during movements.

The turtle is a sedentary species and, under suitable conditions, can spend its entire life in one water body. Thus, movements between subpopulations occur rarely and across relatively short distances, which average 1 to 4 km on land (van Dijk and Sindaco, 2004). Turtles are extremely vulnerable during such movements (Ministry of Lithuania, 2016).

The turtle reaches maturity after about four to ten years, depending on location, with males maturing earlier than females. Mature females produce one, two or, in some populations, three clutches of about six to nine eggs, while the extremes can vary from 1 to 16 eggs; large clutch sizes tend to correlate with fewer clutches per year (Fritz, 2001b in van Dijk and Sindaco, 2004). Their preferred nesting sites have sandy soils that are generally oriented to the south, sloping and have some vegetation (Fritz, 2001b in van Dijk and Sindaco, 2004). The majority of females lay their eggs in the same places for several consecutive years. If their habitats are damaged and they cannot find suitable places, they may instead lay their eggs on forest or gravel roads, which in many cases are unsafe. The young animals stay in the nests over winter and leave them in April-May to travel to water bodies (Ministry of Lithuania, 2016).

In the first half of the 20th century, the European Pond Turtle was quite common in Lithuania, as the species was able to survive in the small shallow water bodies associated with the extensive livestock systems (single-cow homesteads) that were typical at the time. However, intensive land drainage during the Soviet era degraded the species' habitats, leading to a drastically reduced population. The species currently exists mostly

in the southern regions of Lithuania (Lazdijai and Varena), the region with the least damaged habitats with many remote, permanent ponds and meres, which is one of the necessary conditions for turtles to live. The largest population of turtles is in the Lazdijai region, because it is the most suitable for the species, with typical shallow small ponds (and, therefore, warm water) and sandy slopes to lay eggs (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018).

Pressures and threats

According to the IUCN Red List, habitat loss due to urbanisation, road construction and wetland drainage is considered among the main reasons for the European Pond Turtle population decline (Tortoise & Freshwater Turtle Specialist Group, 1996). The species is also sensitive to water pollution, which may be a key factor in its localised disappearance (Atatur, 1995 and Servan, 1995 in van Dijk and Sindaco, 2004). The area and quality of the species' available habitat is being reduced, such as through overexploitation of water sources, which increases their salinity (van Dijk and Sindaco, 2004), and the deepening of water bodies for fisheries (Ministry of Environment, 2016). Furthermore, the turtle is considered at especially high risk from competition for food, basking and nesting sites by an alien species of turtle, the Pond Slider (*Trachemys scripta*) (Kramer 1995; Servan 1995). Whilst it is generally not a major threat, besides its historical impact, the collection of the European Pond Turtle for the food and the pet trade continues in some areas (van Dijk and Sindaco, 2004).

Like other species of turtles, European Pond Turtle populations are assumed to be declining as a result of mainly anthropogenic impacts including urban and agricultural development, habitat loss, fragmentation and road mortality (Daszak et al., 2001 in Namroodi et al., 2017). According to the Article 17 Reports, the most frequently reported high pressures and threats to the European Pond Turtle for the 2007-12 period, across all bio-geographical regions, were the reduction of habitat connectivity, invasive alien species, cultivation, changes in hydraulic conditions, roads, paths and railroads and continuous urbanisation (EEA/ETC-BD, undated). In Lithuania, the pressures and threats affecting the species appear to be rather different, as the national Article 17 report indicated four pressures and threats with high importance: predation, use of biocides, hormones and chemicals, forest planting on open ground and natural eutrophication.

The National Protection Plan for the European Pond Turtle provides a more detailed list of main threats and restrictive factors affecting the European Pond Turtle in Lithuania (Ministry of Environment, 2016):

- aquatic habitat destruction by land drainage that reduces small-size shallow water bodies;
- deterioration of water bodies' quality associated with anthropogenic activity (deepened water bodies for fisheries reduces shallow water areas);
- destruction of terrestrial habitats through intensive farming (annual ploughing near the water bodies destroys potential places for nest placement);
- loss of terrestrial habitats due to vegetation succession (growth of shrubs or trees shade the nesting sites that thus become unsuitable for incubation);
- decrease in the direct illumination of the water surface by more than 80% due to the growth of shrubs and trees on the shores, making these water habitats less suitable for the species; and
- landscape fragmentation (decrease in the number of water bodies used by turtles as interconnecting elements between sub-populations during movements, and other barriers to movement (e.g. roads, settlements or industry) that isolate turtle sub-populations from each other).

The ECONAT LIFE project (2009) revealed that in southern Lithuania, rapidly growing areas of abandoned agricultural land and extensive livestock farming have led to the loss of open, extensively used habitats. The ponds naturally overgrow with grass and shrubs, a process that significantly threatens amphibian and reptile species (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018; Ministry of Environment, 2016). Although infertile soils typical of the southern region of Lithuania are not suitable for arable cultivation, agricultural subsidies have continued to encourage the conversion of these pastures to arable land, a source of pressure for the turtle species. In addition, afforestation measures are often taken in areas most suitable for turtle nesting (sandy hills), which also leads to a reduction in favourable habitats for the species (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018).

Another significant threat is the fragmentation of meta-populations of the turtle. Such a situation has the potential to lead to inbreeding and the isolation (and even extinction) of small populations. As it is a sedentary species and turtles are extremely vulnerable when they do move away from their ponds, it is very sensitive to habitat fragmentation. If the habitats are fragmented by roads, arable fields or larger areas without water

bodies, sub-populations become isolated from each other and turn to inbreeding, which weakens their meta-population structure (Ministry of Environment, 2016).

In Lithuania as much as anywhere else, the survival of the European Pond Turtle species is dependent on the survival of eggs and young animals. Nests are raided by predators, these being mainly Red Foxes (*Vulpes vulpes*) in Lithuania. Many young animals are vulnerable to freezing during extremely cold winters or die in their first days as victims of predatory birds or animals (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018). The observed increasing frequency of extreme weather events, such as heavy precipitation, floods and severe droughts that dry out water bodies, or a decrease in the duration of snow cover and consequent ground freezing (Ministry of the Interior, 2015) endanger the young animals even more (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018). Considering developments in neighbouring countries, e.g. the spread to the east of the Raccoon (*Procyon lotor*), an alien predator of the European Pond Turtle currently in Germany, similar pressures may appear in Lithuania as well (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018).

Drivers of improvements: actors, actions and their implementation approaches

Organisers, partners, supporters and other stakeholders

Many of the conservation actions that have contributed to the species' regional improvement were undertaken through two LIFE projects: NELEAP - Protection of *Emys orbicularis* and amphibians in the north European lowlands (JAN 2005 to DEC 2009); and ECONAT - Development of Pilot Ecological Network through Nature Frame Areas in Southern Lithuania (SEP 2010 to SEP 2014)(Annex 2). Both projects were coordinated by the Lithuanian Fund for Nature, and involved a large number of other partners, with the roles of many of them described below in the section on conservation measures.

Contributions / relevance of strategic plans

The National Protection Plan for the European Pond Terrapin [Turtle] (*Emys orbicularis*) was prepared during the ECONAT LIFE project and adopted in 2016 (Ministry of Environment, 2016). This revealed that, as the country is in the northern part of the turtle's range, the species lives under suboptimal conditions and is unlikely to reach maximum sub-population densities. Active protection measures are accordingly necessary to preserve the European Pond Turtle in Lithuania (Ministry of Environment, 2016a). The plan aims to ensure a favourable conservation status of the turtle by preserving a meta-population of at least 500 individuals in the southern part of Lithuania, with at least 80% of them in sites with effective protection. The protection plan foresees different tasks and measures. For example, the following tasks are included:

- 1) finding out the most important biological species indicators;
- 2) implementing practical nature management measures throughout the ecological network of the turtle;
- 3) improving legal instruments and planning documents;
- 4) keeping track of conservation status changes in the species;
- 5) improving breeding success by artificial means;
- 6) disseminating information to landowners or land-users about the habitats needs for this protected species; and
- 7) establishing species ecological needs under the conditions in Lithuania.

For example, practical nature management measures for the turtle's ecological network include:

- creating new water bodies suitable for the European Pond Turtle;
- maintaining open nesting sites for the European Pond Turtle on at least 90% of known nesting sites by grazing, mowing or removing a part of the woody vegetation; and
- protecting at least 50% of known nesting sites from predators by artificial means, e.g. by covering.

Furthermore, the following artificial means are predicted to improve the breeding success:

- artificially incubating the eggs of the European Pond Turtle taken from unsafe nesting sites;
- monitoring juveniles released to the environment to assess the success of habitat adaptations; and
- transferring individuals to ecologically isolated European Pond Turtle sites in order to increase genetic diversity.

The ECONAT LIFE project followed-up the NELEAP LIFE project, with the main objective of ensuring the favourable conservation status of the European Pond Turtle in the north European lowlands, as well as the

favourable conservation status of the Fire-Bellied Toad (*Bombina bombina*) and the Northern Crested Newt (*Triturus cristatus*) in the areas where they occur together with the turtle. The NELEAP LIFE project was initiated as a result of an ongoing decline of the European Pond Turtle and the Fire-Bellied Toad throughout the north European lowlands, as well as the decline of the Northern Crested Newt in Estonia, Finland, Germany and Denmark, and possibly in Poland and Lithuania.

One of the triggers to start the ECONAT LIFE project was also the insufficiency of the nature frame and Natura 2000 sites in southern Lithuania to protect the Annex II and IV species (reptiles and amphibians) as well as to enable movements amongst the habitats. Therefore, this project primarily sought to create an ecological network in southern Lithuania, which would ensure the favourable conservation status of selected species and increase the ecological value of the region. However, there is no information on any former plan that identified the need for the ECONAT LIFE project.

Measures taken and their effectiveness

Lithuania reported that the following conservation measures were taken for the European Pond Turtle from 2007 to 2012.

Application of conservation measures for the European Pond Turtle for 2007-2012 in Lithuania

Measure	Type	Ranking	Inside / outside N2k	Broad evaluation
Legal protection of habitats and species (6.3)	Legal	Medium	both	not evaluated
Specific single species or species group management measures (7.4)	Recurrent	High	both	maintain

Source: Lithuania Article 17 report 2013 at <https://bd.eionet.europa.eu/article17/reports2012/>

More detailed information from the National Protection Plan for the European Pond Turtle in Lithuania (Ministry of Environment (2016a) reveals that numerous conservation activities have been undertaken in Lithuania for the 2007-12 period, as well as before and after, which included:

- 1998: A species conservation programme carried out in Meteliai Regional Park, prepared and implemented an action plan for species preservation in Kučiuliškės Herpetological Reserve.
- 1999: A project for the management of Juodabalė Herpetological Reserve was prepared and implemented. This altered turtle habitats and nesting places were reconstructed.
- 2001: A project on the reconstruction of species habitats in Meteliai Regional Park and Kučiuliškės Herpetological Reserve was introduced. New water bodies suitable for the turtle were excavated and trees and shrubs were felled to improve the hydrological regime.
- 2002: Species population surveys in Veisiejai Regional Park, Ringelišliai Botanical-Zoological Reserve and Petroškai und Klepočiai forests as well as species habitat reconstruction works were performed.
- 2005–2009: NELEAP LIFE project on the protection of the European Pond Turtle and amphibians in the lowlands of northern Europe was introduced. Turtle habitats were managed by digging ponds, installing sun bathing and wintering places and taking care of feeding and egg laying sites. Genetic research and public education were also carried out.
- 2007: The nature management plan for Lake Zervynas and its surroundings was approved (the Environmental Minister Order No. D1-16).
- 2010, Lithuania approved the methodology to calculate a basic fine for destroying European Pond Turtle nesting sites, eggs and adults. For example, it foresees €290 as a basic fine for a harmed turtle (Ministry of Environment, 2016a).
- 2010–2014: ECONAT LIFE project was implemented, which included the creation of an ecological network for the turtle and rare amphibians between numerous protected areas. During this project, habitats were restored in and between protected areas and various other activities were performed, such as the in-situ protection of the turtle egg clutches from predators.
- 2015: The Avizieniai forest and Drapaliai village nature management plans were approved by Environmental Minister Order No. D1-704; the Paveisiejai village parish nature management plan No. D1-888 as well as the Šlavantai village nature management plan No. D1-12 were also approved. The

implementation of the nature management plans improved the status of the turtle's habitats, which, due to the natural succession and anthropogenic impacts, had been severely degraded.

Of particular importance were the NELEAP and ECONAT LIFE projects, which included the establishment of two core areas of the ecological network. In these areas, extensive livestock farming was maintained to keep the habitats in good condition. A demonstration farm was also used to show farmers in the neighbourhood how to maintain the environment and generate income at the same time. As the Lazdijai region is dominated by meadows with natural wetlands, the majority of farmers have fenced off the wetlands to prevent livestock from a supposed risk of parasites. During information field days, farmers were introduced to the practices of wetland grazing using appropriate breeds of beef cattle. As a result, farmers in surrounding areas purchased beef cattle and started to use wetlands for grazing. The beef cattle graze the willow and stay in wetlands during the summer heat, so farmers benefit from an enlarged grazing area, whilst keeping the wetlands free of high vegetation. One of the challenges of the ECONAT LIFE project was to find the sufficient area of sites suitable for nature conservation, whose owners would be willing to carry out project activities without receiving compensation. About one quarter of the addressed landowners agreed to the habitat restoration measures in their holdings. Another important factor to ensure the continuity of habitat management and conservation success was the ability of the farmers to profitably sell the produced livestock.

In response to the insufficient protection of the threatened target species and ecological connectivity among the core areas, the ECONAT LIFE project team developed an ecological network, including the preparation of criteria, methods and management plans for the target species. The project proposed the enlargement of one Natura 2000 site and the creation of four new sites to enhance the network, which were designated by the Ministry of Environment. The subsequent management plans for the sites included specific habitat maintenance measures for a ten-year period to protect the above-mentioned amphibian and reptile species. The Good Practice Guide, prepared during the project, provides a detailed description on these issues (Bastyte et al, 2014).

The project also developed criteria for defining the favourable conservation status of a range of target species, and this work revealed that securing favourable conservation status of small isolated populations by connecting them through green infrastructure is more cost-effective than strengthening each population separately. To increase the potential for replication, the project organised four experience-exchange workshops and four study tours on particular topics. During the study tours, the Lithuanian national experts (nature scientists, farmers, representatives from the Lithuanian Road Directorate, the Ministry of Environment, the Regional Environmental Department and protected areas, as well as project partner institutions) visited German, Latvian, Estonia, Danish and Polish colleagues, discussed the methods and exchanged knowledge on specific topics (e.g. rearing methods, environmentally friendly farming practices, amphibian conservation – prevention of road mortality, and restoration of reptilian and amphibian habitats). The results were brought together in the Best Practice Guidelines ('Development of a Pilot Ecological Network in Southern Lithuania') and distributed to target audiences.

A specific conservation practice followed in Lithuania is the attention given to the species' protection over its first two life-cycle phases (i.e. the protection of eggs and nesting places and protection of immature animals), as adult turtles are not affected by natural predators in the country (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018). For example, the nesting sites are protected from predators, such as the Red Fox, using either covers or fences, though the latter proved to be ineffective as the turtle avoided the fenced areas. Increasing climate change impacts are another strong pressure for juveniles, as the increasing frequency of unpredictable weather events (extreme rain or severe drought) and the lack of snow cover in winter leads to increased mortality. The protection activities include, for example, the collection of eggs before the winter and their artificial incubation at the Zoological Garden. Eggs were also collected from unsuitable nesting places (e.g. rural roads and gravel tracks) and transferred to artificial incubators. At three years of age and following an adaptation phase, the young animals are released to the natural environment or near the places where the eggs were collected (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018). In total, 109 egg clutches were protected over the 4 years of the ECONAT LIFE project.

Another key output from the ECONAT LIFE project was the National Protection Plan for the European Pond Turtle, as outlined above.

The ECONAT LIFE project also included a range of local community and other stakeholder awareness raising activities. These included more than 150 educational activities in schools about the importance of preserving

the endangered species. In addition, the National Visitors Center in the State Service for Protected Areas under the Ministry of Environment began offering educational sightseeing tours for school pupils (years 1-5) on the species. One of project partners, the Lithuanian Zoological Garden, organised four educational 'Turtle Days' (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018).

The project activities encouraged local communities to join nature conservation activities by organising numerous and time-intensive meetings with landowners in the project area, during which the European Pond Turtle's habitat needs and species protection measures were explained to farmers. Furthermore, developing understanding between different stakeholders, such as Road Administration representative under the Ministry of Transport and Communications and Veisiejai Regional Park administrators, led to the construction of a road pass for the turtle in the Regional Park, financed by the Lithuanian Road Administration (Dalia Bastyte pers comm, Lithuanian Fund for Nature, 2018).

Nevertheless, Dalia Bastyte pers comm. (Lithuanian Fund for Nature, 2018) noted that due to the relatively good state of biodiversity as well as the species' historical prevalence in Lithuania, most Lithuanians do not consider the species to be endangered. Thus, the information and advice provided by nature protection specialists was critical in motivating people to protect the species. Periodic information campaigns in the future are needed to keep the interest of population in species protection.

Funding sources (current and long-term) and costs (one-off and ongoing)

The total budget of the NELEAP LIFE project was €2,346,185, from which about a half of the sum was contributed by the EU (i.e. €1,161,373.00); however the source of co-financing is not explained in the final report. The total budget of the ECONAT LIFE project was €766,260, from which about a half of the sum (i.e. €381,510.00) was provided by the EU. The rest was co-financed by the World Wide Fund for Nature (Sweden), donations from Lithuanian citizens (2%), the income from commercial activities, and the Nordic Ministers Council (non EU).

The table below presents the division of costs according to the actions taken (preparatory actions (A1-A7) and concrete conservation actions (C1-C5)) in the ECONAT LIFE project (Bastyte, 2015):

Division of costs according to the actions taken (preparatory and conservation) in the ECONAT LIFE project

Action No.	Short name of action	Short description	Total sum (Euro)
A1	Development of action plans	One action plan for the creation of ecological corridors; One national action plan for tree frog prepared and submitted to the Ministry of Environment; Updated national plan for the European Pond Turtle and submitted to the Ministry of Environment.	47,584
A2	Rearing methods for the European Pond Turtle	Development of methods for 2 type of breeding ex-situ: 1. Egg collection and rearing of hatchlings; and 2. Adult turtle rearing. Experience exchange visits: 1 to Germany and 1 visit to Poland, 1 conference in Latvia.	7,072
A3	Determining the favourable conservation status for Annex IV amphibian and reptile species in South Lithuania	Definition of criteria for favourable conservation status of seven target species.	5,185
A4	Ecological network-development	1. Preparation of criteria for setting the ecological network; 2. Preparation of the management regulation and proposal for the Ministry of Environment; 3. Implementation of demonstration example in Alytus County.	8,280
A5	Establishing new Natura 2000 sites	Establishment of 5 new Natura 2000 sites (from several hectares up to 10-20 ha); Preparation of 5 local management plans and submission to the Ministry of Environment.	14,028
A6	Preparation of permissions for management	95 permissions from the private owners to work on their land and 36 permissions from the state institutions.	13,315
A7	Farm development	One beef demonstration farm established, 22 Angus breed beef cattle purchased, grazing performed in a core area of the network, farm business development plan made.	33,818
C1	Habitat management	Creation of 163 new ponds (total surface 26,500 m ²); creation and / or restoration of 40 nesting sites, and 30 hibernation sites.	182,456
C2	Renovation of ponds	Restoration of 52 ponds.	29,930
C3	Restoration of wetlands	24 dams were made, affecting a total area of 17.48 ha (together	45,944

Action No.	Short name of action	Short description	Total sum (Euro)
		with the actions C1 and C2).	
C4	Habitat and population management in sandpits	2 small sand pits restored along with the digging of ponds.	373
C5	Population management of the European Pond Turtle and the European Tree Frog, and mitigation of predation on target species	Instalment of 2 enclosures and 1 laboratory; In total, 128 turtle juveniles were released between 2011 and 2013; 6 turtles from Vilkiautinis turtle population (LT05) were radiotracked during spring 2011 and spring 2013; In total, 2799 individuals of the European Tree Frog were released into the wildness between 2011 and 2013.	97,912

Source: Bastyte (2015)

Future actions

To ensure the project's longevity, the After-LIFE Conservation Plan of the ECONAT LIFE project included the following measures for 2014 to 2024, with their responsible institutions and possible sources of funding (Bastyte, 2014).

Measures in the after-LIFE conservation plan, responsible institutions and possible sources of funding

Aim	Measure	Activity	Possible sources of funding
Maintenance of good habitat status in the ecological network core areas	Maintenance of open water surfaces in restored water bodies	Removal of aggravated/woody vegetation (cutting and digging out roots of willows) and rooting out reeds	State budget, EU funds, private funds
	Support for suitable vegetation cover in turtle egg laying sites	Mowing and/or grazing	RDP agri-environment protection payments - management of specific meadows
	Coastal maintenance of water bodies	Cutting of willows and other woody vegetation, mowing of high grassland	RDP agro-environment protection benefits - extensive wetlands management
Strengthening of <i>Emys orbicularis</i> populations	Incubation of turtle eggs collected from insecure places and reintroduction of juveniles	Eggs collection	Structural funds

Source: Bastyte (2014)

The Lithuanian PAF for Natura 2000 in 2014-2020 identifies the following priority conservation measures for the European Pond Turtle, their costs and funding sources (Ministry of Environment, 2016b):

- (F.2) In order to improve and maintain the 'favourable' conservation status of the species, the following conservation priorities are foreseen for reptiles, including *Emys orbicularis*: conducting further surveys in potential localities in southern Lithuania and closing other gaps on species ecology; preventing the modification of water bodies and wetlands; preventing habitat fragmentation and reinforcing ecological networks in municipal planning documents; reducing predator populations; supporting traditional agricultural practices in pastures and meadows; and assisting in ex-situ hatching and releasing juveniles to their mother localities.
- (G.1.a) General priority measures for Natura 2000 include: Preparing species action plans for species under the Habitats Directive, including *Emys orbicularis* (financed by ERDF/CF, ESF, EFF; LIFE, National public).
- (G.1.d) Priority measures for Natura 2000 wetlands habitats and species (including peatlands) include:
 - Preparation of action plans or site management plans (including for *Emys orbicularis*) (financed by ERDF/CF, LIFE, National public, EEE+Norway grants);

- Restoration and maintenance of mires: cutting trees and bushes, reedbeds, infrastructure for extensive grazing or mowing, water regime regulation (including for *Emys orbicularis*) (financed by ERDF/CF, EAFRD, LIFE, National public, EEE+Norway grants);
- Subsidies for the management of wetland habitats and species' habitats (including for *Emys orbicularis*) (financed by EAFRD); and
- Monitoring and assessment of the conservation status of mire habitats and species (including for *Emys orbicularis*) (financed by LIFE, National public, EEE+Norway grants).

The Environmental Projects Management Agency (EPMA), a part of the Ministry of Environment of the Republic of Lithuania, a public institution responsible for implementing EU-funded and national environmental projects, recently launched the 10-year (2018-2027) LIFE-IP project PAF-NATURALIT 'Optimizing the management of Natura 2000 network in Lithuania' (LIFE16 IPE/LT/000016). This LIFE project is focussing on implementing the PAF, which covers the entire Natura 2000 network, in Lithuania.

Furthermore, the National Protection Plan for the European Pond Turtle foresees a number of surveys for the species in southern Lithuania (Ministry of Environment, 2016a).

Achievements

Impacts on the target species

The NELEAP project improved the conservation status of its targets species: namely the European Pond Turtle, the European Fire-Bellied Toad and the Northern Crested Newt. Conservation work included pond digging and restoration, the creation of nesting and hibernation sites for turtles, and the implementation of a sustainable grazing regime (agreements were concluded to ensure continued management of the sites). Furthermore, an extensive awareness campaign was carried out to improve the knowledge of experts and local communities. The impact of the project actions was monitored up to the project end. The data showed that the species can colonise quickly the restored habitats, e.g. the newly dug or restored ponds acquire within 2-3 years typical vegetation, fauna and ecological qualities that are suitable for the target species. The After-LIFE conservation plan set out measures for maintaining the restored habitats. The farms in the project sites ensure long-term management, supported by the agri-environmental schemes and the farming of cattle.

During the follow-up ECONAT LIFE project, the three main key groups of conservation activities were of particular importance in providing benefits for the European Pond Turtle (as well as and other reptile and amphibian species – see below):

- Creation of new or restoration of existing habitats for the project's target species, such as the creation or restoration of 215 ponds, establishment of 40 egg-laying sites for European Pond Turtle and the installation of 24 dams affecting 17.48 ha of wetlands.
- Artificial incubation of the turtle eggs at the Lithuanian Zoological Garden, where 101 individuals of the European Pond Turtle were reared and released into the restored habitats by the end of the project; during the four project years, 86 clutches of European Pond Turtle eggs were protected from predators.
- Creation of ecological corridors to aid population dispersal as part of the demonstrative ecological network, along with stepping stone habitats to connect the core population areas in Natura 2000 sites.

The project, however, does not provide information on the actual turtle population increase in terms of numbers of individuals.

The implementation of these LIFE projects, and the other conservation activities described above, improved the condition of European Pond Turtle habitats, which, due to natural succession and anthropogenic impacts, had been severely degraded, and also improved the viability of the turtle's meta-populations. Although these did not lead to an overall improvements in the conservation status of the species, it did have positive impacts at a regional level (i.e. in southern Lithuania).

Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

The European Pond Turtle is considered to be an 'umbrella species', whereby its preservation ensures the preservation of other species sharing the same type of the habitats (Ministry of Environment, 2016). For

example, the turtle shares its habitats with other high conservation-value species, such as the Northern Crested Newt and European Fire-Bellied Toad. Other target species included in the ECONAT LIFE project were the Natterjack Toad (*Bufo calamita*), European Green Toad (*Bufo viridis*), European Tree Frog (*Hyla arborea*), Sand Lizard (*Lacerta agilis*), Common Spadefoot Toad (*Pelobates fuscus*), Moor Frog (*Rana arvalis*) and the Pool Frog (*Rana lessonae*).

Such benefits for the above species (and other Annex IV amphibian, reptile and dragonfly species) as a result of the conservation measures and habitat management actions for the European Pond Turtle in the ECONAT LIFE project (2009) included:

- Creation of new, or restoration of, existing habitats for the European Tree Frog, including 30 hibernation sites for amphibians.
- Rearing in the Lithuanian Zoological Garden of 2,799 individuals of the European Tree Frog and their release into the restored habitats by the end of the project.
- Creation of ecological corridors along with stepping stone habitats to connect core population areas in Natura 2000 sites to secure the favourable conservation status for the European Fire-Bellied Toad and the Northern Crested Newt.

The advice given to farmers on wetland grazing also provided socio-economic benefits. This is because infertile land is increasingly being abandoned in the region, so new approaches to supporting the viability of extensive grazing using hardy cattle breeds helps provide job opportunities in an area with high unemployment.

Conclusions and lessons learnt

The key targeted conservation measures that led to the improvements

- All three main activities contributed to the improvement of European Pond Turtle status in Lithuania:
 - 1.) the creation and restoration of habitats suitable to the species;
 - 2.) the creation of a demonstration ecological network in protected areas (pilot projects); for example, the establishment of two core areas of the ecological network, as well as the creation of ecological corridors along with stepping stone habitats to connect these core population areas in Natura 2000 sites; and
 - 3.) the artificial incubation of rescued turtle eggs and their release into restored habitats.
- While egg and juvenile protection was the main focus of the species' conservation measures, the maintenance and connection of the habitats was important for all species life-cycle phases.

Conservation measures that have not been sufficiently effective

- When covers or fences were used for the protection of eggs from predators, the latter proved to be ineffective as the turtles avoided the fenced areas.

Factors that supported the conservation measures

- The availability of funding that could be specifically targeted towards the species' conservation needs, in particular the LIFE Nature programme action grants supported the two projects that were very important for stabilising the turtle population in Lithuania.
- Local stakeholder engagement raised awareness of the species and its habitat vulnerability, and highlighted the need for conservation measures as well as supporting their implementation, including after the LIFE project's end.
- Striving toward long-term conservation measures, such as the creation and restoration of habitats suitable for the species, combined with economic needs, was vital for achieving a sustainable regional improvement in the species' conservation status.

Factors that constrained conservation measures

- Limitations on available funding for specific species and habitat conservation measures, in particular after the LIFE projects.
- The absence of LIFE projects that worked together with local policymakers to implement management plans in areas without a protection status, particularly after the LIFE project.

- Pressures from land use change, such as the increasing conversion of pastures to arable land and afforestation, often affect the areas most suitable for turtle clutches (sandy hills), hindering the improvement of the species' population status, even where conservation measures are in place.

Quick wins that could be applied elsewhere for the species

- In Lithuania, species protection actions focus on the most vulnerable first two life-cycle phases of the species (i.e. the protection of eggs clutches and immature animals), as adult turtles do not have natural predators in the country.

Examples of good practice that could be applied to other species

- The ECONAT LIFE project established criteria for creating ecological networks and produced a report called 'Methodology for Creating the Ecological Network for the Target Species in the Nature Frame', demonstrating an example of an ecological network. This provided a model for the development of ecological networks, from theory to practice, that can be applied to other locations, particularly in areas where the landscape is fragmented and current measures of species conservation appear to be insufficient. The project results reveal that securing favourable conservation status of small, isolated populations by connecting them through ecological corridors is more cost-effective than strengthening each population separately (Bastyte, 2015).
- In the framework of the ECONAT LIFE project, the Meteliai and Veisiejai regional parks together with the Lithuanian Zoological garden carried out the turtle breeding programme, which was partially financed by national and structural funds. Another activity of this project was the development of a methodology for the rearing of turtle juveniles. It describes how turtle eggs can be taken from nature, incubated and reared in a zoological garden. This provides an example of best practice learning, as the methods of incubation and turtle rearing were learned from other countries' experience in similar projects; for example, the German turtle breeding station in Linum (Rhinluch Nature Protection Station under the State Office for the Environment in the Brandenburg Federal State) and the Frankfurt am Main and Berlin zoological gardens.

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Annex 1. Status of the European Pond Turtle (*Emys orbicularis*) at Member State and biogeographical levels

Favourable	FV	Unknown	XX	Unfavourable - inadequate	U1	Unfavourable - bad	U2
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Qualifier (+) improving (-) deteriorating (=) stable (x) unknown (n/a) not reported

	2001-06	2007-12				
	Overall	Range, km2	Population	Habitat for species, km2	Future	Overall (with trend)
BG (ALP)	N/A	FV	FV	FV	U1	U1 (-)
IT (ALP)	XX	U2	U2	U2	U2	U2
SI (ALP)	U2	U1	U1	U1	U1	U1 (x)
EU overall (ALP)	U2	FV	FV	FV	U1	U1 (x)
FR (ATL)	U2	FV	U1	XX	U2	U2 (-)
PT (ATL)	U1	XX	XX	U1	U1	U1 (x)
EU overall (ATL)	U2	FV	U1	XX	U2	U2 (-)
BG (BLS)	N/A	FV	FV	FV	U1	U1 (-)
RO (BLS)	N/A	FV	FV	FV	XX	FV
EU overall (BLS)	XX	FV	FV	FV	U1	U1 (-)
LT (BOR)	U2	FV	U1	U1	U1	U1 (=)
LV (BOR)	U2	U2	U2	U2	U2	U2 (-)
EU overall (BOR)	U2	FV	U2	U2	U2	U2 (-)
AT (CON)	U2	U2	U1	U1	U2	U2 (=)
BG (CON)	N/A	FV	FV	FV	U1	U1 (-)
DE (CON)	U2	U1	U2	U2	U2	U2 (=)
FR (CON)	U2	U1	U1	U1	U1	U1 (=)
IT (CON)	XX	U2	U2	U1	U2	U2 (-)
PL (CON)	U2	U1	U1	U1	U1	U1 (-)
RO (CON)	N/A	FV	FV	U1	XX	U1
SI (CON)	U2	U1	U1	U1	U1	U1 (x)
EU overall (CON)	U2	U2	U2	U1	U1	U2 (-)
GR (MED)	U1	XX	XX	XX	U1	U1
ES (MED)	XX	XX	XX	U1	U1	U1 (x)
FR (MED)	U2	U1	U1	U1	U1	U1 (=)
IT (MED)	XX	U2	U2	U1	U1	U2 (-)
PT (MED)	U1	XX	XX	U1	U1	U1 (x)
EU overall (MED)	XX	XX	XX	U1	U1	U1 (x)
HU (PAN)	FV	FV	FV	FV	FV	FV
RO (PAN)	N/A	FV	FV	U1	XX	U1
SK (PAN)	U2(-)	U2	U2	U2	U2	U2 (-)
EU overall (PAN)	FV	FV	FV	FV	FV	FV
RO (STE)	N/A	FV	FV	FV	XX	FV
EU overall (STE)	XX	FV	FV	FV	XX	FV

Source: Member State Article 17 reports as compiled by ETC-BD on EIONET

<https://bd.eionet.europa.eu/article17/reports2012/>

Annex 2. LIFE Nature Projects in Lithuania that aimed to help conserve the European Pond Turtle (*Emys orbicularis*)

Project Title	Project N°	MS	Type Of Beneficiary
ECONAT - Development of Pilot Ecological Network through Nature Frame Areas in Southern Lithuania	LIFE09 NAT/LT/000581	LT	NGO-Foundation
NELEAP - Protection of <i>Emys orbicularis</i> and amphibians in the north European lowlands	LIFE05 NAT/LT/000094	LT	NGO-Foundation

Source: LIFE Programme database, Nature projects with (reptile) "*Emys orbicularis*" listed in keywords. The database lists all together 21 projects, 2 of them in Lithuania.