1st LIFE AMPHICON INTERNATIONAL CONFERENCE

1. MEDNARODNA KONFERENCA PROJEKTA LIFE AMPHICON

BOOK OF ABSTRACTS

ZBORNIK POVZETKOV

AMPHIBIAN CONSERVATION AND HABITAT RESTORATION

OHRANJANJE DVOŽIVK IN OBNOVA NJIHOVIH HABITATOV

LIFE AMPHICON

18 - 20 MAY 2022

DRUŽBENI DOM GROSUPLJE
TABORSKA CESTA 1
1290 GROSUPLJE, SLOVENIA

LIFE18 NAT/SI/000711

Foreword

The Importance of Diversity in the LIFE AMPHICON Project

We should never underestimate the importance of biodiversity in nature, and we should never underestimate the importance of diversity within the work environment. It is imperative to protect, respect, and nourish both.

The LIFE AMPHICON project is a composite of different activities or what are known as actions. First activities within six Natura 2000 sites started in November 2019, and they will be fully completed by December 2026. Many of the "actions" are interdependent. This means that an action cannot begin before the previous one has been completed. The diversity and interconnection of the project actions enable better project results and help reach the overall goals. However, it should be pointed out that any divergence of an action can endanger the process of other actions.

Internationally diverse project team members increase the value of the project. The project partners in the LIFE AMPHICON project are organizations from Slovenia, Germany and Denmark. There are two municipalities, four parks, two nature consulting organizations specialized in habitat management and biodiversity, and the Slovenian Infrastructure Agency.

The coordinating beneficiary is the Municipality of Grosuplje from Slovenia. For the Slovenian beneficiaries the project is co-financed by the Slovenian Ministry of Environment and Spatial Planning.

People coming from different educational and work backgrounds have different work experiences and perspectives when it comes to tackling problems. If we know how to appreciate the diversity within work environment, more productive ideas, interpretations, and approaches can be generated and subsequently the project performs better.

Encouraging diversity in the project management should not only be recommended, it should be required.

Suzana Levstek
LIFE AMPHICON Project Manager

Predgovor

Pomembnost raznolikosti v projektu LIFE AMPHICON

Tako kot ne smemo podcenjevati pomena biotske raznovrstnosti v naravi, ne smemo podcenjevati pomena raznovrstnosti znotraj delovnega okolja in med projektnimi partnerji. Pomembno je, da prepoznamo in se zavedamo različnih oblik raznolikosti na vseh področjih našega sobivanja, da lahko te raznolikosti tudi cenimo in ohranjamo.

Z vidika vodenja projekta je nujno, da raznolikosti med projektnimi aktivnostmi in projektnimi partnerji prepoznavamo kot dodano vrednost.

Projekt LIFE AMPHICON sestoji iz različnih aktivnosti ali tako imenovanih akcij. Prve aktivnosti na šestih Natura 2000 območjih so se pričele izvajati novembra 2019 in bodo v celoti zaključene decembra 2026, ko se projekt konča. Aktivnosti so soodvisne in medsebojno povezane. To pomeni, da se izvajanje določene akcije ne more pričeti, dokler se ne zaključi prejšnja. Raznolikost in medsebojna povezanost projektnih akcij omogočata boljše projektne rezultate in igrata pomembno vlogo pri doseganju ciljev. Odstopanja, zamude ali nepravilno izvajanje aktivnosti, onemogočijo pričetek izvajanje druge aktivnosti, lahko pa tudi v celoti preprečijo njen potek.

Projektni partnerji v projektu LIFE AMPHICON so organizacije iz Slovenije, Nemčije in Danske. V projektu sodelujeta dve občini, štirje parki, dve naravovarstveni organizaciji in Direkcija RS za infrastrukturo.

Prijavitelj in vodilni partner projekta LIFE AMPHICON je Občina Grosuplje. Za slovenske upravičence projekt sofinancira tudi slovensko Ministrstvo za okolje in prostor.

Mednarodno raznoliki člani projektne skupine in partnerji, ki prihajajo iz različnih strokovnih okolij imajo širok in pester nabor delovnih izkušenj ter znanj in s tem povečujejo vrednost projekta. Zaradi raznolikosti v delovnem okolju, se ustvarjajo drugačne in produktivne ideje, interpretacije in pristopi.

Spodbujanje in ozaveščanje o doprinosu raznolikosti pri vodenju projekta ne bi smelo biti le priporočeno, ampak zahtevano.

Suzana Levstek
vodja projekta LIFE AMPHICON

1st LIFE AMPHICON INTERNATIONAL CONFERENCE
1. MEDNARODNA KONFERENCA PROJEKTA LIFE AMPHICON

CONFERENCE PROGRAMME
PROGRAM KONFERENCE

LIFE AMPHICON

18 - 20 MAY 2022

DRUŽBENI DOM GROSUPLJE
TABORSKA CESTA 1
1290 GROSUPLJE, SLOVENIA

LIFE18 NAT/SI/000711

8:00 - 16:00 Registration / Registracija

9:00 - 10:00 Conference Opening / Otvoritev konference

PETER VERLIČ, the Mayor of Grosuplje / župan občine Grosuplje

ANGELO SALSI, the Head of LIFE Unit (CINEA) / vodja programa LIFE pri agenciji CINEA

SUZANA LEVSTEK, LIFE AMPHICON Project Manager / vodja projekta

10:00- 11:00 Coffee Break / Odmor za kavo

LIFE PROJECTS EXPO / EXPO LIFE PROJEKTOV

11:00 -13:40 **SESSION 1: CONSERVATION OF AMPHIBIAN SPECIES AND HABITATS / SKLOP 1: OHRANJANJE DVOŽIVK IN NJIHOVIH HABITATOV**

KEYNOTE SPEECH / UVODNO PREDAVANJE
Lars Briggs, Denmark / Danska
Lessons Learned from 40 Years of Active Amphibian Conservation / 40 let izkušenj z izvajanjem varstva dvoživk

Katja Poboljšaj, Slovenia / Slovenija
AMPHIbian CONservation and Habitat Restoration (LIFE AMPHICON) in Slovenia / Projekt Ohranjanje dvoživk in obnova njihovih habitatov (LIFE AMPHICON) v Sloveniji

Maja Cipot, Slovenia / Slovenija
Conservation of the Amphibians in Slovenia with Natura 2000 / Kako z Naturo 2000 ohranjamo dvoživke v Sloveniji?

Barbara Kink, Slovenia / Slovenija
The role of the IRSNC (The Institute of the Republic of Slovenia for Nature Conservation) in the Conservation of Amphibians and the Restoration of Their Habitats / Vloga ZRSVN pri ohranjanju dvoživk in obnovi njihovih habitatov

Thomas Kutter, Germany / Nemčija
Conserving Bufo calamita and Pelobates fuscus within IP LIFE Atlantic Sand Landscapes in Lower Saxony, Germany / Varstvo Bufo calamita and Pelobates fuscus v IP LIFE Atlantske peščene pokrajine na Spodnjem Saškem, Nemčija

Hauke Drews, Germany / Nemčija
20 Years of Experience on Habitat Restoration and Population Management for Threatened Amphibian Species as Bombina bombina, Hyla arborea, Epidalea calmita, Pelobates fuscus and Bufo viridis / 20 let izkušenj z obnovo habitatov in upravljanjem populacij ogroženih vrst dvoživk Bombina bombina, Hyla arborea, Epidalea calmita, Pelobates fuscus in Bufo viridis

13:40 - 14:40 Lunch break / Odmor za kosilo

14:40 - 16:00 **SESSION 1: CONSERVATION OF AMPHIBIAN SPECIES AND HABITATS / SKLOP 1: OHRANJANJE DVOŽIVK IN NJIHOVIH HABITATOV**

Riinu Rannap, Estonia / Estonija
Protection of Pelobates fuscus and Triturus cristatus in Intensively Used Agricultural Areas of Estonia / Varstvo Pelobates fuscus and Triturus cristatus v območjih intenzivnega kmetijstva v Estoniji

Daniele Seglie, Italy / Italija
Habitat Restoration for Pelobates fuscus in Northwest Italy: Cases and Strategy Within the Project LIFE Insubricus / Obnova habitatov Pelobates fuscus na severozahodu Italije: primeri izvedbe in načrtovanja ukrepov v projektu LIFE Insubricus

Wouter De Vries, Spain / Španija
Interannual Difference in Amphibian Reproduction and Complications for Conservation / Težave pri varstvu dvoživk zaradi različnega razmnoževalnega uspeha med leti

Tomaž Remžgar, Slovenia / Slovenija
Measures for Improving the Habitat of Italian Agile Frog (Rana latastei) Population in Vipava Valley / Varstveni ukrepi za izboljšanje stanja populacije laške žabe (Rana latastei) v Vipavski dolini

16:00 - 16:20 Coffee Break / Odmor za kavo

16:20 - 17:20 **SESSION 1: CONSERVATION OF AMPHIBIAN SPECIES AND HABITATS / SKLOP 1: OHRANJANJE DVOŽIVK IN NJIHOVIH HABITATOV**

Katarina Drašler, Slovenia / Slovenija
To Dig or Not To Dig? Experience on Water Habitats Creation in Ljubljansko Barje Landscape Park / Kopati ali ne kopati? Izkušnje pri vzpostavitvi novih vodnih habitatov v Krajinskem parku Ljubljansko barje

Metod Rogelj, Slovenia / Slovenija
Problems and Proposals for Improvements in the Implementation of Mitigation Measures for the Protection of Amphibians / Problematika in predlogi izboljšav izvajanja omilitvenih ukrepov za varstvo dvoživk na primeru konkretnega gradbenega posega

Martina Lužnik, Slovenia / Slovenia
The importance of Small Waterbodies in the Predominantly Karstic Landscape of South-Western Slovenia: Ponds as Habitats for Amphibians / Pomen malih vodnih teles v pretežno kraški pokrajini jugozahodne Slovenije: kali kot habitat dovživk

Mojca Vek, Slovenia / Slovenija
First Comprehensive and Systematic Survey for the Amphibian Chytrid Fungi in Slovenia / Prvo sistematično testiranje dvoživk na prisotnost hitridnih gliv v Sloveniji

THURSDAY / ČETRTEK 19. 5. 2022

8:00 - 11:50 Registration / Registracija

9:00 - 9:30 Welcome Speeches / Pozdravni nagovori

TOMAŽ WILLENPART
the Head of Roads Investments Division at the Slovenian Infrastructure Agency / Vodja sektorja za investicije v ceste pri Direkciji RS za infrastrukturo

TEO HRVOJE ORŠANIČ
the Director of the Institute of the Republic of Slovenia for Nature Conservation / Direktor ZRSVN

9:30 - 11:20 **SESSION 2: AMPHIBIANS AND ROADS / SKLOP 2: DVOŽIVKE IN CESTE**

KEYNOTE SPEECH / UVODNO PREDAVANJE
Katja Poboljšaj, Slovenia / Slovenija
Amphibians & Roads in Slovenia - in the Pursuit of the Common Objectives / Dvoživke in ceste v Sloveniji – načrtovanje in doseganje skupnih ciljev

Barbara Pezdir, Slovenia / Slovenija
Information Needed for Amphibian Mitigation Measures – from a Contracting Authority's Point of View / Kaj vedeti kot naročnik ukrepov za dvoživke na cesti?

Andrej Sedej, Slovenia / Slovenija
Permanent Amphibian Protection System Zieger / Trajni ukrepi za dvoživke z elementi Zieger

Cvetka Piringer, Austria / Avstrija
Thirty Years of Amphibian Protection on the Roads of Salzburg, Austria / Trideset let varstva dvoživk na cestah v Salzburgu, Avstrija

Nerijus Zablekis, Lithuania / Litva
Amphibian Protection on Roads in Lithuania: From Buckets to Road Reconstruction / Varstvo dvoživk na cestah v Litvi: od postavitve začasnih ograj do rekonstrukcije ceste

11:20 - 11:50 Coffee Break / Odmor za kavo

11:50 - 12:50 **SESSION 2: AMPHIBIANS AND ROADS / SKLOP 2: DVOŽIVKE IN CESTE**

*Ralf Hoinkis, Germany / Nemčija
Planning a Permanent Amphibian Guidance System Based on Migration Activities Assessment at the N2000 site "Kammmolchgebiet Ötzendorf/Mührgehege" / Načrtovanje trajnih ukrepov za dvoživke na podlagi ocene selitev dvoživk v območju Natura 2000 Kammmolchgebiet Ötzendorf/Mührgehege

Andreja Škvarč, Ester Fabiani, Slovenia / Slovenija
Different Approaches in Nature Conservation Activities on Amphibian »Black Spots« in Northern Part of Slovenia / Različni pristopi ohranjanja dvoživk na črnih točkah na Gorenjskem

Katja Konc, Slovenia / Slovenija
Amphibian Conservation on Večna pot in Ljubljana / Varstvo dvoživk na Večni poti v Ljubljani

12:50 - 13:20 **SESSION 3: CITIZEN SCIENCE AND EDUCATION / SKLOP 3: LJUDSKA ZNANOST IN IZOBRAŽEVANJE**

KEYNOTE SPEECH / UVODNO PREDAVANJE
Gregor Torkar, Slovenia / Slovenija
Biodiversity in Education: Guidelines for Teaching Children and Adolescents / Biodiverziteta v izobraževanju: smernice za poučevanje otrok in mladostnikov

13:20 - 19:00 EXCURSION TO RADENSKO POLJE / POHOD PO RADENSKEM POLJU

FRIDAY / PETEK 20. 5. 2022

8:00 - 11:00 Registration / Registracija

9:00 - 10:30 **SESSION 3: CITIZEN SCIENCE AND EDUCATION / SKLOP 3: LJUDSKA ZNANOST IN IZOBRAŽEVANJE**

Tina Stepišnik, Slovenia / Slovenija
Activity = Education / Aktivnost = izobraževanje

Iztok Tomažič, Slovenia / Slovenija
Learning About Amphibians and Their Conservation in Formal and Informal Learning Environments / Spoznavanje dvoživk in njihovega ohranjanja v formalnih in neformalnih učnih okoljih

Tatjana Kotnik, Slovenia / Slovenija
Kozjansko Regional Park – Examples of Good Practice for Amphibian Conservation in a Protected Area / Kozjanski park – primeri dobrih praks ohranjanja dvoživk v zavarovanem območju«

Špela Kaplja, Slovenia / Slovenija
Frog Princess: The Role of Storytelling in Nature Education / Žabja princesa: Vloga pripovedovanja zgodb v izobraževanju o naravi

10:30 - 11:00 Coffee Break / Odmor za kavo

11:00 - 12:30 **SESSION 3: CITIZEN SCIENCE AND EDUCATION / SKLOP 3: LJUDSKA ZNANOST IN IZOBRAŽEVANJE**

Tadeja Smolej, Slovenia / Slovenija
The Coordination Centre for Amphibians in Slovenia and the Importance of Citizen Science Projects for Amphibian Conservation / Informacijski center za varstvo dvoživk Slovenije in pomen projektov ljudske znanosti za ohranjanje dvoživk

Alenka Žunič Kosi, Slovenia / Slovenija
Citizen Science Data Can Help Monitor a Rare Snake Species / Ljubiteljska znanost lahko pomembno prispeva k spremljanju redkih vrst kač

Bálint Halpern, Hungary / Madžarska
Hungarian Amphibian and Reptile Mapping Program - over a Decade of Experience Operating a Citizen Science Effort / Madžarski program zbiranja podatkov o dvoživkah in plazilcih – več kot deset let izkušenj z ljudsko znanostjo

Tatjana Gregorc, Slovenia / Slovenija
Biodiversity and LIFE Communication Approaches to Education and Awareness Raising - Good Practice Examples / Biodiverziteta in LIFE komunikacijski pristopi za izobraževanje in ozaveščanje – primeri dobrih praks

12:30 - 13:30 **CLOSURE OF THE CONFERENCE / ZAKLJUČEK KONFERENCE**

*Online presentation / predavanje na daljavo

SESSION 1: CONSERVATION OF AMPHIBIAN SPECIES AND HABITATS
SKLOP 1: OHRANJANJE DVOŽIVK IN NJIHOVIH HABITATOV

Lessons Learned from 40 Years of Active Amphibian Conservation

Lars Briggs, Amphi International, Denmark

Amphibians in Europe may have been, except for a few species, the most abundant vertebrate in many local communities and they often represented an important part of the food web.

Often, we stopped to hear and see toads and frogs and other amphibians in our ponds, gardens, fields and forests. This decline is mainly initiated by drastic socio-economic changes. Some key examples are agriculture intensification in western Europe after the second world war, intense urban development, abandonment of land in the Baltic states 20 years after independence, and interruption of traditional land-use and pond-use methods in the Mediterranean.

When we started active amphibian conservation, however, we were not aware that bringing back species to the previous metapopulations might take up to 30-40 years.

When we survey ponds and we hear only few frogs at the site, it is most likely that they are old and may not even breed successfully anymore. Generally, the presence of frogs in the range of 2 to 50 adults in the breeding site indicates the necessity of an immediate need for restoration followed by supportive breeding. On the other hand, the presence of frogs in the range of 30 to 50 adults, or above, is sufficient for restoration of the breeding sites.

1st period (0-5 years);

Restoring breeding sites (sometimes followed by supportive breeding) is the way to get young animals into the existing population.

After five years shall follow this procedure and the treated population will show the first signs of growth.

2nd period (5-20 years):

You start to focus on securing terrestrial habitats and migration corridors. This method can be very expensive, due to the land leases needed. Moreover, clear and frequent communication between local private land users is crucial.

You might discover that the breeding ponds you made are not always sustainable and suitable for your target species due to amphibian competition. For example, *Bufo bufo* outcompetes *Epidalea calamita* or a growing *Triturus cristatus* population feeds on *Bombina bombina* tadpoles. In the worst case, the introduction and development of fish or invasive species (both animals and plants) can strongly affect the breeding of your target species.

40 let izkušenj z izvajanjem varstva dvoživk

Lars Briggs, Amphi International, Danska

Z izjemo nekaterih vrst so bile dvoživke v Evropi zelo razširjene in so pogosto predstavljale pomemben del prehranjevalne mreže.

Pogosto smo se ustavljali ob mlakah, na vrtovih, poljih in v gozdovih, da bi poslušali in opazovali krastače, žabe in druge dvoživke. Upad je predvsem posledica drastičnih družbeno-gospodarskih sprememb. Nekateri ključni primeri so intenziviranje kmetijstva v Zahodni Evropi po drugi svetovni vojni, intenziven razvoj mest, opuščanje zemljišč v baltskih državah 20 let po osamosvojitvi ter prekinitev tradicionalne rabe zemljišč in mlak v Sredozemlju.

Lotili smo se aktivnih pobud za varstvo dvoživk, vendar se nismo zavedali, da lahko traja vrnitev določenih vrst v nekdanje metapopulacije do 30 ali 40 let.

Tistih nekaj žab, ki jih pogosto slišimo, je najverjetneje starih in se morda niti ne razmnožuje več uspešno. Navzočnost 2 do 50 odraslih žab na mrestišču na splošno kaže na potrebo po takojšnji obnovi, ki ji mora slediti podporna vzreja. Navzočnost 30 do 50 odraslih osebkov ali več pa zadostuje za obnovo mrestišča.

1. obdobje: do 5 let.

Obnova mrestišč (včasih sledi podporna vzreja) je rešitev za vključitev mladih živali v obstoječo populacijo.
Prvih pet let je treba slediti postopku in populacija bo pokazala prve znake rasti.

2. obdobje: 5-20 let.

Potem se začnemo osredotočati na vzpostavitev kopenskih habitatov in selitvenih koridorjev. Ta metoda je lahko zaradi potrebnih zakupov zemljišč zelo draga. Poleg tega je ključnega pomena jasna in pogosta komunikacija med lokalnimi zasebnimi uporabniki zemljišč.

Včasih ugotovimo, da vzrejne mlake, ki smo jih ustvarili, zaradi konkurence dvoživk niso vedno trajnostni in primerni za ciljno vrsto. Vrsta *Bufo bufo* na primer prekaša vrsto *E. calamita*, naraščajoča populacija vrste *Triturus cristatus* pa se prehranjuje s paglavci *B. bombina*. V najhujšem primeru lahko vnos in razvoj rib ali invazivnih vrst (tako živali kot rastlin) močno ogrozi vzrejo ciljne vrste.

V tem primeru morate znova odkriti svojo »že obnovljeni« mlako in izvesti novo shemo kopanja ter ustvariti mrestišča, ki lahko trajajo od 30 do 40 let s trajnostnimi mlakami oz. skupinami mlak.

If that is the case you must have to rediscover your "already restored" pond and perform a new digging scheme and create breeding sites that can last 30-40 years called a sustainable breeding pond or pond cluster.

3 period (20-50 years and above):

To secure the effort in the long term you must influence and actively have a socio-economic system that will help to maintain the restored or/and created ponds. It can be done by the correct use of agri-environment schemes by the local population, modification of forest exploitation methods, initiation of rewilding schemes and sustainable tourism. All are difficult tasks and must be influenced by herpetological expertise to succeed in the long term.

Can we win and be successful?

I have experienced some successful examples even on the extreme border of their ranges: in general *Bombina bombina* conservation in Denmark, *Hyla arborea* in Sweden, *Epidalea calamita* in Estonia, examples 6 different Annex II and IV species of amphibians on Stiftung Naturschutz land in Schleswig Holstein.
Restoring *Rana arvalis* and *Rana temporaria* population as part of providing the food source for lesser spotted eagle in Poland and European Mink in Estonia is a different way of amphibian conservation in more natural areas in eastern Europe.

3. obdobje (20-50 let in več).

Za dolgoročni uspeh prizadevanj je treba vzpostaviti ustrezen družbeno-gospodarski sistem, ki bo pomagal vzdrževati obnovljene oz. na novo ustvarjene mlake. To je mogoče doseči s pravilno uporabo kmetijsko-okoljskih shem s strani lokalnega prebivalstva, s spremembo načinov izkoriščanja gozdov, z uvedbo shem renaturacije in s trajnostnim turizmom. Vse te naloge so zelo zahtevne in je pogoj za njihov dolgoročni uspeh ustrezno herpetološko strokovno znanje.

Ali lahko zmagamo in smo uspešni?

Nekaj uspešnih primerov sem doživel celo na skrajni meji območij določenih vrst: *Bombina bombina* na Danskem, *Hyla arborea* na Švedskem, *E. calamita* v Estoniji, 6 različnih vrst dvoživk iz priloge II in IV na območju Stiftung Naturschutz v Schleswig-Holsteinu.

Obnovitev populacije vrst *Rana arvalis* in *Rana temporaria* kot vira hrane malega klinkača na Poljskem in za norko v Estoniji je drugačen način varstva dvoživk na bolj naravnih območjih v vzhodni Evropi.

AMPHIbian CONservation and Habitat Restoration (LIFE AMPHICON) in Slovenia

Katja Poboljšaj, Centre for Cartography of Fauna and Flora, Slovenia

The decline of amphibian populations due to habitat fragmentation, increasing traffic and loss of landscape connectivity poses a serious threat for amphibians in Europe, Slovenia included. The main objective of the LIFE AMPHICON (2020-2026) project is to improve the conservation status of amphibian target species (*Triturus carnifex*, *Bombina variegata* and *Bombina bombina*) in 4 Natura 2000 areas in Slovenia through the restoration of ponds and land habitats, improving habitat connectivity, reducing road mortality and improving the coherence of all project sites. Syntopic Annex IV species *Rana dalmatina* and *Hyla arborea* will also profit from the project.

The LIFE AMPHICON project team conducted extensive two-year (2020 and 2021) surveys of amphibians in project areas Ljubljansko barje, Jovsi and Bohor. Population status and specific habitat requirements for target species have been estimated for every site (inventory of breeding sites, data on distribution and abundance, analysis of terrestrial habitats etc.).

In Ljubljansko barje target species are *Triturus carnifex* and *Bombina variegata*. Analyses showed that populations are in unfavourable conservation state. The area has a dense network of different types of ditches and channels, practically without ponds, therefore they represent typical breeding habitat for target species, which is a unique situation in Slovenia. Analyses also showed that the composition of surrounding land habitat is of great importance for both species and that optimal habitat represents a mosaic of wet grasslands, scrubs, hedgerows, and forest patches. The main threats are lack of water, inappropriate maintenance of ditches, intensification of agricultural land use, lack of overgrowth of trees and shrubs, and invasive species.

In Jovsi the main purpose was to provide baseline information on the population of *Bombina bombina*, where before the project we estimated that the population was very small and on the brink of extinction. Since the presence of *Bombina bombina* was not confirmed in 2020, we extended the surveyed area in 2021 to the whole Natura 2000 area Dobrava–Jovsi. In the Dobrava forest we found *Bombina variegata*, also species for which the Natura 2000 area has been designated, but no *Bombina bombina*. Additionally, the results of the survey showed that the population of *Triturus carnifex* is very small, isolated and in a bad conservation state in Natura 2000 area Dobrava–Jovsi. To mitigate the present situation of *Triturus carnifex* in Dobrava–Jovsi site and consequently allow a long term survival of this small isolated population, the population

Projekt Ohranjanje dvoživk in obnova njihovih habitatov (LIFE AMPHICON) v Sloveniji

Katja Poboljšaj, Center za kartografijo favne in flore, Slovenija

Upad populacij dvoživk zaradi izgube, drobitve in uničenja primernih življenjskih prostorov, povečanja prometa ter zmanjšanja krajinske povezanosti predstavlja resno grožnjo dvoživkam tako v Evropi kot tudi v Sloveniji. Osrednji cilj projekta LIFE AMPHICON (2020-2026) je izboljšati stanje ohranjenosti ciljnih vrst dvoživk: veliki pupek (*Triturus carnifex*), hribski urh (*Bombina variegata*) in nižinski urh (*Bombina bombina*) v 4 območjih Natura 2000 v Sloveniji z obnovo mrestišč in kopenskih habitatov, z izboljšanjem njihove povezanosti, z zmanjšanjem smrtnosti na cestah in izboljšanjem povezljivosti projektnih Natura 2000 območij. Posledično bo izboljšano stanje populacij tudi za sintopični vrsti iz Priloge IV rosnica (*Rana dalmatina*) in zelena rega (*Hyla arborea*).

Projektna skupina LIFE AMPHICON je izvedla obsežne dvoletne (2020 in 2021) raziskave dvoživk na projektnih območjih Ljubljansko barje, Jovsi in Bohor. Na podlagi rezultatov inventarizacije (popis mrestišč, podatki o razširjenosti in številčnosti vrst, analiza kopenskih habitatov itd.) smo za vsako območje pripravili ocene stanja populacij ciljnih vrst in njihovih habitatnih zahtev.

Na Ljubljanskem barju sta ciljni vrsti veliki pupek in hribski urh, kjer so analize pokazale, da sta populaciji v projektnem območju LIFE AMPHICON v neugodnem stanju ohranjenosti. Za projektno območje je značilna gosta mreža različnih tipov jarkov in kanalov ter je praktično brez mlak. Barjanski jarki so tudi razmnoževalni habitat ciljnih vrst, kar je edinstvena situacija v Sloveniji. Analize rabe zemljišč so pokazale, da je kopenski habitat zelo pomemben za obe vrsti in da optimalni habitat predstavlja mozaik vlažnih travišč, grmovja, živih mej in gozdnih zaplat. Glavne grožnje so tu pomanjkanje vode, neprimerno vzdrževanje jarkov, intenzifikacija rabe kmetijskih zemljišč, pomanjkanje lesne zarasti ter invazivne vrste.

V Jovsih je bil glavni namen opredeliti izhodiščno stanje populacije nižinskega urha, kjer smo že pred projektom ocenili, da je populacija zelo majhna in na robu izumrtja. Ker v letu 2020 vrsta ni bila potrjena, smo v letu 2021 razširili raziskovano območje na celotno območje Natura 2000 Dobrava–Jovsi. V gozdu Dobrava smo našli hribskega urha, ki je tudi kvalifikacijska vrsta za to Natura 2000 območje, nižinskih urhov pa nismo odkrili. Poleg tega so rezultati raziskave pokazali, da je tudi populacija kvalifikacijske vrste veliki pupek v območju Natura 2000 Dobrava–Jovsi zelo majhna, izolirana in v slabem ohranitvenem stanju. Da bi izboljšali stanje populacije velikega pupka na območju Dobrava–Jovsi in posledično

management action for *Triturus carnifex* will be performed along with the creation and restoration of water habitats and the improvement of terrestrial habitats.

In the Bohor area, we surveyed *Bombina variegata* in the eastern part of the Natura 2000 area, which is part of Kozjansko park. This is a less forested area of Bohor, where agriculture is an important part of traditional land use. The main threat in the area is the disappearance of suitable water habitats, due to changes in water regime and due to poor water quality of streams.

The results of preoperational monitoring are the basis for the decision-making process when, where and which conservation actions should be applied in project areas. It's also needed for the assessment of the impact of the project on the target species and their habitats.

omogočili dolgoročno preživetje te majhne izolirane populacije, se bodo izvedli varstveni ukrepi za uspešno okrepitev obstoječe populacije, vključno s podporno vzrejo ter z vzpostavitvijo in obnovo vodnih ter kopenskih habitatov.

Na območju Bohorja smo raziskovali hribskega urha v vzhodnem delu območja Natura 2000, ki je del Kozjanskega parka. To je manj gozdnato območje Bohorja, kjer je kmetijstvo pomemben del tradicionalne rabe zemljišč. Glavna grožnja na območju je izginotje ustreznih vodnih habitatov zaradi sprememb vodnega režima in slabe kakovosti vode vodotokov.

Rezultati popisa izhodiščnega stanja so osnova za zasnovo varstvenih ukrepov, ki bodo opredelili kdaj, kje in katere konkretne ohranitvene ukrepe je treba izvajati na projektnih območjih. So tudi osnova za ovrednotenje uspešnosti projektnih aktivnosti za populacije ciljnih vrst in njihovih habitatov ob zaključku projekta.

Conservation of the Amphibians in Slovenia with Natura 2000

Maja Cipot, Ministry of Environment and Spatial Planning, Slovenia

Nature in Slovenia is among the richest in the EU, which is reflected in the abundance of animal and plant species in a relatively small area, which also applies to the diversity of amphibians [1]. There are currently 20 native amphibian species registered in Slovenia. This number will surely increase with the development of monitoring techniques and with the expected separation of proteus, the only European cave-dwelling chordate species, into more species.

All amphibian species in Slovenia are protected by national legislation (Decree on protected wild animal species). 16 amphibian species are also protected by the Habitats Directive, from which 6 are protected with Natura 2000 network: olm or proteus (*Proteus anguinus*), yellow-bellied toad (*Bombina variegata*), fire-bellied toad (*B. bombina*), Italian agile frog (*Rana latastei*), Italian crested newt (*Triturus carnifex*) and, Danube crested newt (*T. dobrogicus*). Of the 355 Natura 2000 sites in Slovenia, 57 have at least one amphibian qualifying species.

The Natura 2000 network represents more than 37 percent of Slovenia's territory, which ranks us first in the European Union. Natura 2000 is defined by the Decree on Special Protection Areas (Natura 2000 areas) and is implemented in various sectors by the common Natura 2000 Management Programme (PUN). Sectors such as forestry, hunting, fisheries, and water management have well-established and well-organized natural resource management systems and programmes, which must include nature conservation measures for attaining the nature conservation objectives defined in PUN (population size, the size of habitat or habitat type, specific properties, structures, and processes of a habitat). The desired state in nature (objective) is achieved by appropriate adaptation of human activities (i.e. implementation of protection measures). PUN basically sets out various legislative, administrative, and contractual measures. In many cases, it sets out guidelines for other management plans (e.g. forest management plans, fisheries management plans, water management plan). PUN also sets:

-concrete conservation measures such as habitat restoration, securing the connectivity, purchase of land, management of protected areas, contractual protection, achievement of the protection objective through the implementation of the CAP;

-communication activities;

-a list of monitoring and research, needed for management, and

-a list of priority projects.

Kako z Naturo 2000 ohranjamo dvoživke v Sloveniji?

Maja Cipot, Ministrstvo za okolje in prostor, Slovenija

Narava v Sloveniji je med najbogatejšimi v EU, kar dokazuje tudi številčnost različnih živalskih in rastlinskih vrst na relativno majhnem prostoru. To velja tudi za vrstno pestrost dvoživk[1]. V Sloveniji je trenutno prepoznanih 20 prosto živečih vrst dvoživk iz dveh redov (brezrepe dvoživke (red Anura) in repate dvoživke (red Urodela)). To število se bo še povečalo z novejšimi tehnikami monitoringa in s pričakovano razdelitvijo edine evropske jamske dvoživke na več vrst. Vse vrste dvoživk v Sloveniji so zavarovane z nacionalno zakonodajo (Uredba o zavarovanih prosto živečih živalskih vrstah), 16 vrst dvoživk pa varujemo tudi z Direktivo o habitatih. Z omrežjem Natura 2000 varujemo 6 vrst dvoživk: proteusa (*Proteus anguinus*), hribskega (*Bombina variegata*) in nižinskega urha (*B. bombina*), laško žabo (*Rana latastei*) ter velikega pupka (*Triturus carnifex*) in panonskega pupka (*T. dobrogicus*). Vsaj ena izmed vrst dvoživk je tudi kvalifikacijska vrsta na 57 od 355 območij Nature 2000 v Sloveniji.

Omrežje Natura 2000 predstavlja dobrih 37 odstotkov Slovenije, kar nas po deležu ozemlja uvršča na prvo mesto v Evropski uniji. Natura 2000 je opredeljena z Uredbo o posebnih varstvenih območjih (območja Nature 2000) in se v različnih sektorjih izvaja na podlagi enotnega Programa upravljanja območij Nature 2000 (PUN). Sektorji, kot so gozdarstvo, lovstvo, ribištvo in vode, imajo ustaljene in dobro organizirane sisteme in programe upravljanja z naravnimi viri, ki na podlagi PUN vključujejo cilje za ohranjanje vrst in habitatnih tipov Nature 2000. Cilji PUN opredeljujejo želeno stanje v naravi (velikost populacije, velikost habitata oziroma habitatnega tipa ali specifične lastnosti, strukture ter procesi habitata oziroma habitatnega tipa). Želeno stanje v naravi (cilj) dosegamo z ustrezno prilagoditvijo človekovih aktivnosti (tj. izvajanje varstvenih ukrepov). PUN v osnovi določa različne zakonodajne, upravne in pogodbene ukrepe. V številnih primerih pa določa smernice za druge načrte (npr. gozdnogospodarske načrte, načrte upravljanja ribištva oz. ribiško gojitvene načrte, načrt upravljanja z vodami).
PUN za varstvo dvoživk vključuje:
-ukrepe za pripravo oz. dopolnitev predpisov (priprava strokovnih podlag, ureditev predpisov);

-komunikacijske aktivnosti;

-ukrepe za pripravo naravovarstvenih smernic in mnenj, na podlagi katerih se cilji za vrste vključujejo v sektorske načrte;

-konkretne ukrepe v njihovem naravnem okolju (obnova, doselitev vrste, vzpostavitev podhodov in ograj, odkup zemljišč, upravljanje zavarovanih območij, pogodbeno varstvo, doseganje varstvenega cilja z izvajanjem ukrepov Skupne kmetijske politike itd.);

In the LIFE integrated project for enhanced management of Natura 2000 in Slovenia - LIFE-IP NATURA.SI (LIFE17 IPE/SI/000011), implemented by the Ministry of the Environment and Spatial Planning in cooperation with 14 partners, one of the main project pillars aims to enhance the management of Natura 2000 sites - at the regulatory level as well as in the field. In addition to LIFE-IP NATURA.SI, 9 priority projects of the Natura 2000 Management Programme 2015-2020, financed by the European cohesion policy, are currently underway implementing measures to improve the conservation status of amphibian species.

-seznam monitoringov in raziskav, ki so ključni za poznavanje in upravljanje z vrstami ter

-seznam prednostnih projektov.

V projektu LIFE integriranem projektu za okrepljeno upravljanje Nature 2000 - LIFE-IP NATURA.SI, (LIFE17 IPE/SI/000011), ki ga izvaja Ministrstvo za okolje in prostor v sodelovanju s 14 partnerji, je ena od osrednjih aktivnosti namenjena okrepljenemu upravljanju območij Nature 2000 v Sloveniji. Z različnimi aktivnostmi izboljšujemo načrtovanje in izvajanje upravljanja na ravni predpisov kot tudi na terenu. Poleg LIFE-IP NATURA.SI trenutno poteka še 9 prednostnih projektov Programa upravljanja območij Natura 2000 2015–2020 z vsebinami za izboljšanje stanja vrst dvoživk, financiranih s sredstvi evropske kohezijske politike.

The Role of the IRSNC in the Conservation of Amphibians and the Restoration of Their Habitats

Barbara Kink, Institute of Republic of Slovenia for Nature Conservation, Slovenia

The Institute of the Republic of Slovenia for Nature Conservation is a professional institution established on the basis of the Nature Conservation Act. We pay special attention to the most valuable parts of nature and the most endangered areas and species, including amphibians. In this presentation, we will present the nature conservation system in Slovenia regarding amphibians.

In areas defined as more important for nature conservation – natural values, ecologically important areas, Natura 2000 sites, protected areas, habitat types that are preferably maintained in a favourable condition and habitats of protected plant and animal species – we perform direct, indirect and implementing measures for nature conservation.

Through nature conservation guidelines, the Institute has an important influence on the planning and arrangement of space and the use of natural resources (forest, water, mineral resources). We produce the most nature conservation guidelines for municipal and state spatial documents at all levels of planning. The nature conservation guidelines contain guidelines, recommendations and conditions for the implementation of the planned interventions. We are preparing expert bases in the field of nature conservation for the ministry and other state institutions, opinions on the acceptability of interventions in nature, opinions based on municipal acts and other opinions and consents. Through these procedures, in cases of the presence of amphibians, we ensure the preservation of habitat, structures and connectivity.

We monitor the state of nature conservation, take care of the protection of species and their habitats and natural values, and participate in the management of protected areas. Within our capabilities, we collect data on natural values and biodiversity, which we enter into databases, the Naravovarstveni Atlas and the Sporoči vrsto portal. Quality data are an important basis for our professional work. We take care of the implementation of various international conventions and European directives, such as the Natura 2000 network with the Birds Directive and the Habitats Directive. We have participated in the process of granting the status of a special protection area, we participate in reporting under the Directives and in the protection and management of Natura 2000 sites.

We present and educate about the sustainable coexistence of nature and man. Through participatory communication, we involve experts, interested people and the general public. For the purpose of raising awareness and education, we prepare publications – leaflets, brochures, the professional magazine Varstvo narave and outdoor informational boards.

Vloga ZRSVN pri ohranjanju dvoživk in obnovi njihovih habitatov

Barbara Kink, Zavod Republike Slovenije za varstvo narave, Slovenija

Zavod RS za varstvo narave je strokovna institucija, ustanovljena na podlagi Zakona o ohranjanju narave. Posebno skrb namenjamo naravovarstveno najvrednejšim delom narave ter najbolj ogroženim območjem in vrstam, torej tudi dvoživkam. V prispevku bomo predstavili sistem varstva narave v Sloveniji na primeru dvoživk.

Na območjih, ki so opredeljena kot naravovarstveno pomembnejša: naravne vrednote, ekološko pomembna območja, območja Natura 2000, zavarovana območja, habitatni tipi, ki se prednostno ohranjajo v ugodnem stanju in habitati zavarovanih rastlinskih in živalskih vrst izvajamo neposredne, posredne in izvedbene ukrepe varstva narave.

Zavod ima preko naravovarstvenih smernic pomemben vpliv na načrtovanje in urejanje prostora ter rabo naravnih dobrin (gozd, voda, mineralne surovine). Največ smernic izdelamo za občinske in državne prostorske dokumente na vseh nivojih načrtovanja. Smernice vsebujejo usmeritve, priporočila in pogoje za izvedbo predvidenih posegov. Pripravljamo strokovne podlage s področja ohranjanja narave za resorno ministrstvo in druge državne institucije, mnenja o sprejemljivosti posegov v naravo, mnenja na osnovi občinskih aktov ter druga mnenja in soglasja. Skozi te postopke v primerih prisotnosti dvoživk zagotavljamo ohranjanje življenjskega prostora, struktur in povezljivosti.

Spremljamo stanje ohranjenosti narave, skrbimo za varstvo vrst in njihovih habitatov ter naravnih vrednot, sodelujemo pri upravljanju zavarovanih območij. V okviru svojih zmožnosti zbiramo podatke o naravnih vrednotah in biotski raznovrstnosti, ki jih vnašamo v baze podatkov, v Naravovarstveni atlas in portal Sporoči vrsto. Kvalitetni podatki so pomembna podlaga našemu strokovnemu delu. Skrbimo za izvajanje različnih mednarodnih konvencij ter evropskih direktiv, kot je omrežje Natura 2000 z Direktivo o pticah in Direktivo o habitatih. Sodelovali smo v postopku dodelitve statusa posebnega varstvenega območja, sodelujemo pri poročanju po Direktivah ter pri varstvu in upravljanju območij Natura 2000. V okviru aktivnosti za območja Natura 2000 koordiniramo in usklajujemo tudi ukrepe varstva narave za dvoživke.

Predstavljamo in izobražujemo o trajnostnem sobivanju narave in človeka. S participativno komunikacijo vključujemo strokovno, zainteresirano in splošno javnost. Z namenom ozaveščanja in izobraževanja pripravljamo publikacije - zloženke, brošure, strokovno revijo Varstvo narave in označitve v naravi. Vključujemo se v izobraževalne programe na vseh starostnih stopnjah. Dvoživke so pomembni pokazatelji stanja okolja in so zato dober primer celovite komunikacije pomena ohranjanja narave.

We are involved in educational programmes at all ages. Amphibians are important indicators of the state of the environment and are therefore a good example of comprehensive communication of the importance of nature conservation. Through nature conservation actions and interventions, we carry out activities to improve the situation in nature, in connection with amphibians we mainly revitalize standing water surfaces and participate in campaigns for the transfer of amphibians across the road. We prepare and implement projects with which we apply for both domestic and international tenders; related to the preservation and improvement of amphibian populations, we have successfully implemented the following projects: 101kal, 1001kal, Sources of Life, WETMAN.

Z naravovarstvenimi akcijami in intervencijami izvajamo aktivnosti za izboljšanje stanja v naravi, v povezavi z dvoživkami predvsem revitaliziramo stoječe vodne površine in sodelujemo pri akcijah prenašanja dvoživk preko ceste. Pripravljamo in izvajamo projekte, s katerimi kandidiramo tako na domačih kot mednarodnih razpisih; vezano na ohranjanje in izboljšanje stanja populacij dvoživk smo uspešno izvedli naslednje projekte: 101kal, 1001kal, Viri življenja, WETMAN.

Conserving *Bufo calamita* and *Pelobates fuscus* within IP LIFE Atlantic Sand Landscapes in Lower Saxony, Germany.

Thomas Kutter, Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (NLWKN), Germany

The Integrated EU LIFE Project Atlantic Sand Landscapes (10/2016 - 09/2026) with a total budget of roughly 17 Mio € aims at improving the conservation status of 15 habitats and 10 species of the FFH-directive within the Atlantic Biogeographic Region of Germany. As North Rhine-Westphalia and Lower Saxony hold about 80% of Germany's Atlantic Region, both states cooperate in this project. *Bufo calamita* and *Pelobates fuscus* are among the target species of the project.

In Lower Saxony, the Lower Saxony Water Management, Coastal Protection and Nature Conservation Agency (NLWKN) is responsible for implementing the IP LIFE project. The agency is further responsible for the state's FFH-reporting and the corresponding data collections on habitats and species. Together with local partners, the agency has implemented habitat measures for *Pelobates fuscus* and/ or *Bufo calamita* in 21 project areas so far. About 10 more projects on these species are to be implemented within the IP LIFE. More than 1,000,000 € have been spent for habitat measures for target species projects within the IP LIFE Project. More than 400,000 € have been invested in data data collection to close the knowledge gaps on the distribution of the species and monitoring. Roughly 500,000 € have been raised as additional complementary founding for amphibian conservation leading to stand-alone projects.

An overall concept for *Bufo calamita* is in a draft stage. Details of an "overall concept" on the scale of a biogeographic region and federal state level as well as each habitat or species project on a local scale are demanding. By latest 2026 it should provide a clear guideline on implementing the prioritised action framework (PAF) for these species including sharp data on species and priority areas for conservation measures.

Varstvo *Bufo calamita* in *Pelobates fuscus* v IP LIFE Atlantske peščene pokrajine na Spodnjem Saškem, Nemčija

Thomas Kutter, Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (NLWKN), Nemčija

Integrirani projekt EU LIFE Atlantic Sand Landscapes (10/2016 – 09/2026) s skupnim proračunom približno 17 milijonov EUR je namenjen izboljšanju varstva 15 habitatov in 10 vrst iz direktive FFH v atlantski biogeografski regiji Nemčije. Ker zajemata Severno Porenje-Vestfalija in Spodnja Saška približno 80 % nemške atlantske regije, obe deželi sodelujeta pri tem projektu. Vrsti *Bufo calamita* in *Pelobates fuscus* sta med ciljnimi vrstami projekta.

V Spodnji Saški je za izvajanje projekta IP LIFE odgovorna Agencija Spodnje Saške za upravljanje z vodami, varstvo obale in varstvo narave (NLWKN), ki je odgovorna tudi za poročanje o FFH in za ustrezne zbirke podatkov o habitatih in vrstah dvoživk. Agencija je skupaj z lokalnimi partnerji doslej izvedla habitatne ukrepe za vrsto *Pelobates fuscus* oziroma *Bufo calamita* na 21 projektnih območjih. V zvezi s tema vrstama je v projektu IP LIFE predvidenih še približno 10 projektov. Za habitatne ukrepe v zvezi s ciljnimi vrstami v projektu IP LIFE je bilo porabljenih več kot 1.000.000 €, več kot 400.000 € pa je bilo vloženih v zbiranje podatkov, da bi zapolnili vrzeli v znanju o razširjenosti vrst dvoživk in v monitoringu. Približno 500.000 € dodatnih sredstev je bilo zbranih za samostojne projekte o varstvu dvoživk.

Pripravlja se celovit koncept za vrsto *Bufo calamita*. Priprava podrobnega »celovitega koncepta« v obsegu biogeografske regije in na deželni ravni ter tudi raznih projektov v zvezi s habitati oz. vrstami dvoživk na krajevni ravni je zelo zahtevna. Najpozneje do leta 2026 bi morale biti zagotovljene jasne smernice za izvajanje okvira prednostnih ukrepov (PAF) za te vrste, vključno z natančnimi podatki o vrstah in prednostnih območjih za varstvene ukrepe.

20 Years of Experience on Habitat Restoration and Population Management for Threatened Amphibian Species as *Bombina bombina*, *Hyla arborea*, *Epidalea calmita*, *Pelobates fuscus* and *Bufo viridis*

Hauke Drews, Stiftung Naturschutz Schleswig-Holstein, Germany

For these species the amphibian initiative was started in 2002 because previous conservation efforts within the agri-environmental program had no effect on threatened amphibian species.

The best available knowledge from Amphi Consult Denmark was combined with large areas owned by the state conservation foundation of Schleswig-Holstein (Stiftung Naturschutz Schleswig-Holstein) to implement a long term conservation program based on many single projects. Based on the state database small populations of the target species were selected in areas, where the foundation owns land.

The implementation process gave the amphibian experts free hands and a daily monitoring of the excavator work allowed to shape the ponds according to the conditions at the site and the needs of the target specie, so that potential breeding ponds, where created newly, reactivated or improved. For long term management the ponds ere located in pastures or the management was change to pasture without fertilizer and herbicide application. Meantime all habitat requirements are taken into account according to a habitat complex concept, as hibernation sites, migration routes and new key factors as land habitats were detected.

For several species reserve populations were made and new populations were established by habitat management and follow up population management actions.

Today the program is ongoing. The combination of habitat management and reintroduction by population management became a standard tool in amphibian protection.

The populations treated with this program are thriving and expanding in many cases. *Bombina bombina´*s red list status was threatened to extinction (RL-SH 1) in 2003 and in 2021 threatened (RL-SH 2). That is the first time in Germany that for a threatened amphibian species a change of the negative trend was initiated by a conservation program.

20 let izkušenj z obnovo habitatov in upravljanjem populacij ogroženih vrst dvoživk *Bombina bombina*, *Hyla arborea*, *Epidalea calmita*, *Pelobates fuscus* in *Bufo viridis*

Hauke Drews, Stiftung Naturschutz Schleswig-Holstein, Nemčija

Pobuda za te vrste dvoživk se je začela leta 2002, ker predhodna prizadevanja v okviru kmetijsko-okoljskega programa niso bila učinkovita za ogrožene vrste dvoživk.

Dansko podjetje Amphi Consult je z najboljšim razpoložljivim znanjem prispevalo k izvajanju dolgoročnega programa varstva dvoživk, ki temelji na številnih posameznih projektih za večja območja v lasti državne varstvene fundacije Schleswig-Holstein (Stiftung Naturschutz Schleswig-Holstein). Na podlagi državne baze podatkov so bile izbrane majhne populacije ciljnih vrst na območjih, kjer je fundacija lastnica zemljišča.

Postopek implementacije je dal strokovnjakom za dvoživke proste roke, vsakodnevno spremljanje izkopavanja pa je omogočilo, da so mlake oblikovali glede na razmere na kraju in potrebe ciljne vrste. Tako so ponovno aktivirali mrestišča, jih izboljšali ali ustvarili nova. V primerih mlak na pašnikih so upravljanje pašnikov spremenili tako, da se tam ne uporablja več gnojil in herbicidov. Upoštevane so vse habitatne zahteve v skladu s pojmom habitatnega kompleksa ob odkrivanju mest prezimovanja, selitvenih poti in novih ključnih dejavnikov, kot so kopenski habitati.

Za več vrst so bile ustvarjene rezervne populacije, z upravljanjem habitatov in nadaljnjimi ukrepi upravljanja populacij pa so bile vzpostavljene nove populacije.

Program še vedno poteka. Združitev upravljanja habitatov in ponovne uvedbe z upravljanjem populacij je postala standardno orodje pri zaščiti dvoživk.

Populacije, ki jih ta program obravnava, v številnih primerih uspevajo in se širijo. Vrsti *Bombina bombina*, ki je bila še leta 2003 na rdečem seznamu vrst (RL-SH 1), od leta 2021 ne grozi več izumrtje (RL-SH 2). To je v Nemčiji prvič, da je za ogroženo vrsto dvoživk spremembo negativnega trenda sprožil tak varstveni program.

Protection of *Pelobates fuscus* and *Triturus cristatus* in Intensively Used Agricultural Areas of Estonia

Riinu Rannap, University of Tartu, Estonia

Large areas of naturally open sun exposed habitats, such as inland dunes, heaths, meadows, as well as wetlands and freshwater bodies, have vanished during the second half of the 20th century due to afforestation, drainage, intensification of agriculture or mismanagement. These habitats are vital for a variety of amphibians including *Pelobates fuscus* and *Triturus cristatus*. The county inventories carried out 2008–2014 in Estonia, covering 3179 small water bodies and wetlands, demonstrated that larvae of *Triturus cristatus* were present on average in 14% and larvae of *Pelobates fuscus* in only 4% of the water bodies studied. As a result of the extensive habitat loss *Pelobates fuscus* and *Triturus cristatus*, once widespread and numerous species, are presently in decline in Estonia. To secure the populations of these species, particularly in intensively used agricultural areas, a large-scale aquatic habitat restoration is being implemented in 2021–2025 in nine Natura 2000 sites in the vicinity of large agricultural areas. This work is being done as part of the LIFE-IP project ForEst&FarmLand (LIFE18IPE/EE/000007). In doing so, we draw on the experience of two previous LIFE projects: "Protection of *Triturus cristatus* in the eastern Baltic region" (LIFE2004NAT/EE/000070) and "Securing *Leucorrhinia pectoralis* and *Pelobates fuscus* in the northern distribution area in Estonia and Denmark" (LIFE08NAT/EE/000257). In the course of these abovementioned projects, 347 small water bodies were reconstructed on a landscape scale in Estonia. Such aquatic habitat restoration resulted in immediate success for *Pelobates fuscus* and *Triturus cristatus*. In only three years after reconstruction, the number of ponds with *Pelobates fuscus* larvae increased 6.5 and the *Triturus cristatus* larvae 2.5 times. After five years *Pelobates fuscus* larvae were found in 40% and *Triturus cristatus* larvae in 82% of reconstructed ponds.

Varstvo *Pelobates fuscus* in *Triturus cristatus* v območjih intenzivnega kmetijstva v Estoniji

Riinu Rannap, Univerza v Tartuju, Estonija

V drugi polovici 20. stoletja so zaradi pogozdovanja, izsuševanja, intenzifikacije kmetijstva ali slabega gospodarjenja izginila velika območja naravno odprtih in soncu izpostavljenih habitatov, kot so sipine, vresišča, travniki, pa tudi mokrišča in sladkovodna telesa. Ti habitati so ključnega pomena za različne vrste dvoživk, med temi *Pelobates fuscus* in *Triturus cristatus*. Okrajni popisi, opravljeni med letoma 2008 in 2014 v Estoniji, ki zajemajo 3.179 manjših vodnih teles in mokrišč, so pokazali, da so bile ličinke vrste *Triturus cristatus* navzoče v povprečju v 14 % proučenih vodnih teles, ličinke vrste *Pelobates fuscus* pa v samo 4 %. Zaradi obsežne izgube habitata nekoč zelo razširjeni in številčni vrsti *Pelobates fuscus* in *Triturus cristatus* v Estoniji trenutno upadata. Za varstvo populacij teh vrst, zlasti na območjih z intenzivnim kmetovanjem, se v letih 2021–2025 izvaja obsežna obnova vodnih habitatov na devetih območjih Natura 2000 v bližini velikih kmetijskih površin. To delo poteka v okviru projekta LIFE-IP ForEst&FarmLand (LIFE18IPE/EE/000007). Pri tem se opiramo na izkušnje dveh prejšnjih projektov LIFE: »Zaščita vrste *Triturus cristatus* v vzhodni baltski regiji« (LIFE2004NAT/EE/000070) in »Zaščita vrst *Leucorrhinia pectoralis* in *Pelobates fuscus* na severnem območju razširjenosti v Estoniji in na Danskem« (LIFE08NAT/EE/000257). V okviru omenjenih projektov je bilo v Estoniji krajinsko rekonstruiranih 347 majhnih vodnih teles. Ta obnova vodnih habitatov se je takoj izkazala za učinkovito za vrsti *Pelobates fuscus* in *Triturus cristatus*. V samo treh letih po rekonstrukciji je bilo šestkrat in pol več mlak z ličinkami vrste *Pelobates fuscus* in dvakrat in pol več mlak z ličinkami vrste *Triturus cristatus*. Po petih letih so bile ličinke vrste *Pelobates fuscus* v 40 % rekonstruiranih mlak, ličinke vrste *Triturus cristatus* pa v 82 %.

Habitat Restoration for *Pelobates fuscus* in Northwest Italy: Cases and Strategy within the Project LIFE Insubricus

Daniele Seglie[1], Paolo Eusebio Bergò[1], Giovanni Soldato[1]
[1]ELEADE Soc. Coop., Italy

Pelobates fuscus has undergone a drastic decline in Italy over the last 50 years; the rapid disappearance of the Italian populations makes the Spadefoot toad one of the species at greatest risk of extinction in our country.

Its decline was determined by the progressive reduction of aquatic habitats suitable for reproduction, a consequence of the rapid soil consumption in the Po valley, the degradation of riverine ecosystem and the introduction of alien species.

The heart of LIFE insubricus project (LIFE19-NAT/IT/000883 INSUBRICUS - https://www.lifeinsubricus.eu/) is the realization of habitat restoration interventions aimed at improving the conservation status of the few remaining Italian populations. and also, to create new populations through restocking and reintroduction.

This work illustrates the conservation strategy used in the Project by describing some of the first interventions implemented in the Special Area of Conservation IT2010011 "Paludi di Arsago" (VA, Lombardia).

The presentation also describes the techniques of breeding in semi-captivity of the larvae, methodology at the basis of the planned restocking/reintroduction interventions, recently successfully developed and tested in the field.

Obnova habitatov *Pelobates fuscus* na severozahodu Italije: primeri izvedbe in načrtovanja ukrepov v projektu LIFE Insubricus

Daniele Seglie[1], Paolo Eusebio Bergò[1], Giovanni Soldato[1]
[1]ELEADE Soc. Coop., Italija

Vrsta *Pelobates fuscus* je v Italiji v zadnjih 50 letih doživela drastičen upad; zaradi hitrega izginotja italijanskih populacij je navadna česnovka ena izmed vrst, ki jim pri nas najbolj grozi izumrtje.

Upad populacije te vrste je posledica postopnega zmanjševanja vodnih habitatov, primernih za razmnoževanje, ki ga povzročajo hitra raba tal v Padski nižini, degradacija rečnega ekosistema in vnos tujerodnih vrst.

Jedro projekta LIFE insubricus (LIFE19-NAT/IT/000883 INSUBRICUS - https://www.lifeinsubricus.eu/) je izvedba posegov za obnovo habitatov, katerih cilj je izboljšati varstvo tistih italijanskih populacij, ki še ostajajo, pa tudi ustvarjanje novih populacij z obnavljanjem staležev in ponovnim naseljevanjem.

Prispevek ponazarja strategijo varstva, uporabljeno v projektu, z opisom prvih posegov, ki so bili izvedeni na posebnem območju IT2010011 "Paludi di Arsago" (VA, Lombardija).

V predstavitvi so opisane tudi tehnike vzreje ličink v polujetništvu ter osnovna metodologija načrtovanih posegov za obnovo staleža oz. ponovno naselitev, ki je bila nedavno uspešno razvita in preizkušena na terenu.

Measures for Improving the Habitat of Italian Agile Frog (*Rana latastei*) Population in Vipava Valley

Tomaž Remžgar, Fisheries Research Institute of Slovenia, Slovenia

Habitat loss and degradation is the main threat to most European amphibians. The Italian agile frog (*Rana latastei*) is no exception, as the loss of suitable habitat is considered the main reason for the species' steep decline across its entire range. This small brown frog is endemic to the wider area of the Po Valley, and in the past it inhabited an area between Eastern Italy and Western Slovenia. its typical habitat are lowland forests, most often *Querco-Carpinetum*, interspersed with small streams. This habitat is characterized by highly instable hydrological parameters, to which the Italian agile frog has adapted by having a short life span and high variability in yearly population density.

Estimates show that today the Italian agile frog inhabits only around 5 % of its former range and it is considered one of the critically endangered European amphibians. Small, localized populations are nowadays scattered throughout Northern Italy and Southern Switzerland, the only areas still containing large populations with several thousand individuals are found in Western Slovenia and in Croatia.

The first find of Italian agile frog in Slovenia was in the beginning of the 20th century near Nova Gorica, but it took another 80 years before herpetologists started to discover the true status of the species. Today the Slovenian population of the Italian agile frog is grouped into six meta-populations, four of which are located in the Vipava Valley. Most of the local populations of the Italian agile frog in the Vipava Valley are located no more than 500 m apart, which enables migration of individuals between them and a steady gene flow. Protection of the Slovenian populations of the Italian agile frog is therefore extremely important for the survival of the specie in the future.

The Italian agile frog is one of the target species of the environment protection project named VIPava, which aims to restore its habitat on the bank of the Vipava river, close to the village of Brje. Before 1980, Vipava in this area formed a large, northern oriented bend. After the river was regulated and its stream straightened the bend was turned into a side channel, but after years of seasonal flooding the channel got slowly clogged with fine sediment and debris, and during the dry months of the year parts of it dried up. During restoration works, we removed the debris from the mouth of the channel.

Additionally, we created two ponds in the western part of the area in a location of a shallow depression. Both ponds were made deep enough to contain water all year round. Beforehand the location was flooded during spring rain and Italian agile frogs laid their eggs here, but during the dry period of the year much of the water dried up which led to the death of the tadpoles.

Varstveni ukrepi za izboljšanje stanja populacije laške žabe (*Rana latastei*) v Vipavski dolini

Tomaž Remžgar, Zavod za ribištvo Slovenije, Slovenija

Degradacija in fragmentacija mokrišč je glavni vzrok za ogroženost večine evropskih vrst dvoživk. Laška žaba (*Rana latastei*) ni nobena izjema, saj je njena populacija v 20. stoletju zaradi izgube življenjskega okolja doživela močan upad na celotnem arealu. Ta manjša vrsta rjavih žab je endemit širšega območja Padske nižine in je v preteklosti poseljevala sklenjeno območje med vzhodno Italijo in zahodno Slovenijo ter hrvaško Istro. Njeno tipično življenjsko okolje prestavljajo nižinski hrastovo-belogabrovi gozdovi, prepredeni s potoki in manjšimi rekami. To življenjsko okolje zaznamujejo izrazito nestabilne hidrološke razmere, kar se pri laški žabi kaže v prilagoditvah kot so kratkoživost osebkov ter visoka vsakoletna nihanja v populacijskih gostotah.

Ocene kažejo, da danes laška žaba poseljuje le še okoli 5 % nekdanjega območja razširjenosti ter je tako postala ena najbolj kritično ogroženih dvoživk v Evropi. Manjše, lokalizirane populacije se nahajajo v južni Švici in severni Italiji, večje sklenjene populacije, ki štejejo po več tisoč osebkov, pa lahko najdemo le še na vzhodnem delu areala vrste, v Sloveniji in na Hrvaškem.

V Sloveniji je bila laška žaba prvič najdena v začetku 20. stoletja v bližini Nove Gorice, pravo sliko njene razširjenosti in številčnosti pa so herpetologi pričeli odkrivati šele dobrih 80 let kasneje. Danes v Sloveniji poznamo 6 večjih meta populacij laške žabe, od katerih se 4 nahajajo v Vipavski dolini. Večina lokalnih populacij laške žabe v Vipavski dolini je manj kot 500 m oddaljenih ena od druge, kar omogoča prehajanje osebkov med njimi in posledično nemoten genski tok. Populacije laške žabe v Sloveniji so tako ključne za nadaljnji obstoj vrste, tako iz vidika številčnosti osebkov, kot njihove genske pestrosti.

V sklopu naravovarstvenega projekta VIPava smo za namen dolgoročnega varstva laške žabe v Vipavski dolini izvedli ukrepe za izboljšanje njenega stanja na območju nekdanjega okljuka reke Vipave pri kraju Brje. Med regulacijo reke Vipave v 80.-ih letih se je omenjeni okljuk spremenilo v stranski rokav, a je voda z leti v rokav odlagala vedno večje količine sedimentov, tako da je v sušnem delu leta, del rokava presušil. V sklopu ukrepov smo odstranili nanos sedimentov v začetnem delu rokava.

Dodatno smo na zahodnem delu območja, na obstoječi plitvi depresiji izkopali dve mlaki, ki sta dovolj globoki, da vsebujeta vodo tudi v sušnem delu leta. Pred posegi je med spomladanskim deževjem voda napolnila depresijo, a se je nato tekom sušnega dela leta v večini izsušila, kar je vodilo v propad paglavcev.

To estimate the effect of the restoration we compared the number of breeding Italian agile frog individuals before and after the work took place. Results showed a 68 % increase in the number of egg clutches laid in the year after restoration. The change was especially noticeable in the area where we created the ponds, as the number of egg clutches laid there increased ten times.

The new ponds showed to be an overall improvement since they also attracted other marshland species. The common toads (*Bufo bufo*) spawned there in great numbers and a very pleasant surprise was the appearance of European pond terrapins (*Emys orbicularis*).

Učinek ukrepov smo merili s primerjavo številčnosti osebkov laške žabe med mrestenjem pred izvedenimi ukrepi ter po njih. Rezultati so pokazali za 68 % povečanje števila odloženih mrestov po izvedenih ukrepih. Pozitiven učinek ukrepov se je še posebej pokazal v novo izkopanih mlakah, kjer se je število odloženih mrestov povečalo za več kot 10 krat.

Poleg laških žab so mlake za mrestenje izkoristile tudi navadne krastače (*Bufo bufo*), pozitivno nas je presenetilo tudi pojavljanje več osebkov močvirske sklednice (*Emys orbicularis*).

Interannual Difference in Amphibian Reproduction and Complications for Conservation

Wouter de Vries – EPMAC & Soontiens Ecology, Spain

Most amphibian species of Europe reproduce in waters that are out of reach of larger predatory fish. Consequently, populations live and thrive in areas that do not have water continuously and that are on a larger distance from waters with a permanent fish population. Enormous flood zones around streams and rivers may be an intermediate habitat. As a response to the amount of available ideal waters for reproduction and development of the larvae, the proportion of the population that is breeding varies among years. Vivid populations may have any or low reproduction success in a specific year or consecutive years. In some areas this may be for the temporary presence of large fish populations, in others for the lack or small amount of rain or water in the reproduction sites. The populations are adapted to the natural dynamics. However, the results of surveys and one-season-based studies on populations are affected by these distinct conditions. This is especially the case as most European amphibians are easiest detected in the breeding period.

The results of 10 years of annual systematic amphibian monitoring in Sierra Norte natural park (SW Spain) and around Bialowieza National Park (NE-Poland) shows the large fluctuation in results in between years in the same sites. When there is low precipitation and waters are not formed, most species are detected in 30-50 precent of sites with a large population using similar techniques. Reproduction is detected in a much lower proportion of sites in years with few water. In SW-Spain the presence of water depends (in large amount) on the amount of precipitation in the period September – May. In NE-Poland the presence of water in sites and floodzones is in part related to the amount of precipitation in spring but is also related to the amount of snow and ice in winter.

For environmental impact assessments and for the development of species action plans the large fluctuation in detectability of the populations has to be considered. The results of field surveys in the breeding habitat in years with low water levels, may give an underestimation of the importance for the populations of many species. Studies require several years or the combination of techniques in order to develop appropriate conservation, mitigation and compensation measures. The EPMAC (Educative and Participative Monitoring for Amphibain Conservation) can be used as a reference for the interpretation of other studies in the region.

Težave pri varstvu dvoživk zaradi različnega razmnoževalnega uspeha med leti

Wouter de Vries – EPMAC & Soontiens Ecology, Španija

Večina vrst dvoživk v Evropi se razmnožuje v vodah, ki niso dostopne večjim plenilskim ribam. Dvoživke zato živijo in uspevajo na območjih, kjer ni neprekinjenih vodnih teles in so na večji oddaljenosti od voda s stalno ribjo populacijo. Obširna poplavna območja okoli potokov in rek so lahko vmesni habitat. Glede na količino razpoložljive vode za razmnoževanje in razvoj ličink se delež populacije, ki se razmnožuje, med leti razlikuje. Dinamične populacije imajo lahko v določenem letu ali zaporednih letih manjši uspeh razmnoževanja ali ga celo nimajo. Na nekaterih območjih je za to lahko kriva začasna navzočnost velikih populacij rib, na drugih pa pomanjkanje ali nezadostne količine dežja oziroma vode na območjih razmnoževanja. Populacije so prilagojene naravni dinamiki. Vendar pa ti specifični pogoji vplivajo na rezultate raziskav in enoletnih študij o populacijah. To še posebej velja, kjer je večino evropskih dvoživk najlaže odkriti v času razmnoževanja.

Izsledki 10 let sistematičnega spremljanja dvoživk v naravnem parku Sierra Norte (JZ Španija) in okoli narodnega parka Bialowieza (SV Poljska) kažejo veliko nihanje rezultatov med leti na istih lokacijah. Kadar je malo padavin in se ne nabere voda, je večino vrst mogoče opaziti na 30 do 50 odstotkih območij z veliko populacijo s podobnimi tehnikami. V letih z malo vode je razmnoževanje opaziti na bistveno manjšem deležu območij. V JZ Španiji je navzočnost vode (v veliki količini) odvisna od količine padavin v obdobju od septembra do maja. Na SV Poljskem je navzočnost vode na poplavnih območjih deloma povezana s količino padavin spomladi, vendar je povezana tudi s količino snega in ledu pozimi.

Za oceno vpliva na okolje in za razvoj akcijskih načrtov za te vrste je treba upoštevati veliko nihanje v zaznavnosti populacij. Izsledki terenskih raziskav ploditvenega habitata v letih z nizkimi vodostaji lahko privedejo do podcenjevanja pomena populacij številnih vrst. Študije zahtevajo več let in kombinacijo tehnik zato, da se razvijejo ustrezni ukrepi za varstvo, ublažitev in kompenzacijo. Za razlago drugih študij v regiji se lahko kot referenco uporablja EPMAC (Edukativni in participativni monitoring varstva dvoživk).

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Učinek ukrepov smo merili s primerjavo številčnosti osebkov laške žabe med mrestenjem pred izvedenimi ukrepi ter po njih. Rezultati so pokazali za 68 % povečanje števila odloženih mrestov po izvedenih ukrepih. Pozitiven učinek ukrepov se je še posebej pokazal v novo izkopanih mlakah, kjer se je število odloženih mrestov povečalo za več kot 10 krat.

Poleg laških žab so mlake za mrestenje izkoristile tudi navadne krastače (*Bufo bufo*), pozitivno nas je presenetilo tudi pojavljanje več osebkov močvirske sklednice (*Emys orbicularis*).

To Dig or Not To dig? Experience on Water Habitats Creation in Ljubljansko Barje Landscape Park

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In autumn 2020, Krajinski Park Ljubljansko barje Public Institute ordered the construction of 82 new water bodies for the fire-bellied toad (*Bombina variegata*) and the European pond turtle (*Emys orbicularis*). Measures were conducted within the »Restoration and Conservation of Ljubljansko barje Wetland Habitats« (PoLJUBA) project, which is financed by the European Regional Development Fund and the Republic of Slovenia. Prior to the construction works being implemented, nature conservation permit, cultural conservation permit, water permit and landowners' agreement were required to be obtained. The process of gaining permits, including documentation preparation, took about 6 months. In the permits, some additional demands from the authorities were defined and had to be fulfilled either prior to, during or after the works. Diggings were done by an excavator and archaeological documentation was done while digging on location. The implementation of groundworks took 15 working days. After construction, new water bodies were left to be filled up with water spontaneously. Only natural succession took place. There was no systematic monitoring of newly created water habitats. We learned that water levels between different ponds varied, especially during summer drought. Some of the ponds dried up completely, while others kept water year-around. The experience gained with this project will help us plan additional water habitats in other similar projects.

Kopati ali ne kopati? Izkušnje pri vzpostavitvi novih vodnih habitatov v Krajinskem parku Ljubljansko barje

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V Krajinskem parku Ljubljansko barje smo jeseni 2020 izkopali 82 novih vodnih teles za hribskega urha (*Bombina variegata*) in močvirsko sklednico (*Emys orbicularis*). Ukrepi so bili izvedeni v okviru projekta »Obnovitev in ohranjanje mokrotnih habitatov na območju Ljubljanskega barja« (PoLJUBA), ki ga sofinancirata Evropska unija iz Evropskega sklada za regionalni razvoj in Republika Slovenija. Pred izgradnjo vodnih teles je bilo potrebno pridobiti naravovarstveno, kulturnovarstveno in vodno soglasje ter soglasje lastnikov zemljišč. Pridobivanje soglasij, skupaj s pripravo vlog, je trajalo približno pol leta. V soglasjih so bili definirani dodatni pogoji, ki jih je bilo potrebno upoštevati pred, med in po izkopu. Izkopi so bili opravljeni strojno z bagrom, ob izgradnji pa je potekalo arheološko dokumentiranje. Izkopi na terenu so trajali 15 delovnih dni. Po izkopu so bila vodna telesa prepuščena spontani napolnitvi z vodo in naravni sukcesiji. Sistematičnega spremljanja vodnih teles po izkopu ni bilo. Vodostaji po napolnitvi z vodo so se med posameznimi vodnimi telesi razlikovali, predvsem v sušnem času. Nekatera vodna telesa so popolnoma presahnila, druga so obdržala vodo tekom celega leta. Izkušnje, pridobljene z izgradnjo vodnih teles, bomo lahko prenesli v druge podobne projekte.

Problems and Proposals for Improvements in the Implementation of Mitigation Measures for the Protection of Amphibians

Metod Rogelj and Sonja Rozman, Institute of the Republic of Slovenia for Nature Conservation, Regional unit Kranj, Slovenia

Urbanisation pressure is large, especially in the lowland areas of the Gorenjska region. Urban areas expand into nature, especially to economically less important areas, including wetlands. Industrial and commercial areas are often in the vicinity of main traffic connections but also away from settlements, so they degrade areas that are important for habitat integrity and connectivity.

The Komenda commercial area spreads across the 93 ha and is placed in the lowland forest complex with a large proportion of wetlands. Small local clay pits were scattered in the forest and became important for amphibian spawning and the surrounding forest was their terrestrial habitat. Therefore, the area was very important to amphibians.

Due to strong economic interest, a commercial area was built here. It has been slightly reduced to protect biodiversity, and some mitigation measures have been implemented. Mitigation measures have been focused mostly on replacing the habitats for spawning. Due to the important population of the yellow-bellied toad (*Bombina variegata*), those habitats were created like small water bodies. Twelve shallow water bodies have been located on the meadow between the corn field and forest edge. Water resistance was ensured by impermeable foil. The corn field was later turned into a meadow. Later, 6 new, deeper water bodies were put in the forest, on the area with clay ground, so the water resistance was ensured by the clay.

An amphibian fence has been erected on the border between the commercial area and the forest to prevent amphibians from accessing the commercial area.

In the first spring after the arrangement of the small water bodies, yellow-bellied toads were observed. In that period it became clear that the water bodies need to be maintained frequently, regularly and carefully. As they were not managed, they were soon overgrown with broadleaf cattail (*Typha latifolia*) and due to evaporation and/or permeability of the substrate, also dry. Amphibian fences have been effective, but some sections needed to be rebuilt.

Initially the understanding of the importance of monitoring and managing mitigation measures by the commercial area manager was poor. The problem even had to be solved through the Inspectorate for the Environmental and Spatial Planning.

Problematika in predlogi izboljšav izvajanja omilitvenih ukrepov za varstvo dvoživk na primeru konkretnega gradbenega posega

Metod Rogelj in Sonja Rozman, Zavod RS za varstvo narave, Območna enota Kranj, Slovenija

Soočamo se z velikim pritiskom urbanizacije na Gorenjskem predvsem v nižinskem svetu. Urbana območja se širijo v naravna okolja, predvsem v ekonomsko manj vredna območja, med katerimi so tudi mokrišča. Industrijske in poslovne cone so pogosto v bližini glavnih prometnic, a hkrati odmaknjena od naselij, tako da prizadenejo območja, ki so pomembna za zagotavljanje celovitosti in povezanosti habitatov.

Poslovna cona Komenda obsega 93 ha in je bila umeščena v nižinski kompleks gozda z velikim deležem mokrišč. Na območju so bili nekoč majhni lokalni glinokopi, ki so po opustitvi postali pomembna mrestišča dvoživk, okoliški gozd pa je zagotavljal kopenski habitat. Območje je bilo tako zelo pomembno za dvoživke.

Poslovna cona je bila zgrajena zaradi močnih ekonomskih interesov. Zaradi varstva biodiverzitete je bil obseg poslovne cone nekoliko zmanjšan in izvedeni nekateri omilitveni ukrepi. Ti so bili usmerjeni predvsem v nadomestitev mrestišč. Zaradi pomembne populacije hribskih urhov (*Bombina variegata*) so bila mrestišča urejena v obliki majhnih vodnih teles (luž). Dvanajst luž je bilo urejenih na travniku med koruzno njivo in gozdnim robom. Vododržnost so zagotovili z neprepustno folijo. Koruzno njivo so kasneje spremenili v travnik. Naknadno je bilo izkopanih še šest globljih vodnih teles v gozdu, na območju z zaglinjenimi tlemi, ki so z nekaj dodatne gline zagotavljala vododržnost.

Postavljena je bila tudi ograja za dvoživke na meji med gozdom in poslovno cono, ki je preprečevala prehod dvoživk na območje pozidanih površin.

Prvo pomlad po ureditvi so bili v nadomestnih habitatih opaženi prvi mresti zelenih žab in hribskih urhov. Še v isti sezoni se je pokazalo, da je kotanje treba pogosto, redno in skrbno vzdrževati. Ker niso bile vzdrževane, so bile kmalu zaraščene in zaradi evaporacije ter prepustnosti podlage tudi suhe. Zaščite za preprečevanje migracije dvoživke so bile učinkovite, a mestoma jih je bilo treba obnoviti.

Razumevanje pomena spremljanja stanja in vzdrževanja nadomestnih habitatov s strani upravljavca poslovne cone je bilo sprva slabo. Težavo je bilo treba reševati tudi preko inšpekcijskih služb. Sčasoma se je odnos do nadomestnih habitatov izboljšal, še vedno pa je bilo treba precej angažiranja s strani Zavoda RS za varstvo narave.

Over time, the attitude has changed, but the Institute of the RS for Nature Conservation still needs to be involved in monitoring and acting.

Practice therefore says that mitigation measures must be provided in such a way that they will require the minimum observation and management. If this is not the case, there is a high probability that the mitigation measures will not be properly maintained and will not achieve their goals.

The goal of all entities involved in the operation of mitigation measures must be its effectiveness, without additional burdens on all entities. That goal must be considered in the early phases of decision-making. Otherwise mitigation measures will only become a bypass to obtaining permits and the consequences for amphibians will be devastating. And finally, mitigation measures have only mitigated the amphibians' breeding sites, but not the habitats where they live most of the year and are important for feeding, wintering, migration. In the future the conservation of all parts of the amphibians' habitat should be considered.

Praksa torej kaže, da morajo biti nadomestni habitati načrtovani tako, da potrebujejo čim manj opazovanja in upravljanja oziroma sprotnega vzdrževanja. Če tega ni, obstaja velika verjetnost, da nadomestni habitati ne bodo ustrezno vzdrževani in ne bodo dosegali svojega namena. Cilj vseh v delovanje nadomestnih habitatov in omilitvenih ukrepov vključenih subjektov mora biti »samoumevno« delovanje in učinkovitost. Brez dodatnih obremenjevanj vseh subjektov, kar je treba upoštevati tudi že v fazah presoj in odločanj. Sicer bodo nadomestni habitati postali le sredstvo za pridobivanje soglasij in dovoljenj za graditev, posledice za dvoživke pa uničujoče.

Omilitveni ukrepi so bili usmerjeni samo v omilitev izgube mrestišč, ne pa v ohranjanje habitatov, v katerem dvoživke preživijo večino leta, se v njem hranijo, prezimujejo in se selijo. V prihodnje se bo treba pri ohranjanju dvoživk osredotočiti v ohranjanje vseh delov njihovega habitata.

The Importance of Small Waterbodies in the Predominantly Karstic Landscape of South-Western Slovenia: Ponds as Habitats for Amphibians

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During a 2-year study in SW Slovenia, carried out within the Interreg ITA-SLO project ENGREEN, we investigated ponds and similar waterbodies together with their amphibian communities. The study took place in the sub-Mediterranean part of Slovenia and included karst (limestone) areas, i.e. the Kras, Trnovski gozd and Banjšice plateaus, but also Istra and Brkini, characterised by flysch. These landscapes predominantly lack surface waters and are unevenly and sparsely populated. Traditional agricultural practises in the past led to the construction of semi-artificial water reservoirs such as ponds, wells and walled water springs. Many of them became semi-natural wetlands that form a network of suitable stepping stone biotopes for large numbers of species and also provide ecosystem services. As such, they are now recognised as important sites for the conservation of freshwater biodiversity and as 'green infrastructure'. However, the decline in agricultural livelihoods has led to the degradation and, in many places, the complete disappearance of these habitats. Where ponds are still maintained, new threats (e.g. pollution by agrochemicals, introduction of alien invasive species such as fish) to autochthonous species are emerging. The loss of these waterbodies increases pressure on already threatened and fragmented populations of amphibians and other aquatic organisms.

The aim of our study was to: (i) review the availability and condition of surface aquatic habitats in SW Slovenia; (ii) assess the composition of their amphibian communities.

The locations of ponds were identified from various databases and by enquiries with local people. We visited 360 waterbodies in SW Slovenia that we assumed could be important amphibian habitats. Besides typical ponds with clay or rocky bottoms, we also examined accessible and partially vegetated wells, springs, concrete reservoirs and trenches. Of the sites checked, 42 (12%) were permanently dry, overgrown or filled with material, and another 88 sites (24%) were temporarily dry but appeared to be active in recent months and could be suitable for amphibians. The remaining 230 sites were mostly permanently water-bearing ponds and wells, of which 63 harboured alien species, mostly goldfish (*Carassius auratus*) (18% of all or 27% of water-bearing ponds) and 167 where no fish were detected (46% of all or 73% of water-bearing ponds).

Pomen malih vodnih teles v pretežno kraški pokrajini jugozahodne Slovenije: kali kot habitat dovživk

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Med dvoletno raziskavo, ki smo jo izvajali v okviru projekta ENGREEN Interreg ITA-SLO v JZ Sloveniji, smo proučevali kale in podobna vodna telesa ter združbo dvoživk v njih. Študija je potekala v submediteranskem delu Slovenije in je zajela kraška (apnenčasta) območja Krasa, Trnovskega gozda in Banjšic ter flišna območja Istre in Brkinov. Ta območja so pretežno brez površinskih voda in so neenakomerno in redko poseljena, zato so v preteklosti za potrebe preskrbe s pitno vodo za ljudi in živino tu zgradili vodne zadrževalnike, kot so kali, vodnjaki in »velbani« studenci. Mnogi od teh so sčasoma postali bivališča številnih vrst ter tvorijo mrežo vodnih biotopov in zagotavljajo ekosistemske storitve. Prepoznani so kot pomembni habitati za ohranjanje biotske raznovrstnosti in kot „zelena infrastruktura“. Zaradi spremenjene in zmanjšane kmetijske prakse so ta vodna telesa zdaj degradirana in ponekod popolnoma izginila. Kjer kale še vedno aktivno vzdržujejo, se pojavljajo nove grožnje avtohtonim vrstam (npr. onesnaževanje s kemikalijami iz kmetijstva, vnos tujerodnih invazivnih vrst, predvsem rib). Izguba teh vodnih teles povečuje pritisk na že ogrožene in razdrobljene populacije dvoživk in drugih vodnih organizmov na proučevanem območju.

Cilj naše raziskave je bil: (i) pregledati razpoložljivost in stanje površinskih vodnih habitatov v JZ Sloveniji; (ii) oceniti sestavo združb dvoživk.

Lokacije kalov in drugih vodnih teles smo pridobili iz različnih podatkovnih baz in s poizvedovanjem pri domačinih. Obiskali smo 360 vodnih teles v JZ Sloveniji, za katera smo domnevali, da bi lahko bili pomembni habitati za dvoživke. Poleg tipičnih kalov z ilovnatim ali kamnitim dnom smo pregledali tudi dostopne in delno obrasle »štirne«, »velbane« studence, betonske rezervoarje in korita. Od pregledanih vodnih teles je bilo 42 (12 %) trajno suhih, zaraščenih ali zasutih, 88 (24 %) pa je bilo začasno suhih, vendar so potencialno primerna za dvoživke. Preostalo so bili večinoma trajno vodnati kali in vodni zbiralniki (230), izmed katerih smo v 63 našli tujerodne živalske vrste, večinoma zlate ribice (*Carassius auratus*) (18 % vseh lokacij ali 27 % vodnatih kalov), v 167 pa rib nismo odkrili (46 % vseh ali 73 % vodnatih kalov). V vodnih telesih smo odkrili 11 taksonov dvoživk (prikazano število v kalih brez/z ribami).

We detected 11 amphibian taxa in the waterbodies (reported numbers in ponds without/with fish); smooth newts (*Lissotriton vulgaris*: 87/15) were most common, followed by agile frogs (*Rana dalmatina*: 60/23), Italian crested newts (*Triturus carnifex*: 64/7) and common toads (*Bufo bufo*: 31/41). Less common were yellow-bellied toads (*Bombina variegata*: 31/5), Alpine newts (*Ichthyosaura alpestris*: 14/2), fire salamanders (*Salamandra salamandra*: 17/0), green frogs (*Pelophylax sp.*: 6/3) and common frogs (*Rana temporaria*: 5/1), while European tree frogs (*Hyla arborea*) were detected only in 3 fishless ponds and Italian agile frogs (*Rana latastei*) in 2 sites with fish. The presence of fish had an important negative impact on the composition of the amphibian community. The mean number of amphibian species in fishless waterbodies was 2.066 (SE = 0.107), while in those with fish it was 1.635 (SE = 0.148). Our results show that surface aquatic habitats in SW Slovenia are important for the diverse amphibian community, but their availability and condition are declining, which needs to be addressed immediately at the expert and policy level to stop the negative trend.

Najpogostejši je bil navadni pupek (*Lissotriton vulgaris*: 87/15), sledi rosnica (*Rana dalmatina*: 60/23), veliki pupek (*Triturus carnifex*: 64/7) in navadna krastača (*Bufo bufo*: 31/41). Manj pogost je bil hribski urh (*Bombina variegata*: 31/5), planinski pupek (*Ichthyosaura alpestris*: 14/2), navadni močerad (*Salamandra salamandra*: 17/0), zelene žabe (*Pelophylax sp.*: 6/3) in sekulja (*Rana temporaria*: 5/1). Zeleno rego (*Hyla arborea*) smo odkrili le v treh kalih brez rib, laško žabo (*Rana latastei*) pa v dveh vodnih telesih z ribami. Prisotnost rib je pomembno negativno vplivala na sestavo združbe dvoživk. Povprečno število vrst dvoživk v vodnih telesih brez rib je bilo 2,066 (SN = 0,107), v tistih z ribami pa 1,635 (SN = 0,148). Rezultati kažejo, da so mali vodni habitati v JZ Sloveniji pomembni za raznoliko združbo dvoživk, vendar njihova številčnost upada in stanje se slabša, kar je treba nemudoma obravnavati na strokovni in politični ravni, da bi ustavili negativni trend.

First Comprehensive and Systematic Survey for the Amphibian Chytrid Fungi in Slovenia

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Amphibian chytridiomycosis is a worldwide-spread infectious disease caused by pathogenic fungi *Batrachochytrium dendrobatidis* (*Bd*) and *Batrachochytrium salamandrivorans* (*Bsal*). Due to its quick spread, as well as with high infectivity and mortality, chytridiomycosis is responsible for a major amphibian biodiversity loss on a global scale over recent decades (Scheele et al.; 2019). While *Bsal* has a relatively localized distribution in Europe (Dalbeck et al., 2018; González et al., 2019), the presence of *Bd* has already been confirmed in 23 European countries (Allain in Duffus, 2019). To complement the data on the current range of chytrid fungi in Europe, we conducted the first comprehensive survey on the presence of these emerging pathogens in Slovenia in 2020. We collected skin swab samples of ventral body side and extremities from 110 specimens of 22 native and introduced amphibian species. The samples were obtained at 50 locations in nature and at three captive locations in Slovenia. DNA isolation and standardized qPCR-based diagnostics (Hyatt et al., 2007; Blooi et al., 2013) of the potential presence of chytrid fungi in samples was conducted at the Department of Biology, Biotechnical Faculty, University of Ljubljana. The results confirmed the first occurrence of *Batrachochytrium dendrobatidis* in wild amphibian populations in Slovenia. Although further studies are needed to determine the origin, distribution, and possible impact of the pathogen on amphibian populations in Slovenia, we believe that the first record of this fungal pathogen will help to initiate appropriate and much-needed conservation measures for amphibians in the country.

Prvo sistematično testiranje dvoživk na prisotnost hitridnih gliv v Sloveniji

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Hitridiomikoza je po vsem svetu razširjena nalezljiva bolezen, ki jo povzročata patogeni vrsti gliv *Batrachochytrium dendrobatidis* (Bd) and *Batrachochytrium salamandrivorans* (*Bsal*). Zaradi hitrega širjenja in velike nalezljivosti je prepoznana kot glavni vzrok upadanja števila vrst dvoživk in izgube biotske raznovrstnosti v zadnjih desetletjih na globalni ravni (Scheele et al., 2019). Prisotnost *Bd* je v Evropi potrjena v 23 državah (Allain in Duffus, 2019), *Bsal* pa ima v Evropi relativno lokalizirano razširjenost (Dalbeck et al., 2018; González et al., 2019). Za dopolnitev obstoječih podatkov o pojavnosti hitridnih gliv v Evropi smo v letu 2020 izvedli prvo usmerjeno raziskavo o prisotnosti hitridnih gliv v Sloveniji. Analizirali smo 110 brisov kože 22 različnih domorodnih in tujerodnih vrst dvoživk. Vzorce smo zbrali na 50 različnih lokacijah po celotni Sloveniji in treh lokacijah živali v ujetništvu. Izolacijo DNA in standardizirano qPCR diagnostiko (Hyatt et al., 2007; Blooi et al., 2013) smo izvedli na Oddelku za biologijo Biotehniške fakultete Univerze v Ljubljani. Potrdili smo prvo okužbo z *Batrachochytrium dendrobatidis* v naravnem okolju v Sloveniji. Čeprav so potrebne nadaljnje raziskave za določitev izvora, razširjenosti in možnega vpliva patogena na populacije dvoživk v Sloveniji, menimo, da bo prvi podatek o prisotnosti hitridnih gliv pomembno prispeval k vzpostavitvi ohranitvenih ukrepov za zaščito dvoživk pred omenjenimi patogeni v Sloveniji.

SESSION 2: AMPHIBIANS AND ROADS

SKLOP 2: DVOŽIVKE IN CESTE

Amphibians & Roads in Slovenia - in the Pursuit of the Common Objectives

Katja Poboljšaj, Centre for Cartography of Fauna and Flora, Slovenia

In Slovenia, studies on amphibian road mortality have been carried out at the local, regional and national levels in the last 20 years. So far, there are more than 1,500 locations of roadkills registered in the country. In addition, some long-term volunteer conservation actions have been conducted for several years, with new actions starting every year. Despite all conservation efforts, only a few amphibian mitigation measures have been implemented on state roads. In light of this, the identification of hotspots is a valuable tool for national planning and prioritizing locations for road mitigation measures on state roads in the future.

In 2018 we prepared Amphibian mitigation measures on roads managed by the Slovenian Infrastructure Agency (DRSI), the updated overview of amphibian migration across the state-managed roads in Slovenia. The main outcomes of the study were: a) spatial information on 843 locations of roadkills on state-managed roads; b) evaluation of the existing mitigation measures on 9 roads; c) proposal of the top 13 road sections for urgent amphibian mitigation measures.

The follow-up in 2019 was the preparation of a Baseline study for guidelines for technical specifications for amphibian mitigation measures on the national road network. The aim was to prepare the best practice guidelines for implementing amphibian mitigation measures on existing roads and for the planning of new roads, including a) the proposal of standard monitoring methods for baseline monitoring of amphibian migrations; b) the national criteria for decision-making practice for implementing mitigation measures; c) the technical specification for amphibian mitigation measures; d) the proposal for maintenance of implemented mitigation measures and e) the proposal for monitoring the effectiveness of mitigations.

One of the main objectives of the LIFE AMPHICON project is to improve habitat connectivity, reduce road mortality and improve the coherence of all project sites. To mitigate this, amphibian road tunnels with fences are planned on 5 roads in project areas Ljubljansko barje (3 roads), Radensko polje and Trebča in Kozjanski park. Surrounding habitats will be improved and new ponds constructed to create safe home ranges for the target amphibian species. Additionally, buffer zones and hedgerows between intensive farmland, roads and habitats will be created; thus, connectivity of habitats (stepping stones) and water quality (reduction of influences of agricultural chemicals) will be improved. If necessary, artificial hibernation sites will be created. The results of project activities in the first two years of the LIFE AMPHICON project will be presented, with emphasis on the preoperational monitoring of amphibian migrations on project road

Dvoživke in ceste v Sloveniji – doseganje ter zasledovanje skupnih ciljev

Katja Poboljšaj, Center za kartografijo favne in flore, Slovenija

V Sloveniji so se v zadnjih 20 letih izvajale številne raziskave selitev dvoživk preko cest na lokalni, regionalni in državni ravni. Zbranih je več kot 1500 podatkov o lokacijah povozov dvoživk. Na nekaterih cestnih odsekih se že veliko let izvajajo akcije prenašanja dvoživk, njihovo število pa narašča iz leta v leto. Kljub temu so trajni omilitveni ukrepi za dvoživke izvedeni le na manjšem številu državnih cest. Zato je zelo pomemmbna določitev najbolj problematičnih cestnih odsekov v državi, s čemer bo mogoče boljše načrtovanje in opredelitev prioritet za vzpostavitev trajnih ukrepov na cestah v prihodnje.

V letu 2018 smo pripravili predlog ukrepov za zaščito dvoživk na cestah v upravljanju DRSI, s posodobljenim pregledom stanja prehajanja dvoživk na državnih cestah v Sloveniji. Glavni rezultati študije so: a) prostorske informacije o 843 lokacijah prehajanja dvoživk na državnih cestah; b) ocena ustreznosti izvedbe omilitvenih ukrepov na 9 cestah; c) predlog za izvedbo omilitvenih ukrepov za dvoživke na 13 najbolj kritičnih cestnih odsekih.

V letu 2019 smo pripravili Strokovne podlage za izdelavo navodil in tehničnih specifikacij za izvedbo ukrepov za dvoživke na državnem cestnem omrežju. Cilj je bil pripraviti smernice za izvajanje ukrepov za varstvo dvoživk na obstoječih cestah ter pri načrtovanju novih cest, ki vključujejo: a) predlog standardnih metod raziskav selitev dvoživk za izdelavo strokovnih podlag za dvoživke; b) nacionalna merila za odločitev o izvedbi ukrepov za dvoživke; c) tehnične specifikacije za izvedbo ukrepov za dvoživke; d) splošna navodila za vzdrževanje izvedenih ukrepov za dvoživke in e) predlog spremljanja učinkovitosti ukrepov za dvoživke.

Glavni cilji projekta LIFE AMPHICON so izboljšati povezanost habitatov, zmanjšati smrtnost na cestah in izboljšati povezljivost projektnih območij. Na petih cestnih odsekih v projektnih območjih so kot omilitveni ukrepi predvideni podhodi za dvoživke z varovalnimi ograjami: na Ljubljanskem barju 3 odseki ter odseka na Radenskem polju in v Kozjanskem parku v Trebčah. Za ciljne vrste bodo v bližini cest obnovljeni kopenski habitati in vzpostavljeni novi vodni habitati, ki bodo dvoživkam zagotovili varno okolje. Poleg tega bodo vzpostavljeni dodatni varovalni pasovi in mejice med intenzivnimi kmetijskimi površinami, cestami in primernimi habitati dvoživk. Na ta način se bo izboljšala povezanost habitatov (stepping stones) in kakovost vode (zmanjšanje scejanja kmetijskih kemikalij z zemljišč). Po potrebi bodo vzpostavljene tudi primerne strukture v prezimovališčih. Predstavljeni bodo rezultati projektnih aktivnosti v prvih dveh letih projekta LIFE AMPHICON, s poudarkom na spremljanju selitev dvoživk na projektnih cestnih odsekih v letu 2020 in predstavitev dobrih praks med načrtovanjema trajnih ukrepov.

sections in 2020 and the implementation of best practices in the planning phase. The Coordination Centre for Amphibians (CCA) in Slovenia in the form of the help desk is established. Among other tasks, we offer expertise on amphibian mitigation measures to different stakeholders (municipalities, Nature Conservation Institute (ZRSVN), protected areas, societies and the interested public). Additionally, we work together with DRSI to implement the best practice approach in the regular work of concessionaires of road maintenance. Through CCA, we aim to stimulate the implementation of various temporal and permanent mitigation measures to minimise the negative impacts of road infrastructure in Slovenia.

I review the process of the latest development of amphibian mitigation measures in Slovenia, from both amphibian conservation and road management points of view. Finally, I discuss conceptual frameworks for mitigation, involving volunteer actions (toad patrols) and the potential development of road mitigation projects concerning the existing recent developments on the national level.

Vzpostavili smo tudi Informacijski ceneter za varstvo dvoživk Slovenije kot posredovalnico informacij. Med drugim nudimo svetovanje različnim deležnikom (občine, Zavod RS za varstvo narave, zavarovana območja, društva in posamezniki) o primernih izvedbah ukrepov za dvoživke na cestah. Skupaj z Direkcijo RS za infrastrukturo skušamo izboljšati tudi način dela koncesionarjev pri vzdrževanju cest na območjih selitev dvoživk. Skozi aktivnosti Informacijskega centra želimo ves čas vzpodbujati izvedbo različnih začasnih in stalnih ukrepov za dvoživke za omilitev negativnih vplivov cestne infrastrukture v Sloveniji.

Za zaključek bo predstavljen proces razvoja izvajanja ukrepov za dvoživke v zadnjih letih v Sloveniji, tako s stališča populacij dvoživk kot tudi upravljalcev cest. Pri tem pomemben del predstavlja tudi pospešen razvoj in načrtovanje izvajanja ukrepov na državnih cestah in na odsekih kjer se izvajajo akcije prenašanja dvoživk.

Information Needed for Amphibian Mitigation Measures – from a Contracting Authority's Point of View

Barbara Pezdir, Slovenian Infrastructure Agency, Slovenia

Amphibian road mortality can be an important factor in reducing the stability of amphibian populations in the wider area, especially in areas where roads cross amphibian migration routes - ie. where they take place in the area between terrestrial and aquatic amphibian habitats.

1. Time
In order to solve this problem, DRSI commissioned a study in 2018, which, among other things, identifies potentially problematic sections of state roads with recorded amphibian crossing. This is the starting point for the amphibian mitigation, but it is not enough for planning of amphibian mitigation measures, which requires appropriate amphibian monitoring during spring migrations. Based on the results of monitoring, the amphibian expert assesses the criteria for the implementation of amphibian measures and prepare a proposal for them - ie. proposals for the exact locations of underpasses and guide fence, as well as gratings on the driveways and entrances to the road.
The seasonal nature of amphibian migrations must be taken into account in the process of ordering amphibian monitoring and further implementing measures, which can have a significant impact on the dynamics of work and the project schedule.

2. Flood risk areas
Amphibian tunnels are basically culverts under the road and can affect the hydrological condition in flood risk areas. Therefore appropriate hydrological studies are also needed when planning amphibian mitigation measures in respective road sections.

3. Relief
The surrounding terrain has an important influence on the final solutions of course of the road itself. In the case of road embankments, the design of amphibian underpasses is relatively clear and simple, while the design and installation of amphibian underpasses on roads embedded in the ground is a challenge that, in addition to extensive technical solutions adapted to the location, often requires appropriate land registry arrangements, easement).

4. Project conditions
More extensive planned measures need to be coordinated with opinion givers during design. Due to potentially conflicting project conditions - e.g. from the point of view

Kaj vedeti kot naročnik ukrepov za dvoživke na cestah?

Barbara Pezdir, Direkcija za infrastrukturo Republike Slovenije, Slovenija

Povoz dvoživk na cestah lahko predstavlja pomemben dejavnik za zmanjševanje stabilnosti populacij dvoživk v širšem prostoru, predvsem na območjih, kjer ceste prečkajo selitvene poti dvoživk – tj. kjer potekajo na območju med kopenskimi in vodnimi habitati dvoživk.

1. Čas
Z namenom reševanja navedene problematike je DRSI v letu 2018 naročila izdelavo študije, ki med drugim opredeljuje potencialno problematične odseke državnih cest z evidentiranim prehajanjem dvoživk. Ta predstavlja izhodiščni podatkovni vir glede prehajanja dvoživk, ki pa ne zadostuje za načrtovanje ukrepov za dvoživke, za kar je potrebna izvedba ustreznega monitoringa dvoživk v času množičnih spomladanskih selitev. Na podlagi izsledkov monitoringa strokovnjak za dvoživke oceni upravičenost izvedbe ukrepov za dvoživke ter oblikuje predlog zanje – tj. določi predloge točnih lokacij podhodov in usmerjevalnih ograj ter tudi rešetk pod dovozi in uvozi na cesto.
Pri naročanju monitoringov dvoživk ter nadalje pri izvedbi ukrepov je treba upoštevati sezonski značaj selitev dvoživk, ki lahko pomembno vpliva na dinamiko del in projektni terminski plan.

2. Poplavna območja
Ker izvedba ukrepov za dvoživke, ki so v osnovi prepusti pod cesto, lahko vpliva na hidrološko stanje območij, je pri naročanju projektne dokumentacije za odseke na poplavnih območjih treba predvideti tudi izdelavo ustreznih hidroloških elaboratov ali študij.

3. Relief
Pomemben vpliv na končne rešitve ima seveda tudi sam potek ceste oz. okoliški teren. V primerih ceste v nasipu je načrtovanje podhodov za dvoživke sorazmerno jasno in enostavno, medtem ko načrtovanje in umeščanje podhodov za dvoživke na cestah v vkopu predstavlja svojevrsten izziv, ki, poleg obsežnejših tehničnih rešitev prilagojenih lokaciji, večkrat zahteva tudi ustrezno zemljiško-knjižno ureditev (odkupi, služnost).

4. Projektni pogoji
Obsežnejše načrtovane ukrepe je treba tekom projektiranja uskladiti z mnenjedajalci. Zaradi morebitnih nasprotujočih si projektnih pogojev – npr. z vidika zagotavljanja povezljivosti habitatov in poplavne varnosti je priporočljivo sprotno sodelovanje in usklajevanje rešitev. Glede na značilnosti elementov za prehajanje dvoživk in njihovo vgradnjo je še posebej pomembna uskladitev z vidika odvodnjavanja in poplavne varnosti.

of ensuring habitat connectivity and flood safety, ongoing cooperation and coordination of solutions is recommended. Given the characteristics of amphibian crossing elements and their installation, harmonization from the point of view of drainage and flood safety is particularly important.

5. Communal waters
In the event that the section of the road where amphibian mitigation measures are planned, is located in a water protection area, the implementation of controlled drainage may also be required. The implementation of the latter is usually quite demanding, as the area of the road next to the aquatic habitats of amphibians is usually flat, due to which the vertical course of the road changes only slightly and the longitudinal slopes of the road are extremely small.

Because the construction of underpasses for amphibians interferes with the lower structures of the road, the solutions often come into conflict with the existing municipal infrastructure that runs along the road - e.g. sewerage, telecommunications and water supply. When installing the underpass, it is necessary to take into account the appropriate thickness of the road structure, in order to prevent uneven settlement in the area of the underpass, so the underpass must be located at the appropriate depth. In many cases, it is not only possible to move the lines vertically in order to run above or below the underpass, but also to move the floor plan. This can lead to additional difficulties in providing adequate space for the relocation of lines and also in additional coordination with the opinion providers and operators of these lines. Therefore, it is important that in cooperation with their managers, existing waters are recorded in a timely manner and, if necessary, their relocation or planning is planned. in cooperation with the amphibian expert, adjust the locations of the amphibian subways accordingly.

6. Settlement and landuse
In order to comprehensively ensure the connectivity of habitats, the planning of amphibian measures, in addition to the actual use in the vicinity of the road, must also take into account the planned land use.
In the event that amphibian measures are planned in the settlement area, it is recommended that a public presentation of the planned solutions is envisaged in the design process. This ensures that affected landowners are aware of the planned measures and can also cooperate with suggestions and comments on the feasibility of land interventions, thus avoiding possible complications in potential land acquisitions. Through appropriate and timely communication, we gain people's trust and thus more constructive cooperation on their part, and provide a basis for further comprehensive management of amphibian habitats.

5. Komunalni vodi
V primeru, da se odsek ceste, kjer se načrtujejo ukrepi za prehajanje dvoživk, nahaja na vodovarstvenem območju, je lahko zahtevana tudi izvedba kontrolirane odvodnje. Izvedba slednje je običajno dokaj zahtevna, saj je območje ceste ob vodnih habitatih dvoživk praviloma ravninsko, zaradi česar se vertikalni potek ceste le malenkostno spreminja in so vzdolžni nakloni ceste izjemno majhni.

Ker z izgradnjo podhodov za dvoživke posegamo v spodnje ustroje ceste, rešitve velikokrat pridejo navzkriž z obstoječimi komunalnimi vodi, ki potekajo vzdolž ceste – npr. kanalizacija, telekomunikacije in vodovod. Pri umestitvi podhoda je potrebno upoštevati tudi ustrezno debelino cestnega ustroja, zaradi preprečevanja neenakomernega posedanja na območju podhoda, zato mora biti podhod umeščen na ustrezni globini. Velikokrat vodov ni možno prestaviti samo po vertikali, da bi potekali nad ali pod podhodom, temveč jih je potrebno tudi tlorisno prestaviti. To lahko povzroči dodatne težave pri zagotavljanju ustreznega prostora za prestavitev vodov in tudi dodatnega usklajevanja z mnenjedajalci in upravljavci teh vodov. Zato je pomembno, da se v sodelovanju z njihovimi upravljavci obstoječe vode pravočasno evidentira in po potrebi načrtuje njihovo prestavitev oz. v sodelovanju s strokovnjakom za dvoživke ustrezno prilagodi lokacije podhodov za dvoživke.

6. Poselitev in namenska raba
Z namenom celovitega zagotavljanja povezljivosti habitatov je pri načrtovanju ukrepov za dvoživke poleg dejanske rabe v okolici ceste treba smiselno upoštevati tudi namensko rabo okoliških zemljišč.
V primeru, da so predvideni ukrepi za prehajanje dvoživk v območju poselitve, je priporočljivo, da se v procesu projektiranja predvidi tudi javna predstavitev idejnih rešitev ukrepov. S tem dosežemo, da so tangirani lastniki zemljišč seznanjeni z načrtovanimi ukrepi in lahko tudi sodelujejo s predlogi in pripombami glede izvedljivosti posegov na zemljišča, s čimer se izognemo morebitnim zapletom pri potencialnih odkupih zemljišč. Z ustrezno in pravočasno komunikacijo pridobimo zaupanje ljudi in s tem tudi bolj tvorno sodelovanje z njihove strani in omogočimo osnovo za nadaljnje celovito urejanje habitatov dvoživk.

Trajni ukrepi za dvoživke z elementi Zieger

Andrej Sedej, Slovenija

Na tržišču je prisotnih veliko produktov, ki preprečujejo prehod dvoživkam na vozišče, hkrati pa ponovno vzpostavljajo migracijske koridorje zanje. Elementi so začasnega ali trajnega značaja, razlikujejo pa se glede na obliko in materiale. Poleg navedenega se razlikujejo tudi glede možnosti vgradnje in trajnosti vgrajenih elementov (vzdrževanje, življenjska doba) ter prijaznosti do končnih uporabnikov – dvoživk.

Elementi Zieger zagotavljajo enostavno vgradnjo z dobavo na gradbišče tik pred vgradnjo – neposredna vgradnja brez skladiščenja. Elementi so med seboj kompatibilni in se enostavno sestavljajo, vgradnja pa se prilagaja morfologiji terena in elementom ceste. Ograje so oblikovane na način, da dvoživkam zagotavljajo zadovoljivo osenčenje, varnost pred plenilci in preprečujejo izsušitev kože. Z obliko upravljavcem olajšajo košnjo in zmanjšujejo stroške čiščenja. S sitemom enostavne povezanosti in pravilnim načinom vgradnje so dvoživke usmerjene v podhod, ki jih vodi pod vozišče. Podhodi so zasnovani tako, da tvorijo pravilno obliko in velikost svetlobnega okna, tla tvori okoliška zemljina.

Thirty Years of Amphibian Protection on the Roads of Salzburg, Austria

Cvetka Piringer, Peter Kaufmann, Martin Kyek, Herpetologische Arbeitsgemeinschaft am Haus der Natur, Austria

Systematic amphibian protection along the roads of Austria is implemented since 1992. The situation in Austria is very heterogeneous due to federalistic nature conservation laws and is treated differently in all federal provinces. A survey in 2012 showed that more than 1,000 amphibian migration routes along roads are known throughout Austria, and a total of 184 amphibian protection fences with a length of 105 km were erected in that year. In 90% of the cases, these fences are maintained on a voluntary basis.

In the province of Salzburg, the Haus der Natur museum has been commissioned since 2001 by the Salzburg nature conservation authority to organise the erection and supervision of the amphibian protection fences. In the year 2021 there were 34 road-sections with more than 12km length, that were supervised by more than 250 volunteer "frogpickers". The amphibian numbers recorded at the fences are systematically recorded every year and were also used to calculate population trends.

In addition, there are currently 14 road sections in the province of Salzburg that have been mitigated by the installation of tunnel guidance systems. In Salzburg, there are technical specifications for both the fencing material and the tunnel guidance systems, which are also defined in the official guidelines for road construction (Amhibian protection for tranport infrastructure RVS 4.3.11). Different technical details and experiences on the topics of organisation, amphibian fencing and tunnel systems will be discussed.

Trideset let varstva dvoživk na cestah v Salzburgu, Avstrija

Cvetka Piringer, Peter Kaufmann, Martin Kyek, Herpetologische Arbeitsgemeinschaft am Haus der Natur, Avstrija

Sistematično varstvo dvoživk se na avstrijskih cestah izvaja od leta 1992. V Avstriji je stanje zaradi federalistične naravovarstvene zakonodaje zelo heterogeno, v vseh zveznih deželah je obravnavano različno. Raziskava iz leta 2012 je pokazala, da je na cestah v Avstriji znanih več kot 1000 selitvenih poti dvoživk, hkrati je bilo v tem letu za njihovo zaščito skupno postavljenih 184 varovalih ograj z dolžino 105 km. V 90% primerih se te ograje vzdržujejo prostovoljno.

V salzburški zvezni deželi je s pooblastilom salzburškega naravovarstvenega organa za izvedbo ukrapov glede organizacije, postavitve in nadzora zaščitnih ograj za varstvo dvoživk na cestah od leta 2001 zadolžen muzej "Haus der Natur". Leta 2021 je na 34 cestnih odsekih z začasnimi varovalnimi ograjami skupne dolžine več kot 12 km pri prenašanju dvoživk čez ceste sodelovalo več kot 250 prostovoljcev. Število dvoživk, zabeleženih ob ograjah, se sistematično beleži vsako leto in je bilo obravnavano tudi za izračun populacijskih trendov.

V zvezni deželi Salzburg je trenutno 14 cestnih odsekov, na katerih je bila z namestitvijo trajnih podhodnih sistemov z varovalnimi in usmerjevalnimi ograjami izvedena omilitev poboja dvoživk na cestah. Za gradnjo cest so za material ograj in tudi za podhodne sisteme opredeljene uradne smernice in ukrepi s tehničnimi specifikacijami (Zaščita dvoživk transportne infrastructure; RVS 4.3.11). V okviru prezentacije bodo obravnavane in predstavljene različne tehnične podrobnosti varovalnih ograj in podhodnih sistemov in tudi izkušnje organizacije.

Amphibian Protection on Roads in Lithuania: From Buckets to Road Reconstruction.

Nerijus Zableckis, Foundation for Peatland Restoration and Conservation, Lithuania

There are 13 species of amphibians (11 anurans and two caudates) in Lithuania. This represents about 18% of the 74 indigenous species of Europe. All amphibians found in Lithuania have extensive ranges in Europe and have successfully recolonized the current area following deglaciation. The overall conservation status of Lithuanian amphibian species is relatively good; none is considered threatened at the European level and all are classified as Least Concern. Nationally, however, five species of amphibians are listed in the Lithuanian Red List: *Triturus cristatus*, *Bombina bombina*, *Hyla arborea*, *Epidalea calamita*, and *Bufotes viridis*.

Mortality on roads and increased fragmentation of habitat by networks of roads is among main threats for amphibians followed by destruction and alteration of habitats and pollution, agricultural activities and forestry practices.

Road network in Lithuania covers 84 thous. km. Railway covers another 2 thous. km. The new infrastructures to be installed like *Rail Baltica* will add another few hundred km of new sections of the network, crossing forests, Natura 2000 sites and increasing the fragmentation for wildlife. In addition to this the improvement of road infrastructure, e.g. road maintenance using chemicals, application of salt in winter time, reconstruction of drainage, paving the gravel roads increases the degradation of habitats along the roads and railways. In addition, further degradation of wetlands is caused by climate change, e.g. severe droughts in past years in Lithuania.

In the latter part of the twentieth century, many local initiatives were designed to reduce the mortality of amphibians on roads. Usually, temporary fences were built at the sides of roads during the breeding season. Temporary mitigations of amphibian mortality on roads (temporary fences erected during the breeding season) were built in Varniai, Veisiejai Regional Parks beginning in 2000. Later, similar initiatives were carried out in Pavilniai, Verkiai, Veisiejai and Kurtuvėnai regional parks and in Kamanos State Nature Reserve. From 2013 onwards, 6 permanent mitigating systems with underpasses (tunnels) and barrier-fences were installed in different protected areas of Lithuania as a result of best practice exchange for the policy makers and road authorities, organized by Life project ECONAT - Development of pilot ecological network through nature frame areas in Southern Lithuania (LIFE09 NAT/LT/000581). Mostly L form shaped fences and tunnels of turned over U form made from re-enforced high quality concrete, are preferred. Monitoring of the effectiveness of such protection systems was performed in Veisiejai, Varniai and Pavilniai Regional Parks.

Varstvo dvoživk na cestah v Litvi: od postavitve začasnih ograj do rekonstrukcije ceste

Nerijus Zableckis, Foundation for Peatland Restoration and Conservation, Litva

V Litvi je 13 vrst dvoživk (11 brezrepih in dve repati). To je približno 18 % 74 avtohtonih vrst v Evropi. Vse dvoživke v Litvi imajo obsežno območje razširjenosti v Evropi in so po deglaciaciji uspešno ponovno naselile sedanje območje. Splošno stanje ohranjenosti litovskih vrst dvoživk je sorazmerno dobro; nobena ne velja za ogroženo na evropski ravni in vse so uvrščene med najmanj ogrožene vrste. Na državni ravni pa je pet vrst dvoživk na litovskem rdečem seznamu: *Triturus cristatus*, *Bombina bombina*, *Hyla arborea*, *Epidalea calamita* in *Bufotes viridis*.

Med glavnimi grožnjami za dvoživke sta umrljivost na cestah in povečana razdrobljenost habitata zaradi omrežji cest, sledijo uničenje in spreminjanje habitatov ter onesnaževanje, kmetijske dejavnosti in gozdarske prakse.

Cestno omrežje v Litvi obsega 84.000 km. Železnica pokriva dodatnih 2.000 km. Nove napovedane infrastrukture, kot je *Rail Baltica*, bodo dodale še nekaj sto kilometrov novih odsekov omrežja, ki bodo prečkali gozdove in območja Natura 2000 ter povečali razdrobljenost habitatov divjih živali. Tudi izboljšave cestne infrastrukture – npr. vzdrževanje cest s kemikalijami, nanos soli v zimskem času, rekonstrukcija drenažnih sistemov, asfaltiranje makadamskih cest – povečuje degradacijo habitatov ob cestah in železnicah. K degradaciji mokrišč prispevajo tudi podnebne spremembe, npr. hude suše, ki so prizadele Litvo v preteklih letih.

V drugi polovici 20. stoletja so bile zasnovane številne lokalne pobude za zmanjšanje umrljivosti dvoživk na cestah. Običajno so bile v času ploditve ob cestah zgrajene začasne ograje. Začasne ukrepe za zmanjševanje smrtnosti dvoživk na cestah (začasne ograje, postavljene v času ploditve) so v začetku leta 2000 izvedli v Varniaiju in regionalnem parku Veisiejai. Pozneje so podobne pobude izvedli tudi v Pavilniaiju, Verkiaiju, regionalnem parku Kurtuvėnai in naravnem rezervatu Kamanos. Od leta 2013 je bilo na različnih zaščitenih območjih Litve vzpostavljenih 6 trajnih sistemov za prehod dvoživk s predori in pregradami kot rezultat izmenjave dobrih praks za oblikovalce politik in cestne organe, ki jo je organiziral projekt Life ECONAT – Razvoj pilotnega ekološkega omrežje prek naravnih okvirnih območij v južni Litvi (LIFE09 NAT/LT/000581). Večinoma gre za ograje v obliki črke L in predore v obliki obrnjene črke U iz visokokakovostnega armiranega betona. Spremljanje učinkovitosti tovrstnih zaščitnih sistemov je potekalo v regijskih parkih Veisiejai, Varniai in Pavilniai.

Planning a Permanent Amphibian Guidance System Based on Migration Activities Assessment at the N2000 Site "Kammmolchgebiet Ötzendorf/Mührgehege"

Ralf Hoinkis, AmphiConsult, Germany

In 2020 Amphi Consult Germany was hired by the county of Uelzen (Niedersachsen) to monitor amphibian spring migration, crossing the county road K45 at Oetzendorf. There the road cuts the N2000 site "Kammmolchgebiet Ötzendorf/Mührgehege" in half. The study was carried out by installing and checking a temporary amphibian fence during migration.

Aim of the study was to determine the exact type, location and implementation of a permanent amphibian guidance system foreseen for the site, based on the results of the observed migration activities.

From beginning of February to mid-April 2020, a 912m long stretch with 184 dug in buckets was maintained, covering the complete time span of the spring migration (first migration recorded at Feb 4th, fence taken down on April 11th). The beginning migration back from the reproduction sites to the land habitats was also monitored. A total of 5602 amphibians was recorded at the fence.

In addition to the migration monitoring, a count of all egg clutches of brown frogs (*R. arvalis*, R. *temporaria* and R. *dalmatina*) in the reproduction sites was carried out, thus giving a clue what percentage of the migrating female brown frogs needed to cross the road before spawning.

The study provided good and precise information on the local amphibian migration routes and hot spots of the various species. This allowed a finely tuned and high-quality execution planning of the permanent amphibian fence.

As a result of the findings, the entire stretch was subdivided into three sections with different priorities and relevance for the local amphibian population.

Načrtovanje trajnih ukrepov za dvoživke na podlagi ocene selitev dvoživk v območju Natura 2000 Kammmolchgebiet Ötzendorf/Mührgehege

Ralf Hoinkis, AmphiConsult, Nemčija

Leta 2020 je okrožje Uelzen (Spodnja Saška) zadolžilo nemški Amphi Consult za spremljanje spomladanske selitve dvoživk, ki prečkajo okrajno cesto K45 pri Oetzendorfu. Cesta tam seka območje N2000 »Kammmolchgebiet Ötzendorf/Mührgehege«. Za potrebe študije je bila med selitvijo dvoživk nameščena začasna ograja.

Namen študije je bil na podlagi rezultatov opazovanih migracijskih aktivnosti določiti tip, lokacijo in izvedbo stalnega sistema vodenja dvoživk za to območje.

Od začetka februarja do sredine aprila 2020 smo vzdrževali 912 m dolg odsek s 184 vkopanimi vedri, ki je kril celotno obdobje spomladanske selitve (prva selitev je bila zabeležena 4. februarja, ograja pa je bila odstranjena 11. aprila). Spremljali smo tudi začetno selitev z razmnoževalnih območij nazaj v kopenske habitate. Pri ograji so zabeležili skupno 5.602 dvoživk.

Poleg spremljanja selitve smo na mrestiščih prešteli vse mreste rjavih žab vrst *R. arvalis*, *R. temporaria* in *R. dalmatina* na mrestiščih ter ugotovil, kolikšen odstotek samic, ki se selijo, mora prečkati cesto, preden odložijo mreste.

Študija je priskrbela dobre in natančne podatke o lokalnih selitvenih poteh dvoživk in o zgostitvah posameznih vrst na cesti. To je omogočilo natančno zasnovano in kakovostno načrtovano namestitev stalne ograje.

Na podlagi ugotovitev je bilo območje razdeljeno na tri odseke z različnimi prednostnimi nalogami in z različnimi pomeni za lokalno populacijo dvoživk.

Different Approaches in Nature Conservation Activities on Amphibian »Black Spots« in Northern Slovenia

Škvarč Andreja[1], Rozman Sonja[1], Hrabar Nika[1], Fabiani Ester[2]
[1]The Institute of the Republic of Slovenia for Nature Conservation
[2]Alma Mater Europaea Maribor, volunteer Žabice Šinkov Turn

In the article we present three different approaches in nature conservation activities on amphibian »black spots« on local roads in northern Slovenia. Solutions and approaches differ regarding to the geographic characteristics of location and cooperation network set-up. To enable more systematic comparison between the approaches we are dividing the conservation activity into the following parts: initiative, method, set-up (purchase and set-up of materials), field activity and social aspect (collaboration and PR support).

The »Koseze-Šinkov Turn« case (Mengeš/Vodice Municipalities): The initiative was made by local inhabitants 11 years ago. The method is temporary amphibian fence and transportation of amphibians across the road. The set-up was at first in the hands of local inhabitants and volunteers, who provided and installed a simple temporary fence and temporary traffic signs, later the set-up was taken over by the IRSNC and both municipalities (temporary fence and permanent traffic signs were co-financed by the project Zgodbe naših mokrišč), in the year after the project the municipalities carried out the whole set-up themselves. Field activity is carried out by local inhabitants and volunteers (individuals, families, schools, NGOs etc.). PR is lead mainly by volunteers (mailing list, social media forums) and supported by IRSCN and the municipalities (websites, local newspaper). The length of the road section is 1000 m, there are around 3000 amphibians transported per year (8 species, mainly common toads). There are long-term measures (permanent tunnels and fence) planned along with road reconstruction in year 2022/23.

The »Bobovek« case (Kranj Municipality): The initiative was made by IRSNC 5 years ago. The method is temporary blockage of road and bypass during the amphibian spring migration. The set-up is done by IRSNC, the municipality is providing the road-block ramp. There is no field activity needed, monitoring is carried out by students from the Naklo Biotechnical Centre. PR is carried out by IRSCN and the municipality (websites, local newspaper, radio). The length of the road section is 1200 m. There are long-term measures (closing road for transit) planned in the future.

The »Stražišče pri Kranju« case (Kranj Municipality): The initiative was made by the Municipality of Kranj 3 years ago. The method is transporting amphibians across the road without setting an amphibian fence.

Različni pristopi ohranjanja dvoživk na črnih točkah na Gorenjskem

Škvarč Andreja[1], Rozman Sonja[1], Hrabar Nika[1], Fabiani Ester[2]
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[2]Alma Mater Europaea Maribor, prostovoljka Žabice Šinkov Turn

V prispevku predstavljamo tri različne pristope k ohranjanju dvoživk na črnih točkah na občinskih cestah na Gorenjskem. Pristopi in rešitve se razlikujejo glede na geografske lastnosti posamezne lokacije ter glede na vzpostavitev mreže sodelovanja. Z namenom bolj sistematične primerjave pristopov smo naravovarstveno aktivnost razdelili na naslednje dele: pobuda, metoda, vzpostavitev (nakup in postavitev materialov), terenska aktivnost (prenašanje) in družbeni vidik (sodelovanje in obveščanje).

Primer »Koseze-Šinkov Turn« (občini Mengeš in Vodice): Pobuda je bila podana s strani lokalnih prebivalcev, pred 11 leti. Metoda je postavitev začasne ograje in prenašanje dvoživk čez cesto. Postavitev preproste začasne ograje in začasnih prometnih znakov so najprej izvajali lokalni prostovoljci, kasneje so postavljanje prevzeli ZRSVN in obe občini (začasna ograja in stalni prometni znaki so bili so-financirani iz projekta Zgodbe naših mokrišč), v letu po zaključku projekta pa so občine izvedle celotno postavitev ograje same. Terensko aktivnost (prenašanje) izvajajo lokalni prebivalci in prostovoljci (posamezniki, družine, šole, NVO itd.). Za obveščanje skrbijo predvsem prostovoljci (e-poštne liste, družabna omrežja), podpirajo jih tudi ZRSVN in obe občini (spletne strani, občinska glasila). Dolžina odseka je 1000 m, prenesenih je okoli 3000 dvoživk na leto (8 vrst, pretežno navadne krastače). Na odseku so načrtovani trajni ukrepi (podhodi in stalne ograje) ob rekonstrukciji ceste v letu 2022/23.

Primer »Bobovek« (Mestna občina Kranj): Pobuda je bila podana s strani ZRSVN, pred 5 leti. Metoda je začasna zapora ceste in obvoz v času spomladanskih selitev. Postavitev zapore je izvedena s strani ZRSVN, zaporo prispeva občina. Terensko prenašanje dvoživk ni potrebno, izvaja pa se monitoring prehajanja dvoživk s pomočjo študentov BC Naklo. Za obveščanje skrbita ZRSVN in občina (spletne strani, občinsko glasilo, radijske objave). Dolžina odseka je 1200 m. Na odseku so načrtovani trajni ukrepi (zapora ceste za tranzitni promet).

Primer »Stražišče pri Kranju« (Mestna občina Kranj): Pobuda je bila podana s strani občine, pred 3 leti. Metoda je prenašanje dvoživk čez cesto, brez postavitve ograje. Postavitev ograje ni možna. Terensko aktivnost (prenašanje) izvajajo prostovoljci (predvsem družine z otroki), aktivnost pa podpirata ZRSVN (strokovni nadzor)

In terms of set-up there are no materials (installation not possible), field activities are carried out by volunteers (merely families with children) and supported by IRSCN and municipal security (traffic-calming). PR is carried out by IRSCN and the municipality (websites, local newspaper, radio). The length of the road section is 800 m, there are around 2000 amphibians transported per year (6 species, mainly common toads). Long-term measures (permanent tunnels and fence) are possible in the future.

Comparing the three cases we can see that the method (amphibian fence, blockage of road) depends on geographical characteristics of location (steepness of road banks) and traffic situation (possibility of bypass). From a social aspect we can see that the initiative was made from different sources, but success was guaranteed by the collaboration of three main parties: local inhabitants and volunteers, nature conservation institutions and municipalities. In all three cases temporary methods evolved into planning permanent solutions. We would also like to emphasize the vital role of local organizers and volunteers in the past, which led to enhanced collaboration.

Thus, for setting new activities on amphibian »black spots« we would recommend to explore the possible methods in this order: road closure - temporary fence - action with no fence, and to establish collaboration with multiple partners.

in občina (mestno redarstvo umirja promet). Za obveščanje skrbita ZRSVN in občina (spletne strani, občinsko glasilo, radijske objave). Dolžina odseka je 800 m, prenesenih je okoli 2000 dvoživk na leto (6 vrst, pretežno navadne krastače). Na odseku so možni trajni ukrepi (podhodi in stalne ograje) ob rekonstrukcijah ceste v prihodnosti.

Iz primerjave predstavljenih treh pristopov je razvidno, da je izbira metode (ograja, zapora ceste) odvisna od geografskih značilnosti lokacije (strmina ceste brežine) in cestnega omrežja (možnost obvoza). Iz družbenega vidika vidimo, da so bili pobudniki različni, uspeh pa je zagotovilo sodelovanje treh glavnih deležnikov: lokalnih prostovoljcev, inštitucije za varstvo narave in občine. V vseh treh primerih se začasne metode razvijajo v smeri stalnih ukrepov. Treba je poudariti ključno vlogo lokalnih organizatorjev in prostovoljcev v preteklosti, katerih vztrajno delo se je skozi leta nadgrajevalo do današnjega razširjenega sodelovanja.

Na podlagi izkušenj iz obravnavanih primerov priporočamo, da se pri načrtovanju novih aktivnosti na črnih točkah razišče možnost izbire metode v smeri zapora ceste – ograja in prenašanje – prenašanje, ter da se vzpostavi več partnersko sodelovanje.

Amphibian Conservation on Večna pot in Ljubljana

Katja Konc, Herpetološko društvo – Societas herpetologica slovenica, Slovenia

Many species of amphibians migrate during the year from their land habitat to spawning sites. These migrations are divided into primary and secondary. The primary migration from spring habitats to spawning sites is the most massive. Other, secondary migrations are migrations from spawning grounds to summer habitats and autumn migrations when amphibians head to winter habitats, where they hibernate until spring. The latter migrations are not so abundant and are more dispersed than the primary migration in spring. The migration paths often cross traffic roads and mortality at those crossing sites especially during primary migration is very high. One such crossing site is on Večna pot in Ljubljana, near the ZOO. Amphibians hibernate on the south of the road in the forest, but their spawning sites are in the ZOO and around it on the Rožnik hill in different types of water bodies. Slovene Herpetological Society – Societas herpetologica slovenica started an Amphibian conservation action in 2008 by putting up a temporary amphibian fence there every year in springtime. Every evening a few members of the society with the help of local volunteers carried amphibians across the road. This year the fence stood from 20 February 2022 until 13 April 2022. In that time, 1428 amphibians had been carried across the road and another 155 were found dead on the road. The most common species were the common toad (*Bufo bufo*), the common frog (*Rana temporaria*) and the agile frog (*R. dalmatina*). Since the spring in 2022 was at first unusually cold and dry, effects of temperature and precipitation on migration are clearly visible.

Varstvo dvoživk na Večni poti v Ljubljani

Katja Konc, Herpetološko društvo – Societas herpetologica slovenica, Slovenija

Veliko vrst dvoživk se med letom seli od svojih kopenskih habitatov do mrestišč. Te selitve delimo na primarne in sekundarne. Primarne so spomladanske selitve iz zimskih prebivališč na mrestišča, ki so najbolj množične. Druge, sekundarne selitve so od mrestišč do poletnih bivališč, in jesenske selitve, ko se dvoživke odpravijo do zimskih bivališč, kjer hibernirajo do pomladi. Slednji selitvi ne potekata tako množično in sta bolj razpršeni kot pomladna. Selitvene poti velikokrat prečkajo prometne ceste in smrtnost dvoživk na teh območjih je visoka, še posebej v času spomladanskih selitev. V Ljubljani je ena od tako imenovanih 'črnih točk' v bližini živalskega vrta na Večni poti. Dvoživke hibernirajo južno od ceste v gozdu, mrestišča pa se nahajajo v živalskem vrtu in na Rožniku v različnih tipih vodnih teles. Slovensko Herpetološko društvo – Societas herpetologica slovenica od leta 2008 naprej vsakoletno postavi začasno varovalno ograjo za dvoživke. Člani društva nato vsak večer za čas selitve skupaj s prostovoljci prenašajo dovživke čez cesto. Letos je ograja stala od 20. februarja 2022 do 13. aprila 2022. V tem času je bilo prenesenih 1428 dvoživk in 155 jih je bilo najdenih povoženih. Največ je bilo krastač (*Bufo bufo*), nekaj sekulj (*Rana temporaria*) in še manj rosnic (*R. dalmatina*), redko pa so se pojavile še nekatere druge vrste. Ker je bila letošnja pomlad sprva zelo mrzla in izredno suha, so vplivi temperature in precipitacije na selitve zelo očitni.

SESSION 3: CITIZEN SCIENCE AND EDUCATION
SKLOP 3: LJUDSKA ZNANOST IN IZOBRAŽEVANJE

Biodiversity in Education: Guidelines for Teaching Children and Adolescents

Gregor Torkar, Univerza v Ljubljani Pedagoška fakulteta, Ljubljana, Slovenia

The paper describes the concept of biodiversity in the school context and explains relevant teaching approaches for biodiversity conservation and education. Teaching about biodiversity and its conservation could be an effective means of communicating the significance of various species and ecosystems and people's dependence on ecological support systems. A nested model with four main guidelines for teaching biodiversity is outlined, recommending teaching from the species to genetic level, from the local to global (natural, social) environment, from direct to symbolic experiences, and from the affective to the ethical level. The model is going to be supported with educational research evidence.

Biodiverziteta v izobraževanju: smernice za poučevanje otrok in mladostnikov

Gregor Torkar, Univerza v Ljubljani Pedagoška fakulteta, Ljubljana, Slovenija

Članek opisuje koncept biotske pestrosti v šolskem kontekstu in pojasnjuje ustrezne pristope poučevanja za ohranjanje biodiverzitete in izobraževanje o biodiverziteti. Poučevanje o biodiverziteti in njenem ohranjanju bi lahko bilo učinkovito sredstvo za obveščanje o pomenu različnih vrst in ekosistemov ter odvisnosti ljudi od ekoloških podpornih sistemov. Orisan je ugnezdeni model s štirimi glavnimi smernicami za poučevanje biodiverzitete, ki priporoča poučevanje od vrstne do genetske ravni, od lokalnega do globalnega (naravnega, družbenega) okolja, od neposrednih do simbolnih izkušenj in od afektivne do etične ravni. Model bo podprt z dokazi iz izobraževalnih raziskav.

Activity = Education

Tina Stepišnik, Grosuplje Tourism, Radensko Polje Landscape Park, Slovenia

In addition to concrete nature protection activities - support breeding, pond creation and restoration, construction of amphibian underpasses and permanent protective fences, which are going to be implemented within the LIFE AMPHICON project in Slovenia, Germany and Denmark, educational and communication activities are crucial for the conservation of amphibians and their habitats. The most effective approaches to education include those activities that entail people's own participation.

In the LIFE AMPHICON project, we encourage individuals to become actively involved in activities related to the introduction and conservation of amphibians through educational content. A large part of the project's educational content are hands-on workshops in which participants get to know amphibians in person. As part of the project, we have so far conducted over 140 workshops and nature education days on amphibians for preschool children, pupils, high school students and university students, as well as for families and wider public. Workshops are important for children and adults to get to know amphibians in person and have a real-life experience with amphibians. We also organize lectures about the project and amphibian conservation for stakeholders and variable target groups, and present project activities and amphibians at bigger events. An important part of education are also professional conferences.

In addition, each spring Frog patrols have been organized in project sites Radensko Polje Landscape Park and Kozjansko Regional Park for many years. In the spring of 2021, almost 83.000 amphibians were saved by the volunteers and coordinators of the actions on the roads across Slovenia. Such experiences make an important contribution to raising awareness among the general population about the importance of amphibians and the reasons for their endangerment.

Anyone who acquires knowledge about the importance of amphibians and is aware of their threats can make an important contribution to their further conservation. Teachers pass on awareness to future generations of pupils and students. When children meet an amphibian, they pass on their knowledge and awareness to their family members and friends. Parents and adults attending amphibian workshops and Frog patrols can play an important part in concrete conservation measures (for example, restoring amphibian habitat by setting up a pond in their backyard). However, parents can also be stakeholders and decision-makers in activities connected to amphibian conservation and habitat restoration.

The active participation of individuals in amphibian workshops and Frog patrols has a significant impact on their perception of the environment and thus their understanding of the importance of amphibians.

Aktivnost = izobraževanje

Tina Stepišnik, Turizem Grosuplje, Krajinski park Radensko polje, Slovenija

Poleg konkretnih naravovarstvenih aktivnostih - podporna vzreja, vzpostavitev in obnova mlak, gradnja trajnih varovalnih ograj in podhodov za dvoživke, ki jih izvajamo v okviru projekta LIFE AMPHICON na območju Slovenije, Nemčije in Danske, so za ohranjanje dvoživk in njihovih habitatov ključne tudi izobraževalne in komunikacijske dejavnosti. Med najbolj učinkovite pristope k izobraževanju lahko štejemo tiste dejavnosti, v katere je vključena lastna aktivnost posameznika. V okviru projekta LIFE AMPHICON preko izobraževalnih vsebin spodbujamo posameznike, da se aktivno vključujejo v dejavnosti, povezane s spoznavanjem in ohranjanjem dvoživk.

Velik del projektnih izobraževalnih vsebin predstavljajo delavnice, v okviru katerih udeleženci spoznavajo dvoživke v živo. Do sedaj smo v okviru projekta izvedli že preko 140 delavnic in naravoslovnih dni za predšolske otroke, učence osnovnih šol, dijake in študente, pa tudi za družine in širšo javnost. Na delavnicah otroci in odrasli spoznavajo dvoživke v živo in s tem konkretno izkušnjo z dvoživkami. Poleg tega organiziramo tudi predavanja na temo projekta in ohranjanja dvoživk za različne deležnike in ciljne skupine, predstavljamo pa se tudi na večjih dogodkih. Pomemben del izobraževanja so tudi strokovne konference.

Poleg delavnic se na projektnih območjih Krajinski park Radensko polje in Kozjanski regijski park že vrsto let odvijajo spomladanske akcije prenosov dvoživk poimenovane "Pomagajmo žabicam čez cesto." Preko tovrstnih aktivnosti prostovoljci vsako leto prispevajo k ohranjanju dvoživk. Samo v letu 2021 so prostovoljci širom Slovenije po poročanju organizatorjev in izvajalcev akcij v spomladanskem času preko ceste prenesli skoraj 83.000 dvoživk. Tovrstne izkušnje pomembno prispevajo k zavedanju širšega kroga prebivalstva o pomenu dvoživk in vzrokih za njihovo ogroženost.

Vsi, ki jih znanje o pomenu in problematiki dvoživk doseže, lahko pomembno prispevajo tudi pri nadaljnjemu širjenju znanja. Vzgojitelji in učitelji zavedanje prenašajo na nadaljnje generacije učencev. Otroci ob srečanju z dvoživko predajajo znanje ožjim družinskim članom in prijateljem. Starši in odrasli, ki se udeležijo delavnic za lokalno prebivalstvo in akcij prenašanja dvoživk so lahko po eni strani lokalni prebivalci in predstavljajo pomemben del pri konkretnih ukrepih ohranjanja dvoživk (z obnovo habitata za dvoživke z vzpostavitvijo mlake na svojem dvorišču, primernim urejanjem habitatov za dvoživke). Lahko pa so starši tudi ključni odločevalci o nadaljnjih aktivnostih za ohranjanje dvoživk in obnovo njihovih habitatov.

Aktivno udejstvovanje posameznika na delavnicah in akcijah prenašanja dvoživk pomembno vpliva na njegovo zaznavanje okolja ter s tem razumevanje pomena dvoživk in vzrokov za njihovo ogroženost.

As prof. Gregor Torkar has written in his review of the Amphibian Identification Key, created within the LIFE AMPHICON project (Naravoslovna solnica, June 2021): "*What we do not perceive, we do not know, we do not understand, we do not feel or protect.*"

Kot je zapisal prof. Gregor Torkar v svoji recenziji Določevalnega ključa dvoživk Slovenije, ki je nastal v okviru projekta LIFE AMPHICON (Naravoslovna solnica, junij 2021): *»Česar ne zaznamo, ne poznamo, ne razumemo, ne čutimo, tudi ne varujemo.«*

Learning about Amphibians and Their Conservation in Formal and Informal Learning Environments

Iztok Tomažič, Biotechnical Faculty, Department of Biology, Slovenia

Amphibians have been of great concern for many biologists in the past decades, as their numbers have decreased radically. For conservation biology, education plays an important role through which biologists can present novel environmental problems to the general public, first to inform them about the issues and second to motivate people to take action to preserve healthy environments.

Six studies conducted in the past 20 years on Slovenian participants will be presented here, where authors have assessed their attitudes, knowledge, negative emotions, and misconceptions about amphibians.

Study 1: This study assessed the effect of hands-on instruction (direct experiences) on seventh-grade students' attitudes to and knowledge about amphibians (green frog, European fire salamander, and common toad). The study showed that students who reported prior direct experiences with animals expressed more positive attitudes toward them and achieved higher pre-test scores. Hands-on instruction had a higher effect on students' attitudes and knowledge retention than teacher-centered instruction.

Study 2: This study was part of the first study that focused on students' negative emotions (fear and disgust) regarding amphibians and other non-human animals. On a list of animals that included fear-relevant animals, disgust-relevant animals, and pets, amphibians were placed in the middle of the list according to students' ratings of fear. However, a common toad was placed at the top of the list regarding disgust ratings. Between 60% and 80% of students reported no direct experiences with amphibians. Students who reported prior direct experiences with animals also reported less fear and disgust toward them.

Study 3 and 4: In studies 1 and 2, we found that toads are the most disgusting animals for seventh-grade students. So we developed (study 3) and reevaluated (study 4) a questionnaire with which we assessed students' attitudes (scientistic, negativistic, ecologistic, and moralistic) toward toads. The main variables that affected students' attitudes were study year, gender, and reported direct experiences with animals.

Study 5: In this study, we assessed cognitive and affective outcomes of teaching about different poisonous and venomous animals and also compared two types of instruction (hands-on vs. teacher-centered). Animals we used: a nose-horned viper, an emperor scorpion, a rose hair tarantula, a common toad, and a sea anemone. The instruction did not affect students' fear and disgust toward common toads but affected their interest in learning about them.

Spoznavanje dvoživk in njihovega ohranjanja v formalnih in neformalnih učnih okoljih

Iztok Tomažič, Biotehniška fakulteta, Oddelek za biologijo, Slovenija

Številne biologe zelo skrbi upadanje števila dvoživk v zadnjih desetletjih. Na področju varstvene biologije ima izobraževanje pomembno vlogo, saj lahko biologi predstavijo nove okoljske probleme širši javnosti z namenom obveščanja o okoljskih vprašanjih in motivirajo ljudi, da tudi sami ukrepajo in sodelujejo pri ohranjanju zdravega okolja (pro-okoljsko vedenje).

V prispevku bomo predstavili šest študij, ki so bile opravljene v zadnjih 20 letih na slovenskih udeležencih, v katerih so avtorji raziskovali stališča, znanje, negativna čustva in napačne predstave o dvoživkah.

Študija 1: V tej študiji so avtorji ocenili učinek praktičnega pouka (neposredne izkušnje) na stališča in znanje učencev sedmega razreda do dvoživk (zelena žaba, navadni močerad in navadna krastača). Študija je pokazala, da učenci s predhodnimi neposrednimi izkušnjami z živalmi, izražajo bolj pozitivna stališča do njih in dosegajo višje rezultate na preizkusu znanja. Praktično poučevanje ima večji učinek na stališča učencev in na trajnost znanja kot poučevanje, ki je osredotočeno na učitelja (frontalni pouk).

Študija 2: Ta študija je bila del prve študije in se je osredotočala na negativna čustva učencev (strah in gnus) do dvoživk in drugih živali. Na seznamu živali, ki je vključeval živali, povezane s strahom, živali, povezane z gnusom, in hišne ljubljenčke, so bile dvoživke glede na ocene strahu uvrščene na sredino seznama. Vendar pa je bila navadna krastača glede ocene gnusa postavljena na sam vrh seznama. Med 60 % in 80 % učencev je poročalo, da nimajo neposrednih izkušenj z dvoživkami. Učenci, ki so poročali o predhodnih neposrednih izkušnjah z živalmi, so poročali tudi o manj strahu in manj gnusa do njih.

Študiji 3 in 4: V študijah 1 in 2 smo ugotovili, da so krastače za učence sedmega razreda najbolj nagnusne živali. Zato smo pripravili (študija 3) in testirali (študija 4) vprašalnik, s katerim smo lahko ocenili stališča (znanstveno, negativistično, varstveno in moralno) učencev do krastač. Glavne spremenljivke, ki so vplivale na stališča učencev, so bili razred, spol in neposredne izkušnje z živalmi.

Študija 5: V tej študiji smo ocenili kognitivne in afektivne vidike poučevanja o različnih strupenih živalih ter primerjali dva načina poučevanja, praktičen in frontalni pouk. Živali, ki smo jih uporabili,v študiji, so bile modras, kraljevi škorpijon, ptičji pajek, navadna krastača in morska vetrnica. Pouk sicer ni vplival na nivo strahu in gnusa učencev do navadnih krastač, vendar je pozitivno vplival na njihov interes za učenje o njih.

Študija 6: Osredotočili smo se na napačne predstave učencev o razvrščanju dvoživk in plazilcev.

Study 6: We focused on students' misconceptions about amphibian and reptile classification. We found that common misconceptions are also present in the Slovenian population of students. Namely, students easily categorize prototypical animals (a frog, a lizard) into appropriate groups, but they have difficulties classifying salamander, olm, and pond turtle. Students' reasons for classifying animals can be linked to animal anatomy, habitat, or even common names.

As part of the cognitive dimension of nature protection, one of the efforts should be to shift negative attitudes toward amphibians to positive ones. From most of our studies, that can principally be achieved by offering participants direct experiences with animals and their habitats, which is easily accomplished in the case of amphibians.

Ugotovili smo, da so pogoste napačne predstave prisotne tudi v slovenski populaciji učencev. Učenci namreč zlahka razvrstijo prototipične živali (žaba, kuščar) v ustrezne skupine, vendar imajo težave pri razvrščanju močerada, človeške ribice in močvirske sklednice. Njihove razloge za razvrščanje živali je mogoče povezati z anatomijo živali, habitati ali celo s pogovornimi imeni živali.

Kot del varstva narave bi moralo biti poleg kognitivne dimenzije eno od prizadevanj tudi spreminjanje stališč do dvoživk. Večina naših študij je pokazala, da je to mogoče doseči predvsem tako, da udeležencem ponudimo neposredne izkušnje z živalmi in njihovimi habitati, kar pa je v primeru dvoživk enostavno doseči.

"Kozjansko Regional Park – Examples of Good Practice for Amphibian Conservation in a Protected Area"

Tatjana Kotnik, Kozjansko Regional Park, Slovenia

The Kozjansko Regional Park is one of the oldest and largest protected areas in Slovenia. The harmony of nature and man is the guiding principle of the management of the Kozjansko Regional Park, as habitats of higher nature conservation value have been largely co-created by the sustainable management and work of local people. The forested hills, meadow orchards, dry meadows and the lowland along the Sotla and Bistrica rivers create the conditions for the area's exceptional biodiversity.

The recognition of the Kozjansko Regional Park is mainly due to the meadow orchards, which are an important bird habitats. The Kozjansko apple is therefore a symbol of the preserved nature, tradition and recognition of the protected area.

The Kozjansko Regional Park also has a long-standing practice of conserving one of the most endangered groups of animals – amphibians.

Near Podsreda lies the Trebče pond, one of the largest amphibian breeding sites in the Kozjansko Regional Park. Since 1990, when 1500 amphibians were killed over a distance of 400 m, the Kozjansko Regional Park has launched the Frog patrol actions during the spring migration from overwintering sites to the breeding site. A temporary amphibian fence is erected every year at the end of winter. Amphibians are carried across the road twice a day in both directions. At the start of the season to the pond, and then in the opposite direction when the amphibians leave for their terrestrial habitat.

An important objective of the actions is to inform adults and schoolchildren about amphibians, their characteristics, threats and ways to increase their survival. That is why every year we invite primary schools located in the Park to take part. This way, pupils of every generation experience contact with amphibians, get rid of their fears and beliefs about them, and learn about their importance for nature and humans.

Since 2000, summer research camps have been taking place every year in Kozjansko Regional Park for pupils to become young guardians of nature, where Amphibian Education is an important part of the programme.

The expert help of Kozjansko Regional Park in establishing the open-air classroom next to Lesično Primary School is an important example of the cooperation with primary schools. The school pond created in 2021 is an important upgrade of the open-air classroom, which is an important space for lessons in the nature.

»Kozjanski park – primeri dobrih praks ohranjanja dvoživk v zavarovanem območju«

Tatjana Kotnik, Kozjanski regijski park, Slovenija

Kozjanski park je eno najstarejših in največjih zavarovanih območij v Sloveniji. Sožitje narave in človeka je vodilo upravljanja Kozjanskega regijskega parka, saj sta habitate višje naravovarstvene vrednosti v veliki meri soustvarila sonaravno ravnanje in delo domačinov. Hribovja, porasla z gozdovi, visokodebelni travniški sadovnjaki, suhi travniki ter ravninski svet ob rekah Sotla in Bistrica ustvarjajo pogoje za izjemno biotsko pestrost območja.

Prepoznavnost Kozjanskega parka gre v največji meri visokodebelnim travniškim sadovnjakom, ki so pomemben življenjski prostor za ptice. Kozjansko jabolko je zato simbol ohranjene narave, izročila in prepoznavnosti zavarovanega območja.

V Kozjanskem parku je doma tudi dolgoletna praksa ohranjanja ene najbolj ogroženih skupin živali – dvoživk.

V bližini Podsrede je ribnik Trebče, ki je eno največjih mrestišč za dvoživke v Kozjanskem parku. Od leta 1990, ko je bilo na razdalji 400 m povoženih 1500 dvoživk, je Kozjanski park pričel z akcijo prenašanja dvoživk v obdobju spomladanskih selitev iz prezimovališč na mrestišče. Vsako leto ob koncu zime se postavi začasna varovalna ograja. Dvoživke se dvakrat dnevno čez cesto prenašajo v obe smeri. Na začetku sezone k ribniku, nato pa v obratni smeri, ko dvoživke odidejo v svoj kopenski habitat. Pomemben cilj akcije je seznanjanje odraslih in šolske mladine o dvoživkah, njihovih značilnostih, načinih ogrožanja ter pristopov za povečanje možnosti njihovega preživetja. Zato vsako leto na akcijo povabimo parkovne osnovne šole. Tako učenke in učenci vsake generacije doživijo stik z dvoživkami, se znebijo strahu in vraž o njih ter spoznajo njihov pomen za naravo in človeka.

Od leta 2000 se v Kozjanskemu parku vsako poletje izvajajo naravoslovni tabori za osnovnošolske otroke, kjer se udeleženci usposobijo za mlade varuhe narave. Pomemben del programa taborov je izobraževanje o dvoživkah.

Uspešen primer sodelovanja z osnovnimi šolami je strokovna pomoč Kozjanskega parka pri urejanju učilnice na prostem pri OŠ Lesično. Vzpostavljena učna mlaka v letu 2021 predstavlja pomembno nadgradnjo učilnice, ki je pomemben prostor za izvajanje pouka na prostem.

V projektu LIFE AMPHICON se v Kozjanskem parku načrtuje izgradnja podhodov in ograje na Trebčah, ki bodo dvoživkam omogočili varno prehajanje cest ob selitvah, ureditev informacijskega centra za dvoživke z učno potjo na Trebčah, nakup 15 ha zemljišč na območju Jovsov in ureditev 10 mlak z namenom izboljšanja stanja dvoživk,

As part of the LIFE AMPHICON project in the Kozjansko Regional Park, at Trebče will be built amphibian underpasses and a fence to allow amphibians to safely cross roads during migration, together with the amphibian information centre and a learning trail. In the Jovsi area 15 ha of land will be purchased and 10 amphibian ponds created to improve the status of amphibians and in the Bohorje area 30 amphibian ponds will be created to improve the conservation status of the yellow bellied toad. We will also carry out the population reinforcement for the great crested newt in Jovsi with the help of Danish partners.

vzpostavitev 30 mlak na območju Bohorja za izboljšanje stanja ohranjenosti hribskega urha ter podporna vzreja velikega pupka s pomočjo strokovnjakov iz Danske z namenom povečanja njihove populacije na območju Jovsov.

Frog Princess: The Role of Storytelling in Nature Education

Špela Kaplja, Slovenia

The author is a writer and storyteller for Nature. She uses the art of storytelling in the nature conservation education of children and adults, which she takes care of within the Terra Anima Society for Deep Ecology. Based on her experience of working with children in the woods, she has published a book created in a local wetland - the Forest Book, which is a practical tool for bringing nature closer to children through stories. She runs workshops on the use of stories for raising awareness and educating at home and abroad. As part of the Stories of Our Wetlands project, she has led training for experiential nature guides. For the Fair Earth Foundation, she trains young volunteers in the use of storytelling to educate about whales and dolphins. Wetlands are especially close to her, she has trained herself in listening to the stories told by Nature in the local Blate-Mlake and is currently an active force in the civil initiative to protect the local swamp in the landscape park.

Frogs appear in many stories and bring different symbolism. Špela will tell an environmental story about the Frog Princess, which is an adaptation of the famous story The Frog Prince. With an example of a story, it will show us how a story can present a frog, its properties and peculiarities and its significance for the environment, as well as its significance for us individuals on a personal level.

Our planet, facing ecocide, is suffering. This global crisis threatens the existence of many life forms. To raise awareness of the importance of healthy natural environments and our inter-connectedness with nature, we need stories again. What is the power of the story and how can it serve in solving current problems and education?

Despite the many already known positive effects of connection with Nature, superficiality is still present in the way children and adults perceive the natural world - it remains at a rational level from which they cannot create deeper bonds. In order to deepen their relationship with her, they must first get to know her as a living being, and at the same time get to know themselves as an equal part of her. Only this way can they truly perceive the all-intertwining of the natural world and their own significance in this living matrix of the world. And only then can they create a relationship with her. That Nature is alive is understood - it grows, blooms, flows and crawls. But how to make people understand that nature is alive - with feelings and consciousness? To know her as a being with whom they can have an equal relationship? How does storytelling educate about Nature and what is the importance of developing empathy in environmental education? How do stories inspire into connection with Nature and into taking action to preserve it? Those are topics that Špela will touch on in her presentation based on the story and personal experience of working with storytelling in Nature.

Žabja princesa: Vloga pripovedovanja zgodb v izobraževanju o naravi

Špela Kaplja, Slovenija

Avtorica prispevka je pisateljica in pripovedovalka zgodb za Naravo. Umetnost pripovedovanja uporablja pri naravovarstveni vzgoji otrok in odraslih, za katero skrbi v okviru društva za poglobljeno ekologijo Terra Anima. Na podlagi izkušenj dela z otroci v gozdu je izdala knjigo, ki je nastajala v lokalnem močvirju - Gozdna knjiga, katera je praktično orodje za približevanje narave preko zgodb otrokom. Delavnice s področja uporabe zgodb za ozaveščanje in izobraževanje vodi doma in v tujini. V okviru projekta Zgodbe naših mokrišč je vodila izobraževanje za doživljajske vodnike, za organizacijo Fair Earth Foundation pa mlade prostovoljce trenira v uporabi pripovedovanja zgodb z namenom izobraževanja o kitih in delfinih. Še posebej blizu so ji močvirja, v lokalnih Blatah-Mlakah se je kalila v poslušanju zgodb, ki jih pripoveduje Narava, trenutno pa je aktivna sila v civilni iniciativi za zavarovanje lokalnega močvirja v krajinski park.

Žabe se pojavljajo v mnogih zgodbah in prinašajo različno simboliko. Špela bo povedala okoljevarstveno obarvano zgodbo o Žabji princesi, ki je priredba poznane zgodbe Žabji kralj. Na konkretnem primeru zgodbe nam bo pokazala kako nam lahko zgodba predstavi žabo, njene lastnosti in posebnosti in pomen za okolje ter tudi pomen za nas posameznike na osebni ravni.

Naš planet, soočen z ekocidom trpi. Ta globalna kriza ogroža obstoj mnogih življenjskih oblik. Za ozaveščanje o pomenu zdravih naravnih okolij ter naše vse prepletenosti z naravo, spet potrebujemo zgodbe. Kakšna je moč zgodbe in kako lahko služi pri reševanju aktualne problematike ter izobraževanju?

Kljub že poznanim, premnogim pozitivnim učinkom, ki ga ima stik z Naravo na nas, je površinskost še vedno prisotna v načinu kako otroci in odrasli dojemajo naravni svet - ta ostaja na razumski ravni iz katere ne morejo splesti globlje vezi. Da bi lahko poglobili svoj odnos z njo, jo morajo najprej spoznati kot živo bitje, obenem pa spoznati sebe kot enakovreden del nje. Šele tako lahko zares dojamejo vse-prepletenost naravnega sveta in svoj pomen v tej živi matrici sveta. In šele takrat lahko spletejo odnos z njo. Da je Narava se razume - saj vendar raste, cveti, teče in se plazi. Kako pa doseči, da bi otroci razumeli, da je narava živa - z občutki in zavestjo? Da jo spoznajo kot bitje s katerim lahko spletejo enakovreden odnos? Na kakšen način zgodbe za Naravo izobražujejo in kakšen je pomen razvijanja empatije pri okoljski vzgoji? Kako nas zgodbe navdihujejo k povezovanju z Naravo in k aktivnemu zavzemanju za skrb ter ohranjanje le-te, so teme, ki se jih bo dotikala v svoji predstavitvi, ki temelji na zgodbi ter osebnih izkušnjah dela s pripovedovanjem zgodb v Naravi.

“Kaj pa, če je vse res?!” so otroci spraševali z odprtimi usti in očmi uprtimi v žabo, ki je sedela na lokvanju za Špelo, ki je otrokom pripovedovala zgodbo o Žabji princeski.

"What if it's all true?!" the children asked, with their mouths open and their eyes fixed on the frog sitting on the water lily behind Špela, who was telling them the story of the Frog Princess. This is the power of a well-told story for Nature - it creates the bridge between us and Nature and re-connects us.

To je moč dobro povedane zgodbe za Naravo - most med nami in Naravo ustvari in nas spet poveže.

The Coordination Centre for Amphibians in Slovenia and the Importance of Citizen Science Projects for Amphibian Conservation

Tadeja Smolej, Katja Poboljšaj, Centre for Cartography of Fauna and Flora, Slovenia

Citizen science projects are an essential part of understanding and monitoring of many species populations and their habitats because they collect a variety of biological data at a large spatial scale over a long period and at a much finer resolution than would otherwise be possible. In the long term, Citizen science activities and accurately collected data make an important contribution to scientific research, provide answers to complex biological questions such as accurately determining migration routes, population size, changes in abundance between years, present species and sex ratios, provide information for appropriate mitigation measures, habitat condition, and maintain other important information. Citizen science projects, along with education, which is playing an essential role in increasing knowledge, awareness, and acceptance among stakeholders and target groups are one of the key factors in successful long-term amphibian conservation.

The Coordination Centre for Amphibians in Slovenia (CCA) was established in 2020 in the Centre for Cartography of Fauna and Flora (CKFF) in the form of a helpdesk. We provide expertise, organisation and analysis of Citizen Science projects on amphibian road mortality and other amphibian conservation issues in the country. The important part represents a further development of the existing CKFF database of amphibian migratory crossings on the roads in Slovenia through the interface of BioPortal. CCA is a one-stop shop for amphibian conservation in Slovenia. The aim is to open up more exciting opportunities for networking and capacity building in the field of amphibian conservation, which will lead to an overall improvement of amphibian populations in Slovenia. The main objective of CCA is to provide information and promote best practices for the conservation of amphibians, their habitats, migration routes and road ecology. Through CCA, we aim to stimulate the implementation of various measures to minimise the negative impacts of human activities, agriculture and transport systems on herpetofauna and their habitats.

We would like to promote this activity by establishing a national network of Frog patrollers and coordinating information to road administrations (national and local) and Natura 2000 managers so that best practice solutions can be implemented in the future. Once a year we publish a newsletter Regljač (Croaking Frog) with a national overview of amphibian conservation actions and project results which could not be carried out without outstanding collaboration with many organisations, associations, volunteers and individuals from all over Slovenia.

Informacijski center za varstvo dvoživk Slovenije in pomen projektov ljudske znanosti za ohranjanje dvoživk

Tadeja Smolej, Katja Poboljšaj, Center za kartografijo favne in flore, Slovenija

Ljudska znanost prispeva pomemben del k razumevanju ter spremljanju stanja populacij številnih vrst in njihovih življenjskih prostorov z zbiranjem različnih bioloških podatkov, ki zajemajo veliko območje v daljšem časovnem obdobju in z boljšo natančnostjo kot bi bilo to sicer mogoče. Podatki zbrani v projektih ljudske znanosti dolgoročno predstavljajo pomemben prispevek k znanstvenim raziskavam ter dajejo odgovore na kompleksna biološka vprašanja, kot so opredelitev natančnejših selitvenih poti, številčnosti populacij, spremembe številčnosti med posameznimi leti, vrstna in spolna sestava, zagotavljajo informacije za ustrezne varstvene ukrepe, dajejo vpogled v stanje habitata in omogočajo pridobivanje drugih pomembnih informacij. Projekti ljudske znanosti, v povezavi z izobraževanjem, imajo pomembno vlogo pri posredovanju strokovnega znanja, ozaveščanju ter sprejemanju ukrepov med deležniki in ciljnimi skupinami in so eden od ključnih dejavnikov za zagotavljanje uspešnega dolgoročnega ohranjanja dvoživk.

Informacijski center za varstvo dvoživk Slovenije (ICVDS), ki na enem mestu združuje vse pomembne informacije o varstvu dvoživk, je bil v Centru za kartografijo favne in flore (CKFF) vzpostavljen leta 2020. Posredujemo strokovno znanje, zbiramo ter analiziramo rezultate projektov ljudske znanosti o dvoživkah in cestah ter drugih vsebin s področja varstva dvoživk v Sloveniji. Pomemben del predstavlja nadaljnji razvoj obstoječe Podatkovne zbirke CKFF, kjer so zbrane tudi informacije o selitvah dvoživk preko cest ter uporabniškega vmesnika BioPortal. Namen ICVDS je ustvariti nove priložnosti za mreženje ter krepiti zmogljivosti na področju ohranjanja dvoživk, kar bo omogočilo izboljšanje stanja populacij dvoživk na območju Slovenije. Glavni cilj je posredovati informacije in promovirati primere dobrih praks za varstvo dvoživk in njihovih habitatov ter selitvenih poti. Preko Informacijskega centra za varstvo dvoživk Slovenije želimo spodbuditi izvajanje različnih ukrepov za zmanjšanje negativnih vplivov človeških dejavnosti, kmetijstva ter prometa na dvoživke in njihove habitate.

Dejavnost želimo razširiti z vzpostavitvijo nacionalne mreže različnih organizacij, društev, prostovoljcev in posameznikov, ki prispevajo k varstvu dvoživk Slovenije, zbrane podatke pa posredovati upravljavcem državnih ter občinskih cest in upravljavcem območij Natura 2000 z namenom, da bodo izvajanja ukrepov v prihodnosti primeri dobrih praks. Enkrat letno izdamo novičnik Regljač, ki je namenjen predstavitvi in letnemu pregledu aktivnosti na področju varstva dvoživk in njihovih habitatov.

During the spring migrations in 2020, nearly 65.000 amphibians were recorded on 21 road sections (approximately 36 km) by 560 Frog patrollers. In 2021, nearly 63.000 amphibians were recorded on 20 road sections (approximately 40 km) by 336 Frog patrollers.

Identifying the initial status of the amphibian populations and the threat factors is critical information for the decision about the best conservation measures for amphibians in the problematic area, which will also ensure the effective protection of the species and their habitats. Therefore, during the planning phase of conservation measures, conservation objectives must be clearly defined and monitoring of their performance must be implemented. This is the only way to ensure the long-term survival of the endangered amphibian populations. For the successful implementation, cooperation with a range of stakeholders and target groups is an important part of the process.

Za izjemno dobro sodelovanje se moramo zahvaliti številnim organizacijam, društvom, prostovoljcem in posameznikom iz vse Slovenije, ki vsako leto sodelujejo pri pripravi nove številke Regljača. V času spomladanskih selitev je v letu 2020 560 prostovoljcev na 21 cestnih odsekih (približno 36 km) zabeležilo skoraj 65.000 dvoživk. Leta 2021 pa je 336 prostovoljcev na 20 cestnih odsekih (približno 40 km) registriralo skoraj 63.000 dvoživk.

Za odločitev o izvedbi ukrepov za dvoživke na nekem območju je opredelitev začetnega stanja populacij dvoživk in dejavnikov ogrožanja ključna informacija, ki bo zagotavljala tudi učinkovito varstvo vrst in njihovih habitatov. Pri načrtovanju ukrepov morajo biti zato jasno opredeljeni varstveni cilji, način izvedbe in spremljanje njihove uspešnosti. Le na ta način bomo zagotovili tudi dolgoročno preživetje ogroženim populacijam. Pomemben del procesa za uspešno izvedbo akcije predstavlja tudi sodelovanje z različnimi deležniki in ciljnimi skupinami.

Citizen Science Data Can Help Monitor a Rare Snake Species

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The secretive behaviour and life history of snakes make them difficult to study, and knowledge of their biology, ecology, and distribution remains incomplete. Even for harmless, rare species, the general fear of snakes often makes it difficult to engage laypersons in their studies. As part of the integrated LIFE-IP NATURA.SI project, we aimed to assess the status of the population of the four-lined snake (*Elaphe quatuorlineata*, Colubridae) in the Natura 2000 site in western Slovenia. To do this, we used a citizen science approach, among others.

The four-lined snake is our largest non-venomous snake, identified by the four longitudinal stripes on its back. It occurs in southern Europe in S and NE Italy, along the western coast of the Balkan Peninsula, Greece and its islands, Macedonia, SW Bulgaria, Bosnia and Herzegovina, Montenegro and Albania. In Slovenia, the most recent finds are mainly from the valley of the Dragonja River. It is a rare and extremely elusive snake species that is very difficult to detect.

Based on the idea to search for the four-lined snake as finding a lost pet, we developed a digital communication campaign called "Finding four-lined snake", which we disseminated through social and traditional local media, geographically focused on the Dragonja Valley and its surroundings. We created a communication plan about "A shy, elusive giant," provided photos and information about the snake's biology and its role in the environment. We also provided radio interviews and encouraged people to send us photos and associated metadata of live specimens with sightings or/and shaded skin of the four-lined snake.

Media coverage and resident response exceeded our most optimistic expectations. We collected a total of five photos and videos of the four-lined snake. In addition, we received a lot of scientifically useful information about other snake species and their locations in other parts of Slovenia. In addition to valuable data on the distribution of the species, our Citizen Science campaign also had an awareness-raising effect that can contribute to efforts to achieve a long-term favourable conservation status of the endangered four-lined snake in the Natura 2000 site Slovenska Istra.

Ljubiteljska znanost lahko pomembno prispeva k spremljanju redkih vrst kač

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Zaradi njihovega skrivnostnega vedenja je kače težko preučevati, zato je poznavanje njihove biologije, ekologije in razširjenosti še vedno nepopolno. Tudi pri nestrupenih in redkih vrstah je zaradi splošnega strahu pred kačami prostovoljce pogosto težko vključiti v njihovo preučevanje. V okviru LIFE integriranega projekta za okrepljeno upravljanje Nature 2000 v Sloveniji (LIFE-IP NATURA.SI) smo želeli oceniti stanje populacije progastega goža (*Elaphe quatuorlineata*, Colubridae) na območju Natura 2000 v zahodni Sloveniji. V ta namen smo med drugim uporabili pristop ljubiteljske znanosti.

Progasti gož je naša največja nestrupena kača, ki jo prepoznamo po štirih temnih progah vzdolž telesa. V južni Evropi se pojavlja v J in SV Italiji, vzdolž zahodne obale Balkanskega polotoka, v Grčiji in njenih otokih, Makedoniji, JZ Bolgariji, Bosni in Hercegovini, Črni gori in Albaniji. V Sloveniji so najnovejše najdbe omejene predvsem na dolino reke Dragonje. Gre za redko in težko zaznavno vrsto kač, ki jo je zelo težko odkriti.

Na podlagi ideje, da bi progastega goža iskali po principu izgubljenega hišnega ljubljenčka, smo razvili digitalno komunikacijsko kampanjo z naslovom "Išče se največja slovenska nestrupena kača", ki smo jo razširjali prek družbenih in tradicionalnih lokalnih medijev, geografsko pa smo se osredotočili predvsem na dolino reke Dragonje in njeno okolico. Izdelali smo komunikacijski načrt o "Plašnem velikanu", zagotovili fotografije in informacije o biologiji kače ter njeni ekološki vlogi v naravi. Poskrbeli smo tudi za radijske intervjuje in spodbujali ljudi, naj nam pošljejo fotografije in z njimi povezane metapodatke živih osebkov ali opaženih olevkov progastega goža.

Odmevnost v medijih in odziv prebivalcev sta presegla naša najbolj optimistična pričakovanja. Skupaj smo zbrali pet fotografij in videoposnetkov progastega goža. Poleg tega smo prejeli veliko znanstveno koristnih informacij o drugih vrstah kač in njihovih nahajališčih v drugih delih Slovenije. Poleg dragocenih podatkov o razširjenosti iskane vrste je imela naša akcija tudi pomemben učinek ozaveščanja in izobraževanja, ki lahko prispeva k prizadevanjem za doseganje dolgoročnega ugodnega stanja ohranjenosti progastega goža na območju Natura 2000 Slovenska Istra.

Hungarian Amphibian and Reptile Mapping Program - over a Decade of Experience Operating a Citizen Science Effort

Bálint Halpern, Gergely Babocsay, Attila Péntek, Judit Vörös, Amphibian and Reptile Conservation Group of MME BirdLife, Hungary

In order to learn more about distribution of Hungarian herpetofauna, we launched a citizen science website in 2010. The static website contains information about amphibian and reptile species, occurring in Hungary and encourages visitors to share their sightings, adding points to the observation point maps. Since the widespread use of smartphones became obvious, we developed free Android and IOS applications, enabling users to share observation data or check local herpetofauna records. In the past decade we managed to gather over 69.000 observation points from 1744 registered users. The most commonly reported amphibian is spadefoot toad (*Pelobates fuscus*) while reptile is green lizard (*Lacerta viridis*). Our database provided information for the distribution maps of New Atlas of Amphibians and Reptiles of Europe, country reports on N2000 selection criteria species and Invasive Alien Species.

In order to maintain or even increase interest of the general public in reporting herpetofauna observations, we launched our Amphibian and Reptile of the Year campaign in 2012. Since then each year we select a species, naming it publicly as Species of the Year, and we managed to get fair amount of public attention this way. The campaign includes production of leaflet, sticker and poster, several online tools like collection of photos, free presentation for download and article, introducing the species and the reasoning for its selection, always naming actual conservation challenges and potential solutions. Probably the most successful elements of this effort are the mobile exhibitions, that were produced by our group, using distribution maps, based on collected data. We have 4 sets, presenting Lizards, Snakes, Frogs and Newts of Hungary. Each mobile exhibit consists of rollups, each presenting a certain species. We provide these exhibits mainly for schools and local cultural centres free of charge, organising transport with help of our network of professionals and volunteers.

Madžarski program zbiranja podatkov o dvoživkah in plazilcih – več kot deset let izkušenj z ljudsko znanostjo

Bálint Halpern, Gergely Babocsay, Attila Péntek, Judit Vörös, Skupina za varstvo dvoživk in plazilcev organizacije MME BirdLife, Madžarska

Da bi izvedeli več o razširjenosti madžarske herpetofavne, smo leta 2010 uvedli znanstveno spletno stran za državljane. Statično spletno mesto vsebuje podatke o vrstah dvoživk in plazilcev, ki se pojavljajo na Madžarskem, in spodbuja obiskovalce, da delijo svoja opažanja ter dodajajo točke na zemljevide opazovalnih mest. Zaradi razširjene uporabe pametnih telefonov smo razvili brezplačne aplikacije za Android in IOS, ki uporabnikom omogočajo izmenjavo podatkov o opazovanjih in vpogled v evidenco lokalne herpetofavne. V zadnjem desetletju nam je uspelo od 1.744 registriranih uporabnikov zbrati več kot 69.000 opazovalnih točk. Med dvoživkami najpogosteje opozarjajo na navadno česnovko (*Pelobates fuscus*), med plazilci pa na navadnega zelenca (*Lacerta viridis*). Naša baza podatkov je priskrbela informacije za zemljevide Novega atlasa dvoživk in plazilcev Evrope ter za poročila raznih držav o merilih za izbor N2000 in o invazivnih tujerodnih vrstah.

Da bi ohranili ali celo povečali zanimanje širše javnosti za poročanje o opazovanjih herpetofavne, smo leta 2012 začeli akcijo »Dvoživka in plazilec leta«. Od takrat vsako leto izberemo vrsto in jo javno razglasimo za vrsto leta. Na ta način smo pridobili precejšnjo pozornost javnosti. Kampanja vključuje izdelavo letakov, nalepk in plakatov, več spletnih orodij, kot so zbirke fotografij, brezplačne prenosljive predstavitve in članki, predstavitev vrste in utemeljitev za njen izbor, pri čemer vedno izpostavljamo dejanske izzive za varstvo in morebitne rešitve. Najuspešnejši elementi teh pobud so verjetno potujoče razstave, ki jih je naša skupina priredila z uporabo zemljevidov razširjenosti na podlagi zbranih podatkov. V štirih kategorijah so madžarski kuščarji, kače, žabe in pupki. Vsako potujočo razstavo sestavljajo panoji, ki predstavlja določeno vrsto. Brezplačno jih prirejamo predvsem za šole in krajevne kulturne centre, prevoze pa organiziramo s pomočjo mreže strokovnjakov in prostovoljcev.

Biodiversity and LIFE Communication Approaches to Education and Awareness Raising - Good Practice Examples

Tatjana Gregorc, Lutra, Institute for Conservation of Natural Heritage, Slovenia

LIFE communication and information projects (GIE) are primarily aimed at education and awareness-raising. A considerable proportion of similar activities are needed in virtually all of LIFE projects. Already at the phase of the project proposals preparation, applicants try to find effective approaches to achieve project objectives, which includes reaching out to a selected share of target groups. Lutra Institute is a relatively small, private, non-profit organization, but is considerably successful in preparing LIFE project applications and securing the funding. We have successfully completed LIFE projects AQUALUTRA, Conservation of otter population (*Lutra lutra*) in Goričko and AQUAVIVA, Live Water - from Biodiversity to the Tap. There are currently two ongoing projects: LIFE NATURAVIVA, Biodiversity - Art of Life and LIFE BEAVER, Living with the Beaver, Wetlands and Climate Change.

We use various approaches to achieve project objectives; from well-established (workshops, lectures, indoor and outdoor exhibitions, publications, competitions, websites, promotional materials, video contents, social media, info points and educational paths) to less standard and even innovative approaches. Among the predominantly market-oriented advertisements (advertising on billboards, online, on city and intercity buses and in the media), nature conservation content generally stands out well and has a high reaching effect. We include nature themes in cultural events (classical music concerts), high fashion (fashion collection inspired by the diatoms exhibition that won the fashion week award), debates competitions, research assignments in primary and secondary schools, in shopping malls, at various festivals, fairs and even sporting events.

In all of our approaches, quality and vivid illustrations, photographs or video content, good design, quality materials, short and clear messages are tailored to suit different target groups. The medium used to achieve our aims is crucial. It is also important for us to follow the market and to adapt to its newly arising technologies and trends. This way, it is possible for us to search for new solutions and to overcome potential obstacles, even if it requires activities which were originally not planned in the project.

The Covid pandemic was especially challenging in terms of reaching various target groups. In the past two years, due to the Covid restrictions, we had to adjust our project activities and, consequently, moved the majority of them online and to the streets.

Biodiverziteta in LIFE Komunikacijski pristopi za izobraževanje in ozaveščanje – primeri dobrih praks

Tatjana Gregorc, Lutra, Inštitut za ohranjanje naravne dediščine, Slovenija

Komunikacijski in informacijski projekti programa LIFE (GIE) so namenjeni predvsem izobraževanju in ozaveščanju, znaten del takšnih aktivnosti pa je potreben pravzaprav v vseh LIFE projektih. Že pri pripravi projektnih prijav se prijavitelji trudimo poiskati učinkovite pristope, ki nam pomagajo pri doseganju zastavljenih ciljev projekta, med katerimi je tudi doseg določenega števila ali deleža izbranih ciljnih skupin. Inštitut Lutra je sicer majhna, pri pripravi projektnih prijav programa LIFE pa precej uspešna zasebna neprofitna organizacija. Uspešno smo zaključili projekta LIFE AQUALUTRA, Ohranjanje populacije vidre (*Lutra lutra*) na Goričkem in AQUAVIVA, Živa voda – od biodiverzitete do pipe. Trenutno tečeta dva projekta, in sicer LIFE NATURAVIVA, Biodiverziteta – umetnost življenja in LIFE BEAVER, Živeti z bobrom, mokrišči in podnebnimi spremembami.

Za doseganje zastavljenih ciljev projektov uporabljamo različne pristope, od dobro uveljavljenih (delavnice, predavanja, notranje in zunanje razstave, publikacije, natečaji, spletne strani, promocijski materiali, video vsebine, družbeni mediji, info točke in učne poti) do manj standardnih in celo inovativnih. Med pretežno tržnimi oglasi (oglaševanje na plakatnih mestih, na spletu, na mestnih in medkrajevnih avtobusih, v medijih) naravovarstvene vsebine še posebej izstopajo in imajo zelo dober doseg. Naravo vključujemo v kulturne prireditve (koncerti klasične glasbe), visoko modo (modna kolekcija, ki je navdih dobila na razstavi alg diatomej in zmagala na tednu mode), debatna tekmovanja, raziskovalne naloge v osnovnih in srednjih šolah, v nakupovalne centre, na festivale, sejme in celo športne prireditve.

Pri vseh pristopih so ključnega pomena kvalitetne in nazorne ilustracije, fotografije ali video vsebine, dobro oblikovanje, kvalitetni materiali ter kratka in jasna sporočila, prilagojena ciljnim skupinam in mediju, ki ga uporabljamo. Prav tako je pomembno, da spremljamo in se prilagajamo novim tehnologijam in trendom ter da iščemo rešitve za premostitev morebitnih ovir, tudi če so zato potrebne aktivnosti, ki jih v projektu prvotno nismo načrtovali.

Epidemija koronavirusa je bila z vidika doseganja ciljnih skupin poseben izziv, zato smo projektne aktivnosti zaradi omejitev zbiranja v zadnjih dveh letih prilagajali ter jih selili na splet in na ulice.

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