

Living on the(h)EDGE



Bat conservation
in agricultural landscapes in Serbia





Bats are:

✓ Important for agriculture

Bats are important inhabitants of agricultural landscapes. Being the only active flying mammals, they are very mobile and able to cover kilometres on a single night. These animals are important natural regulators of insects, some of which are pests in agriculture, forestry, or vectors of diseases which are dangerous for people or domestic animals.

✓ Bioindicators and “umbrella” species

Bats are recognized as bioindicators and “umbrella” species in nature protection.

- Bioindicators - because their species diversity, population numbers and level of activity indicate the quality of environment, landscape diversity and structure, and reflect the number and species composition of their prey – insects;
- “Umbrella” species - because through implementation of bat conservation measures, having in mind that bats are highly mobile species using diversity of different habitats, we also protect other wildlife sharing same habitats with bats.

✓ Protected by law

Despite the importance of bats for ecosystems and people, these mammals are “living on the edge” – ranges of numerous species are contracting, population numbers are decreasing. This is why they need to be protected. All bat species in Serbia are protected by law - from disturbance, cruelty and killing. Their roosts are also legally protected as they are particularly important for bat survival. However, habitats where bats feed or that are used to commute to hunting grounds, are not adequately recognized and protected by the law, especially in intensively managed agricultural landscapes.

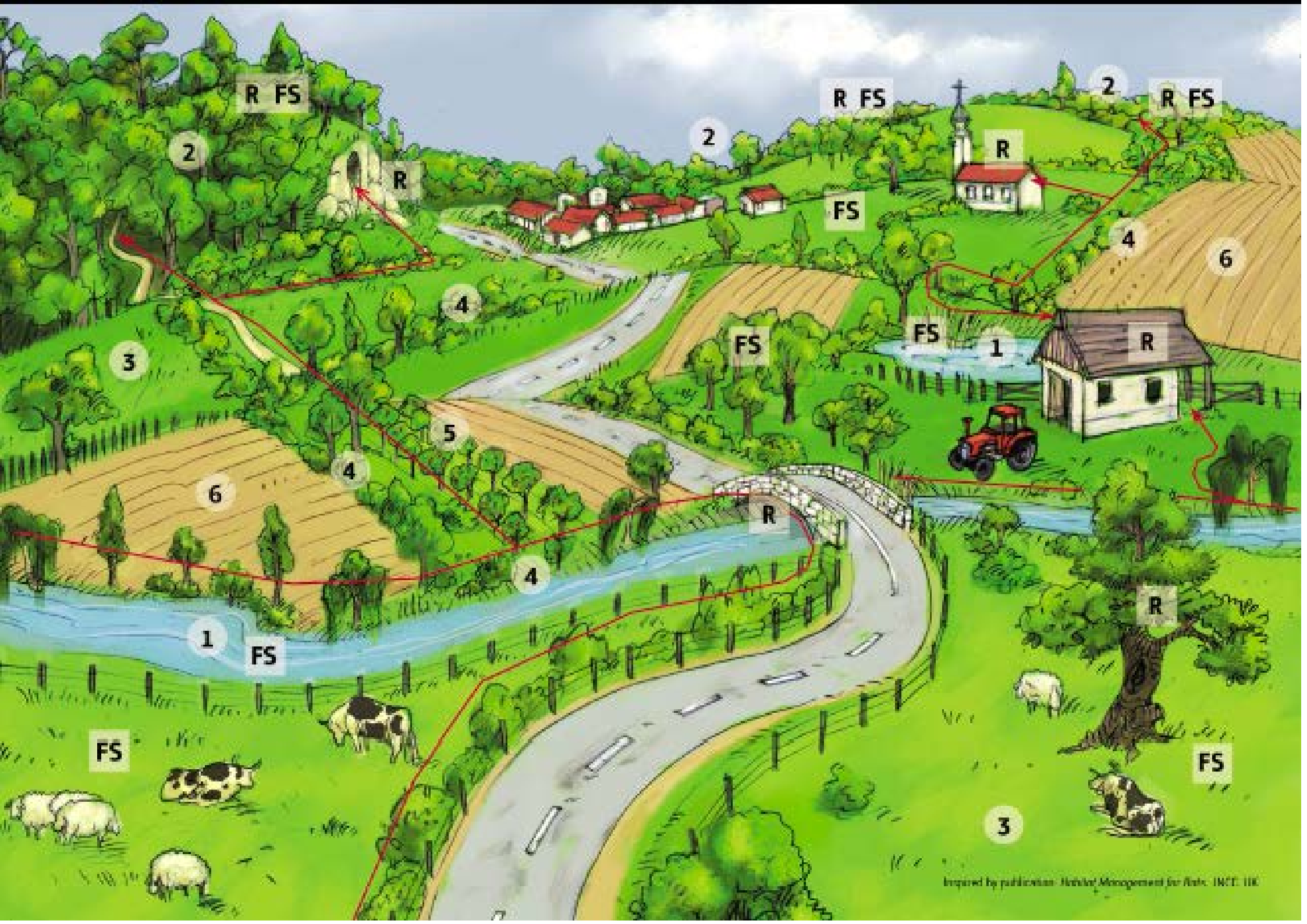
Bats are affected by negative impacts of agriculture

Intensive agricultural production has significant negative effect on bats and wildlife in general because of:

- Use of chemicals (pesticides, herbicides, insecticides, etc.)
- Destruction and contamination of water habitats
- Cutting down or poor management of forests
- Removal of hedgerows, tree lines, vegetation along waterways (linear features in the landscape)
- Vast surfaces covered with monocultures
- Disturbance of landscape structure and diversity
- Destruction and fragmentation of natural habitats.



These negative effects directly influence the abundance and species richness of insects hunted by bats, as well as the structure of habitats used by bats as foraging or commuting grounds.



Agricultural landscape makes around 65% of Serbia's territory, from which 71% belongs to intensive agriculture.

Agricultural landscape “tailored” for bats

- (1) Water habitats** are places where bats come to drink water and feed. Bank vegetation provides bats with protection while they are hunting, and also presents important habitat for their prey – insects.
- (2) Woodlands** provide roosts to many bat species, but also important hunting grounds, as high diversity of insects can be found there, especially for bat species who glean insects from vegetation.
- (3) Meadows and pastures** - natural meadows have high diversity of plants and insects and because of that are very important for bats, but also other wildlife in agricultural landscape
- (4) Linear features** (hedgerows, tree lines, woodland edges, rivers, streams) are particularly important as bats use these habitats to forage and commute, especially species which do not fly over open habitats. These linear features provide cover from bad weather conditions and wind, not only to bats but also to their prey (insects), and they can also serve as protection from predators.
- (5) Orchards and parkland** provide additional feeding sites for species that feed in semi-open habitats such as woodland edges and glades.
- (6) Arable land** can be important as feeding grounds for bats if they are managed in a sustainable way and connected with other landscape elements through linear features.

Legend

R - roost

FS - foraging site

 - possible commuting flyway

” Bats are very sensitive to the loss or significant decrease in length of hedgerows in intensive agricultural landscapes“
(Pocock & Jennings, 2008).

” Agricultural intensification in the 20th century significantly contributed to decreasing population numbers of European bats.“
(Stebbings, 1988).

” Total bat activity (of all species) was significantly higher (by 61%) over organic farms than over conventional farms, while foraging activity was significantly higher (by 84%) on organic farms“
(Wickramasinghe et al. 2003).

HOW TO MITIGATE NEGATIVE EFFECTS OF AGRICULTURE ON BATS?



In order to mitigate the negative effects which intensive agriculture has on bats, at the same time contributing to the development of sustainable agriculture, it is needed to:

- 1. Develop and implement national agri-environment policy** which will identify agri-environment measures directed to bat conservation, but also to other wildlife sharing habitats with bats in the agricultural landscape.
- 2. Provide continuous informing to citizens, especially farmers,** about benefits which wildlife has for sustainable, healthy and safe agriculture, as well as the ways of conserving, enhancing and creating suitable habitats for wildlife in agricultural environment.

Scientists and experts, non-governmental organisations, media and the state – they all have important roles in creating a political, social and cultural environment where wildlife conservation can become part of agricultural and rural development policies.

Scientific research – a key to success

In order to achieve the goal, agricultural measures have to be “tailored” according to the characteristics of habitats and agricultural landscape of the country where they are applied, and need to be scientifically based.

Research aimed at identifying habitats and landscape features important for bats in agricultural landscapes in Serbia, has been initiated in 2013 through project “Conservation of bats and important habitats in agricultural landscapes in Serbia”. This research project was aimed at assessing presence and level of activity of different bat species and their association with various habitat types in wider areas of Fruška Gora, Obedska bara, Zasavica, Avala i Lower Danube area. Research has been conducted using automatic stationary detectors recording bat ultrasound, as well as using computer analysis of sound recordings, geoinformation systems and statistical methods in the final data processing .

Results of field research in Serbia showed that there is a significant effect of **water** and **woodland habitats**, and that **edge habitats** and **linear elements** are important features for bats in agricultural landscapes in Serbia. The look of the agricultural landscape “tailored” according to the needs of bats is shown in the central picture of this leaflet.

More about this project and its results can be found at
www.rufford.org and www.orca.rs



Život na (Ž)IVICI



Zaštita slepih miševa
u poljoprivrednim predelima Srbije





Slepi miševi su:

✓ Važni za poljoprivredu

Slepi miševi su važni stanovnici poljoprivrednih predela. Kao jedini leteći sisari veoma su mobilni i sposobni da prevale i po nekoliko kilometara tokom jedne noći. Ove životinje su značajni prirodni regulatori brojnosti insekata od kojih su mnogi štetni po poljoprivredne kulture, šume ili zdravlje ljudi ili domaćih životinja.

✓ Bioindikatorske i „kišobran“ vrste

Slepi miševi su prepoznati kao bioindikatorske i tzv. „kišobran“ vrste u zaštiti prirode.

- Bioindikatorske vrste - jer su njihova raznovrsnost, brojnost i aktivnost nepogrešivi pokazatelji kvaliteta životne sredine, predeone raznovrsnosti i strukture, odnosno brojnosti i sastava insekata kojima se oni hrane;
- „Kišobran“ vrste, jer se kroz preduzimanje mera za njihovu zaštitu, kao visoko mobilnih vrsta koje koriste različite vrste staništa, štite i mnoge druge divlje vrste koje sa njima dele ta staništa.

✓ Zaštićeni zakonom

Uprkos značaju koji imaju za ekosisteme i ljude, danas slepi miševi „žive na ivici“ – mnogim vrstama se sužavaju areali, brojnost populacija opada. Zbog toga im je potrebna kontinuirana zaštita. Sve vrste slepih miševa u Srbiji zaštićene su zakonom. Zakonom se ove životinje štite od uznemiravanja, zlostavljanja i ubijanja, a zaštićena su i njihova skloništa koja su naročito značajna za njihov opstanak. Međutim, staništa u kojima se hrane ili koja im služe da stignu do lovnih teritorija, nisu adekvatno prepoznata niti zaštićena, a naročito su ugrožena u poljoprivrednim predelima.

Slepi miševi trpe nepovoljne uticaje poljoprivrede

Intenzivna poljoprivredna proizvodnja ima izrazito nepovoljan uticaj na slepe miševe i generalno divlji svet usled:

- upotrebe hemijskih sredstava (pesticida, herbicida, insekticida i drugo),
- isušivanja i zagađivanja vodenih i vlažnih staništa,
- krčenja ili nepravilnog upravljanja šumama,
- uklanjanja živica, drvoreda, vegetacije koja prati vodene tokove (linearnih predeonih elemenata),
- gajenja monokultura na velikim površinama,
- narušavanja raznovrsnosti i strukture predela,
- uništavanja i fragmentacije prirodnih staništa.



Ovi negativni procesi direktno utiču na brojnost i sastav vrsta insekata kojima se slepi miševi hrane, kao i na nestajanje staništa koja slepi miševi koriste kao svoje loвне teritorije i letne koridore između skloništa i lovnih teritorija.



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Poljoprivredni predeo čini oko 65% teritorije Srbije, od čega se 71% površina koristi na intenzivan način.

Poljoprivredni predeo „po meri“ slepih miševa

- (1) **Vodena staništa** su mesta gde slepi miševi piju vodu i hrane se. Vegetacija na obalama pruža slepim miševima zaštitu prilikom lova, a istovremeno je i važno stanište za insekte koji su njihov plen.
- (2) **Šumska staništa** pružaju sklonište mnogim vrstama i značajna su lovna područja usled velikog broja vrsta insekata koji tu žive, naročito za one vrste slepih miševa koji love insekte sa površine vegetacije.
- (3) **Livade i pašnjaci** - prirodne livade imaju veliku raznovrsnost vrsta biljaka i insekata te su zbog toga značajne za slepe miševe ali i ostale organizme u poljoprivrednom predelu.
- (4) **Linearni predeoni elementi (živice, drvoredi, ivica šume, potoci, reke)** su naročito važna lovna područja i letni koridori za slepe miševe, posebno za vrste koje uopšte ne lete na otvorenim staništima. Ovi predeoni elementi čine zaklon od vremenskih nepogoda i vetra kako slepim miševima, tako i njihovom plenu (insektima), a mogu im pružiti i zaštitu od predatora.
- (5) **Voćnjaci i parkovi** su dodatna skloništa i lovna područja za vrste slepih miševa koje se hrane u poluotvorenim staništima, kakva su ivice šume i proplanci.
- (6) **Obradive površine** mogu biti važna lovna područja za slepe miševe ukoliko se njima upravlja na održiv način i ukoliko su linearnim elementima povezane sa ostalim predeonim elementima.

Skraćenice

S - sklonište,

LP - lovno područje



- potencijalni letni koridor

” Slepi miševi su veoma osetljivi na gubitak živica, kojih u intenzivnim poljoprivrednim sistemima nema ili im je dužina značajno smanjena“
(*Pocock & Jennings, 2008*).

” Poljoprivredna intenzifikacija u 20. veku bila je veoma uticajan faktor smanjenja brojnosti populacija slepih miševa u Evropi“
(*Stebbins, 1988*).

” Totalna aktivnost slepih miševa (svih vrsta) bila je za čak 61% viša na organskim farmama u odnosu na konvencionalne farme, dok je hranidbena aktivnost bila viša za čak 84% na organskim farmama“
(*Wickramasinghe i saradnici, 2003*).

KAKO UBLAŽITI NEPOVOLJNE UTICAJE POLJOPRIVREDE NA SLEPE MIŠEVE?



Kako bi se umanjili ili izbegli negativni uticaji koje intenzivna poljoprivreda ima na slepe miševe, istovremeno doprinoseći razvoju održive poljoprivrede, potrebno je:

- 1. Usvojiti i sprovesti nacionalnu agroekološku politiku** koja će identifikovati agroekološke mere usmerene na zaštitu slepih miševa, odnosno drugih divljih vrsta koje dele stanište sa njima u poljoprivrednom predelu.
- 2. Kontinuirano informisati građane, naročito farmere,** o koristima koje divlji svet ima za održivu, zdravu i bezbednu poljoprivredu, kao i o načinima očuvanja, unapređivanja, odnosno stvaranja odgovarajućih staništa divljih vrsta biljaka i životinja.

Naučna i stručna javnost, nevladin sektor, mediji i država imaju važnu ulogu u stvaranju političkog, društvenog i kulturnog ambijenta u kojem će zaštita biodiverziteta postati deo politika u oblasti poljoprivrede i ruralnog razvoja.

Naučna istraživanja – preduslov za uspeh

Kako bi postigle željeni cilj, agroekološke mere moraju da budu „skrojene“ prema karakteristikama staništa i poljoprivrednog pejzaža države u kojoj se primenjuju i moraju biti naučno zasnovane.

Istraživanja usmerena na identifikaciju staništa i predeonih elemenata važnih za očuvanje i zaštitu slepih miševa u poljoprivrednim predelima u Srbiji započeta su 2013. godine, kroz projekat „**Zaštita slepih miševa i značajnih staništa u poljoprivrednom predelima u Srbiji**“. Ovaj istraživački projekat se bavi ispitivanjem prisustva i nivoa aktivnosti vrsta slepih miševa u odnosu na različite tipove staništa na široj teritoriji Fruške Gore, Obedske bare, Zasavice, Avale i Donjeg Podunavlja. Istraživanje je realizovano koristeći automatske stacionarne detektore za snimanje ultrazvuka koji emituju aktivni slepi miševi, kao i kompjutersku analizu snimaka, geoinformacione sisteme i statističke metode u zbirnoj obradi podataka.

Rezultati terenskih istraživanja u Srbiji ukazuju na poseban značaj **vodenih i šumskih staništa**, odnosno **ivičnih delova staništa** i **linearnih elemenata** kao letnih koridora i lovnih područja za slepe miševe u poljoprivrednim predelima Srbije. Izgled poljoprivrednog predela „po meri“ slepih miševa prikazan je na centralnoj slici ovog materijala.

Više o projektu i njegovim rezultatima potražite na
www.rufford.org i www.orca.rs

