Dendromass4Europe.eu

Animal Species Diversity Monitoring of SRC Plantations - Amphibians and Birds

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About the project

Dendromass4Europe (D4EU; 2017 – 2022) aims at establishing sustainable, Short Rotation Coppice (SRC)-based, regional cropping systems for woody biomass (dendromass) production on marginal agricultural land. The dendromass produced in SRC (ligneous biomass, bark and wood) is supplied to dedicated bio-based value chains that create additional income and job opportunities in rural areas. The supply chains will be tailored for optimum efficiency of supply logistics and for reducing CO_2 emissions. Innovative bio-based materials will help to replace fossil-based materials.

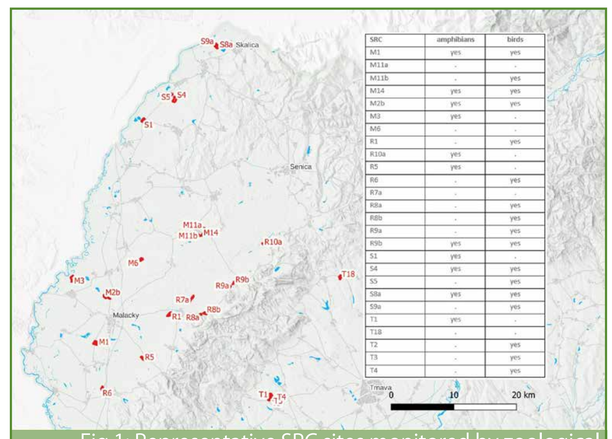
Reference monitoring	Number of localities				Number of records				number of species in SRC (and in control sites)			
	2018	2019	2020	2021	2018	2019	2020	2021	2018	2019	2020	2021
Birds	11	12	13	14	1171	1247	2030	1724	34 (67)	37 (61)	49 (74)	37 (71)
Amphibians	8	9	10	11	145	247	514	566	6 (4)	6 (1)	8 (5)	10 (5)
Butterflies	8	9	10	11	380	431	310	359	29 (37)	37 (38)	29 (41)	29 (41)
Beetles	8	9	10	11	978	1326	2254	3159	161 (194)	207 (208)	237 (233)	231 (228)

Tab.1: Collected data - overview

Introduction, Task and Challenges

Fast-growing trees are more competitive than native plants. This led to increasing concerns regarding their effects on biodiversity. Since the specific impacts of SRC on biodiversity need to be elaborated, this impact assessment is based on the data collected at the D4EU SRC (see tab.1 and fig.1).

The status of the biodiversity is the key factor needed for understanding the impact of SRC on nature. It can be evaluated on landscape level or on species level. In the scope of the present project, the species level is used because it offers detailed information needed for such dynamic ecosystems like fast-growing tree plantations.



SRC	amphibians	birds
M1	yes	yes
M11a	-	-
M11b	-	yes
M14	yes	yes
M2b	yes	yes
M3	yes	-
M6	-	-
R1	-	yes
R10a	yes	-
R5	yes	-
R6	-	yes
R7a	-	-
R8a	-	yes
R8b	-	yes
R9a	-	yes
R9b	yes	yes
S1	yes	-
S4	yes	yes
S5	-	yes
S8a	yes	yes
S9a	-	yes
T1	yes	-
T18	-	-
T2	-	yes
T3	-	yes
T4	-	yes

Fig.1: Representative SRC sites monitored by zoological reference monitoring

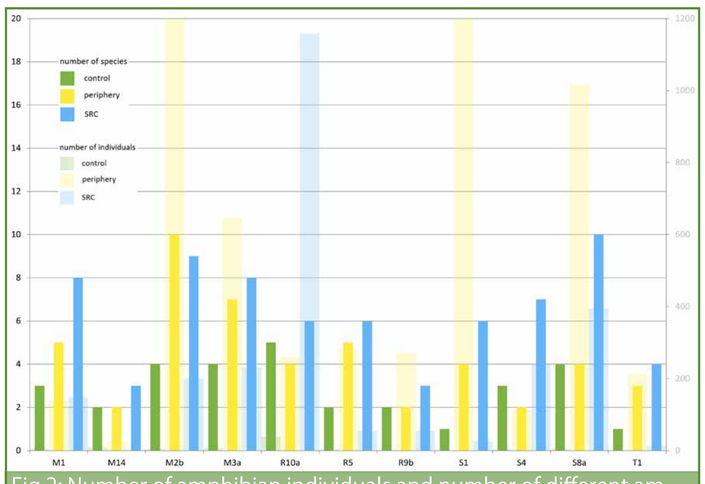


Fig.2: Number of amphibian individuals and number of different amphibian species, separately for SRC, control and periphery plots of monitoring sites

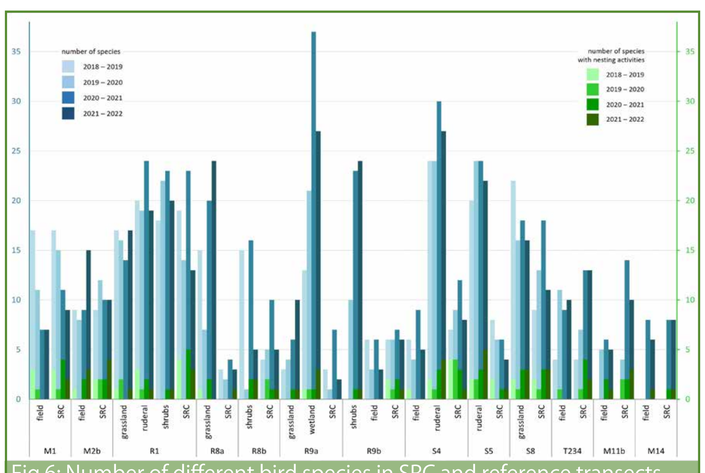


Fig.6: Number of different bird species in SRC and reference transects during four seasons

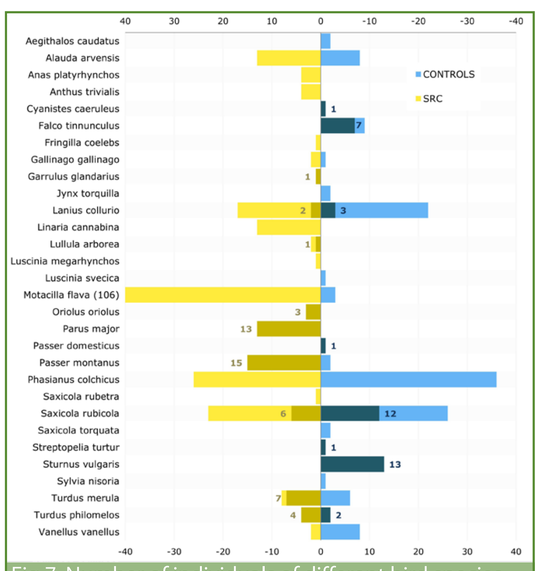


Fig.7: Number of individuals of different bird species recorded with nesting activities in SRC and reference/ control plots (dark colors and respective numbers: individuals with confirmed nesting)

Methodology

Monitoring of birds, amphibians, beetles and butterflies species was done during four years on 26 SRC sites, representatively selected according to presence of neighbouring habitats, soil conditions and specific needs of different animal species groups.

Each selected site was visited minimally three times per year. The species were recorded within the SRC site and its adjacent biotopes (as a control sample). All data was kept in the information system developed specifically for this task. Part of it is available on http://daphne.sk/d4eu/.

Fig.3: *Pelobates fuscus* in one of the SRC sites

Fig.4: Birds nest in a SRC site

Fig.5: Number of SRC sites and control plots with recorded presence of amphibian species (max. 11) in different seasons

Results

Amphibians

During the years 2018-2021, a combination of direct observation methods on transects with trap capturing and acoustic monitoring has been used. At the selected 11 sites within SRCs, their adjacent biotopes and periphery, 10 species of amphibians were found (see fig.2). In figure 5, the number of SRC and CONTROL sites with recorded presence of amphibian species (max. 11) in different seasons is presented. It shows a significant preference for SRC sites.

Dependent on how the amphibians use the SRC, they can be divided into three groups (colors are used in fig.5):

species that use SRC throughout the year as residential and food habitat (as well as for overwintering)

species that use SRC at a certain time of the year

species whose occurrence in SRC is rather accidental, caused by unintentional entrance from another habitat

An overall assessment of the four monitoring seasons shows, that the benefit of SRC is not only the reduction or termination of agrochemical application. Another important fact is the structural differentiation, meaning the improved spatial structure of the habitat as compared with conventional agricultural fields. The main advantage is the maintenance of free space between the rows of trees. Positive effects of the SRC mainly concern amphibian species that bury themselves in lighter, sandy soil.

Birds

In total, 151 different bird species were recorded during all four seasons in 14 sites. 65 of them were recorded at SRC sites, 112 at control transects and 137 species were found in surrounding biotopes (out of control sites) (see fig.6).

The bird species biodiversity is significant in the two SRC sites R1 (established on originally wetland areas) and S8 (contains wetland biotopes). There the number of different bird species in at least three last seasons is above 10.

Conclusions and Recommendations

The monitoring results show that amphibians can benefit from the ecological conditions in SRC.

In SRC sites and their reference habitats 30 different bird species with nesting activities were found. Ten of them were recorded solely inside the SRC sites.

These results show that short rotation poplar coppices established on previous arable fields become an important refugium for different species groups, and they can increase the biodiversity value of the respective part of the landscape.

In contrast, SRC established on former grasslands, wetlands or other rather natural non-forest biotopes decrease former biodiversity value.

Disking, which is an important non-chemical weeding measure, can have positive but also adverse effects, depending on the respective animal species and on the timing within the growing season.

SRWCs with one or two year old trees provide good conditions for most of the animal species groups. For bird species, the “memory of the site” was observed. It is a phenomenon, when birds return to a known place even in cases when the site has already changed.

Establishing a mosaic of different tree age classes within one SRC site can increase its biodiversity and habitat values for several species of fauna and flora.

Inside many sites of SRC there are small areas with unfavorable conditions for intensive poplar dendromass production. The reasons can be different hydrological conditions (too wet or too dry), unsuitable soil conditions (sandy or rocky) or inaccessible terrain (depressions or hills). These areas could be used as “biodiversity islands”, which might be managed for the benefit of wild flora and fauna.

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