

AGRINATUR
AT-HU



Challenge Results Reports Voices

AgriNatur AT-HU Interreg VA-
Project Austria-Hungary
Collection document

Strategy for biodiversity by
anthropogenic management for nature
protection areas

May 2022

This summary report volume on the Interreg project

AgriNatur AT-HU - Biodiversity by anthropogenic management for nature protection areas

- provides an overview of the project "AgriNatur" and the topics treated therein,
- summarizes local strategies and general recommendations for Austria and Hungary,
- contains comments from project stakeholders,
- provides contributions for further efforts based on the discussions. Links and references for individual topics support this.

The report volume is oriented around the application and core outputs.

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Vienna, May 2022

The motto is AgriNatur

Project Manager Susanne Leputsch

The acronym AgriNatur AT-HU for the transboundary project reflects the core content of the project on interactions between "cultural landscape" and "wilderness". Globally, these are usually clearly separated over large areas, mainly due to the size requirements in natural area protection. Small-scale interconnected landscapes are a special feature of European protected areas. "Special" because in transition areas between different landscape spaces a special habitat quality and diversity can develop on a small scale, usually yielding a higher species diversity. Using a fact-based approach, the project shows the importance that the interactions between "cultural landscape" and "wilderness" in the project areas have for biodiversity and the potential consequences of their loss.

The play on words in the title's acronym combines the word elements "*agri*" from the Greek "*agricola*" meaning "nature-cultivating man" with "nature" from Latin "*nasci*", to be born, in the past tense, for "that which was not created by man."

"AT" and "HU" are the country codes of the project areas.

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Foreword



Dear interested readers,

Earlier than necessary with regard to climate change-induced harvest declines, the urgency of maintaining the usability of the fields in the project areas is increasing. The temporary use of fallow land can temporarily help to feed the many people fleeing war zones. Production areas for valuable staple foods are an integral part of crisis preparedness, especially near the cities in which many people live.

The sustainability and biodiversity goals must be pursued now in every action. Climate change and species extinction warrant no delay. Results from current research efforts such as the AgriNatur AT- HU project should enable simultaneously achieving goals for biodiversity and livable cities with diverse landscapes as well as producing valuable food. This combined utilization with management measures for local biodiversity.

AgriNatur AT-HU can make contributions for the Lobau and the Moson Plain,

- _ to improve habitats for openland floodplain species, such as the yellowhammer,
- _ to offer visitors a variety of recreational areas, for example with berry fruit, and
- _to reach people with measures that raise awareness for sustainable agriculture and protected areas where they live: along the Danube.

Thanks to many experts, the EU project developed feasible solutions for both project areas. The present report and the detailed project results are a solid foundation for these efforts.

Katrin Fuchs, Susanne Leputsch, Kriszta Takács

For the project partners
Bio Forschung Austria,
Forestry Office and Urban Agriculture of the City of Vienna
and Szechenyi István University, May 2022



Introduction

About this document

This collection on the AgriNatur AT-HU project includes:

_Results of the combination of available and newly created knowledge, a comprehensive dialogue with international experts, accompanying ecological planning, consideration of economic and legal framework conditions and sustainable solutions for the Viennese sections of the Danube Floodplain National Park and the Natura 2000 area Mosoni plain with special consideration of SDGs, nature conservation, national park and Aichi goals, the biodiversity strategy and the importance of ecosystem resilience.

_ Reports on various monitoring studies are included in short form in the summaries of the Local Implementation Plans LUP AT and LUP HU. All studies, presentations and documentation of the expert workshops are publicly available on the websites of the program and the partners:



Projektseite



cbc.wien



food.sze.hu

<https://www.interreg-athu.eu/agrinaturathu/>

https://cbc.wien/Projekte/umwelt_nachhaltigkeit_energie

<https://food.sze.hu/agrinatur>

_“Core outputs” are the Local Implementation Plans “LUP AT”, “LUP HU” and the General Collection of Quotations from the interdisciplinary expert dialogue, which contains valuable recommendations for improving nature conservation and biodiversity in the interlocking zones of protected natural areas and farmland. For other lowland protected areas, the discussion contributions, perspectives and approaches are impulses for solutions and beneficial solutions.

_ Voices and opinions show the pros and cons surrounding the project. They also underline the necessity to pursue this project process, as do quotes from the magazine “National Park. Where humans and wilderness meet”:

“Ownership means commitment. At the same time, land use should serve the public good. But even in bird sanctuaries, the state is evidently unwilling to use, let alone exploit, the available opportunities. The living conditions for the agricultural birds in the protected areas should be so

favorable that they also support the populations in the adjoining areas. This is a basic expectation of every nature reserve, but it turns out to be a fiction."

WILHELM BREUER, lecturer for nature conservation law and co-founder of the "Gesellschaft zur Erhaltung der Eulen e. V.", translated quotation, appeared in the article "Vergessen und Verloren" about the situation of the field birds. In: National Park. No. 194, 4/2021

"Foremost, a sustainable view of our land use seeks to find its way in making "normal" land use environmentally compatible. The greatest challenges here are in agriculture and in land use planning. Moreover, there is a worldwide interest in non-use to maintain biodiversity, where, according to biodiversity researcher E.O. Wilson (note: 1920-2022), the phrase 'Nature needs half' means that half the Earth should be protected areas for evolution. This makes it a matter of "doing" as well as of "not doing". Both can be integral parts of large-scale protected areas."

"Embedded in dialogue, new things can emerge – later incorporated into regional development and legislation. I think we need the discussion about the next generation of large-scale protected areas."

"If our protected area projects are to be successful, we also need to find new ways of dialogue."

MARIO BROGGI, winner of the 2013 Euro Nature Prize, on Parks of the Future, translated quotation, appeared in the article "Challenges for National Parks - What is needed in the 21st century". In: National Park. No. 188, 2/2020

About the project development

In the course of an amendment to the law in 2015, the time limit for the economic use of arable land in the Lobau was extended by 10 years until the end of the year 2027. (<https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=LrW&Gesetzesnummer=20000420>)

This enabled not only organic farming in the Lobau until the end of the 30-year transition period since the establishment of the national park, but also the comprehensive treatment of the questions that arose regarding the significance of these organic fields for biodiversity. Today, these issues are supported by scientifically collected data. This is accompanied by a direct connection with the historical landscape development, which was very important for the local population and continues to represent an important identification feature today.

But let us look back again to 2015, to the start of the development of the project by the City of Vienna. The first brainstorming led to the cooperation between the City of Vienna and Bio Forschung Austria and subsequently with Szechenyi István University. How did this come about? Bio Forschung Austria has been dealing with research questions related to climate, soil and organic agriculture in the Upper Lobau since 1980. In addition, it was mainly the research results of Dr. Bernhard Kromp, today head of the institute, on ground beetles in organic fields, which – together with knowledge about rare field wild herbs – had led to second-guessing about abandoning organic arable farming in the Lobau.

The step to the Hungarian partner was based on common project experience, comparable competence and local knowledge. The cooperation with the Hungarian scientists enables among other things

- cross-border exchange of knowledge and experience in the fields of nature conservation and agriculture,

- the extension of the research questions to the Natura 2000 area Moson Plain, an important bird sanctuary with extensive arable landscape in the Alluvial Danube Floodplain, and
- additional application possibilities with old varieties of the university's own variety database.

Vienna should contribute significantly more area to increase the proportion of natural zones in the national park by the end of the 30-year transition period. This is a major challenge due to the special situation of Lobau as part of the City of Vienna with very strong population dynamics and recreational use. Above all, the goal was to incorporate the existing empirical knowledge of the locally responsible foresters to find a solution.

In the Moson Plain (Special Protected Area according to Bird Life), the largely cleared agricultural landscape is a prerequisite for the strictly protected Great Bustard. The private farmers, most of whom farm conventionally, should be motivated and involved in promoting measures for the currently present bird species and higher biodiversity.

In addition, the overall project should actively contribute to new and improved nature education recreational opportunities.

Also in 2015, the 2030 Agenda for Sustainable Development was adopted as a new global framework. Accordingly, the member states of the United Nations commit themselves to working towards the implementation of the Sustainable Development Goals (SDGs) at the national, regional and international level by the year 2030 (translated, source: <https://www.bundestkanzleramt.gv.at/themen/nachhaltige-entwicklung-agenda-2030>).

The central framework condition for the Vienna National Park section is the recognition of the Lobau in the Donau-Auen National Park as a Category II National Park. The World Conservation Union IUCN is responsible for both the category system for the national classification of protected areas, which is internationally regarded as a reference, and for monitoring progress with regard to the biodiversity-related SDGs (translated, source: <https://www.iucn.org/theme/global-policy/our-work/sustainable-development-goals/iucn-and-sdgs>).

The SDGs have implications for protected areas, to meet and support the SDGs: "In some cases, SDG goals and targets provide opportunities; in others, they have implications and bring additional obligations for protected area managers to ensure that their areas meet and support the wider aims of the SDGs." (Source: https://www.iucn.org/sites/dev/files/natural_solutions_-_sdgs_final_2.pdf). The WCPA (World Commission on Protected Areas, Commission of the IUCN) will have an important role to play here.

With regard to an optimization of biodiversity in the project areas, should a long-term agricultural management pursue innovative strategies?

At the beginning of the project, the Environmental Protection Department of the City of Vienna, which is responsible for nature conservation, as a strategic partner, called for such a management plan to be implemented for the Lobau project area, comparable to the agricultural use of the meadows in the National Park.

In cooperation with strategic partners and experts (see chapter "Goals, solution approach"), the knowledge about the existing biodiversity was deepened for both protected areas and a dialogue with the local farmers was conducted with the aim of habitat improvements. Starting in May 2019, expert workshops were held with the active participation of 91 experts from AT and HU for information and discussion. Old local varieties from the existing variety database of Szechenyi University were included in the project research, including tests on cultivation and nutritional quality. In connection with the arable use, comprehensive observations of the

species groups field birds, ground beetles, butterflies, wild bees as well as tree stands and field herbs were carried out. Local implementation plans were developed for the project areas encompassing the Vienna part of the Danube Floodplain National Park (LUP AT) and Hungary (LUP HU), both including the research results from the international expert dialogue.

This work is a concrete contribution to the SDGs. "Recognizing the links between biodiversity and ecosystem services can support achieving the 2030 Agenda with 41 targets across 12 Sustainable Development Goals, including both human well-being and environmental goals." (https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf) Links between cities, (large) protected areas, climate, sustainable agriculture, biodiversity, and resilience are established and goals are formulated to inform metropolitan spatial and protected area planning.

Definition for National Park Protection Category II (IUCN)

"Natural area of land and/or sea, designated,

- (a) to protect the ecological integrity of one or more ecosystems for present and future generations,
- (b) to exclude exploitation or occupation inimical to the purposes of designation of the area and
- (c) to provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities.

All of which must be environmentally and culturally compatible."

According to the designation and recognition, the primary objectives for national parks are preservation of species protection and genetic diversity, as well as maintainance of environmental services.

Management objective	Ia	Ib	II	III	IV	V	VI
Scientific research	1	3	2	2	2	2	3
Wilderness protection	2	1	2	3	3	–	2
Preservation of species and genetic diversity	1	2	1	1	1	2	1
Maintenance of environmental services	2	1	1	–	1	2	1
Protection of specific natural/ cultural features	–	–	2	1	3	1	3
Tourism and recreation	–	2	1	1	3	1	3
Education	–	–	2	2	2	2	3
Sustainable use of resources from natural ecosystems	–	3	3	–	2	2	1
Maintenance of cultural/traditional attributes	–	–	–	–	–	1	2

Key: 1 = Primary objective; 2 = Secondary objective; 3 = Potential objective; – = not applicable (IUCN, 1994).

Table: Matrix of management objectives and IUCN protected area management categories 1994

Quelle: <https://www.umweltbundesamt.at/fileadmin/site/publikationen/BE129.pdf>

According to the chapter on applying the categories, in order to establish the appropriate category, at least three quarters and preferably more of the area must be managed for the primary purpose; and the management of the remaining area must not be in conflict with that primary purpose.⁹⁵

Objectives of Management: to protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes; to perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity; to manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state; to eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation; to maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation; and to take into account the needs of indigenous people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

The protected area categories have been supplemented by EUROPARC and IUCN with interpretations for the special situation in Europe. These encompass the characteristic features of Europe such as the division into "very diverse and different landscapes", the wide distribution of "historically evolved cultural landscapes", which reflect the "very long historical development, the settlement and land use" and which have led to a "strong increase in the diversity of habitats with a true checkerboard pattern of cultural and natural areas". This also incorporates the fact that "it is generally recognised that the distribution of many animal and plant species is directly linked to the natural habitats shaped by humans".

(Translation, source: https://nationale-naturlandschaften.de/wp-content/blogs.dir/29/files/2020/09/IUCN_Richtlinien_fuer_Management-Kategorien_von_Schutzgebieten.pdf)

Central questions in the project

Herbert Weidinger presented key issues in the start-up workshop on 7.5.2019 to launch the project::

How can agriculture function near the city, in the national park?

What is a sustainable path for organic farming?

How can unique values such as a national park be preserved despite increasing settlement pressure?

How must development be controlled and managed in order to preserve such qualities in the long term?

The topics in the project context are correspondingly broad:



"It takes living collaborations, learning from each other.

Thinking together makes sense!"

Susanne Lepusch, 7.5.2019 (Start-Up-Workshop)

Abstract/Short info



The nature region Vienna-Győr is characterised by the water bodies of Danube, Lake Neusiedl and their surrounding floodplain forests, protected as Natura 2000 areas and National Parks. They are bordered by agricultural areas, settlements, agglomerations and linked traffic areas. Natural (waters, woods, reeds) and cultivated areas form a patchwork habitat. It is recognized that mowing and extensive grazing are measures to maintain habitats and species protected by Habitats (Fauna and Flora)- or Birds Directive. In the course of the project the ecological relevance of further anthropogenic use for species protection should be set. E.g. some orchids colonize pioneer sites on dams, resulting from flood protection or railway constructions. Solid data about ground beetles show the species conservation value of organic cultivation. The importance of their interconnectedness with FFH-Habitats lies in the project focus. Through combination of common conservation measures with crop farming actions innovative landscaping activities will be developed to improve the protection of Habitats- or Birds Directive species.

Using the example of the Viennese Danube Floodplains the results shall serve to increase natural areas in conformity with the national park whilst improving biodiversity and resilience. The optimization of both is also the focal point of the hungarian example.

Public gardens, being implemented in Mosonmagyaróvár and Vienna, will reveal the complex information in an attractive way.

Essential is the joining of internationally recognised research by SZE in cutting-edge crop production on alluvial soils with the specific BFA-expertise in the field of species protection by organic farming and the experience of the ground area manager MA 49.

The outcome of the project will be transferable to other european lowland protection areas.

Why the project? The central challenges



→ Biodiversity loss, land consumption

Dynamic development in the Vienna-Győr region is creating multiple demands on agricultural land as a limited resource. The population is growing rapidly and with it the demand for land. The remaining agricultural land is intensively cultivated or left fallow. The consequence is biodiversity loss through pesticide use and intensive fertilization of the fields as well as through the spread of invasive neophytes in the fallows. The simultaneous removal of landscape elements causes biodiversity to decrease dramatically, and the associated resilience declines, i.e. the ability of agro-ecosystems to regenerate after disturbances. Only environmentally sustainable (bio)managed fields in a diverse cultural landscape can provide multifunctional services for food supply, climate protection, soil protection, recreational use and biodiversity.

→ Agriculture in national parks and nature reserves

Arable land, meadows, pastures and forests in the maintenance/management zones of national parks and other protected areas, which are managed in a manner appropriate to nature conservation, enrich the overall biodiversity with their special species assemblage. Furthermore, they represent important partial habitats for strictly protected species of the natural zones. Finally, management is crucial to help contain invasive neophytes. Completely abandoning agricultural use in the course of the change to more non-impacted nature zones, as foreseen by the IUCN guidelines, would mean an additional loss of species in mono-dominant neophyte areas on rewilded (former arable) fields, for example for the Viennese part of the Danube Floodplain National Park. Retreat areas for agrobiodiversity and their resilience potential would also be lost, as would the possibility of the species expanding into the surrounding cultivated landscape via biotope networks.



The global context

The AgriNatur project operates at an interface of high public interest. Some of the directly or indirectly addressed topics are in conflict with each other, others support each other or allow synergies. Some examples of topic areas on the public agenda and different levels include:

- Nature conservation, species protection/diversity/biodiversity.
- the use of available space in the area of conflict between increasing scarcity and growing demands, e.g. increasing building density vs. increasing demand for open and recreational spaces – nature experience vs. nature conservation
- Conservation of resources, especially soil protection
- Food security and healthy, high-quality food from local sources with traceable origin – high social importance of agriculture close to the city
- Climate protection and adapting to climate change
- Awareness raising, experience and education
- Economy and efficiency – also in the long term
- Exemplary effect of the public sector and supporting institutions as essential elements for necessary attitude and behavioral changes in our society
- Countermovement to potentially divisive forces in our society – attitude of solidarity, togetherness on a political, social, economic and ecological level.

These thematic areas are also the content of those Sustainable Development Goals mentioned in the introduction that have a high social impact. In line with these goals, Vienna was for example the 2020/21 chair city of the Organic Cities Network Europe and organizer of the Organic City Conference on 9. November 2021.

"The Future is Now: Science for Achieving Sustainable Development", is the first Global Sustainable Development Report prepared by the Independent Group of Scientists appointed by the United Nations Secretary-General." Passages from this report and other quotations underline the importance of the SDGs and also highlight conflicting objectives:

"A liveable city will provide high-quality services and foster "naturbanity" – a close connection between people and nature to protect biodiversity, enhance human health and well-being, and strengthen climate resilience."

"Liveable cities can be smart cities that use technology to provide services in a more efficient and equitable manner. Liveable cities will also create more equitable and symbiotic relationships with the surrounding periurban and rural areas."

"Loss of biodiversity can permanently reduce future options – such as wild plants that might be domesticated as new crops or used for genetic improvement – and threatens resilience, as lost species may have been resistant to diseases, pests or climate change."

"Many pollinating species have declined in abundance and are threatened with further loss, putting the production of 75 per cent of food crops at risk."

"Biodiversity is also critical to ecosystem health and stability. Sustainable development relies on resilient and biodiverse ecosystems that support household livelihoods, food production and the availability of clean water, while also promoting climate change mitigation and resilience."

"This unprecedented loss of biodiversity is driven by several interrelated factors: change in land and water use, overexploitation of resources, climate change, pollution and emergence of invasive species"

"It is likely that most of the Aichi Biodiversity Targets for the period 2011–2020, adopted at the tenth meeting of the Conference of the Parties to the Convention on Biodiversity, held in Aichi Prefecture, Japan, in October 2010, will be missed, although supporting conservation of biodiversity for future generations is key for sustainable development."

"An agroecological approach would entail thorough data collection and research to identify areas best suited for agricultural production, carbon storage, provision of high-biodiversity habitats and biophysical climate regulation."

Source: https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf

"Conflicts between process protection and traditional species protection arise when rare species within the area are tied to specific habitats". Expert Opinion, Source: https://www.wwf.at/wp-content/uploads/2021/07/wwf-oebf-studie_wildnis-in-oesterreich.pdf

"A so-called post-normal approach to conservation of nature and natural resources also includes better consideration of social and historical relationships, or cultural characteristics, which have emerged as part of a co-evolution of human societies and nature. Study co-editor Thora Herrmann of the University of Montreal warns, "Bio-cultural diversity is under serious threat. The extinction crisis in nature includes species and ecosystems, but also languages and the diverse management practices of hundreds of human cultures."

Source: www.klimaplastischer-naturschutz.de/node/30; © University of Applied Sciences Eberswalde (FH), University of Potsdam, Potsdam Institute for Climate Impact Research

Key Messages 5, 6 SDGs

Urban and peri-urban development

Liveable cities place people – not businesses and not automobile transportation patterns – at the centre of all planning decisions.

National and municipal governments will make land use and spatial planning decisions to strengthen the ties between cities and their peri-urban surroundings, ..., innovative governments, a committed private sector and an active citizenry can work together to foster naturbanity, a close connection between people and nature to protect biodiversity, enhance human health and well-being, and strengthen climate resilience.

The ideas of naturbanity and urban metabolism conceptualize cities as ecosystems, with humans and the natural world taking and giving and taking again, all within a sustainable framework.

By thinking of the city in these terms, decision makers will prioritize renewable low- or no-carbon energy, water efficiency, including reusing and recycling grey water, and local and sustainable food production."

Global environmental commons

Impediments. Loss of biodiversity

The diversity of species on land and in oceans plays a key role in ecosystems and the services they provide. However, the 2019 report of the Intergovernmental SciencePolicy Platform on Biodiversity and Ecosystem Services warns that an average of around 25 per cent of species in assessed animal and plant groups are threatened, suggesting that around 1 million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss. Without such action there will be a further acceleration in the global rate of species extinction, which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years. Many pollinating species have declined in abundance, or are threatened by chemical use and agricultural expansion, putting the production of 75 per cent of our food crops at risk. Globally, local varieties and breeds of domesticated plants and animals are disappearing. That loss of diversity, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change. That unprecedented loss of biodiversity is driven by several interrelated drivers including climate change, resource overexploitation, chemical pollution, fragmentation of land, invasive species, poaching and the disposal of plastics. It is likely that most of the Aichi Biodiversity Targets for 2020 will be missed, in spite of the fact that supporting conservation and securing a safe operating space for future generations is key for sustainable development. The interaction between the living organisms on this planet and the physical climate system controls the state of the overall global environment, so the loss of biodiversity reduces the resilience of the biosphere, which is essential for maintaining the climate conditions we enjoy on Earth. Extinctions reduce the genetic diversity of the biosphere, and thus the resilience of biosphere functions under changing climate conditions. The pace at which biodiversity is being lost is unprecedented with currently nearly 1 million species, or 25 per cent of the assessed animals and plants, being threatened by extinction in the coming decades."

Levers for transformation

All aspects of the global environmental commons are mutually supportive. Sustainable land management and the adoption of conservation agricultural practices can support biodiversity and nutrient cycling, provide good-quality water, and help with adaptation to and mitigation of climate change.

In return, mitigating climate change can reduce the stress on land by reducing the frequency and intensity of extreme events and hence support ecosystems. Recognizing the links between biodiversity and ecosystem services can support achieving the 2030 Agenda with 41 targets across 12 Sustainable Development Goals, including both human well-being and environmental goals."

Source: https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf

The development and adaptation of international protected area categories for Europe illustrates the particular challenge of creating effective tools globally for the diversity of affected landscapes:

"In January 1994, the IUCN General Assembly in Buenos Aires adopted a recast division into six (as opposed to ten previously) management categories for protected areas, with the following materially completely renewed wording adopted for Category II "National Park", which itself remained formally unchanged. (Note: see definition "IUCN Protection Category II National Parks", page 10)

In the case of landscapes that were previously altered by humans, the precondition is that land use is discontinued on most of the area and ecological processes are allowed to proceed unhindered. The management goal should be to discontinue use as much as possible - if not immediately, then in the medium term.

In order to establish the appropriate category, at least three quarters and preferably more of the area must be managed for the primary purpose; and the management of the remaining area must not be in conflict with that primary purpose.

Measures on the residual areas that serve a conservation purpose, such as habitat creation and restoration, protection of specific species, preservation of diverse structures, or traditional, sustainable forms of land use, do not conflict with the primary conservation objective. Zoning based on the principles of the six management categories is a valuable tool, but it should not be used to assign an individual protected area to more than one IUCN category."

"Some national parks designated for Category II do not meet the standards set and do not really properly fit into any category. IUCN is willing to issue a certificate on request as to whether a particular area is worthy of designation as a Category II protected area (see page 10 for comment). Moreover, both EUROPARC and IUCN/WCPA are willing to assist states in improving the management of such areas to meet the criteria of Category II.

In particular, the characteristics of Europe mentioned in the introduction – such as the predominance of cultural landscapes, generally quite small land units, the high proportion of private land, but also the division into many countries, some of which are very small and have a high population density – complicate the designation of protected areas that meet the criteria of Categories I, II and VI. However, these categories are essential for ensuring the protection of our valuable European natural heritage in representative areas."

(Translation, source: https://nationale-naturlandschaften.de/wp-content/blogs.dir/29/files/2020/09/IUCN_Richtlinien_fuer_Management-Kategorien_von_Schutzgebieten.pdf)

Goals, solution approach, (working-)method



In the AgriNatur Strategies work package, innovative, cross-border workshops are organized to bring together those responsible for the respective regions and nature reserves with experts from nature conservation and agriculture. In a joint planning process, available research data on the natural area of the project region are merged with new surveys and agricultural experiments in the Research work package. Supplemented by external ecological and economic expertise, this yields an AgriNatur strategy that is generally applicable for farmland-rich protected areas and landscapes in the program region, specifically in Austria and Hungary (Local Implementation Plans NP Danube Floodplains Vienna, Mosoni sík). This AgriNatur strategy for promoting biodiversity through agricultural/forestry uses also includes selection criteria for those terrestrial FFH habitats that require long-term management measures, as well as recommendations for cost-effective and efficient measures to control invasive neophytes such as goldenrod.

Another novel approach is the development of innovative agronomic management methods that combine diverse crop rotations and modern agricultural machinery technology with basic biological knowledge on species-specific habitat requirements. This helps to promote both functional agrobiodiversity and those species of the natural zones that particularly require protection. This special management approach creates agricultural nature conservation areas that fulfill several demands: attractive habitats for animal and plant species requiring protection, production of high-quality (organic) food, and attractive recreational landscape. New opportunities arise for raising public awareness for the conservation value of landscapes used for anthropogenic purposes.

Project partners and other contributors

Partners

Vienna, Municipal Department 49, Forestry Office and Urban Agriculture (LP)

Bio Forschung Austria (BFA, PP)

Széchenyi István University (SZE, PP)

Strategic Partners

Municipality of Mosonmagyaróvár

Vienna, Municipal Department 22 - Environmental Protection (MA 22)

Neusiedler See-Seewinkel National Park

Metropolitan Area Management Vienna –

Lower Austria (SUM)

Nature Protection Association of Szigetköz Region

The Department of Rural Development Office of Lower Austrian Provincial Government (NÖ ABB)

Fertő-Hanság National Park

Equally involved in the process

Representatives of Donau-Auen National Park GesmbH

and the cities of Vienna and Mosonmagyaróvár.

The following were invited to participate

Project area experts associated with the national park advisory boards, relevant associations and universities

List of experts: Alphabetically listed below are all responsible and contributing staff members of the strategic partners and project partners, project area managers, experts and other persons, who have contributed to the project in the context of the expert workshops and meetings:

Christoph Ableidinger, István Árvay, Tibor Bányai, Johann Berthold, Bolfán Blanka, Ádám Bodor, Christiane Brandenburg, Barbara Brandstätter, Hubert Brandstätter, Harald Brenner, Markus Breuer, Brigitta Burda, Ivoneta Diethart, Anna Dopler, Johannes Ehrenfeldner, Alexander Faltejsek, Werner Fleck, Christian Fraissl, Katrin Fuchs, Zoltán Fűzfa, István Goda, Harald Grabenhofer, Franziska Hanko, Wilfried Hartl, Hans-Peter Haslmayer, Kim Hissek, Alexander Hofer, Daniela Hofinger, Michael Hollinger, József Iváncsics, Andreas Januskovecz, Renátó Kalocsai, Wolfgang Khutter, Botond Gergely Király, Gábor Koltai, Bernhard Kromp, Matthias Kropf, Gábor Kukorelli, Matthaëa Kulcsárné Roth, Gabriele Kutzenberger, Harald Kutzenberger, Bálint Lampert, Susanne Leputsch, Ákos Lobitz, Bernd Lötsch, Mihály Martinschich, Alois Mätzler, Ludwig Maurer, Karl Mayer, Milena Mcinnes, Tatjana Meshkova, Christina Nagl, Lajos Nagy, Andrea Németh, Attila Németh, Michael Niedermayer, Esther Ockermüller, Thomas Ofenböck, Christian Ohr, Gerald Oitzinger, Gabriele Pfundner, Manfred Pinter, Thomas Podsednik, Borbála Pólyáné Hanusz, Péter Pomsár, Valentin Rakos, Ewald Recher, Krisztina Réder, Birgit Rotter, Norbert Sauberer, Ferdinand Schmeller, Marlis Schnetz, Anita Somogyiné Nagy, Gabriele Stelzmüller, Daniela Stiegelmar, Martin Strausz, Pamela Strohmayer-Steinmetz, Csaba Szabó, Erwin Szelek, Krisztina Takacs, László Tilai, Miklós Váczi, Otília Vámos, András Vér, Günter Walzer, Gerhard Wehofer, Herbert Weidinger, Jurrien Westerhof, Thomas Wrbka, Karoline Zsak, Renate Zuckerstätter-Semela.

Cooperation AgriNatur AT-HU



Project duration

1.1.2019-30.6.2022

Project budget

1,477,151.32 Euro (Funding rate 85%)

Overview of project areas

The project region Vienna-Mosonmagyaróvár is characterised by strong human population dynamics instead of the former dynamic processes in the Danube alluvial plain. Especially since the 19th century, the Danube has been increasingly constrained into a single river bed. This improved the settlement possibilities, leading to an increased demand for and supply of regionally produced food and recreational areas.

Thanks mostly to its status as an imperial hunting grounds, a large area of the Danube floodplains, which begin in Vienna, remained protected from intensive use. This included today's national park encompassing over 9,600 hectares. The character of the floodplain was preserved, at least with regard to groundwater dynamics and the mosaic-like pattern of small-scale habitats.

In accordance with the national park objective, the water dynamics in the eastern Danube floodplains are being restored to the extent possible. Nonetheless, when walking through the Lobau in the western part in Vienna, instead of endless watercourses you are more likely to encounter kilometre-long transitional strips of land between meadows, "Heißblände" (dry meadows on former gravel or sand deposits), field paths and fields bordering the floodplain forest. A great diversity of fauna and flora inhabit this environment, for example insects that require open ground, poorly competitive wild herbs in the fields, late-flowering plants along the fringe and bird species that prefer the sunny forest edges. Different periods of agricultural use of the meadows and fields result in and complement the various flowering phases of forage plants as well as provide hiding and hunting opportunities.

Information on the web:

<https://www.donauauen.at/>

<https://www.wien.gv.at/umwelt/wald/erholung/nationalpark/>

The Moson Plain, featuring "high natural value", is located as part of the Győr Basin in the Small Hungarian Plain. It borders on the Moson-Danube, the Waasen (Hungarian: Hanság) and the Parndorf Plateau. The location near the border played (and continues to play) an important role in defining the present landscape.

Wittmann Park forms a transition zone between the natural and the urban environment. In the grove of the original Lajta Plain, the public park was originally laid out in the style of an English garden. The work in its interior started by Antal Wittmann in 1813 included draining the marshes between the Leitha and the higher meadows, draining the untamed waters and reforestation. This marked the beginning of the Főhercegi Grove, today's Wittmann-Antal Park.

Information on the web:

<https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=HUFH10004>

Project timeline workshops overview

7.5.2019 Vienna, Bioforschung	Start-up workshop <ul style="list-style-type: none"> • Concretize expectations for the project • Impulses, delineation of working landscape, identification of interfaces • Confirmation of project access
22.4.2020	Virtual meeting <ul style="list-style-type: none"> • Monitoring wild bees AT • Monitoring meadow regeneration areas AT
29.4.2020	Virtual meeting <ul style="list-style-type: none"> • Monitoring butterflies AT • Monitoring birds HU
6.5.2020	Virtual meeting <ul style="list-style-type: none"> • Monitoring birds, Donau-Auen/Lobau National Park • Monitoring tree population, Wittmann Park
13.5.2020	Virtual meeting <ul style="list-style-type: none"> • Monitoring of field weeds, Donau-Auen/Lobau National Park • Field Trials, Moson Plain
20.5.2020	Virtual meeting <ul style="list-style-type: none"> • Monitoring of ground beetles (report, discussion) • -AgriNatur elsewhere: Parque Coto de Doñana/Sustainable Doñana (report, discussion)
27.5.2020	Virtual meeting <ul style="list-style-type: none"> • Project status • Monitoring Empirical Forester Knowledge (report, discussion, video) • Status GIS Project Ecological Planning AT (report, discussion)
17.6.2020 Vienna, National Park	Workshop 3 <ul style="list-style-type: none"> • Impulse nature conservation and agriculture • First draft ecol. mplementation Plan National Park Danube Floodplains • Consolidation of the results
11.11.2020	Virtual workshop 4 <ul style="list-style-type: none"> • Local Implementation Plan ("LUP") Project Area NP Donau-Auen • Presentation and discussion of the scenarios • Project status
26.5.2021, Vienna, National Park	Workshop 5, Hybrid solution in person and virtually <ul style="list-style-type: none"> • LUP Project Area Danube Floodplain National Park • Project status in general • Subsequent topics
15.6.2022, Castle, Mosonmagyaróvár	Final conference <ul style="list-style-type: none"> • Presentation of the project results in Hungary and Austria

Detailed overview of the work path in the project

based on the dates and presentations

Data option, e.g.

7.5.2019	<p>The start-up workshop AgriNatur AT-HU serves to concretize the expectations of the project, to generate impulses and to identify interfaces.</p> <p>Presentations and their topics:</p> <ul style="list-style-type: none"> • Motivation/objectives for the AgriNatur AT-HU project (S. Leputsch). • History of zoning in the national park (C. Fraissl) • Zoological background and importance of agrobiodiversity (B. Kromp) • Agrobiodiversity monitoring on anthropogenically used areas (K. Fuchs) • Monitoring of natural changes in the Danube Floodplain National Park – projects, measures and experience gained (G. Oitzinger, B. Rotter) • Recording the local empirical knowledge held by district foresters (M. Hollinger) • Hungarian visitor plots (Vér A.) and • AgriNatur small plot trials in Hungary (Vámos O.). <p>The main goal of the workshop was to inform and motivate experts to participate.</p>	<p>Download cbc.wien</p>
2020-2021	During the process, infoletters enabled compact accessory communication of the project events in AT and HU, which proved invaluable especially in the challenging time of the pandemic.	
February 2020	Newsletter 1 Preserving quality of life and the environment in a combined effort	interreg-athu.eu cbc.wien food.sze.hu
March 2020	Newsletter 2 The 2 nd Step Basics and the Common Path	interreg-athu.eu cbc.wien food.sze.hu
31.3.2020	The 2 nd expert workshop planned for 31.3.2020 had to be cancelled due to the pandemic. Instead, a series of virtual expert meetings were held. The focus of the joint work was to analyze the data collected so far in the project and to discuss their significance for the development of the AgriNatur strategy.	Cancellation/ 6 virtual meetings instead
22.4.2020	<ul style="list-style-type: none"> • Monitoring of wild bees, Lobau (E. Ockermüller) • Monitoring of meadow regeneration areas in the Upper Lobau (N. Sauberer) 	<p>Conducted virtually; documents: cbc.wien</p>
29.4.2020	<ul style="list-style-type: none"> • Butterfly monitoring Upper Lobau (M. Strausz) • Survey of ecological networks: bird mapping in the Natura 2000 site Mosoner Plain and Wittmann Park (G. Király) 	<p>virtual; documents: cbc.wien</p>

6.5.2020:	<ul style="list-style-type: none"> • Bird surveys in the Lobau. Interim report 2020 (C. Nagl) • Tree inventory of the Wittmann Park in Mosonmagyaróvár (G. Király) 	Conducted virtually; documents: cbc.wien
13.5.2020	<ul style="list-style-type: none"> • Weed monitoring (Lobau) (C. Ableidinger) • Field trials HU project area Moson Plain Vámos O., Kalocsai R.) 	Conducted virtually; documents: cbc.wien
20.5.2020	<ul style="list-style-type: none"> • Ground beetle monitoring 2019 (Lobau) (B. Kromp, K. Fuchs) • AgriNatur elsewhere: Sustainable Doñana (LIFE00 ENV/E/547) (S. Leputsch) 	Conducted virtually; documents: cbc.wien
27.5.2020	<ul style="list-style-type: none"> • Recording of local empirical knowledge held by district foresters in the Lobau National Park Forest Administration (M. Hollinger) • Ecological Implementation Plan Vienna (Team TBK) • Worldcafé with 4 stations of group work (target species, zoning, edge zones, arable land) and consolidation of the discussion in plenary session 	Conducted virtually; documents: cbc.wien
June 2020	Newsletter 3 New ways of working together	interreg-athu.eu cbc.wien food.sze.hu
17.6.2020	<p>The central workshop for the AgriNatur strategy development was successfully held in person, bilaterally along with an accompanying project area excursion in a large machinery hall. The focus was on presenting and discussing the first draft "Local AgriNatur Implementation Plan AT for the project area in the Danube Floodplain National Park", which was prepared based on the analysis of ecological basic data, consolidation with AgriNatur monitoring data and expert meetings, as well as impulse presentations by the Hungarian partner on the project status, agriculture and nature conservation</p> <ul style="list-style-type: none"> • Current status of the project – Where do we stand? (S. Leputsch, K. Fuchs, Vér A.) • Impulse nature conservation and agriculture (Koltai G.) • Ecological Implementation Plan Vienna (Team TBK) 	Real event, documents: cbc.wien
October 2020	Newsletter 4 The results of the cooperative effort are already visible	interreg-athu.eu cbc.wien food.sze.hu
1.10.2020	<p>For the Moson Plain, the Local Implementation Plan HU was dealt with through presentations and impulse speeches:</p> <ul style="list-style-type: none"> • Status of Local Implementation Plan Vienna (H. Kutzenberger). • Current status of the Hungarian Implementation Plan (Bányai T.) 	Conducted virtually

2019-2020	Field trips to share experience regarding: <ul style="list-style-type: none"> • LIFE Sustainable Doñana, Doñana (2019) • WWF grazing March-Auen, Marchegg (2020) • Urban Ecological Implementation Program, Species Protection Project Arable Weeds Upper Austria, Traun (2020)) 	A joint excursion of the AT-HU project team was only possible in 2019. interreg-athu.eu/cbc.wien
November 2020	Newsletter 5 Answers for Today + Tomorrow	interreg-athu.eu/cbc.wien food.sze.hu
11.11.2020	Topic of the 4th Expert workshop was the two scenarios of the Local Implementation Plan ("LUP") AT: <ul style="list-style-type: none"> • Current status in the AT/HU project (S. Leputsch) • Report from Hungary (Vér A.) • Work status Local Implementation Plan AT. Information and discussion (Team TBK)) 	Conducted virtually; documents: cbc.wien
May 2021	Newsletter 6 Common decision-making principles	interreg-athu.eu/cbc.wien food.sze.hu
26.5.2021	5th Expert workshop: The Local Implementation Plan AT was presented face-to-face and to online participants. Essential follow-up topics included a look into the future and the dissemination of knowledge gained: <ul style="list-style-type: none"> • Local Implementation Plan AT for the Viennese part of the National Park Donau-Auen (Team TBK) • Review of the project events – photographs from the project: <ul style="list-style-type: none"> - Report from Austria (S. Leputsch); - Report from Hungary (Vér A.) - Report from Bio Forschung Austria (K. Fuchs) • Preview: What else is planned in AgriNatur? (S. Leputsch, K. Fuchs, Vér A.) • Platform hour" on biodiversity in agriculture (Moderation: A. Mätzler) 	Conducted virtually; documents: cbc.wien
24.3.2022	Pilot implementation for biodiversity-enhancing permanent structures at the Wolfsboden	cbc.wien
May 2022	Newsletter 7 Finding solutions together	interreg-athu.eu/cbc.wien food.sze.hu
15.6.2022	AgriNatur AT-HU Final Conference at Széchenyi István University, Mosonmagyaróvár	food.sze.hu

Overview of publicly accessible activities

19.9.2019	Public Workshop at the Széchenyi István University	food.sze.hu
9.5.2020, 19.9.2020	AgriNatur excursion at event on "Europe in my region", National Park House Vienna-Lobau	Cancellation
8.10.2020	Online training for students of Széchenyi István University	food.sze.hu
3.11.2020	During the open research evening at the National Park House Vienna-Lobau, the interested public gained insight into the monitoring and planning process: Bird Surveys in the Lobau. Results 2020 (C. Nagl) Insect monitoring Upper Lobau – current status (B. Kromp, K. Fuchs) The development process towards biodiversity-enhancing organic agriculture. Status Local Implementation Plan Vienna (H. Kutzenberger)	Conducted virtually; documents: http://cbc.wien/Projekte/umwelt_nachhaltigkeit_energie/Projekte_aus_der_F%C3%B6rderperiode_2014-2020/Agrinaturobc.wien
26.11.2020	Online training for students of Széchenyi István University	food.sze.hu
21.1.2021	Lecture at the Mosonmagyaróvár Pensioners' University	Conducted virtually
21.5.2021, 29.5.2021	„AgriNatur Science Day" theme hike, National Park House Vienna-Lobau	Cancellation
March – October 2021	AgriNatur special exhibition in the National Park House Vienna-Lobau	Available for download from Bio Forschung Austria, German, English, Hungarian
25.9.2021	„AgriNatur Science Day" Bio Forschung Austria and Austrian Society for Nature Conservation	interreg-athu.eu
11.10.2021, 2.11.2021, 5.11.2021	„AgriNatur Science Day" at Széchenyi István University, Dunasziget Ecopark	food.sze.hu
21.10.2021	Public workshop at the Széchenyi István University	food.sze.hu
27.1.2022	Training for farmers, Széchenyi István University	Cancellation
From March 2022	AgriNatur special exhibition at the Lobau National Park Forestry Administration, Großenzersdorf	Available for download from Bio Forschung Austria, German, English, Hungarian
24.3.2022, 30.3.2022	„AgriNatur Science Day" at Széchenyi István University, Dunasziget Ecopark	food.sze.hu

7.5.2022	AgriNatur information stand of Bio Forschung Austria at the Europe Festival on May 7, Mariahilfer Straße, Vienna	cbc.wien
14.5.2022, 25.5.2022, 24.6.2022	„AgriNatur Science Day" theme hike	Info/registration at the National Park House Vienna-Lobau
11.4.2022, 22.4.2022, 4.5.2022	Guided ornithological observations of Széchenyi István University	food.sze.hu
22.4.2022, 4.5.2022	Guided tours of the nature trails, Mosonmagyaróvár	food.sze.hu
30.5.2022	Opening of the AgriNatur visitor area " Fields of Diversity", Vienna, with „Cross Border-Excursion“	Download of the information boards at Bio Forschung Austria, German, English
8.6.2022	Opening AgriNatur garden and nature trail, Mosonmagyaróvár, with „Cross Border-Excursion“	food.sze.hu
15.6.2022	AgriNatur AT-HU final conference at Széchenyi István University, Mosonmagyaróvár	cbc.wien food.sze.hu
Autumn 2022, spring 2023	Audience workshops as part of the annual creative competition National Park House Vienna-Lobau	interreg-athu.eu

Further activities to disseminate the project results

2019-2022	Online documents on project website, partner sites, interreg-athu.eu https://www.interreg-athu.eu/agrinaturathu/ / food.sze.hu https://food.sze.hu/agrinatur cbc.wien https://cbc.wien/Projekte/umwelt_nachhaltigkeit_energie/Projekte%20aus%20der%20F%C3%B6rderperiode%202014-2020/Agrinatur Bio Forschung Austria https://www.bioforschung.at/projects/agrinatur-at-hu-biodiversitaet-durch-anthropogene-nutzung-fuer-naturschutzgebiete/ Media articles, for example in the NP newspaper "Aublick"
10.11.2021	Excursion for employees of the City of Vienna working with EU projects

Impulses for lowland floodplain protected areas from joint work



The aim of the work package is to develop a common AgriNatur strategy and two local implementation plans (National Park Danube Floodplain Vienna part, Mosoni Plain) to promote synergies between FFH habitats and organic arable land use. To this end, the project partners are working together with local managers and external experts in bilateral expert workshops: Positive effects of agricultural use for species protection, biodiversity and reduction of invasive neophytes are discussed based on the case-study areas. Specifically, management changes regarding organic farmland near FFH habitats (especially forests, meadows and dry grasslands) will be assessed with regard to the long-term promotion of their biodiversity and resilience, taking into account the legal and economic feasibility.

The work strategy followed in the project

At the project application stage, the partners already outlined an approach to the work that focused on exchange and coordination. This is intended to enable various institutions and individuals to join forces in order to meet the challenges of our time in the project area. This requires a professional foundation as well as clear perspectives for political and practical feasibility.

The essential "building blocks":

Large workshops represent the network nodes in a joint planning process. This is where the information and interim results from the individual work packages come together. These are presented, discussed, supplemented if necessary and then released for subsequent steps. This approach also yields additional topics to be dealt with, working questions or hypotheses.

Research and implementation projects are structured in and clearly assigned to different work packages.

Meetings and coordination in other, smaller formats and with different memberships form central elements for exchange, coordination and networking.

For further communication in the project and externally, the positions provided for in the application were continuously adapted according to developments in the project and supplemented as needed.

The control and management of the project received high priority from the onset in order to do justice to the complexity of the project. Among the typical challenges of the project, which were already recognized in advance, were the bilingual or trilingual nature of the discussions and documentation, the need for intensive, active networking between the project and the project environment, and the administration of tasks and funding in two different countries.

Naturally, the worldwide pandemic was not foreseen in the project planning. Considering the face-to-face meeting approach in AgriNatur, CoVid-19 had serious consequences.

Accordingly, the general uncertainty, especially in the first phase, required cancelling a large workshop and other adaptations in the project schedule.

New ways of exchange were quickly found with the "Virtual Expert" meetings. In compressed and quickly standardized web sessions, topics were presented and discussed according to the program. This enabled maintaining the project framework in terms of both content and project technology until one or the other in-person meetings became possible again. accompanying, comprehensive discussions in the project with international experts, experts from the administration and local responsible persons, in addition to the assignment of contractors for monitoring and planning, provide an added value: identification increases, questions and approaches to solutions are sharpened.

The discussions within the AgriNatur project have yielded valuable impulses in different topics. Quotations from the AgriNatur expert* workshops are compiled here in sorted order and may be relevant for further work also in other lowland floodplain conservation areas. The following graphic gives an overview of the topic structure, the topics are in alphabetical order:



General collection of quotations from the interdisciplinary expert dialogue

The number given on the left refers to the source list at the end of the collection document.

Nr.	Field herbs
31	On the issue of strong weed emergence (example of Plättenmaiß 2019: corn poppy, field stonecrop, Sophienrauke) despite harrowing: possible explanations: the timing of harrowing too late so that the weeds were not pulled out, or rainfall shortly after harrowing saved the weeds, or harrowing too early so that many weeds germinated afterwards.

36	Regarding the correspondence of species communities of fields and open soil areas along watercourses or forest edges: marsh zest at Oberleitner Wasser and water knotweed are relicts of old arms and would both also be present in wet meadows. Field goose thistle and field thistle also thrive better on moist sites.
64	On the threat classification of field weeds: In general, the intensification of agriculture means that the situation for most weeds has become worse.
69	Example of old cultivated landscapes near Vienna in the Waldviertel: In permanent marginal and small structures, if they are not over-fertilized and remain undisturbed for a longer period of time, then a special "ant-controlled" species community becomes established: white-toothed shrew, thyme, violets, on small field margins: "the small hot land" with high quality.
76	On reduced seed strength: based on 30 years of experience on the sensitive balance between wild weed pressure and management, the options vary on individual plots (example rye, corn poppy); some wild weeds difficult to control, seed strength is targeted to these.
82	Permanent small structures are the most important aspect; further consideration to optimizing ongoing management; reduction of seed rates must be closely examined, with regard to problematic wild weeds. Green Deal aims at 30% protected area in terrestrial habitats.
102	To control root weeds with alfalfa: Alfalfa must be in the field for at least two years, through shading and water competition, the alfalfa displaces the Canada thistle. Due to this competition, other field weeds have a hard time on these areas during the growth of the alfalfa. Weeds such as shepherd's purse or field thistle still thrive where there are gaps in the cultivation. The nodule bacteria of the lucerne collect large amounts of nitrogen during these 2 years. After the alfalfa has been tilled, nitrogen-consuming, deep-rooted crops must be planted so that the nitrogen does not sink into deeper soil layers, thus benefiting only the few surviving thistles.

Nr.	Other animals
27	Hares and field mice cause considerable damage to the experimental plots.
32	In HU a model farm that explicitly produces seed mixtures to encourage small animals and also larger ones; These are sown at the edge, the strip does not produce income – but is an important food source mainly for red deer and keeps them out of the field.
37	Regarding field mice in the Lobau: they are not a problem in crops here.

Nr.	Recreational spaces
9	Recreation and conservation have become even more important in times like these (note: Corona): The lockdowns "drive" Vienna residents to the national park. This calls for creativity and clever minds; such high-quality discussions on the AgriNatur topic have never been held before.
10	The need for recreation is increasing.

23	Challenges specifically also regarding the interaction between the city and its surroundings.
42	Conscientious assessment very positive. Because we have to be very careful and conscientious with the responsibility also as a national park, the combined conversion seems to me at the present time to be the most plausible variant. That would enable reacting to the clearly different potential of the respective areas and to take these into account. Here I would like to note that in this combination, from my point of view, extensive organic farming would also be possible in principle – if, analogous to meadow management, this provides an added value for the preservation of characteristic species and especially species compositions.
43	However, I would like to warn against trying to accommodate all conservation interests in the national parks. There are different categories of protected areas with different objectives (NP in Austria 2.8%, of which 75% non-intervention, 25% for conservation measures through management); from the national park point of view, dry grasslands and hotlands are particularly noteworthy.

Nr.	Agriculture
1	Organic farming essentially means doing without chemical pesticides and nitrogen mineral fertilizers. Organic farming does not mean extensification per se. Further thinking is needed here.
4	The importance of biodiversity and organic farming must be brought to the attention of as many people as possible, e.g. through educational measures and information. Target groups include schoolchildren, BOKU students, the residents of the surrounding districts, and farmers.
6	Consumers also need to have a better understanding – even food that is not superficially flawless has value.
7	It is imperative to continue and increase using the potential of agricultural and open land areas for communicating environmental information.
8	Exemplary basic research for the ecologization of lowland agriculture; this has wide-ranging consequences. I am grateful for this project, an experimental field, which is important for agriculture as a whole; it is publicly funded, provides motivation for an ecologization and biodiversity research, while at the same time being important for the rest of the cultural landscape. Favorable also because a certain amount of game damage benefits the national park animals. It's a silver lining because of the ratio of managed land to national park, clearly as a national park-compliant cultural landscape maintenance of the management zone in the lowland national park, also setting an example for other lowland national parks. I don't see major problems as far as IUCN recognition is concerned. Cultivation is currently not an essential requirement for lowland floodplains, but considering the enormous ambition in AgriNatur research, I believe IUCN approval is possible. What is the area ratio? Up to 25% management zone if managed in the spirit of the national park. How much is arable land? 7.66% in the Viennese part. Actually, we are a model in taking care of this area in such a scientifically motivated way. We have already produced findings that actually benefit the reserve.
11	EU-Mission "Soil health & food".

12	AgriNatur results are an input for the next ÖPUL program. They provide an impulse by being a clear commitment to food security, nutrition and environmental protection.
13	Scenario B would be suitable as a positive example or lighthouse project towards "Soil Health & Food".
16	In agriculture, the pressure is increasing – be it on a practical, legal, economic or social level. At the same time, demands are growing in the realms of housing, leisure, transport, consumption, etc.
17	Recommendations for eco-conscious management.
18	Paradigm shift: agriculture is no longer a "residual" but an asset item.
19	AgriNatur project area could be a 2nd Austrian example of a "Lighthouse Farm", as a showcase for environmentally responsible & biodiversity-enhancing farmers.
21	Farmer must be able to generate income, regardless of whether intensive or extensive. Any expenses for protection etc. must be compensated.
22	Difference between the particularly biodiverse land in the Doñana area and the industrial, export-oriented agriculture in the surrounding area (with its extreme water requirements) is dramatic.
24	Organic agriculture in the Lobau is a major achievement. It contributes considerably to the supply of fresh and high-quality food. In addition, the Lobau is a very attractive recreational area. It is important to raise awareness for these values in the city of Vienna.
26	Optimize land use and seeding/cultivation structure; Select optimal crops and crop rotations; Create appropriate field sizes and shapes that allow for both specific agrotechnical measures and biodiversity (organic matter, living organisms); Increase the buffering capacity of the soil (e.g., construct appropriate agricultural structures (paths, ditches, bridges, alleys).
28	On the question of why the structures do not currently exist and whether they are economically justifiable: organic farming is in a development phase: for a long time the primary question was: how do we get out of large-scale poisoning of food and soil. Species and habitat protection was not at the forefront of this issue. It has long been known that biodiversity suffers due to mechanical soil cultivation, for example.
29	Permanent structures are crucial for humus buildup and erosion prevention; the main agricultural problem is structural loss of landscape elements.
34	Urban agriculture has significant societal relevance. Arable/ field vegetable areas close to the city are significant for food supply and risk prevention.
39	Publicly owned land and farms can test new solutions in close cooperation between research and practice and break new ground in the direction of "agriculture of the future". Cost considerations make this impossible in the private sector.
40	Regarding the contribution of the Lobau arable land to the development of yield security: the special local conditions here are highly relevant for Vienna. The fields in the Lobau are of great importance. For example: homes for seniors in Vienna can be supplied with potatoes from these areas.
41	To assess scenarios: Checking whether you lose something is essential. In both AT and HU, the development of agricultural structures is intensive, costly. Few model farms, know-how accumulated over 30 years.

44	The low fertilizer application (note: in the project area AT) is relatively unique (only compost and not annually) and the result of decades of soil preparation.
45	External effects of diseases from other fields are largely eliminated due to isolated location in small clearings.
68	On the difference between arable land and other habitats: temporarily open soil patches are a characteristic feature of arable land; they provide a link to dynamic watercourse banks and their habitat structures.
70	New species have higher yields but fewer vitamins and salts. In addition, the stands are less biodiverse and more susceptible to pathogens, which can lead to increased pesticide use.
71	An important consensus can also be to discontinue importing our early potatoes from Egypt, for example.
74	Farm Vienna: Harnessing know-how from decades of organic farming
77	Regarding reducing the area under cultivation for species conservation-oriented arable farming: approx. 10%
79	Regarding succession: Biodiversity-enhancing agriculture is not the easy version. Landscape management will have to be adapted.
83	Regarding the concept of industrial agriculture: I would like to make a comment: what does this mean exactly, what is the indicator? The "folklorification" of organic agriculture does not enable making progress. The social conditions of pre-industrial feudal structures are not the goal. A profitable system is a basic condition: the largest cultivations widths have potato and green pea - these provide the widest spacing for structuring efforts, whereby 60 m field width is also a good size from the species protection point of view.
84	Transferable solutions for agriculture in lowlands. e.g. regarding species and habitat protection, transfer of knowledge, regarding concrete measures (example potato/wireworm/pea).
88	The issue is currently being overshadowed by the much more rapid pace of global warming (example domestic potatoes and heat-loving pests). Reaction in conventional agriculture is the use of chemical agents. In organic farming this is not possible, but 25 years of experience can be used to avoid these pests.
99	On the difference in the care of meadows and (small) "Wieserln": Meadows are cut by farmers twice a year and the hay is removed. The Wieserln and Schneisen are mulched twice a year. They are mostly narrow strips in which little material accumulates.
103	Sustainable Doñana" involved 33 pilot farms working together to develop biodiversity-enhancing agriculture. What emerged, however, was great skepticism about "new" measures (e.g. sown strips) that are not anchored in traditional. These measures require a lot of convincing.

Nr.	Ground beetles
65	Regarding the recolonization range for ground beetles in fragmented habitat systems: wide in principle because many eurytopic cultural landscape species are capable of flight. Stenotopic, often rare, species are often flightless.

66	Regarding the occurrence of the bombardier beetle: in the 2019 AgriNatur monitoring, only 3 individuals of <i>Brachinus expulso</i> were caught in the 6 organic fields, but with a total of 19 individuals in 3 marginal fields, mainly flattened maize.
67	Experiential knowledge on the occurrence of individual ground beetle species: The development of the ground beetle fauna in the Lobau foreland is probably unfavorable in conventional farming; organic farming certainly has "better" ground beetle communities, more <i>Poecilus cupreus</i> . The moisture-loving species <i>Pterostichus melanarius</i> was not found by us in the Upper Lobau in 2019; it may have disappeared from dry fields due to climate change.
104	The biodiversity and species richness associated with agricultural land, such as ground beetles or certain bird species, is much more difficult to convey to the public than, for example, a kingfisher or white-tailed eagle.

Nr.	Project architecture
2	Strengths of international cooperation: "Joint projects make particular sense when complex issues are involved. In cooperations, knowledge and experience can be bundled across borders; at the same time, the project and work structure help to set a clear focus".
3	Targeted and functioning cooperation by various partners, the linking of research and practice, and the (awareness) education measures are central success factors in the project.
5	High value that various educational efforts have for the cooperation on the ecological and on the social level.
14	Current issues biodiversity, dealing with settlement pressure, water, wildlife management or soil conservation.
15	In these contexts, solidarity will be necessary for solutions.
73	Desire for secured and well-discussed results, clear statements and approaches to solutions for a future topic such as this.
75	Every new model must work with the technical know-how of today.
78	Merge scenarios so that there is also a common solution.
80	The inclusion of (note: financial) hedging mechanisms is not a shortcoming.
81	Avoid "one fits all" solutions.
96	Regarding the variety database at SZE: The genebank has only a handful of seeds of some varieties, currently building up stocks.
100	It is imperative that evaluation be included in every implementation. This is the only way to make findings usable for others.

Nr.	Butterflies
35	Regarding the overlap of species of field margins and butterflies in the project area: Approximately 30% of the species that occurred on the dry grassland also occur on field

	margins. The Small Schiller Butterfly and the Large Fire Butterfly inhabit only on field margins.
54	Regarding weed species in the field that are visited by butterflies: for weeds in the potato field, Canada thistle (<i>Cirsium arvensis</i>) and annual bindweed (<i>Erigeron annuus</i>) are important nectar plants for butterflies.
55	Regarding the suitability of marginal strips for butterflies: forage plants especially for caterpillars of selected species need support such as Kidney Vetch (<i>Anthyllis vulneraria</i>) for Dwarf Blue (<i>Cupido minimus</i>), dock species (<i>Rumex</i> sp.) for Large Fire Butterfly (<i>Lycaena dispar</i>) and Brown Fire Butterfly (<i>Lycaena tityrus</i>), Small Fire Butterfly (<i>Lycaena phlaeas</i>). The edges are very grassy due to mulching; targeted mow removal would help considerably to promote diverse herbaceous floras.
94	Regarding the temporal availability of legumes, especially alfalfa or sainfoin for butterflies: Often two generations of butterfly caterpillars use these two host plants. Therefore, if possible, no measures before the end of May or staggered mowing in partial areas.

Nr.	Protected areas
20	Additional costs for maintenance.
30	"If our protected area projects are to be successful, we also need to find new ways of dialogue."
63	Regarding the regeneration of the silver poplar in Wittmann Park: there is some regeneration, but little chance of reaching tree condition due to shade.
72	"National parks can't encompass all conservation goals": it's important to keep thinking about enlargement at the same time; about the water issue.
85a	On hunting: wildlife backdrop works in cultural landscapes, e.g., small shrubs with fruit trees to direct wildlife to divert pressure from reforestation areas. Hunters are traditional allies of conservation efforts in open cultural landscape.
85b	Example of eco-strips in the Marchfeld; On landscape structural elements: Promote biodiversity using multi-use hedges, for example – more than simple windbreak hedges.
89	Agents (wilt fungus, <i>Verticillium</i> species) against tree of heaven are available. No application in the national park.
93	Regarding promoting the spread of plant species in the area: migratory grazing is a perfectly reasonable approach!
97	Regarding setting measures in the pine stands: Stand will be monitored for pine bark beetle and pine scab and successively removed or stand will be converted even beyond 2028.
98	Regarding the darkening of ash maple: stock cuttings of ash maple are cut again 2-3 years after the conversion. Then they have no chance against other tree species and die under the umbrella of the other trees. Experience shows that it is best to cut the ash maple at about 1 m height. Instead of forming a root outbreak, it develops a cane outbreak, which is subsequently easier to treat.

101	Regarding the health of ash trees (ash shoot dieback) in Wittmann Park: the health status varies widely.
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Nr.	Birds
25	Multiple relationships between conservation and agriculture: several bird species are now considered very rare.
56	Concerning the populations of Turtle Dove and Corn Bunting in the Moson Plain: both are very rare in the area, even in the tree-lined alleys no reliable evidence. Decreasing trend as in Western Europe, both were very common a few decades ago and decreased dramatically. Turtle Doves require groups of bushes; in northwestern Hungary, where there are many meadows, the Corn Bunting is still widespread.
57	Regarding rook colony populations: stagnating, more likely to be preserved in cities. Problems with pollution and noise.
58	Regarding the habitat requirements of bird species of forests and forest edges: There are pure forest species (e.g. wren), open land species (e.g. skylark) and species that prefer the forest edge, e.g. yellowhammer. For breeding, these species require shrubbery and hedgerows.
59	Concerning the Turtle Dove populations in the Lobau: The structurally rich forest edges and especially the more overgrown hotlands of the Lobau are considered optimal breeding habitats. However, surveys between 2002 and 2004 indicate a decline of this species also in the Lobau.
60	On the question of minimum sizes of small clearings for the skylark: paved roads are avoided, meadow paths are attractive for foraging; an expansion of small clearings in the Lobau would be a conflict of objectives with, for example, protection measures for the partridge, which requires a more closely meshed structure. (Addendum C. Nagl: Open areas of less than 5-10 ha and semi-open landscapes with a hedge proportion of more than 150-200 m/ha are usually not colonized by skylarks, see Handbuch d. Vögel Mitteleuropas).
61	On the quality of structures for skylark/partridge and the factor of human disturbance/habituation: The most important factor is the type and frequency of cultivation. Repeated mechanical cultivation destroys clutches. A potential solution: meadow strips or rewilded strips and tree groves provide breeding opportunities and cover for ground-nesting birds.
62	Concerning the strong decline of the partridge: The primary reason is the trend toward more extensive fields and the too low proportion of fallow land. Disturbance caused by recreational use (e.g. dogs running free) is also a problem. Tillage negatively affects ground-nesting birds.
86	Regarding the planned structuring: individual trees are important for raptor species, such as eagle species in particular.
95	On the issue of nesting aids: in Moson Plain currently no nest cavities at all. In Wittmannpark promotion of existing species. For Saker Falcon only artificial nesting aids on power poles are known, providing for a positive population development.

Nr.	Water
33	The water project (note: planned Dotation Panozzalacke) is not contradictory to AgriNatur; on the contrary, the improved groundwater situation is beneficial.
38	On the issue of water balance: For the ecological implementation plan, former stream landscape is deliberately taken as a model.

Nr.	Meadow regeneration areas
87	Forest edge scenery has enhancement potential – de facto a lot of structural quality can be gained there in combination with neophyte management.
91	For meadow regeneration from goldenrod stands (Note: Rural Development "LE" project "Meadow development Lobau"): Development of the meadow type "Lean lowland mowing meadow" instead of goldenrod stands has been fulfilled. Deep tillage (40 cm) with forestry mulcher + winter cereals (rye) has been successful. There has been differentiation of REWISA seeding mixes within the area; drier vs. fresher areas. In wetter sites, goldenrod is more competitive and persists in higher proportions. I recommend deliberate use of rattle cane (<i>Rhinanthus</i> sp.), e.g., with cuttings transfer. <i>Rhinanthus</i> attaches itself in an undifferentiated manner on every root it contacts and thus weakens especially the dominant species (such as knotgrass, alfalfa, <i>Solidago</i>).
92	Tegarding antagonism grasses versus goldenrod: grass is an important antagonist against goldenrod – combination of tillage and winter cereals is good;

Nr.	Wild bees
85c	Showcase Lasse: mixture of 1-year-old flowering plants, succession: drainage ditches, field path vegetation strips; rich insect supply for bee-eater colony
46	Mobility of wild bees: The radius of the collecting flight distances of the individual wild bee species is – depending on their body size – approximately 200 - 1000 meters between nesting site and food plant. If habitats are completely recolonized, wild bees can also travel several kilometers.
47	On the importance of open soil places of the arable fields for wild bees: When the fields were not yet heavily overgrown, the open soil spots on the field were readily used by wild bees as nesting sites. The nests are located about 10 - 20 cm below the ground, which is why it is important to reduce the plowing depth so as not to damage the nests.
48	On the importance of arable land size for wild bees: The larger the arable land, the fewer species and individuals are found. The smaller the arable land, and the more landscape elements are present (e.g. hedges, tree rows, field margins), the more species and individuals there are.
49	On the importance of open ground sites of forest edges for wild bees: The open soil sites at the forest edges play an important role, especially because they are not turned over, unlike the arable land.

50	To promote wild bee diversity: One should maintain or support both the overall wild bee diversity in the area and rare target species. Likewise, special attention should be paid to the habitat needs of oligolectic species (i.e. species that specialize in certain flowering plants).
52	On the question of what species digs the nesting holes of wild bees: Some bumblebee species also use abandoned mouse holes. Ground-nesting wild bee species usually dig their nest tunnels.
90	On the question of how to reduce field size: Through various measures such as planting hedges or tree rows. Also through "flowering strips" or another crop (e.g. fennel).
51	On the specificity of potato fields for wild bees: The potato fields in the study area were particularly rich in weeds. Furthermore, mounding creates sloping open soil areas that are very attractive to some wild bee species. The potato flowers themselves are also readily used as a nectar source by many wild bee species. In comparison, weeds are abundant in the grain fields only in March and April, and are later overgrown by the grain.
53	Are certain wild bees restricted to field herbs? Most oligolectic species are specialized on certain plant families or genera, but not on specific plant species. Accordingly, if, for example, rare field weeds are from the Lamiaceae family, then they may be visited by bees specializing in Lamiaceae.

Monitoring overview, pilot tests, sample plots

A central component of the project activities is the monitoring surveys of the partners. They include recording of the current state of agrobiodiversity in the project areas. This chapter provides an overview.

For an up-to-date status report on biodiversity in the Austrian project area, seven different surveys were conducted by the Austrian partners between 2019 and 2021. The already extensive data set on the area was specifically supplemented with surveys on fields and empirical knowledge.

The monitoring of organic farmland and adjacent areas in the Lobau, designed by project partner Bio Forschung Austria, comprised 2-year surveys for the organism groups field weeds, ground beetles, butterflies, wild bees and birds; a total of 516 species were surveyed. Field weeds are a rarely surveyed group that has been increasingly affected by species decline since the use of tractors. Ground beetles play an important role in natural pest regulation in agroecosystems. Butterflies, in turn, provide important evidence of vegetation diversity and are characterized by ease of detection in the field. As indicators of vegetation and structural diversity, wild bees are also useful for assessing the conservation status of project sites. These important pollinators are threatened by widespread insecticide use. In addition, birds were selected because their species decline in agroecosystems has been well documented in recent decades. The Farmland Bird Index provides a good basis for comparison with current surveys in the project area.

The lead partner forestry and agricultural company evaluated the meadow regeneration, which was completed in 2014. The study site involved 45 hectares of rewilding land created in 1998 by incorporation into the natural zone and accompanied by management measures. The study allows comparisons to older surveys and provides insight into a future development option for agricultural land in the National Park.

Collecting the long-term experience gained by the locally responsible foresters about the investigated areas helped create a plan for the long-term conversion of managed forest parts into non-intrusive natural zones. This proposal enables achieving an increase of the natural zone in the Viennese National Park portion to 75 percent.

The listed monitoring activities provide basic data for the strategy development process of the Local Implementation Plan in Austria (LUP AT). The data were further processed by the Technical Office Kutzenberger and presented for discussion in the workshops on the strategy development process.

All monitoring reports are available in digital form and can be downloaded from the CBC site of the City of Vienna (www.cbc.wien) or the microsite of the project (www.interreg-athu.eu/agrinaturathu/).

From the perspective of the City of Vienna, the plan is to incorporate the results/data of the monitoring in the digital thematic city plan "Vienna Environmental Assets" of the Vienna Environmental Protection Department (MA 22) and to make them available to a broad public.

In the Hungarian project area (Natura 2000 site Moson Plain and Wittmann Park and Castle Garden in Mosonmagyaróvár), continuous surveys were conducted during the project to assess the ecological networks. Between 2019 and 2021, experts were charged with conducting several surveys and assessments of tree and bird populations in the area. In addition to the ecological perspective, a study of the historical features of Wittmann Park was carried out, highlighting the unique intertwining of the natural environment and the history of

the park, and providing material for the information boards of the eco-educational efforts (nature trail) on site.

Survey sites

The surveys took place in two parts of the area, representing two different habitat types of the Mosonmagyaróvár area, both of which are extremely important from the perspective of ornithology and bird protection: agricultural land divided by groves of trees and meadows (Moson Plain) and hardwood forests along rivers (Wittmann Park). The Moson Plain Natura 2000 site covers an area of 13,096 hectares and is located in the northwestern part of Győr-Moson-Sopron County, within the Hungary-Austria-Slovakia border triangle.

The Wittmann Park in Mosonmagyaróvár still retains a forest-like, structured, multi-storied tree population. Based on the vegetation classification, it represents a species-rich hardwood oak forest harboring all tree species of Szigetköz.

Surveys in the project area:

- Recording ecological networks: recording the tree population of Wittmann Park 2019.
- Bird monitoring in urban habitats (Mosonmagyaróvár: Wittmann Park and Castle Garden) 2019
- Ornithological monitoring and baseline survey in the Natura 2000 site Moson Plain 2019.
- Bird monitoring in urban habitats (Mosonmagyaróvár: Wittmann Park and Castle Garden) 2020
- Ornithological monitoring and baseline survey in the Natura 2000 site Moson Plain 2020.
- Bird watching in urban habitats (Mosonmagyaróvár: Wittmann Park and Castle Garden) 2021
- Ornithological monitoring and baseline survey in the Natura 2000 site Moson Plain 2021
- Final report on the ornithological observations 2021

Recording of ecological networks: surveying the tree population of the Wittmann-Antal Park.

Results: In the recorded area part of Wittmann Park, we found a total of 37 tree species, with 380 trees reaching a diameter at chest height of 50 cm. We also measured another 78 trees that had a diameter of less than 50 cm. In the old-growth part of the park, sycamore (*Acer pseudoplatanus*) was the most abundant (116 trees), followed by common horse chestnut (*Aesculus hippocastanum*, 75 trees), common ash (*Fraxinus excelsior*, 70 trees), and maple-leaved sycamore (*Platanus × hybrida*, 63 trees). Interestingly, it is necessary to highlight the copper beech (*Fagus sylvatica*, 20 trees), the mountain elm (*Ulmus glabra*, 2 trees), the silver linden (*Tilia tomentosa*, 1 tree) and the ginkgo (*Ginkgo biloba*, 1 tree). The park's tree population also includes large trees of several tree species that are undesired invasive species: common black locust (*Robinia pseudoacacia*, 2 trees), ash-maple (*Acer negundo*, 5 trees), tree of heaven (*Ailanthus altissima*, 3 trees), and white mulberry (*Morus alba*, 1 tree). We measured the greatest tree heights for the copper beech and maple-leaved sycamore. Here, several trees exceeded 35 m. We also recorded the maple-leaved plane tree as having the largest diameter (max. 182 cm), but high values were also recorded for the sycamore, copper beech, common ash, silver poplar (*Populus alba*), and English oak (*Quercus robur*), which reached 120 cm in diameter. Of the "true" shrub species, the typical species of the hardwood forests (e.g. the red dogwood) dominate. On higher ridges, species that are rarely found in the

lowlands were also present (e.g. the cornelian cherry, the common pimpernut, the honeysuckle), which, some were found at only a few other sites in the whole area of Szigetköz (Király, 2019).

Ornithological monitoring

Moson Plain: During the 2019-2021 survey of the 2 Moson Plain sample areas, we observed a total of 50 bird species. Of these, 37 species probably or certainly bred in the area, and another 13 species were occasional or regular foragers, but (at least in the sample areas) not breeding birds. The nest box colony established in 2020 had two documented brood-rearing events in 2020 and three in 2021. The nest box colony is also expected to contribute in the longer term to the establishment of birds nesting in natural cavities in the area, which is otherwise very poor in older trees. (Király, 2021).

Wittmann Park: We observed a total of 41 bird species during the 2019-2021 survey of Wittmann Park. Of these, 35 species were likely or certainly breeding in the area, and an additional 6 species were occasional or regular foragers, but (at least in the sample areas) not breeding birds. The project deployed three different types (A, B, and C) of nest boxes in 2019 that are suitable for hosting a variety of bird species. Generally urbanized, native forest species (e.g., blackcap, chaffinch, blackbird) have very strong populations in the area. For the species nesting on the ground (e.g. the warblers, the robins) the urban conditions are not particularly suitable; for them nest predation poses a greater threat than in forest habitats (Király, 2021).

Field tests in the Moson Plain (HU)

The aim of the trials is to investigate the varieties of "old" and traditional cereals currently being cultivated from a crop production point of view and to evaluate comparatively the nutritional qualities of these varieties. The trial was set up in an area whose plant growing conditions were typical of the landscape. In the selected varieties we concentrated on the varieties with older traits; with regard to bread cereals, these were the lines einkorn - emmer - spelt.

An important task was to find the traditionally cultivated plant species/varieties typical for the area and to evaluate the available materials. We sifted the materials of the SZE MÉK genebank and selected the varieties that are characteristic for the production site, as their breeding and cultivation take place in Mosonmagyaróvár. The varieties we found were always supplemented by modern varieties, especially those which have already been proven to grow well in the area and that farmers preferentially sow.

Small plot trials - 1.1.2019-30.6.2020

Objective: to study the cultivability of modern (in public cultivation) and traditional plant varieties and compare yields and nutritional values.

Experimental area: Moson Plain, in the surroundings of Jánossomorja, 0.5 ha. A randomized block arrangement (randomization limited due to the different sowing times and sowing technologies) was applied on the experimental plot. The plots were sown in four replicates with a net plot size of 10 square meters. Weed control: manual weeding was performed continuously.

Irrigation: None, no irrigation is possible in the experimental area.

2020/2021 Large plot trials

Based on the results of the spring and fall trials, we selected winter cereal varieties sown in the fall for the large plot trials in the third year. We sowed 3 hectares of old wheat varieties and

locally bred spelt varieties. Seeding was done at two dates: 08.11.2020: Mv. Alakor, Mv. Martongold, Mv. Hegyes; 10.11.2020: Lajta, ÖKO-10.

Results

The results of the study show significant differences in performance between the local varieties and the winter wheat varieties used today in production. Farmers can expect significantly higher yield averages when growing the modern varieties, but the higher crude protein content of the local (older) varieties compensates for their lower yield.

Field trials in the Lobau (AT)

The aim of the field trials in the 2nd monitoring year 2020 was to implement measures that promote agrobiodiversity in the organic fields of the Lobau, specifically measures that could be implemented in the short term and integrated into the management processes. This yielded first practical experience for the implementation of the "Local Implementation Plan LUP-AT", scenario B.

Preparation in autumn/winter 2019:

Z Relevant literature (e.g. Gottwald & Stein-Bachinger 2016) was examined and ground beetle catches in 2019 were evaluated in preparation for the field trials.

In a discussion with Kromp (LP/MA 49), the biodiversity promotion scheme elaborated by Ableidinger (PP2/BFA) involving expanding the crop rotation by cultivating alternative crops (such as maize, pumpkin, winter pea, lupine, chickpeas) was classified as not feasible in the short term by Mayer (estate manager Biozentrum Lobau, Landwirtschaftsbetrieb der Stadt Wien/LWB). This was due to game pressure and already concluded purchase contracts. As a compromise between agroecology and agroeconomics, the decision was made to cultivate aromatic herbs and flowering mixture strips along the field edges and in the field interior as well as to sow alfalfa in poorly cultivable parts of the fields.

The pre-selection of monitoring plots for 2020 was based on the monitoring results of 2019: the green peas (GE) and potatoes (K) with intensive spring tillage and sprinkler irrigation showed an impoverished ground beetle fauna compared to the cereal crops. Therefore, 5 fields with GE and K as a preceding or follower crop in 2020 were agreed upon: "French Cemetery", "Camp 2", "Wolf's Soil 2", "Slapped Corn" and "Birch Spike".

Implementation in spring/summer 2020:

In mid-March, organically certified seed of the aromatic herbs caraway, fennel, anise and coriander was organized for field trials by BFA, as well as alfalfa seed of Hungarian origin, which was successfully delivered just after the Covid 19 lockdown (from 16.3. on) in Austria. Flowering mix seed ordered by Mayer/LWB from an Austrian company was delivered in late March.

On 20.3. Kromp handed over the BFA seed to Mayer. In a joint field inspection, 3 of the 5 fields were selected and suitable seeding locations in the field were located.

In late March, potatoes were planted in the "Franzosenfriedhof ("French cemetery")" and green peas were planted in "Lager ("Camp") 2" in early April. Due to a cold spell in the first half of April and subsequent drought in the second half of April, the aromatic herb strips could only be sown in stages and with delay. After an analysis of the species composition of the flowering mixture by Ableidinger, Kromp advised against its use in the Lobau as not conforming to national park standards (mainly due to the introduction of alien species and partly non-certified or cultivated breeds of flowering herbs). Alternatively, aromatic herbs should be

cultivated and the strips inside the field should be left to the spontaneous emergence of autochthonous wild herbs.

In early April the following biodiversity measures were available for further observation or agroecological and agricultural evaluation: "Franzosenfriedhof": along northeastern field edge each 6-m-wide strips of fennel (2 cultivation dates 2. and 10.4. respectively), anise and coriander (10.4.), spontaneous emergence at the edge/in the field. "Lager 2": along northern field edge 18-m-wide caraway cultivation 4/14 for 2-year stand (turned over 2nd half of April due to drought). "Wolfsboden (Wolf ground) 2": along northern field edge/upstream hedge: 3-m-wide coriander (cultivated 10.4.).

Inspections by Ableidinger (late April, early June) and Kromp/Fuchs on 24 July showed that cilantro had coped best with late cultivation and was abundantly visited by flower visitors (including admirals, blueflies, various ichneumon flies, longhorned beetles, Bee-Eating beetles) in "Wolfsboden 2" in full bloom.

Conclusion from an agricultural perspective: from a cultivation standpoint, spice cultivation in the Lobau is feasible, but commercial acceptance of the harvest is unclear.

Implementation of pilote measures for biodiversity promoting organic agriculture in spring 2022

Permanent features which provide additional hiding places, space for nesting as well as feeding with blossoms, berries and fruits for the species of the field landscape surveyed here were implemented in the pilot field "Wolfsboden". They are essential features of organic farming promoting biodiversity.

Further information: https://cbc.wien/sonstiges/Agrinatur%20Projekt/Agrinatur_Pilotma%C3%9FnahmenWolfsboden%20Fr%C3%BChling%202022_Dokumentation_Optimized.pdf

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Local Implementation Plan for the Viennese share of the Donau-Auen National Park ("LUP-AT")

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For a short Version, see Appendix I

Long version see here:

https://cbc.wien/sonstiges/Agriatur%20Projekt/TBK_Agrinatur_LUP_AT_Final%20Report_April2022_English_Optimized.pdf

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For a short Version, see Appendix II.

https://www.interreg-athu.eu/fileadmin/be_user_uploads/AgriNatur/AgriNatur_LUP_HU_Summary_english.pdf



Reflections, voices, Opinions

Thoughts from experts from A to Z on the AgriNatur topic

The statements, questions and answers on AgriNatur AT-HU were written by individuals and teams and are printed in the original text (translated, except statement of Margaret Erös).

National park and industrial agriculture (Baumgartner, C.)

3.11.2020

Christian Baumgartner is a scientific staff member of the Donau-Auen GmbH National Park.

Industrial agriculture has no place in an IUCN Category II National Park, whether with or without agrochemicals.

Regarding the 25% of possible management areas: extensive management measures and farming practices are compatible with achieving relevant national park objectives (species protection, biodiversity, landscape, visitor experience, ...), mostly involving traditional land uses (grazing, meadow management, ...) or small-scale measures of species protection. Industrial and commercially oriented agriculture with large-scale equipment is certainly not one of them.

The results of the investigations available to me so far do not provide any conclusive reasons why industrial agriculture should be necessary in the national park. And certainly no argument can be made for huge homogeneous fields. If at all, one could perhaps justify extensive agricultural land use for some sub-areas in order to preserve open landscape and soil disturbance. But even there I am extremely skeptical.

The retention of industrial agriculture will ultimately lead to the Upper Lobau and the affected areas of the Lower Lobau being removed from the National Park. (This will not be an Austrian decision!) I recommend the project team to involve Dr. Wolfgang Scherzinger (note: on the project mailing list) in the discussion: to get an impression how these issues are seen in the international framework and in the environment of the IUCN. I miss the consideration of the large-scale situation: after all, a very pronounced organic agriculture is taking place in the Marchfeld. Does this not take on any of the protection tasks for the species mentioned? Within the IUCN system it would also be possible to take the Upper Lobau out of the category II area and to define it as a category V area, for example. This would then no longer be a part of the national park, but merely an area upstream of the national park with other claims.

Undoubtedly, however, this would lead to considerable reputational losses for the City of Vienna, both with regard to nature conservation and the political arena, and would hardly be plausibly explainable to the public. Therefore, in my opinion, this is not a serious option.

What is unique about the Lobau? (Erös, M.)

28.11.2021

Margaret Erös, biologist and teacher, conducted her own exploration of the diversity of flowering herbs along the waysides of the Upper Lobau over a period of 8 years. Her findings of over 380 species were published in 2021 as a comprehensive photo book "Wildblumen der Lobau – Wild Flowers of the Lobau" in two languages (german and english).

"The uniqueness of this small area of the DonauAuen National Park on the doorstep of the city of Vienna can be summed up by its extraordinary habitat diversity.

A visitor can experience open backwaters, marsh, dry steppe-like grassland, meadows, rough grassland, scrubland, wide forest paths lined with trees, some covered with creepers and lianas, narrow winding paths through woodland with occasional clearings, fallen tree trunks in various stages of natural decomposition with fungal growth and traces of insect, woodpecker or beaver activity and finally arable fields where organically-grown crops are interspersed with flowering plants giving a splash of colour that has all but disappeared in the modern world of intensive agriculture.

The many transitional zones from one habitat type to another or undisturbed margins alongside the footpaths are in themselves a vital area of retreat for plant and small animal species from the effects of human activity, be it by visitors (in the Lobau up to many thousands each day) or as a result of farm or forest management.

And yes – all of this can be experienced within the space of a comfortable 2- 3 hour walk!

The area is however undergoing a slow but progressive process of change as a result of the regulation of the Danube which was necessary for the flood protection of the city and this necessitates further management measures to be taken if the uniqueness and existing natural diversity is to be protected. The project Agri-Natur has made a valuable contribution by presenting the necessary background data on which to base such decisions and by considering some innovative suggestions to enable the Lobau to retain its uniqueness while still fulfilling the aims of a sustainable environmental protection.

Future development of the National Park

In the Lobau the survival of the rich variety of open land plant species and the insect, bird and other life forms associated with them is not only compatible with but actually depends upon retaining the highly unusual patchwork of open fields that form the basis of the well-established organic arable farming practised here. The Agri-Natur study report explains well the historic reasons for it and its close relationship with the former landscape of the Danube flood plain. The results of research done on the open land species clearly indicate the contribution of this type of agriculture to the diversity of natural communities living here as well as the small but significant contribution to local organic food supplies.

Considering the massive increase of our human population and corresponding demands on the resources of this planet, if we hope to find a healthy and sustainable way of living in the imminent future to ensure our peaceful survival we must re-adapt to more respectful ways of combining our needs with the needs of the natural world on which we depend for everything, not least for our health and food.

We are facing a critical time in our history but all meaningful change begins in a small way by changing the way we think about things, not only the experts and specialists but all of us.

The way we think about National Parks is part of this. Are we protecting nature from human influence by putting a ring fence around it or do we see ourselves as part of nature's pattern?

The position of a partly arable area within a national park, where the commitment to a respectful protection of nature and diversity is formerly protected, constitutes a rare and valuable opportunity to help us reconsider our place in nature.

The introduction of new permanent features into the arable landscape

The innovative idea introduced in the Agri-Natur project that species diversity could be further encouraged by creating new permanent features into the existing landscape seems interesting from two main points of view.

Firstly it would help to deal with the problem, especially in the Upper Lobau, of larger numbers of visitors who are unwittingly putting extreme pressure on the environment we wish to protect. The provision of natural islands within the arable fields would create natural habitat for open land species that is difficult to access and would therefore remain undisturbed. The positioning and shape of the islands would need to be compatible with the practical requirements of machinery working the soil and harvesting. The windbreak effect would also have to be considered to ensure that the deflection of wind flow did not create further unintended problems.

It would nevertheless be a valuable experiment only possible in a natural park area where the farming is not subjected to normal commercial pressures. The expertise acquired could however have important wider applications. This leads to the second point.

Wind erosion is a widespread problem in flat agricultural areas such as parts of Lower Austria between Vienna and Hungary. The construction of windbreaks may reduce the soil erosion but it offers nothing for wildlife. The idea of living windbreaks similar to some of the permanent features proposed in the Lobau, strips of low maintenance natural habitat between different fields would not only enhance the landscape, occupy relatively little land area and provide lasting protection from wind erosion but also make an invaluable contribution to the conservation of nature in such areas.

They would effectively form well established hedges similar to those, for example, around the irregularly-shaped fields (a relic from historic field patterns) familiar in the English countryside. These hedgerows are also much valued by nature conservationists because they offer a permanent habitat and retreats for small wildlife, such as insects (including many pollinators), mice, hedgehogs, and birds, that interconnect over wide areas of landscape.

The use of pesticides and artificial fertilizers on the fields is another problem that will also have to be addressed in the near future if we intend to move towards sustainable agriculture. These challenges of improving food quality while protecting our natural environment go hand in hand.

The models, tried and tested over many years in the Lobau, could contribute much useful knowledge and expertise to the matter of finding workable solutions in organic farming that are consistent with our aims of nature protection. For this to happen they must be supported, both here and, where possible, in the wider agricultural landscape.

Educational value

The educational value of the Lobau is exceptional, particularly because of its easy accessibility to the large population of the city of Vienna (circa. 2 mio).

The universities and research institutions based here make good use of it as a source and inspiration for study and schools raise awareness of environmental issues and sustainability by introducing groups of children to the area.

But “education” is also, very importantly, an informal process – we absorb, think about and learn from the things we experience in everyday life.

The Lobau is an accessible “everyday” experience for many thousands of visitors who come for a multitude of reasons, for exercise and sport, to walk the dog, meet with friends, hug trees, take photos, look for flowers, get the children away from the computer and into the fresh air... the list is endless.

The sight of a field of barley waving in the wind and dotted with blue cornflowers, white chamomile and red poppies or a flowery wayside buzzing with life is exciting, especially for children who notice the smallest of things. These are lasting impressions that can positively influence our wellbeing and feelings of optimism.

Unspoiled waysides, where the flowering plants are allowed to complete their life cycles and reseed in a natural way, provide a simple showcase for the rich diversity of plant and animal species in the various habitats passed along the way. In addition they can be enjoyed without venturing deeper into the protected zones.

The care of the wayside flora and fauna should, in my view, be carefully considered and included in the overall concept of Lobau management.

Beautiful things we are familiar with and enjoy are assimilated, seem “right” and are valued. We see what is possible– it gets us thinking, gives a positive example that helps to counteract the bad news and pessimism we face on a regular basis about the environmental crisis. This also helps us to evaluate other situations and consider alternative solutions with a dose of optimism that is essential for us to think constructively about the future.

This is a vital learning process that begins by protecting those parts of our natural environment that are still unspoiled, making them accessible to the general public and providing information in strategic places that helps generate interest, deepen understanding of what can be found there and how to treat our environment respectfully.

Retaining and better integrating the existing examples of organic arable farming adds another important dimension to this experience as the Agri-Natur report makes clear.

Technical response to questions from the National Park Administration by Team TBK.

7.10.2021

Team TBK around Harald Kutzenberger is the contractor for ecological planning.

On the part of the administration of the National Park, concrete questions with special relevance for a joint assessment of the project results from the point of view of the NP Society Danube Floodplain were compiled on 5.6.2021 and answered by Team TBK on 7.10.2021:

Which species and habitat types are dependent on arable farming?

Central European cultural landscapes have been characterized to a high degree by arable farming since the Neolithic period. Many plant and animal species have adapted their habitat requirements to human land use expansion.

*As habitat types, fields are describable by the form of use with annual crops and associated regular disturbances. These disturbances are a prerequisite for the survival of many open-soil species of dynamic habitats and are not present in this form in meadows. The Rote Liste gefährdeter Biotoptypen Österreichs (Umweltbundesamt Hrsg. 2005: Rote Liste gefährdeter Biotoptypen Österreichs: Äcker, Ackerraine, Weingärten und Ruderalfluren, Vienna 286 p.) identifies a number of different arable biotopes. Essential for the evaluation is the distinction between intensively and extensively managed fields. The BT Intensively managed field is characterized as follows: "These are species-poor stands dominated by herbicide-resistant companion plants. Species numbers are particularly reduced in intensive root crops..." (ibid. p. 63). Within the extensively managed fields, several biotope types are summarized and these are generally characterized as follows: "Extensive management is understood to mean agricultural production with low use of machinery, fertilizers and biocides, i.e. a mode of operation that is economical in terms of input goods. Extensive use need not necessarily correspond to traditional management." (ibid. p. 64). Note here that the organic fields in the Lobau have been cultivated for several decades free of biocides and chemical fertilizers, and for years no compost applications have been required because the soil health is very high due to crop rotations and farm experience. The areas are therefore to be classified as extensive. The BT (biotope type) "Species-rich field on an average site" corresponds to the situation of the organic fields in the Lobau: many of the characteristic species were detected during the monitoring, including rare characteristic species from the group of indigenous weed species such as field stonecrop (*Buglossoides arvensis*) or gold-of-pleasure (*Camelina microcarpa*). This biotope type is assessed as endangered in the Red List of endangered habitat types in the Pannonian region in the criterion "rarity", and as severely endangered to endangered in the criteria "loss of area" and "loss of quality". Therefore, without addressing the soil biological value of long-standing organic production practices, extensive fields are classified as "severely endangered" overall in the Pannonian region. Therefore, Lobau's organic croplands themselves represent a high-value conservation asset in terms of habitat protection. The sizes and shapes of the organic fields in the Lobau are very heterogeneous and range from one to 28 hectares.*

In scientific terms, limitations of species occurrences can rarely be restricted to cropland because the evolutionary origin of nearly all present-day species extends far beyond the period of human cropland activity. Therefore, the scientifically neutral and more accurate term "open land species" is used in this paper. Depending on the environment, the respective habitat mosaic is used. On pages 92ff. (TBK 2021), the corresponding habitat requirements are

presented for the species studied. This is clearly evident for ground-based invertebrate species such as ground beetles.

Which of these species are typical species of the riverine landscape?

Within the riverine landscape, a distinction must be made between aquatic, semi-aquatic and terrestrial species. In river ecology, the analysis of river ecosystems usually focuses on the truly aquatic fish, insect, crustacean and mollusk species. Lateral connectivity regrettably receives little attention. Here, numerous open-land species are represented on shallow banks and impinging slopes, and may also occur on croplands. Certain ground beetles, such as the southern swift (*Harpalus albanicus*) or the sand swift (*Harpalus calceatus*), show foci of habitat use in sandy fields, fallows, and ruderal areas as eurytopic ground beetle species of xerotopic open landscapes. These are commonly found along banks in natural river systems. The same is true for several ground beetle species of the genera *Notiophilus* and *Ophonus*. Within the diverse wild bee fauna of the area, numerous ground-nesting beetles, such as those of the species-rich genera *Andrena*, *Lasioglossum*, and *Halictus*, find comparable habitats on banks and in fields.

Do these species actually require arable management at the current scale and intensity? Or are these species of open land and its marginal areas? Do the species mentioned require large arable areas or are marginal structures or strips operated as fallow, sufficient?

Open land species do not require arable management, but in the absence of other factors such as natural stream dynamics, they can cope with it and survive in this environment. Large areas of cropland present obstacles for numerous species. A specific situation in the Lobau is represented by the extraordinarily diverse edge structures, which are also an essential prerequisite for the species-rich biocoenosis. These field corridors also form a culturally and historically unique situation in Austria. A supplementation by field divisions involving a differentiated network of inner edge zones with permanent elements can substantially promote open land species. At the same time, a relevant impoverishment of the species community is foreseeable when such structures are abandoned because these species – in contrast to forest species – have no alternative. The current extent of arable land is in the range of minimal areas from the population dynamics point of view. Any further restriction increases the risk of extinction of further species occurrences in the national park. The endangered field hamster (*Cricetus cricetus*) and the endangered or strongly declining species of turtle dove (*Streptopelia turtur*), red-backed shrike (*Lanius collurio*), corn bunting (*Emberiza calandra*) and whitethroat (*Sylvia communis*) are examples of this. The endangered species lapwing (*Vanellus vanellus*), skylark (*Alauda arvensis*) and barred warbler (*Sylvia nisora*), which are no longer detectable in the Lobau, shows the consequences of the previous reductions of open land areas in the Danube Floodplain National Park.

Which of these species or habitat types can be preserved only in the national park? Are there alternatives, e.g. farmland in the national park foothills?

Note that none of the species recorded during the monitoring studies can be conserved only in the Danube Floodplains National Park. This applies equally to all other species because even large protected areas can only represent small pieces of the puzzle in the biogeographical spatial structure of the continental region. Note also that there are no alternatives in the National Park foreland for the specific occurrences of the endangered open land species.

What is the minimum ongoing intervention required to maintain arable open sites?

The framework conditions are partly set by the strict rules for organic farming, so that chemical fertilizers and biocides are kept out of the ecosystem. Here, through many years of activity, a pronounced soil health is evident. The already practiced minimization of water withdrawal for

supplementary sprinkling of selected crops during dry periods in spring also helps to minimize interventions. Essential from an ecological point of view is a significant improvement of the structural endowment by increasing high-quality edge zones within the croplands. This mosaic of small rough pastures, linear structural elements, single trees, single shrubs, ruderal flora, pollarded willows, rows of fruit trees and tall herbaceous vegetation underlines the current deficiency of habitats in the Danube Floodplain National Park. This also pertains to the associated species such as the Red-backed Shrike (*Lanius collurio*), whose populations have declined sharply in recent decades despite an increase in protection status, or to the Barred Warbler (*Sylvia nisoria*), which is currently even extinct in the National Park. Incorporating biodiversity-promoting organic farming represents an effective model for integrated cultural landscape protection for these small portions of land – without impairing one of the main conservation goals in floodplain and process protection.

Is there an ecological added value of the arable areas compared to the meadow types and succession areas that would be possible in the case of a transfer to meadow areas?

Each habitat type has a specific community of species. Meadows and fields are habitats that, in our climatic area, have both been created solely by agricultural activity. Thus, both habitat types are equally elements of cultural landscapes and not of a process-oriented wilderness concept. This makes them elements of a conservation-oriented protected area management. In the course of the discussion with scientists during the international, interdisciplinary expert workshops, it was stated that the diversity of sites represents a significant ecological added value in the Lobau. The species community of the meadows and hotlands has been brought into a high-quality condition through many years of management with great personnel and financial effort. This also includes numerous sites on former arable land. The organic croplands represent independent habitats with independent species communities. The unique situation in the Lobau shows the individual fields as cultural landscape archives of the river landscape with a special edge line structure (TBK 2021: p. 37). Both the long length of the edge zones, which have been preserved over centuries, and the field forms themselves represent high cultural-historical values, which, if abandoned, only have long-term regeneration potential.

What are the adverse consequences of arable farming, i.e. what improvements in other protected assets could be achieved by abandoning arable farming?

In the Danube Floodplain National Park, four "types of use" can be identified in a simplified representation: water bodies, forest, meadows and arable land. By far the largest share is taken up by forests, in addition to the watercourse areas of the Danube and the preserved tributaries. Meadow habitats, including hotlands, are mainly found in the Lobau. Arable land, with 1.77 percent of the national park area, takes up an infinitesimally small share of the approximately 9600 hectares. In precise overviews, the tables on the zoning proposal in the chapter "Acquisition of local empirical knowledge of the district foresters" of the final report (TBK 2021: p. 43ff.) show the shares of the habitat categories for the Viennese part of the Lobau (*ibid.*, p. 46), the Lower Austrian part of the Lobau (*ibid.*, p. 47) and the Lower Austrian part of the Viennese administrative district Mannswörth (*ibid.*, p. 48). Overviews are presented on the subsequent maps and the summary table (TBK 2021: p. 51).

These ratios underscore the low influence of organic croplands on the other protected assets. The detailed analysis of the habitat requirements of the more than 500 animal and plant species recorded on open land during monitoring enables a precise forecast based on the indicator groups ground beetles, wild bees, butterflies, birds and arable plants. In the chapter "Biodiversity and Environmental Research" (TBK 2021: p. 91ff.), the advantages and disadvantages of abandoning organic farming and the perspectives through a move towards

biodiversity-promoting organic farming are elaborated on a species-specific basis. For more than 300 species, a negative population development is to be expected if organic fields and their marginal structures are abandoned.

Are there other (so far unconsidered) factors in the environment of arable farming? (Irrigation, access roads, groundwater, visitors, ...)

The operational aspects in connection with organic arable farming were elaborated in an economic planning and an agro-economic model for the ecological implementation plan LUP AT (TBK 2021: p 126ff.). Therein, the aspects of irrigation were also worked out (TBK 2021: p 132): "Two crops (green pea, table potato) are irrigated as needed. In reality, the amount of irrigation is subject to annual fluctuations depending on the weather conditions. On the farm, an average of 30 mm (2 x 15 mm) is used for green pea and an average of 75 mm (3 x 25 mm) for potato. The economic costs were determined in a contribution margin calculation separately for the two different techniques (piping and drum system) using documents from the Chamber of Agriculture of Lower Austria. The value is below the large-scale regional average due to the specific small-scale climatic conditions." Due to these small-scale and short irrigation periods, combined with comparatively low water withdrawals, no irrigation-related changes are discernible for groundwater levels. Moreover, the above-mentioned mineral fertilizer and biocide-free cultivation means no qualitative impairments of the groundwater by the local organic farming.

The agricultural trail network of the Upper Lobau is crucial for public access. Currently, an estimated two million people visit the Danube Floodplain National Park annually. By far the largest share of these visitors seek the cleared islands of organic farmland in the upper Lobau. This represents a challenge for cultivation because, among other considerations, visitor safety is an issue. Individual aspects are presented in the chapter "Summary comparison of the scenarios – an AgriNatur strategy" in the final report (TBK 2021: p 135ff.).

Statement on the AgriNatur Strategy Department (Kutzenberger, H.)

13.01.2022

Harald Kutzenberger is a landscape planner, university lecturer and coordinator of the expert group "Sustainable Development and Public Participation" in the "International Association for Danube Research" and the "DIAS – Danube Region Invasive Alien Species Network".

Harald Kutzenberger is a landscape planner, university lecturer and coordinator of the expert group "Sustainable Development and Public Participation" in the "International Association for Danube Research" and the "DIAS – Danube Region Invasive Alien Species Network".

After extensive discussions, the report on the Local Implementation Plan LUP AT was presented in the fall of 2021 as a basis for professional discussion and political decision-making. The LUP AT project team deliberately did not take a partisan role for one of the two scenarios in this process because we see our task in an unbiased, differentiated scientific preparation of the impressive data material from the species group-specific monitoring. We considered it essential that inconspicuous species groups such as ground beetles and wild bees were included for the first time, which is scientifically challenging due to their abundance of species and specific requirements.

We believe it is essential that future decisions on landscape management in and outside protected areas more concretely incorporate precisely this kind of knowledge. In doing so, we must also be aware that species extinctions also occur in protected areas if we shift the focus in our concepts. Lapwing, Corn Bunting and Barred Warbler are just a few examples of highly endangered character species of the structured cultural landscape that have already abandoned the Lobau since the establishment of the Danube Floodplains National Park and the related transformations. The argumentation that suitable habitats for open land species are available in the agricultural foreland is by no means tenable. The arable land of the Lobau represents a highly endangered biotope type; in its current state it already constitutes a high-ranking conservation asset. The landforms represent an archive of the river landscape history and are unique in their structure. Significant improvements in species protection can be achieved through the planned enhancement with customized, permanent structural elements. In contrast, the field arrangement in the foreland is strictly geometric, larger-scaled, and virtually devoid of permanent edge structures. Beyond small relict occurrences, none of these species could gain a foothold in this area. When assessing the environmental impact of infrastructure projects, these species can be decisive in the approval of a species protection permit. In small-scale development projects, potential negative impacts must be assessed for each field hamster and sand lizard. . Why shouldn't this also be valid for larger protected areas? From an expert's point of view, species protection must clearly be implemented across the board and independent of protected area boundaries. In addition, there is a special contractual reporting obligation in European protected areas.

We are currently experiencing an unprecedented increase in human pressure on landscapes. We usually ignore the central cause behind this because it is difficult to bear: after tens of thousands of generations of humans, we have seen a fivefold increase in the human population since 1900, which is currently still increasing by more than 50 million annually. This phenomenon explains the desire for wilderness and human-free zones, whereby national parks are important bulwarks within protected area concepts to provide other species with a chance to survive and regenerate. Two nature conservation concepts have emerged: The first is a segregation of protection and use through spatial separation, which led to a network of protected areas as a result of the 1st European Year of Nature Conservation in 1970

"Protection of Nature in Protected Areas". The second stems from the 2nd European Year of Nature Conservation 1995 "Nature Conservation Everywhere". It emphasized the awareness of Europe's mature cultural landscapes: this means, on the one hand, that no urban or agricultural areas are abandoned as "National Sacrifice Areas", and on the other hand, that it is precisely the interlocking of natural and semi-natural cultural elements that has enabled the highest biodiversity. From a professional perspective, it is clear that coordinating the two concepts in individual cases best serves "nature." Today, the inclusion of soil, water and climate protection is another cornerstone in any integrated approach.

The upcoming decision for one of the two scenarios in the LUP AT implementation plan harbours a great opportunity: we urgently need encouraging examples of how to take responsibility in a large-scale changing environment. Retreating into familiar, sectoral thinking can only address a few issues. Comparing the two scenarios clearly shows that applying the existing national park strategy to 98.23 percent of the protected area has proven valuable. However, now also including the last 1.77 percent of organic fields – independent of national economic responsibility – will achieve no more added value for process protection or riparian forest species. In fact it would entail a relevant impoverishment of biodiversity even in the national park: centuries-old edge zones would disappear along with their faunay. The habitat structure analysis here demonstrated that these species have made the transition from the open ground habitat along the wild river to the edge zones of the fields and – like the sand lizard – can still be found there today.

For us, the results in the synopsis are surprisingly clear and, based on the facts, Scenario B with the opportunity for a model project involving biodiversity-promoting organic farming is a valuable addition to, rather than a deviation from, the national park objectives. The species protection consequence of the alternative approach is significant habitat degradation for far more than 300 species in a national park. The resulting necessary compensatory measures such as species-specific resettlement would be uncharted territory in terms of procedural law and public relations.

AGRINATUR: (Lötsch, B.)

12.12.2020

Bernd Lötsch is a biologist, environmental activist and pioneer of the Donau-Auen National Park.

The original task of "AgriNatur" seemed to be to check the "nature compatibility" of the decades-old agricultural business in the Viennese floodplain protected area Lobau. Accordingly, the project goal is to achieve near-natural arable farming for the management zone on approx. 7% of the current national park. This involves a biocenotic interweaving with the strict nature zones, renouncing chemicals, adapted the use of machinery, as well as enabling more than one million(!) recreation-seeking visitors per year to experience nature.

In the meantime, however, it turns out that the project results are becoming less important for the protected area issue than for agricultural science itself (see below).

The fact that we are dealing with part of a national park part is the very justification for the special motivation for the deepened ecologization and biodiversity research, while at the same time representing an important experimental field and model for a sustainable nature conditioning of the agricultural landscape in lowlands. A favorable aspect of the funded project is that game damage is also acceptable, because that actually benefits the wildlife of the national park.

Clearly, arable farming is not a natural prerequisite for a lowland floodplain, and this is all the more true for a national park, which defines itself as a "renunciation of use by a cultural nation in favor of nature". The most logical option would be an extensive use of meadows and pastures, an approach that in the past kept the desired clearings open in such floodplain areas. The retention of communal arable land owned by the City of Vienna (already converted to "organic" years ago with considerable effort and experience gain) on a few percent of the national park area also offers opportunities: The agreed-upon practice of poison-free cultivation with organic soil husbandry promotes the accompanying biodiversity and enables considering the landscape by appropriately adapted farm machinery.

Thus, the project, which was originally focused on a protected area, could become a model case for nature-conform lowland management – with public subsidies such as EU and municipal funds, removing any risks for private enterprises. This would demonstrate the viability of a departure from the monotony of agro-industrial tractor steppes – all this tailored to landscape and wildlife management up to and including "designed hunting grounds" for legitimate hunting interests.

The importance of organic farming for nature conservation from an ecosystem theory perspective. (Maurer, L.)

29.5.2020

Ludwig Maurer is biologist and one of the pioneers of organic farming in Austria.

Terrestrial ecosystems can be divided into two groups:

- Natural landscapes
- Cultural landscapes

Natural landscapes are those in which succession can take place without active anthropogenic influence, i.e. dynamic systems whose dynamics are determined by endogenous factors such as the genetic information contained in the organisms and exogenous site factors such as climate. The organisms are interconnected by food chains (cycling of substances). A longer-term state of equilibrium in this process is defined by the species diversity and population density at that time and is referred to as the climax stage. Due to mutations, crossbreeding and selection as well as changes in exogenous factors, climax stages are also not stable with regard to geological time scales, but build up new patterns of order due to the changed framework conditions.

Cultural landscapes are habitats developed and shaped by humans from the natural landscape, whose appearance and functionality depend on the type and intensity of use. The strategies of use can be based on the system processes in natural landscapes or deviate strongly from them. However, in contrast to natural landscapes, work is necessary for all strategies of use in order to maintain the respective system of use. The greater the extent to which the laws of natural landscapes are applied as a utilization strategy, the more the designation "ecologically oriented" is permissible.

In the agricultural sector, organic farming is an ecologically oriented utilization strategy for the purpose of producing food and biogenic raw materials. Organic farming enables the establishment of the highest possible biodiversity under production conditions, both in the landscape and in the soil, even though in organic farming succession must be prevented by labor input. This is the contribution of organic farming to "nature conservation" in cultivated agricultural landscapes.

In principle, from an ecosystem theory point of view the term nature conservation should be replaced by the terms "quantitative natural landscape conservation (system protection)" and "ecologically oriented cultural landscape design (working methods)". Nonetheless, it is retained here as a working title, although the term nature (except perhaps as a collective term for non-built-up areas in common usage) is not defined in any way. Moreover, the term protection is often misleading, especially when it comes to the protection of individual animal or plant species: If in natural landscapes there is no system protection and in cultural landscapes there is no ecologically oriented use, then the protection of individual animal and plant species will be of little use.

Organically managed cultivated landscape areas are the ideal transition zone from natural landscapes (e.g. core zones of national parks) to those cultivated landscapes which contain only a few elements of natural landscapes (densely built-up parts of the landscape, industrial areas, traffic routes, etc.) This is the contribution of organic farming to "nature conservation" for natural landscapes in the sense of minimizing the influence (exogenous factors) of cultivated landscapes on natural landscapes.

What can we learn from the AgriNatur process? (Pintar, M.)

24.1.2022

Manfred Pintar is a zoologist and active in the Austrian Orchid Conservation Network (ÖON)

I have observed and followed with interest the entire AgriNatur process – albeit patchily. Since I have spent my entire professional life researching the characteristics and changes of the Lobau, I may remark that the new monitoring has created such a rich data base beyond that available for many other protected areas. This should be a relevant decision-making aid for us! For important species groups, the state of knowledge has been fundamentally improved, so that we can actually work on the future of the area on a professional basis. Based on this, the lines of argumentation for both scenarios are very plausible and comprehensible to me. For this reason, I will largely refrain from repeating what has already been explained in detail in the comparison of the two scenarios. However, I would like to add a few thoughts, because much is at stake.

As a zoologist and for 10 years "hobbyist" of orchids and frequent visitor of the area in question, I can of course appreciate both scenarios. It will certainly not be an easy decision for the persons and institutions involved. The big advantage of the comprehensive data situation is that it should enable arguing the final decision well and comprehensibly! This has not always been the case in similar (decision) situations, which I and others can confirm from long, relevant professional experience! I can, however, let the cat out of the bag right at the onset and, after careful consideration, prefer scenario B.

What is my rationale?

Much can be said for the targeted and well-founded promotion of certain, often highly endangered open land species – be it ground beetles, wild bees, butterflies, open land plants or birds – in such a densely forested country as Austria, even in a Danube Floodplain National Park. It is precisely regarding these species that we have the greatest and continuing habitat losses, and still too few answers in species protection matters. Fortunately, some improvements have been made for sensitive forest species – especially in the Danube Floodplains National Park. To me, the possibility and feasibility of such efforts emerge plausibly from the final report and may also be verified there. The situation of the agricultural areas especially in the northern bordering area of the Danube Floodplains National Park is not encouraging, and the climate change will exacerbate this trend. This calls all the more for useful and comprehensible

examples of a biodiversity-promoting agriculture, which is particularly valid in the vicinity of a city of millions!

To me, this proximity to the city also seems to be another point that gives variant B a minor advantage from the point of view of the national park, along with a clear advantage in the overall view. Last but not least, as a "practicing grandfather", I can identify with both of the above-mentioned advantages of variant B: I can roam with my four grandchildren through a varied landscape and at the same time can contrast the monotonous agriculture of the Marchfeld with the comparatively small-scale and diverse agricultural production areas of the Lobau. In many cases, historically evolved field shapes can be clearly juxtaposed with the strictly geometric fields of the Marchfeld! This is all supported by the manifold scientific knowledge gained in scenario B, knowledge stemming from both the agricultural and the environmental educational sector! Another important issue is the conservation and propagation of edge zones. My main research area was the amphibians (for which a broad offer of ecotones plays a crucial role!), but I have also gained considerable insight into the biology of reptiles. I therefore know that particularly for the fence lizard, which is already very much in decline, these marginal strips are indispensable for maintaining a functioning population! Of course, this also applies to their predator, the smooth snake.

Particularly endangered open land species such as the red-backed shrike, barred warbler, and Argus blue butterfly, which require a combination of groves in conjunction with vegetation-free areas and open ground, can be helped concretely and effectively with the variant I favor. Such conditions are abundantly present in structured farmland. It has been shown, and I would affirm, that these species benefit from the habitat structures targeted in Scenario B as much as they do from an expansion of meadows and hotlands. This mosaic of suitable habitat structures is not always available in an optimal form even in hotlands and meadows, which is why an expansion seems quite plausible to me. This is all the more valid where the surrounding countryside cannot offer the favorable coincidence of habitats necessary for these species! If species like the Corn Bunting or the Barred Warbler are to return to Vienna, then thanks to the added value of such a structuring of the floodplain agriculture in addition to the meadow habitats.

As an opportunity – one that is not explicitly addressed in the AgriNatur process – I also see possible solutions for the currently not very satisfactory hydrological situation in the Lobau.

Of course, it is clear to me that the advantages for variant B, which I have given as examples (in addition to the other advantages described in detail in the final report), in no way discriminate against variant A. Nonetheless, as is well known, even in evolution a minimal advantage is often the decisive one! This perspective also motivates my recommendation for scenario B!

Insights: What contributes to the emergence of beneficial solutions?



The work in the AgriNatur project has benefited positively from the following factors, among others:

Interdisciplinary thinking, discussing and doing: linking research, practice and educational measures is a key success factor. This approach enables creating and sustainably transferring well-founded findings into daily practice. Similar collaborations between different institutions as in AgriNatur also lend themselves to other problems, e.g. recreation, water or space scarcity.

Cooperation across borders: Especially in the case of complex tasks such as in AgriNatur, international cooperation makes sense. Apart from the additional funding, such cooperation helps to bundle knowledge and experience across federal borders and sharpen the focus. In addition, cooperation often opens up new horizons because other positions are included.

Focus on a common thread: Focusing on a common challenge, which the participants are reminded of when necessary, makes it possible to deal with complexity. It is also essential that the results are shared and that communication is target-oriented and comprehensible. It is important not to lose sight of the benchmark and to concentrate on areas that can actually be shaped. For example, in AgriNatur, topics such as additional water allocation for the Danube floodplains, more dynamization or visitor guidance were subjects of discussion, but they were clearly defined as overriding goals.

Take into account what already exists. In development projects, that which remains is often at least as important as what is newly created. Accordingly, existing frameworks – goals and standards – should be considered and form the point of departure.

Positive "side effects". If project results contribute to the social understanding of natural areas, agriculture and nature and underline their social significance, this is helpful in a wide range of social issues.

Conclusion: Beneficial solutions on the topic

- show tangible perspectives for practical feasibility,
- have the lowest possible additional costs or reduce yields the least,
- involve as little additional effort as possible, and
- do not create a "botanical Disneyland".



Create awareness

Visitors' areas "Fields of Diversity" in the Neue Lobau, Vienna

Landscape and characteristics of the cultural landscape reflect about 200 years of agricultural and forestry use. Examples include the emergency supply of the Viennese population by the War Invalids Fund and for the military uses k.u.k. Dragoon Regiment No.3, Hussar Regiment No.14, old barracks Groß Enzersdorf 1798-1915, Napoleon's headquarters 1809 and strategic oil reserves for the then Ostmark of Nazi Germany.

The establishment of pasture and fodder areas for at least 200 horses (equestrian regiment) and 300 cattle (War Invalids Fund) was the decisive background for the landscape development of the Upper Lobau. Furthermore, the regulation of the Danube with the associated change in the groundwater regime and altered flooding events was decisive for the emergence of today's landscape.

Today, the Upper Lobau is also a site for the implementation of ecologically oriented utilization strategies such as organic farming, ecologically oriented forestry care and material cycle management within the framework of biowaste bin composting (one of the largest composting sites in Europe). It is one of the most popular recreational areas for Vienna residents. Preserving its landscape structure and the characteristics of this cultural landscape continue to require sustainable and ecologically oriented agricultural and forestry management.

In order to manifest the ecological significance and development of this cultural landscape and to create new local recreation destinations, new "Fields of Diversity" rest areas and connecting trails were designed adjacent to the national park area. "Wide view", „Field view“ and "Bird's nest" near the national park entrance Saltenstraße and "Insects oasis" near the headquarters of Bio Forschung Austria provide infotainment about local biodiversity and cultural landscape development.



The many Transitions of our Lobau

A BEAUTIFUL LANDSCAPE IN THE COURSE OF HISTORY

In the area of the Upper Lobau, after almost a thousand kilometers of flow, the Danube opens up into a mighty river valley. The *Erdinger Becken*, *Machland* and *Tullner Feld* already show large expansions, but these have almost disappeared today due to intensive land use. The Lobau allows you to experience the deep and higher terrain levels of the floodplain with hotlands and oxbow lakes. The surrounding agricultural area, including old villages such as *Kagran*, *Aspern*, and *EBling*, lies on a somewhat older level of the floodplain, only a few meters higher. This was enough to ensure that these villages were only rarely affected by floods.



seit
1912

since
1980

1939

1912–
1914

1870

1798–
1915

–1800

~1850

1809

Agricultural Use of the Lobau

1800–1809

1810–1819

1820–1829

1830–1839

1840–1849

1850–1859

1860–1869

1870–1879

1880–1889

1890–1899

1900–1909

1910–1919

1920–1929

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1940–1949

1950–1959

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2110–2119

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2140–2149

2150–2159

2160–2169

2170–2179

2180–2189

2190–2199

2200–2209

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2240–2249

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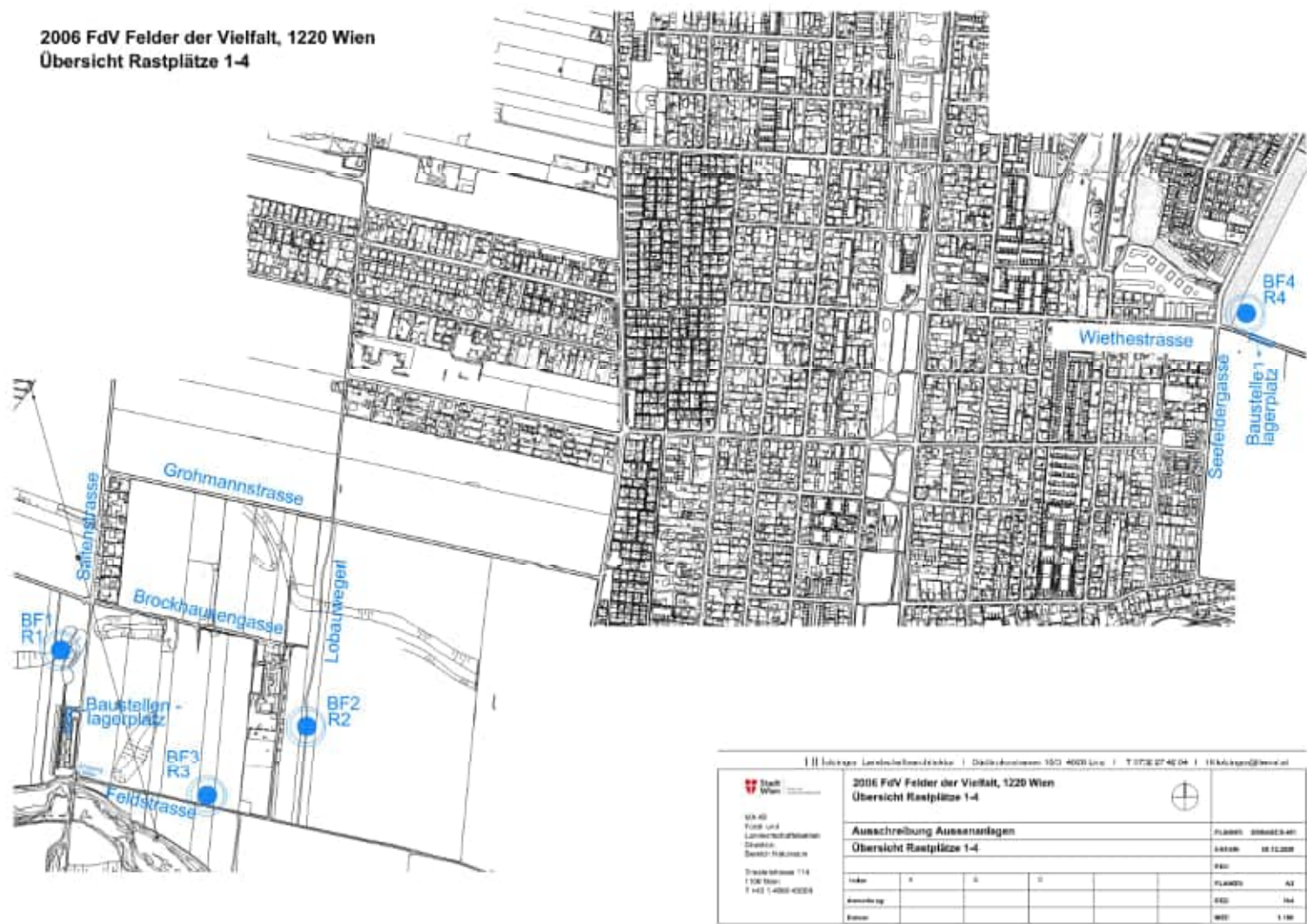
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**2006 FdV Felder der Vielfalt, 1220 Wien
Übersicht Rastplätze 1-4**



Construction overview plan for rest areas (R) and construction fields (BF)1-4

The transition area from national park to dense city is visible in the construction overview plan. The figure "Construction overview plan" shows the location of the new resting areas "Fields of Diversity":

- R1 "Field view", with information about birds inhabiting trees and bushes,
- R2 "Wide view", about changes in the landscape based on the history of surveying,
- R3 "Bird's nest", with a focus on arable land as a habitat and
- R4 "Insects oasis", which treats varied field margins, including at night.

For comprehensive public information about the EU project, a special exhibition about the project AgriNatur AT-HU was shown during the visitor season 2021 in the National Park House Vienna-Lobau. The exhibition panels were moved to the Lobau National Park Forestry Administration in Groß-Enzersdorf in March 2022 and are depicted on the following pages.

All information panels are available online:

Information panels on the "Fields of Diversity": 8 double panels in German and English.

Mobile exhibition about AgriNatur AT-HU: panels 1-13 in English and German, 1-3 Hungarian.

<https://www.bioforschung.at/projects/agrinatur-at-hu-biodiversitaet-durch-anthropogene-nutzung-fuer-naturschutzgebiete/>

AGRINATUR AT-HU

PRESERVING QUALITY OF LIFE AND THE ENVIRONMENT

Biodiversity by anthropogenic management for nature protection areas (EN)
Biodiversität durch anthropogene Nutzung für Naturschutzgebiete (AT)
Biodiverzitás a természetvédelmi területek antropogén hasznosítása révén (HU)

The cross-border project, AgriNatur AT-HU, investigates the conservation significance of biological arable land for species protection and biodiversity. The research is being conducted specifically in the Viennese area of the Danube National Park (Austria) and in the Natura 2000 protected area, Moson Plain (Hungary). Both areas lie in the lowland alluvial of the Danube, where riparian forests exist in a patchwork with bodies of water, meadows and cropland. Project-relevant research is used to determine and optimize the positive effects of organic farming on biodiversity, resilience and protected species. This includes monitoring agrobiodiversity, collecting the empirical knowledge of those responsible locally, and organic arable farming field trials.

Within the project, project partners and strategic partners, as well as experts and those ultimately responsible, collaborate to develop AgriNatur strategies, which ensure that organic arable farming makes a positive impact on conservation. Important environmental education measures in the project include the design of new local recreation areas that make the positive synergies between nature conservation and agriculture tangible. Educational measures are being implemented in the New Lobau in Vienna, and in the urban area of Mosonmagyaróvár in Hungary.

PROJECT PARTNERS: Municipal Department 49 - Forestry Office and Urban Agriculture (MA 49, Lead Partner), Bio Forschung Austria, Széchenyi István University, Faculty of Agriculture and Food Sciences

STRATEGIC PARTNERS: Mosonmagyaróvár Város Önkormányzata, Municipal Department 22 - Environmental Protection (MA 22), Neusiedler See-Seewinkel National Park, Metropolitan Area Management Vienna - Lower Austria, Szigetközi Természetvédelmi Egyesület, The Department of Rural Development Office of Lower Austrian Provincial Government, Fertő-Hanság Nemzeti Park

PROJECT DURATION: January 2019 to June 2022 (due to extension)

FINANCING: European Regional Development Fund (ERDF), Program: INTERREG V-A Austria - Hungary, SO2.2 NATURE PROTECTION Improving the ecological stability and resilience of landscape and ecosystems

FOR FURTHER INFORMATION, PLEASE VISIT:
<https://www.interreg-austria-hungary.eu/agrinaturathu/>

Overview of the Project Areas in Austria and Hungary

Photo Credits: TerraMetrics, Map Data: 2018, Google Maps

Stadt Wien **SZECHENYI EGYETEM** **bioforschung austria**

Interreg Austria-Hungary
 European Union - European Regional Development Fund
AgriNatur AT-HU

Project Description: Hungary

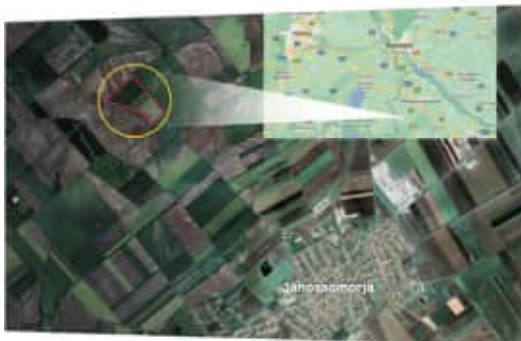
SZÉCHENYI ISTVÁN UNIVERSITY (SZE)

Project Partner in Hungary

Project Activities in Hungary

In Hungary, strategy and implementation plans are being developed together with all the project partners to support and promote biodiversity in the nature reserve of Hungary's Moson Plains.

Agriculture and the cultivation of land are particularly important for the area. The project, therefore, primarily revolves around investigating methods with which to best maintain and manage the land in the protected area to promote biodiversity.



Research, Trials and the Local Implementation Plan

Together with the Austrian project partners and experts from different disciplines, the most important goals in the Hungarian area were discussed, and how these goals can be met. The project additionally investigates which animal and plant species occur in the area, which habitats exist, and the effect of land use on species and habitats. Cultivation trials with traditional and very old plant varieties are also being carried out to compare what is best for the protected area and for promoting biodiversity.

The results of these discussions, research and trials will be used to develop the Local Implementation Plan for maintaining the protected area and promoting biodiversity.

The Creation of Visitor Areas in Mosonmagyaróvár:

In addition to research and trials, two nature trails will be created in Mosonmagyaróvár, a town directly beside the protected area. These trails will explain the project, the importance of the landscape, the animals, the plants, and the ecological agriculture in the protected area.



COMMUNICATIONS

NEWSLETTERS IN HUNGARIAN:
<https://food.sze.hu/agronatur-47-49>

Széchenyi István, University
Faculty of Agriculture and Food Science
Project contact: Vár András
var.andras@sze.hu, uniszze.hu



Project Description: Austria

CITY OF VIENNA FORESTRY OFFICE AND URBAN AGRICULTURE BIO FORSCHUNG AUSTRIA

Project Partners in Austria



Project Activities in Austria

In the Vienna area of the Natura 2000 Danube Floodplains, research is being carried out on the positive effects of organic agriculture on biodiversity, resilience and protected species. In 5 bilateral expert workshops, experts on research, nature conservation, agriculture, and administration share their knowledge, basic data and monitoring results. Together, they are developing strategies for biodiversity-promoting agriculture, which will have an effect in the project area and in other lowland protected areas. Another aim of the project is to raise people's awareness of the biodiversity of arable land.

Experience, Monitoring, and the Local Implementation Plan

For an up-to-date picture of biodiversity, the species groups wild bees, butterflies, ground beetles, and wild field herbs were recorded from 2019 to 2020, and birds until 2021, on organic farmland in the Lobau. At the same time, locally responsible foresters have drawn up a proposal for converting managed forest areas into nature zones. The aim is to achieve the IUCN (International Union for Conservation of Nature) target of a 70% natural zone in the Vienna National Park area. The results form the basis of the "Local Implementation Plan for the Viennese part of the Danube Floodplain National Park", which provides a foundation for decisions on the future development of these national park areas.



New Visitor Areas in the New Lobau

An agroecological nature trail is being created through the arable land of the "New Lobau", in the foreground of the National Park. From fall 2021, four "Fields of Diversity" rest areas will invite visitors to linger and will provide information on biodiversity in organic agriculture ("Life in the Field", "Insect and Bee Pasture") and the history of the Lobau landscape ("A Beautiful Landscape in the Course of History").

Get Involved!

Themed walks make it possible to experience "biodiversity in organic farming" up close. "A Bug's Life in the Field" is the theme of a creative competition for school classes in Danube City and also a special exhibition in 2023 at the Vienna-lobAU National Park House. Online information about the activities and results from the projects in Austria and Hungary can be found in newsletters and on websites.

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WWW.MA48.WIEN.AT



Project Activities



“The AgriNatur project takes into account the responsibility of the National Park for the development of ecological, environmentally sound and biodiversity promoting arable farming. The lessons learned, and steps for implementation, are guideposts for diversity promoting management. The positive effects on animal food chains and opportunities for local urban supply will form the basis of the allocation of the National Park's outer zone: special arable land section to future habitats.”

—Wolfgang Khutter

Head of Nature Conservation & Geobiodiversity Technology
City of Vienna Environmental Protection Department

“The National Park, including the European protected area of the Danube National Park, is an especially important component of the high diversity of species and habitats in Vienna.”

There is less and less water in the Lobau. Climate changes have contributed to this drying up. Plant populations are changing. A political decision is urgently needed to preserve this protected water area! Due to its size and high biodiversity, the National Park will always remain a specially protected area in Vienna.

—Marlis Schnetz

Area Protection Activities Expert,
City of Vienna Environmental Protection Department

In three AgriNatur expert workshops and seven virtual meetings, dedicated participants have been working together from agriculture, forestry, nature conservation and other areas of expertise. Beginning with the Start-Up workshop in May 2019, expectations for the project, goals and research results were discussed, such as:

- How can agriculture contribute to biodiversity?
- Are the timings of cultivation and harvesting, the crops grown, or the presence of structures such as individual trees or hedgerows important?

For the Austria project area, the results of individual meetings trigger the preparation of a Local Implementation Plan for the Viennese part of the Danube Floodplain National Park. These provide an important basis for deciding whether arable farming should remain in the National Park in the long term or whether other solutions are better for nature conservation. One of the main objectives of the AgriNatur AT-HU project is to raise public awareness of the issue of biodiversity on agricultural land. New nature trails and open spaces ("Fields of Diversity", "AgriNatur Garden") will remain in place even after the project has been completed as they are sustainable educational activities.

Some of the events are held in cooperation with the Vienna-IohAU National Park House:

- AgriNatur AT-HU project research evening (November 3, 2020, online) with presentations and discussions about monitoring as well as two scenarios of the Local Implementation Plan for the Austria project area
- Special exhibition of the 2021 visitor season
- Themed walks
- Creative competition for elementary schools in the Donaustadt district: "A Bug's Life in the Field"



“The transfer of knowledge is an integral concern of the AgriNatur AT-HU project. If you want to make a difference in the long term, you have to start with the youngest children. In 2021, therefore, the topic of biodiversity will be brought closer to elementary school children in Vienna's 22nd district, within the framework of the Vienna-IohAU National Park House's school class competition.”

—Kim Hisek

Bo Forschung Austria



FOR FURTHER INFORMATION, PLEASE VISIT:
<https://www.interreg.at/hu/agrinaturat-hu/>
https://www.projekte.univie.ac.at/nachhaltigkeit_energie
— "Projekte aus der Förderperiode 2014-2020" — "AgriNatur AT-HU"

Project Activities

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Finding solutions together!
Therein lies huge potential! Project partners, strategic partners, experts and responsible persons are working together to answer the following questions:

- How can the use of agricultural land in the National Park be managed in the future?
 - How can organic farming be further developed?
- In this way, naturally managed areas should continue to enrich biodiversity!

—Susanne Lepusch

Project Manager, City of Vienna Forestry Office and Urban Agriculture



“

Vahand, joint efforts from across disciplines and areas of responsibility, practical knowledge and experience, scientific insights and approaches, openness, consistency and goodwill—these are the building blocks for truly future-oriented solutions. AgriNatur is leading the way.

—Alois Mützler

Moderator for Process and Communication, respectively



”

› EXPERIMENTS WITH “OLD” PLANT SPECIES › WHAT ARE ARTIFICIAL NEST BOXES GOOD FOR? ›
DISTRICT FORESTERS: CONSTANT OBSERVERS › BIODIVERSITY MONITORING › “LEADER BEETLE”
AND LITTLE VERONICA › VIRTUAL EXPERT MEETINGS › NATURE TRAILS: ECOSYSTEMS UP CLOSE!

NEWSLETTERS SHARE THE KNOWLEDGE

The progress of the project is communicated as clearly as possible. The **CONTENTS** of the newsletters provides a concise overview of the project activities at the relevant stage.



Green lark (Sylvia curruca)



Sand lizard (Lacerta agilis)



Blackbird (Sylvia atricapilla)



The Lark



Field trials in Hungary

“

Within the framework of the project's joint activities, the available research data on the natural environment of the program region will be combined with the results of ongoing experiments and the project's own research in the Natura 2000 areas.

The work of the Austro-Hungarian AgriNatur project is in full swing. The development of AgriNatur strategies is an important element. The recent period has shown that effective work can be done on both sides of the border even without face-to-face meetings.

—Vér András

Hungary Project Manager, Széchenyi István University



We live in an age in which industrial agriculture is causing biodiversity to disappear.

The aim of the AgriNatur AT-HU project is to identify new opportunities for sustainable agriculture that promote biodiversity. For this purpose, Bio Forschung Austria is surveying the current biodiversity of wild bees, butterflies, birds, ground beetles, and wild field herbs in the agriculturally used part of the Danube Floodplains/Lobau National Park.

—Katrin Fuchs

Project Manager Bio Forschung Austria

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FOR FURTHER INFORMATION, PLEASE VISIT:

<https://www.interreg.atn.eu/agriatur/hu/>

cdi.wien.at/projekte/umwelt_nachhaltigkeit_energie

— “Projekte aus der Förderperiode 2014-2020” — “AgriNatur AT-HU”

Biodiversity Monitoring



Seventeen rare weed species that are on Austria's Red List have been found in the fields of the Lobau. As part of the Agri-Natur project, we are investigating whether and how these species can be encouraged in the Lobau fields, because field weeds are not only competitors of cultivated plants, but also form an important basis for biodiversity in agricultural habitats.

— Christopher Abledinger
for Forchung Austria



Field Weed Monitoring

Since the widespread use of tractors, fertilizers and herbicides in agriculture, field weeds have become rare, but their flowers and seeds provide an important food source for many animals.

For the first time, monitoring was carried out on field weeds in the organic fields of the Lobau, where 72 distinct species were found. The cornflower (*Cyanus segetum*) and the Breckland speedwell (*Veronica praecox*) are even on Vienna's Red List!

Possible strategies for the promotion of arable weeds:

- Field strips with a reduced seed rate in fields with a low proportion of competitive root weeds
- (Rewilded) islands in fields for field birds and insects, preferably with local seeds



The goal of meadow regeneration in the conversion areas of the Lobau has largely been achieved. Species-poor areas of goldenrod have become species-rich meadow ecosystems with a remarkably high proportion of herbs. In contrast, the "untreated" goldenrod areas have remained unchanged.

— Norbert Souberer, V.I.N.C.A.
Institute for Nature Conservation Research and Ecology for the Nature
Conservation Association of Lower Austria



Monitoring of Meadow Regeneration Areas

This monitoring was carried out to assess the effectiveness of measures for converting neophyte fields on former arable fields into hay meadows. The conversion of neophyte-dominated land (with mainly goldenrod, *Solidago gigantea*) into meadows has been successful. Mowing twice is enough to prevent the goldenrod from coming up again. By contrast, the areas where goldenrod is still present today have remained stable and unchanged since 2001.

In 2000–2003, 45 hectares of meadows from goldenrod lands were developed in the Lobau by cultivating grain, and sowing a grass-rich, regional seed mixture from the Danube–March region to suppress the goldenrod. 10 years later, goldenrod coverage is mostly below even 1%, and the former arable species, which were still abundant in 2004, have disappeared.



Wild Bee Monitoring

Wild bees are important pollinators in agriculture and thus make an essential contribution to our daily diet. Due to their central role, the diversity of wild bees in the Upper Lobau area was examined in detail.

There are around 700 species of wild bees in Austria, many of which can be observed in the National Park from early spring onwards while foraging or building nests. The violet carpenter bee (*Xylocopa violacea*) is the largest wild bee species found in the area, measuring just under 3cm. The furrow bee *Lasioglossum glabriusculum* is one of the smallest bees, measuring 4–5 mm.



With 20 wild bee species, about half of the species known to Vienna occur in the study area. The high diversity of species is in large part due to the close interlinking of open and forest habitats. 80 bee species use arable land as a partial habitat, either by collecting pollen or nectar from the flowers of weeds, or by building their nests in gaps in the arable soil. It is important for wild bees that land management extensification measures are taken in the Upper Lobau.

— Esther Ockermüller
Office for Entomology & Conservation



FOR FURTHER INFORMATION ON MONITORING, PLEASE VISIT:
[HTTP://WWW.INTERREG-ETHNOLEU.ORG/NATURATOUR/](http://www.interreg-ethnoleu.org/naturatour/)
GEO.WIEN/PROJEKTE/UMWELT...NACHHALTIGKEIT...ENERGIE
— Projektschwerpunkt Förderperiode 2014–2020 — "AgriNatur AT-HU"

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• **Species-rich in the Lobau farmland:** So far more than 90 species have been identified, including some endangered species on the Red List, such as the ground beetle *Harpalus smaragdinus*.



—Bernhard Kropf
 Institut für Forschung Amerika



They are used to check and assess the quality of agricultural habitats because they react sensitively to pesticides and over-fertilization, and they are comparatively easy to detect in the field.



—Martin Strunz
of Die Forschung Austria



In addition to the waterfowl and forest bird species typical of the Danube Floodplain National Park, numerous cultivated land species also breed in the area. They occur in open areas such as hot lands, meadows and fields as well as in the edge zones. Typical and particularly common representatives are the goldfinch, yellowhammer and starling. Small-scale arable land also provides a habitat for rare species such as the common quail. The agricultural areas are used for foraging, while the edge zones provide important breeding sites for cavity-nesting birds due to the high proportion of old trees. A total of 48 breeding bird species were detected in the project area in 2020. These included strictly protected species such as the red-backed shrike (*Lanius collurio*) and the European turtle dove (*Streptopelia turtur*).



The Lohs, especially in areas of dry grassland and Heiländen, is very species-rich, and the edge zones are particularly valuable. Unfortunately, the arable land itself is not an ideal breeding ground. Extensification and strips of flowers or fallow land can provide birds with a food base and undisturbed breeding sites.

—Christina Nagel
BirdLife Austria



FOR FURTHER INFORMATION ON MONITORING, PLEASE VISIT:
<https://www.interneth2016.eu/nominaturathu/>
https://www.interneth2016.eu/nominaturathu/cbc-wish/projekt/umwelt_nachhaltigkeit_energie
 Projekt auf der Fortemporende 2016 & 2020 – "Nachhaltig" ist kein



Knowledge from Experience

THE VIENNA DISTRICT FORESTERS



Life in Vienna's forests is truly diverse. Our task is to preserve this diversity – now more than ever.

The population of Vienna is approaching two million people. Wherever the city grows, we need new forests to host the wildlife and all the other forest dwellers. We need to have adequate protected areas, development opportunities, and zoning.

– Herbert Weidinger

Deputy Head, City of Vienna Forestry Office and Urban Agriculture



Herbert Weidinger's vision: Vienna and Michael Kallinger



District foresters bring valuable knowledge together with decades of experience from the Viennese forests

This valuable knowledge and district-specific experience is being carefully utilized in order to facilitate the increase in proportion of nature zones to at least 75%.

More wilderness in the Lobau! In the National Park there are:

- a nature zone, from which we humans keep out; and
- a management zone, in which certain uses are possible.

The proportion of nature zones is set to grow from 57% to about 75%. To achieve this, Vienna's district foresters have carefully examined the issues that need to be taken into account. There are, for example, diseases such as ash dieback, and very dominant invasive tree species. Tree of heaven, for instance, or box elder, can spread unhindered without accompanying measures.

What happens next?

The following measures are intended to achieve the greatest possible diversity in the Danube National Park:

- Preservation and maintenance of existing picnic meadows and natural bathing areas
- Preservation and maintenance of habitats worthy of protection, such as the hot lands and meadows, e.g. regular mowing, local de-bushings
- areas currently used for forestry to be converted into natural areas
- the creation of further visitor areas
- pruning along paths
- control of invasive tree species ("neophytes") and tree diseases
- solution for arable land: either cultivation with targeted promotion of biodiversity or abandonment and conversion
- Decreasing hunting activities in large meadows near the hiking trails so that wildlife is more visible there



The Lobau, a green jewel embedded in a rapidly developing urban environment, is facing great challenges. Climate change, the loss of biodiversity, and the rapidly increasing demand for recreational and leisure space, etc. are focusing the public's attention on this green jewel even more than before. In this situation, the foresters, who have a strong connection and a wealth of experience in the Lobau through their daily work, have a responsible role to play.

It is they who can provide valuable contributions to make the right decisions so that this green jewel can continue to shine for generations to come.

– Alexander Faltejssek

Head of the Lobau Forestry Administration



Typical Danube

FOR FURTHER INFORMATION ON MONITORING, PLEASE VISIT:

<https://www.interreg.at/AGRIINATUR/AGRIINATUR/AGRIINATUR/>

https://oec.wien.at/PROJEKTE/UMWELT_NACHHALTSAMKEIT_ENERGIE/

– "Projekte aus der Förderperiode 2014-2020" – "Agriinatur AT-01"



Biodiversity

IN THE OPEN COUNTRY AND IN THE EDGE ZONES

I see water supply as a priority for species protection in the Danube Floodplains National Park. I have observed amphibians my entire career and note that there is a significant shortage of water. I can illustrate this with a very simple example. When I used to go to the floodplain, I used to get a lot of mosquito bites, whereas now I have more bites from ticks than from mosquitoes. That says it all, and I would look very hard at ensuring that more water gets back into the floodplain. The 'Heißblinden' (dry grassland on former fluvial deposits) too, of course: intelligent management is needed to ensure that they are preserved.

—Manfred Pinter

Zoologist, University of Natural Resources and Life Sciences Vienna



Many animal and plant species in the Lobau live in the forest and in the waters. For a long time, the dynamics of the Danube River were the most important force, constantly creating new habitats for open land species, especially on the banks. The old maps show us that many animal species that live on the edge of the fields today, could have lived in the same place two hundred years ago, on a tributary bank, and found comparable structures there. The edge zones between open land and forest are crucial foundations for biodiversity, so that the small bombardier beetle with its explosive sounds survives here just as effectively as the German sandpiper beetle or the large fire butterfly.

Important questions for a Vienna Local Implementation Plan are: how could the target species of the open land in the Lobau be promoted, what is the importance of edge zones for these species, and how can new edge zones be created?

Target Species in Open Land

These target species are dependent on open land as habitats. Specific structural measures on arable and open land should be used to promote them in a targeted manner. It is already clear that the edges between different habitats are particularly important, such as the edge of a forest or a hedge along a field. But exactly which measures are suitable, and why, is now being researched further.



What significance do changes in arable farming have for edge zone habitats, and how can the target species of the Lobau's open land be promoted?

These and other questions are the subject of further research and will be addressed in the Local Implementation Plan. The current state of research already shows the importance of structural elements and edge zones for species diversity.



“

The Upper Lobau represents an optimal transition zone between the National Park core zone and the urban area. Here you can move between areas with organic farming and sustainable forest management and get to know a variety of plants and animals without disturbing the peace and quiet needed for the core zone.

—Ludwig Maurer

Lecturer in Agronomy at the University of Vienna,
Chairman of the Bio Forschung Austria Association



I am the estate manager for the Lobau Bioscience. We have been farming organically in the Lobau since 1978, so we were actually pioneers in organic farming. It has always been a goal of the farm to supply Vienna locally, which means that finding the shortest possible route to market is a fundamental issue for us. It is very important to me to maintain this local supply with healthy and healthily produced food. The City of Vienna should look to protect its farmland so that we can continue to produce food for ourselves in the future.

—Kari Mayer

Estate Manager, City of Vienna Forestry Office and Urban Agriculture

FOR FURTHER INFORMATION, PLEASE VISIT:

<https://www.interreg.at/leu/AGR/NATURALHILF/>

OR: WIKI/PROJEKTE/UMWELT_NACHHALTIGKEIT_ENERGY

— "Projekte aus der Förderperiode 2014-2020" — "AgriNatur AT-HIP"



Interreg Austria Hungary 2014-2020. This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska Curie Grant Agreement No. 101019719.

The Development of the Local Implementation Plan AT

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At the start of the "AgrNatur" project, it was important to us to first analyze the environmental compatibility of the organic farming operation, which had already been practiced for decades in the Vienna Lobau Floodplain conservation area. This type of arable farming was as close to nature as possible for the management zone, on around two percent of the entire national park. It involved not only a biocenotic (ecological) interdependence with strict nature zones, a lack of chemicals and the appropriate use of machinery, but also the experience of nature for more than one million(!) recreation visitors per year.

Meanwhile, the project outcomes have become increasingly important as a model for future organic agriculture, in which climate adaptation and biodiversity are factored in, and not restricted to protected zones. There is a special interest in conducting intensive ecologization and research into biodiversity here because it is a national park area – but at the same time, it has proven to be an important experimental field, and a model for sustainably and naturally conditioning agricultural lowland landscapes, transforming them into biodiverse, wildlife-friendly territory designs, where hunting is still of value in the cultivated land.

–Bernd Idtsch

Biologist, General Director Emeritus, Natural History Museum, Vienna

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SCENARIO A:

The Danube Floodplain National Park as a forest landscape with preserved meadows, either through uncontrolled, natural development or through conversion measures with accompanying maintenance for the targeted structuring of open land areas.



SCENARIO B:

The Danube Floodplain National Park as a forest landscape with preserved meadows and biodiversity-promoting organic agriculture, by optimizing the current management:

- Diversification of field crops and crop rotations
- Intercropping, annual seedling on edge zones
- Targeted structuring of fields to protect and promote open land species



The Lobau - Today and Tomorrow

What will the Lobau look like in the future? Today it is a large forest area with a variety of grand trees. Primeval forest-like oxbow lakes reveal the old Danube landscape: occasional ditches, regular water lilies and lying logs. In between, are many meadows and dry "hot lands" where gravel banks used to be. In some areas, Vienna also comprises arable land, which has been cultivated organically for over 30 years.

In the Viennese part of the Danube Floodplain National Park there is currently just under 85 organic farmland, and in the entire national park 185. What will happen to these arable areas in the Lobau? Two realistic development scenarios have emerged from the research.



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During the first decades of conservation work, the focus has been on saving remnants of the natural landscape. For this, human uses have to be pushed back so that forests and waters can continue to survive.

Today, we face a new paradigm shift in nature conservation: if we also want to preserve our diverse cultural landscapes, with their diversity of species, we need partnership-based approaches. Added to this, there are the challenges of climate adaptation, an impending food crisis in Pannonian agriculture and the impact of invasive species.

The preservation of biodiversity is closely and inextricably linked to quality of life and livelihoods. The Agrinatur AT-HU project's Vienna Local Implementation Plan is an important learning ground, helping us to recognize that agriculture – especially the leading organic farms – can no longer be the global reserve of all social interests.

For the entire Danube Floodplain National Park, 18 percent of arable land is only a small proportion of a large natural area. However, these areas produce healthy and valuable food for Vienna on 670 hectares – and can become a model for a vital patchwork of habitats through many new structures, and the biodiversity-promoting organic agriculture of tomorrow!

–Harald Kutzenberger

Landscape Planner

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FOR FURTHER INFORMATION, PLEASE VISIT:

<https://www.interreg.at/hu/au/agrinaturat/>

OR: info@interreg.at / info@interreg.at

– "Projekte aus der Förderperiode 2014–2020" – "Agrinatur AT-HU"

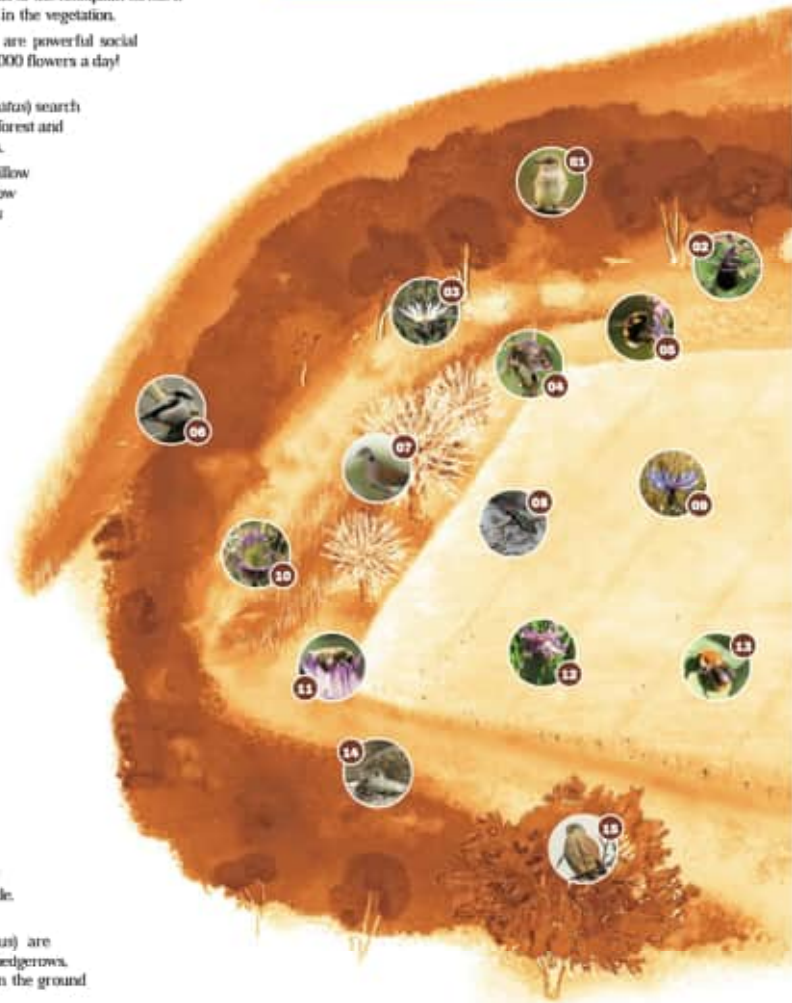


In and around the Lobau's organic fields

01. The little **spotted flycatcher** (*Muscicapa striata*) waits on a dry branch on the bank for passing insects and catches them skillfully in flight.
02. The **caterpillar-hunter** (*Calosoma inquisitor*, on the blackthorn) is a ground beetle but it can fly well. It lives in bushes where it eats caterpillars and other larvae.
03. A large, bright **sail swallowtail butterfly** (*Ipheclides podalirius*) "sails" over the creeks and fields of the Lobau. The caterpillars are usually found on solitary sloes and hawthorn bushes at the edge of fields.
04. The small **harvest mouse** (*Myzomys minutus*), with its long tail, lives hidden in reeds, reed canary grass, or in the sedge beds of the floodplain forest. It builds its spherical nests there and climbs skillfully in the vegetation.
05. **Buff-tailed bumblebees** (*Bombus terrestris*) are powerful social bees that tolerate the cold well and pollinate up to 4000 flowers a day! They contribute to the ripening of many fruits.
06. In winter, the **long-tailed tits** (*Argythaleus caudatus*) search for insects in small family groups at the edge of the forest and in hedgerows, while climbing through the branches.
07. A persistent cooing can be heard from the willow bush at the edge of the floodplain forest—this is how we normally find the **turtle dove** (*Streptopelia turtur*).
08. Plenty of open ground on banks, dry grassland, and field margins is a survival prerequisite for the greenish iridescent **cliff tiger beetle** (*Cylindrus germanicus*).
09. **Cornflower** (*Cyanus segetum*) is mainly found on the edges of cornfields, where its plentiful blue flowers shine in the sun. The high sugar content of the flower nectar makes it a popular bee pasture.
10. The towering **wild teasel** (*Dipsacus fullanum* L. with the eastern Bath white) has many prickly stems. Rainwater collects in the funnels of its stem leaves for birds or hikers to drink.
11. The **furrow bee** (*Halictus confusus*) looks like a very small honeybee. It collects pollen from many different flowers and digs underground cavities for its nest.
12. **Red deadnettle** (*Lamium purpureum*) thrives on nutrient-rich soil in fields and forest edges. The nectar of the long-tubed flowers is especially popular with common carder bees. Buff-tailed bumblebees hit open the side of the flowers to get at the nectar.
13. The specialized **common carder bee** (*Bombus pascuorum*) has a long proboscis, so it mainly visits mint plants such as groundsel and deadnettle. Their small colonies often live at forest edges.
14. **European hedgehogs** (*Erinaceus europaeus*) are found in the Lobau at the edge of forests or in hedgerows, where they forage for worms, insects, and snails on the ground at night.
15. First on the **kestrel's** (*Falco tinnunculus*) menu are voles, which are usually spotted whilst in flight and are captured in a dive. To save energy, they look for prey from their perches in winter.
16. Large poplar trees are the preferred eyrie (aerial nest) trees for colonies of **gray herons** (*Ardea cinerea*). They eat mice, frogs, and small fish.

Monitoring

In addition to protecting specific habitats, national parks also serve to protect diversity and the flora and fauna. To find out how important the preservation of farmland and its surrounding areas are for biodiversity in the National Park, and to discover whether species worthy of special protection can be found there, systematic observation has been carried out since 2009 on a selection of indicator groups of animal and plant species.



Proposal for a New Zoning

according to the proposal in the Local Implementation Plan, Summary II: "Forest landscape with preserved meadows and biodiversity-promoting organic farming".

- Forested area
- Open area with meadowland, or forest (about 1 km²)
- Water area with meadowland / forest or forest (about 1 km²)



17. The primitive **banded demoiselle** (*Calopteryx splendens*) flies like a butterfly and has a conspicuous, dark wing band. It inhabits slow-flowing, sandy streams with loosened riparian vegetation.

18. A field border with a few wild rose bushes is rich in grasshoppers, beetles and Hymenoptera, which the skillful **red-backed shrike** (*Lanius collurio*) pursues in flight; the hawthorn bush serves as a hunting and breeding ground.

19. The **Scheidler's ground beetle's** (*Carabus scheidleri*) preferred habitats are hedges, small piles of leaves and stones, which they can hide underneath during the day.

20. The **yellowhammer** (*Emberiza citrinella*) sings high up on a treetop at the edge of the forest. Its nest is hidden on the ground among the grasses. There it forages for weed seeds in the fields.

21. Deadwood, old grass and sandy soil for laying eggs and warming up, frost-free hibernation sites, and many small insects for food—this is an ideal habitat for a **sand lizard** (*Lacerta agilis*).

22. **Bombardier beetles** (*Small B., Brachinus expulsores*) are among our smallest ground beetles. They live in sandy locations and need the pupae of other ground beetles of the genus *Amara* for their food.

23. **Grey partridges** (*Perdix perdix*) need hedges and a variety of food: herb seeds for the parents and small insects for the young. The families stay together all winter and sometimes fly up in "chains" from the edge of the field.

24. Just a few decades ago, the **European hamster** (*Cricetus cricetus*) was widespread. Today it is threatened with extinction worldwide. It has been given a new chance in the fields of the Lohau.

25. The large gray or brown **blue-winged grasshopper** (*Oedipoda caerulescens*) only truly catches your eye when it flies along the field paths and its turquoise underwings light up.

26. The **Eurasian skylark** (*Alauda arvensis*) breeds in open terrain with dry to variable soils and largely unobstructed horizons. It often mimics the sounds of its environment.

27. Gossamer-winged butterflies are typical of near-natural flowery meadows. The **green-underside blue** (*Glaucopsyche alexia*) typically has a metallic-green pattern on the gray underside of its wings.

28. **Queen of Spain fritillary** (*Issoria lathonia*) caterpillars live on violets at the edge of the forest. The butterflies, with their conspicuous white wing spots, live and fly on flower-rich margins.

29. Annual herbs such as **bugloss** (*Anchusa arvensis*) are typical in fields and they are popular with bees. They cope well with the dynamics of farming, which is often similar to that on riverbanks.

Agrobiodiversity Indicator Groups



Ground Beetles

• Rich in species and specimens in agricultural ecosystems • Indicators of cultivation intensity • Important for natural pest control



Field Herbs (Agricultural Weeds)

• Sharply declining floristic in the last decades due to intensification of agriculture



Birds

• Well-studied species group • Currently in sharp decline in agricultural landscapes



Wild Bees

• Important crop pollinators • Indicators of vegetation & structural diversity



Butterflies

• Easy to detect in the field • Indicators for vegetation diversity



NEW RECREATIONAL AREAS
FORM THE FIELDS OF DIVERSITY

Bird Nesting Site, Insect and Bee Pasture, A Beautiful Landscape in the Course of History

As part of the AgriNatur AT-BU project, the Forestry and Agricultural Office of the City of Vienna is creating an ecological nature trail in the New Lobau. It comprises 4 rest areas, "Fields of Diversity" (BU-R4), which are connected to the existing network of paths.

Thoughtful planning, natural construction, appropriate planting, and interesting information about the biodiversity in organic fields will provide attractive, new recreational spaces for visitors, as well as suitable areas for today's endangered animal and plant species.

Completion: Fall 2021



Putting our hearts into it The information boards have been designed for young and old alike. The dual concepts of nature education and graphic design have been combined to create a representation, not only of diverse species and their interplay with the agricultural Lohau foreland (New Lohau), but also with the conservation of nature at its heart.

—Sophie Stark
Stark Design



Goodbye to agricultural monocultures. The focus is on biodiversity for the Lotau area. The 4 rest places have been designed to draw attention to the special nature of the area, the disappearing, threatened, typical flora and fauna of the agricultural landscape and its edge zones.

A wide range of recreational, rest and play areas are being built for people and, of course, new habitats and refuges for animals are also being created.

—Heidelinde Holzinger
Hofinger Landscape Architecture



It is important to allow a degree of responsible use. I am, however, convinced that education is needed to ensure people use it correctly. The Lohau and its surroundings are especially popular for leisure activities, for example, cycling, hiking, children playing, picnicking, and more!

I feel that such an area, such a natural resource, is incredibly important.

—Christian Ohr
District Councilor and
Environmental Committee Chairman (ret.) Bensenville



Visitors' areas in Mosonmagyaróvár

The visitors' areas in Mosonmagyaróvár are designed to present the flora and fauna of the urban environment and the city surroundings. They also introduce the flora and fauna of the Burggarten and Wittmann Park to adult and children visitors, raising awareness for the importance of biodiversity.

We want to achieve this by establishing two nature trails (Burggarten, Wittmann Park) as well as an AgriNatur Garden and an eco-playground. Information

panels and fun educational elements will be used in the visitors' areas to educate the public about the environment and help people to hold informed opinions. Rest areas will be set up to make the visit more pleasant. The informational elements will be designed to appeal to all generations, both in terms of content and design, in order to stimulate thought and instill a love and respect for nature. In addition to ecological content, guests will also be informed about the project's goals and activities. An important aspect in the design of the visitors' areas is the use of nature-friendly, ecologically sustainable solutions, which also reflect the above concept.

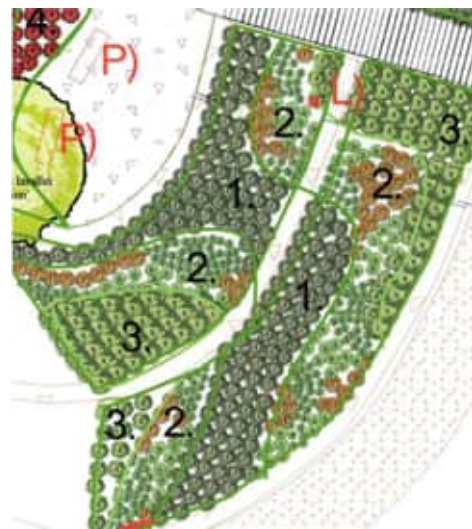


Castle Garden in Mosonmagyaróvár

Educational trail and eco-playground in the Castle Garden

In the Castle Garden, in addition to the informational elements, "bird-friendly" and other biodiversity-promoting elements will be placed along the entire nature trail to attract birds, insects, and small vertebrates from the surrounding (thus increasing biodiversity). The idea is to raise awareness for the importance of conservation and provide ideas for environmentally friendly alternatives for the home.

The Castle Garden will also feature an ecological playground that will help draw attention to the trail and promote children's awareness of nature. The playground will include a variety of toys, mainly made of natural materials, and eco-elements (e.g. a willow tunnel).



Design of the herb garden on the Castle Garden trail

Nature trail in Antal Wittmann Park

The site of this development is the Wittmann-Antal Park in Mosonmagyaróvár, which, in addition to its ecological significance, forms an interesting border zone between the natural habitats of the Lajta (Leitha) River, the planted historical parks and the city. The park is closely connected with the nearby Faculty of Agricultural and Food Sciences of Széchenyi István University, which has been an agricultural higher education institution for more than 200 years. Wittmann, who played a significant role in founding the faculty, also began the planting of the park in 1813.

The main purpose of the nature trail is to familiarize visitors with the ecosystem of the area, the flora and fauna of the park, and to provide – in a fun way – a deeper insight into the natural environment and the importance of preserving and promoting biodiversity. Along the trail, we have also placed artificial nesting boxes that visitors can easily spot as they pass by. The information panels will also convey local history and the history of agriculture in close connection with ecological knowledge. The park will also include rest areas along the path, similar to the Castle Garden.



AgriNatur látogatói területek Mosonmagyaróváron - Várkert AgriNatur Besucherflächen in Mosonmagyaróvár - Burggarten

- Várkert tanösvény, "AgriNatur kert" és öko-játsszór; Mosonmagyaróvár, Vár tér 2.
- Burggarten Leirpfad, "AgriNatur-Darten" und Öko-Spielfeld; Vár tér 2, Mosonmagyaróvár



Látogatói területek a várkertben Besucherflächen im Burggarten



Mosonmagyaróvár, Wittmann park

- Történelmi és ökológiai tanösvény
- Historischer und ökologischer Naturlehrpfad



Tanösvény a Wittmann parkban
Lehrpfad im Wittmann-Park

Impressum / Impressum

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www.arts.at/office/medien/medien.htm
www.wissenschaftszentrum-nachhaltigkeit.at





AgriNatur látogatói területek Besucher*innenflächen

Ausfläben und Magyarszägon
in Österreich und Ungarn

ÄTELHETÖ BIODIVERZITÄS...

Az AgriNatur projekt egyik célkitüzése, hogy közeliffigható közebe hozza és ätelhetövé tegye a biológiai sokféleség szerepét és fontosságát. Ebböl a célból látogatói területeket alakítottunk ki, ahol bemutatjuk a természetvédelem és a mezőgazdaság kapcsolatát, a biodiverzitás szerepét.

ERLEBBARE ARTENVIELFALT...

Eines der Ziele des AgriNatur-Projekts ist es, die Schönheit und Bedeutung der biologischen Vielfalt greifbar und erlebbar zu machen. Zu diesem Zweck haben wir Besucherbereiche eingerichtet, um die Verbindung zwischen Naturschutz und Landwirtschaft sowie die Rolle der biologischen Vielfalt zu zeigen.



DIE „FELDER DER VIELFALT“ IN DER NEUEN LOBAU

HIER finden Sie die vier Besucher*innenflächen:

- Saltenstraße-Brockhausengasse-Lobauwegert
- Ecke Wiethestraße-Seefeldergasse

„Mogelwies“, „Feldblick“, „Weitblick“ und „Insektenwiese“ laden zum Verweilen ein. Sie bieten Informationen zur Artenvielfalt der Feldlandschaft und zur Landschaftsgeschichte und viele Elemente zum Schauen, Lesen, Spielen und Rasteln. Steine und Stämme zum Sitzen, Böden und Früchte zum Riechen und Naschen, offene Bodenstellen und geschützte Plätze für Feldvögel und Insekten.




Legende / Jelmeznyek

- Gewässer / Vízfelület
- Rad- und Fußwege / Kerékpár- és gyalogút
- Bushaltes / Busz






Stadt Wien

Wien Umweltgut Die Felder der Vielfalt



Natura 2000-Gebiet
Nationalpark Donau-Auen (Wiener Teil)

A „SOKSZÍNÜSÉG MEZÖ“ A NEUE LOBAUBAN (BÉCS)

Itt találja meg a négy bécsi látogatói területet:

- Saltenstraße-Brockhausengasse-Lobauwegert
- Wiethestraße-Seefeldergasse sarok

„Fészek“, „Rét kilátó“, „Kilátó“ és „Rovar oázis“ kellemes időtöltésre invitál. Információkat nyújtanak a látogatóknak a mező biológiai sokféleségéről és a táj történetéről, valamint számos élelmezési lehetőséget kínálnak megtekintésre, olvasásra, játékosra és rejtvények megfejtésére. Köveket és fatörzseket, amelyekre leülhetnek, virágokat és gyümölcsöket, amelyeket megcsodálhatnak vagy megköszönhetnek, nyílt területeket és védett helyeket a mező madarainak és rovarainak.






Closing words



The start of the AgriNatur AT-HU project in early 2019 marks a positive and important step in bringing the usually controversial issues of nature conservation and agriculture into a forward-looking, synergetic connection.

"As a young, budding biologist in the early 1980s, I studied the ground beetles of the fields embedded in the biotope mosaic of the former Danube floodplains in today's Upper Lobau National Park. I was immediately fascinated by the magnificent landscape with its wide fields, framed by grassy ridges, hedges, tree-lined alleys and forest edges. While researching in the fields, I experienced firsthand the change of seasons and the alternation between the different crops. The organic fields had a very rich ground beetle fauna with typical species, some of them rare, which did not occur in the forests and meadows of the Lobau. In the 1990s, studies on other insect groups consolidated the picture of a particularly species-rich fauna typical of the arable landscape. Based on my many years of experience and today's research results, I am firmly convinced that organic fields in the Lobau must continue to contribute to biodiversity in this landscape area." (Bernhard Kromp)

"Especially since the beginning of the Corona pandemic in 2020, it has become clear to me how important this connection with the Lobau is, especially for the inhabitants of the metropolis of Vienna: recreational space in a natural environment to reduce stress on the one hand, agricultural production areas to ensure basic food supplies in times of crisis on the other, both framed by rich biodiversity in the most valuable protected area category – in a national park. The recent developments have once again underlined this – natural recreational space helps compensate shattering daily news, and biodiversity-enhancing managed organic fields close to the city help ensure sustainable future nutrition." (Alexander Faltejsek)

"Active conservation has played a major role in my life since childhood. As a practicing conservationist, birdwatcher and agricultural engineer, it is especially important to me to look at our environment in a complex way. Environmentally conscious, smart and sustainable agriculture can help produce a sufficient amount of food, but we must also keep biodiversity in mind: combining nature conservation and agriculture is the only way we can live in harmony with nature in the long run. Working together in the AgriNatur project to achieve this goal was both a great challenge and a great pleasure." (Vér Andras)

The project plays a pioneering role in protected area management because it takes into account the current needs of people and nature as well as the needs of future generations. This gives it the potential to become an exemplary project for the management of natural resources.

Bernhard Kromp, Alexander Faltejsek und Vér Andras

For the project partners

Bio Forschung Austria,

Forestry Office and Urban Agriculture of the City of Vienna

and Szechenyi István University, May 2022

Sources



Nr.	Author/original source	Date
1	Bernhard Kromp	7.5.2019 (Start-up workshop)
2	Herbert Weidinger	17.6.2020 (3 rd Expert workshop)
3	Minutes, welcome round	17.6.2020 (3 rd Expert workshop)
4	Bernhard Kromp	7.5.2019 (Start-up workshop)
5	Renate Zuckerstätter	17.6.2020 (3 rd Expert workshop)
6	Bernhard Kromp	7.5.2019 (Start-up workshop)
7	Minutes, platform hour	26.5.2021 (5 th Expert workshop)
8	Bernd Lötsch	11.11.2021 (4 th Expert workshop)
9	Andreas Januskovecz	11.11.2021 (4 th Expert workshop)
10	Alexander Faltejssek	11.11.2021 (4 th Expert workshop)
11	Erwin Szelezak	11.11.2021 (4 th Expert workshop)
12	Minutes, platform hour	26.5.2021 (5 th Expert workshop)
13	Minutes, platform hour	26.5.2021 (5 th Expert workshop)
14	Christian Ohr	17.6.2020 (3 rd Expert workshop)
15	Christian Ohr	17.6.2020 (3 rd Expert workshop)
16	Minutes, Merging the results	17.6.2020 (3 rd Expert workshop)
17	András Ver	11.11.2021 (4 th Expert workshop)
18	Team TBK	11.11.2021 (4 th Expert workshop)
19	Erwin Szelezak	11.11.2021 (4 th Expert workshop)
20	Susanne Leputsch	11.11.2021 (4 th Expert workshop)
21	Bernhard Kromp	7.5.2019 (Start-up workshop)
22	Bernhard Kromp	20.5.2020 (5 th virtual Expert meeting/2 nd Expert workshop)
23	Renate Zuckerstätter	17.6.2020 (3 rd Expert workshop)
24	Minutes, platform hour	26.5.2021 (5 th Expert workshop)
25	Gábor Koltai	17.6.2020 (3 rd Expert workshop)
26	Gábor Koltai	17.6.2020 (3 rd Expert workshop)
27	András Ver	11.11.2021 (4 th Expert workshop)
28	Harald Kutzenberger	11.11.2021 (4 th Expert workshop)

29	Erwin Szlezak	11.11.2021 (4th Expert workshop)
30	Susanne Leputsch, quotation from Mario F. Broggi	17.6.2020 (3rd Expert workshop)
31	Christophorus Ableidinger	13.5.2020 (4th virtual Expert meeting/2nd Expert workshop)
32	András Ver	11.11.2021 (4th Expert workshop)
33	Bernd Lötsch	11.11.2021 (4th Expert workshop)
34	Bernhard Kromp	7.5.2019 (Start-up workshop)
35	Martin Strausz	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop)
36	Christophorus Ableidinger	13.5.2020 (4th virtual Expert meeting/2nd Expert workshop)
37	Karl Mayer	13.5.2020 (4th virtual Expert meeting/2nd Expert workshop)
38	Harald Kutzenberger	27.5.2021 (6th virtual Expert meeting/2nd Expert workshop)
39	Minutes, summary	17.6.2020 (3rd Expert workshop)
40	Hans-Peter Haslmayr	11.11.2021 (4th Expert workshop)
41	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
42	Karoline Zsak	11.11.2021 (4th Expert workshop)
43	Karoline Zsak	11.11.2021 (4th Expert workshop)
44	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
45	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
46	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
47	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
48	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
49	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
50	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
51	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
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53	Esther Ockermüller	22.4.2020 (1st virtual Expert meeting/2nd Expert workshop)
54	Martin Strausz	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop)
55	Martin Strausz	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop)
56	Gergely Kiraly	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop)
57	Gergely Kiraly	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop)
58	Christina Nagl	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
59	Christina Nagl	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
60	Christina Nagl	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
61	Christina Nagl	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
62	Christina Nagl	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
63	Gergely Kiraly	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
64	Christophorus Ableidinger	13.5.2020 (4th virtual Expert meeting/2nd Expert workshop)
65	Bernhard Kromp	20.5.2020 (5th virtual Expert meeting/2nd Expert workshop)
66	Bernhard Kromp	20.5.2020 (5th virtual Expert meeting/2nd Expert workshop)
67	Bernhard Kromp	20.5.2020 (5th virtual Expert meeting/2nd Expert workshop)
68	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
69	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
70	Ottília Vámos	7.5.2019 (Start-up workshop)
71	Harald Kutzenberger	11.11.2021 (4th Expert workshop)

72	Susanne Leputsch	11.11.2021 (4th Expert workshop)
73	Andreas Januskovecz	11.11.2021 (4th Expert workshop)
74	Team TBK	11.11.2021 (4th Expert workshop)
75	Team TBK	11.11.2021 (4th Expert workshop)
76	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
77	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
78	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
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80	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
81	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
82	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
83	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
84	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
85a	Harald Kutzenberger	11.11.2021 (4th Expert workshop)
85b	Bernhard Kromp	11.11.2021 (4th Expert workshop)
85c	Christophorus Ableidinger	11.11.2021 (4th Expert workshop)
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88	Bernhard Kromp	7.5.2019 (Start-up workshop)
89	Gerald Oitzinger/Birgit Rotter	7.5.2019 (Start-up workshop)
90	Esther Ockermüller	22.4.2020 (1. virtual Expert meeting/Expert workshop2)
91	Norbert Sauberer	22.4.2020 (1. virtual Expert meeting/Expert workshop2)
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93	Norbert Sauberer	22.4.2020 (1. virtual Expert meeting/Expert workshop2)
94	Martin Strausz	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop2)
95	Gergely Kiraly	29.4.2020 (2nd virtual Expert meeting/2nd Expert workshop2)
96	Ottlia Vámos, Renato Kaloscsai	13.5.2020 (4th virtual Expert meeting/2nd Expert workshop)
97	Michael Hollinger	27.5.2021 (6th virtual Expert meeting/2nd Expert workshop)
98	Michael Hollinger	27.5.2021 (6th virtual Expert meeting/2nd Expert workshop)
99	Michael Hollinger	27.5.2021 (6th virtual Expert meeting/2nd Expert workshop)
100	Minutes, platform hour	26.5.2021 (5th Expert workshop)
101	Gergely Kiraly	6.5.2020 (3rd virtual Expert meeting/2nd Expert workshop)
102	Christophorus Ableidinger	13.5.2020 (4th virtual Expert meeting/2nd Expert workshop)
103	Susanne Leputsch	20.5.2020 (5th virtual Expert meeting/2nd Expert workshop)
104	Protokoll, Plattformstunde	26.5.2021 (5th Expert workshop)
105	Susanne Leputsch quotes E.O.Wilson	26.5.2021 (5th Expert workshop)
106	Susanne Leputsch quotes Leonardo da Vinci	27.5.2021 (6th virtual Expert meeting/2nd Expert workshop)
107	Susanne Leputsch quotes Paolo Coelho	27.5.2021 (6th virtual Expert meeting/2nd Expert workshop)

Annex I: LUP AT





Short version

¹Interreg Project AgriNatur AT - HU Local Implementation Plan ("LUP-AT") for the Viennese share of the Donau-Auen National Park

Elaboration of two development scenarios
based on ecological planning principles
combining
existing data with results
from monitoring and workshops
and taking account of
legal and economic feasibility



Wilhering, March 2022

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ASSIGNMENT

The City of Vienna, Forestry Office and Urban Agriculture Department commissioned Team TBK (Team LUP-AT), represented by the engineering office TBK (Büro für Ökologie und Landschaftsplanung Kutzenberger, Wilhering) with the preparation of the ecological and economic basis for a Local Implementation Plan AT for the Viennese share of the Danube Floodplain National Park within the bilateral Interreg AT-HU Project AgriNatur AT-HU.

TBK TBK Office for Ecology and Landscape Planning

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A LOCAL IMPLEMENTATION PLAN (AT) FOR THE DONAU-AUEN NATIONAL PARK

Each European protected area has a management plan, which maps the protected assets, specifies development objectives and fulfils the formal reporting obligations as a member state. The subjects of the processing are the sub-areas of the Danube Floodplain National Park located in Vienna and the sub-areas of the Danube Floodplain National Park managed by the City of Vienna in Lower Austria. These are all sub-areas of the Danube Floodplain National Park in Vienna and Lower Austria administered by the National Park Forestry Administration.

The Local Implementation Plan for the Viennese share of the Danube Floodplain National Park is based on a coordinated set of different methodological approaches:

- - ecological survey methods for the analysis of habitat structures for open land species in their historical development, recognition of target species by evaluating results of species monitoring and research into complementary species occurrences,
- - landscape planning methods for the development of a proposal for the future zoning of the Viennese share of the Danube Floodplain National Park,
- - evaluation of the overall social significance of the project with regard to local food supply, recreation and environmental education,
- - agro-economic methods for analysis of the economic basis of organic farming in this particular part of the Danube Floodplain National Park.

These topics were developed and discussed over a period of one and a half years in numerous coordination meetings involving different groups of people:

The result of the Local Implementation Plan for the Viennese part of the Danube Floodplain National Park describes two scenarios, which show a high nature conservation effectiveness, but in clearly different ways. The decision for one or other of the two implementation paths will subsequently also determine the overall biodiversity in the Danube Floodplain National Park.

TARGET SPECIES

THE SPECIES COMMUNITY OF THE LOBAU

The protection of the species-community of aquatic and riparian forest species is a central conservation goal of the Danube Floodplain National Park. Habitat suitability, especially for the species of old-growth and deadwood locations, has improved noticeably in the last decades due to silvicultural measures aimed at creating natural zones. Moisture-dependent species however, especially semi-aquatic species dependent on river dynamics, remain under intense pressure and require more attention to improve habitat suitability. Open habitat species are the main focus of this study. Open land habitats were present in the dynamic zones of the diversely structured and often changing river landscape until the regulation of the Danube around 1870 (Jungwirth, Haidvogel, Hohensinner, Waidbacher & Zauner 2014). The Franciscan Cadastre shows these wild river dynamics in their full expression. Hohensinner (see Jungwirth et al. 2014) has extensively researched its morphological evolution over many years. This constantly changing environment produced a multitude of ecological niches in flat and sloping, dry and wet open-land sites for specialised plants and small animals.

MONITORING OF SELECTED INDICATOR GROUPS 2019 TO 2021

Within the AgriNatur AT-HU project, extensive biodiversity surveys were conducted in two consecutive years on the organically managed project areas. The meadow development from rewilded arable fields (Sauberer & Pfundner 2019), field weeds (Ableidinger, Fuchs & Kromp 2021), ground beetles (Fuchs, Diethart & Kromp 2021), wild bees (Ockermüller 2020), butterflies (Strausz 2020) and birds (Nagl 2021) were investigated. The surveys provide information on the current state of the open land habitats with regard to the diversity of their plant and animal species. Target species were subsequently selected from the surveyed groups. These are intended to be representative of numerous other species which have similar life patterns and habitat requirements. They are subsequently the focus of special measures.

GROUND BEETLES

In the course of the AgriNatur monitoring by Bio Forschung Austria (Fuchs, Diethart & Kromp 2021), which has been researching the ground beetle population of the organic fields of Lobau for many decades, six arable fields and six field margins were investigated in each of the two study years. In addition, a former arable field and its marginal areas were sampled. The surveys were carried out by means of soil traps in transects.

Results

94 species were found on the monitoring plots (arable field, former arable field and margins) in the national park (total of 6077 captured individuals). 64 species have a life focus in the arable field, of which 12 species were found in this area only. 31 species live in the former arable field (central area and margin), of which 3 species were encountered in the former arable field only. 78 species live in the marginal area of the crops in the transition area to adjacent habitats, predominantly forest edges, of which 21 species were encountered in the transition areas only.

WILD BEES

In the AgriNatur monitoring by Ockermüller (2020), wild bees are all native bee species except the honey bee.

Four field plots with a length of 100 x 100 m were investigated (Ockermüller 2020). In addition to the four study areas, data from the immediate marginal biotopes of the arable fields (classified as shrub or forest edges) were collected. Furthermore, a former arable, managed by mowing and a semi-arid grassland area were investigated.

Results:

Overall, the investigated areas can be classified as especially species-rich with regard to their bee fauna. The number of bee species detected in both study years together amounts to 210, which corresponds to about 45% of the bee species found in Vienna as a whole.

A total of 80 species could be detected directly in the arable fields. The average number of species was highest in the early potato fields with 29. The early potato fields were used as nesting sites by several wild bees (e.g. *Lasioglossum marginatum*) in April and May due to the scarcity of surface growth and the open and loose soil. More species-rich than the fields themselves were the field edges - here the species numbers are on average higher than in the field by a factor of 2.2 - those of the population numbers higher by a factor of 2.5.

Remarkable is the high number of rare and very rare bee species as well as the high population densities of some of these species (*Lasioglossum pallens*, *Lithurgus cornutus*). Occurrence of *Sphecodes majalis* in the Lobau.

BUTTERFLIES

Butterflies are characteristic species of richly structured open landscapes with a high proportion of flowers and caterpillar food plants.

Within the AgriNatur-Monitoring, Strausz (2020) used six arable fields for the survey of the butterfly fauna. For this purpose, two 100-meter transects were established in each case - one transect in the centre and one at the edge of the field. In addition, two reference areas (an area of former arable land managed by mowing and a dry grassland area) were investigated.

Results

During the two monitoring years, a total of 46 butterfly species were recorded. This clearly shows that a very species-rich butterfly fauna can be found in the Upper Lobau project area, which is partly due to its wide range of diverse habitats.

The arable fields themselves were not very attractive for butterflies, as nectar and caterpillar food plants can only grow in the fields (as weeds) to a limited extent. The flowers of most crop plants (e.g. cereals, peas, maize, soybeans, potatoes) do not offer a correspondingly attractive nectar supply for butterflies, which is why they are hardly frequented by them. The six field margins investigated in the project performed significantly better than the fields themselves. Both the number of individuals and the number of species were more than twice as high at the edge of the field as in the fields studied. In addition, a field edge was almost as species-rich as the dry grassland, with 25 butterfly species recorded including a high number of Red List species (six RL species). On the former arable land 21 species were recorded, on the dry grassland 26 species.

BIRDS

The birds of the structured, open cultural landscapes of Western and Central Europe have been in decline for some time. The surveys for the AgriNatur monitoring of bird species in the Lobau (Nagl 2021) took place from April to June 2020 and 2021. About 75% of the surveyed areas are located in the Upper Lobau, while about a quarter are located in the Lower Lobau. The project area includes 53% open area and its forest margins in a 50 m buffer zone (47% of the total area). In addition to the arable land, a nearby former arable field (rewilding and managed by mowing) and a semi-arid grassland were surveyed. All bird species in the project area were recorded, but for further analyses a focus is put on indicator species that are also used for the calculation of the Farmland Bird Index (FBI). The FBI is an indicator composed of population trends of typical species that occur predominantly in cultivated land. The results of the first field season 2020 (Nagl 2020) are presented below.

Results

A total of 69 breeding and visiting bird species were recorded. 48 species were classified as breeding birds. The most frequent registrations in 2020 were of starling, followed by great tit and chaffinch. In addition, blackcap, carrion crow, blue tit, great spotted woodpecker, golden oriole, wood pigeon and goldfinch were among the top 10 species. In 2020, Schusterau and Franzosenfriedhof were particularly rich in species.

For the characteristic bird species of the richly structured cultural landscape, it must be noted that they are affected to an above-average extent by habitat loss and associated population declines. For this purpose, a comparison of the monitoring results with the data of the Vienna Breeding Bird Atlas (Wichmann et al. 2009) is important. These clearly depict the changes in habitat patterns and the increase in forest areas in the National Park in recent decades.

OTHER ANIMAL SPECIES

Due to habitat suitability and their importance for species protection, other relevant species such as smooth snake (*Coronella austriaca*), Aesculapian snake (*Zamenis longissima*), sand lizard (*Lacerta agilis*) and field hamster (*Cricetus cricetus*) were included in the rating of various scenarios in individual cases.

FIELD HERBS (AGRICULTURAL WEEDS)

The study of field herbs (Ableidinger, Fuchs & Kromp 2021) includes the representation of crop plants and their accompanying vegetation (weeds). Depending on their way of life, distinction was made between the current crop plants, re-growth from the previous year's crop, colonizing woody species from surrounding areas such as woodland, permanent grassland or former arable fields and actual field

weeds. For each species, the status as cultivated, indigenous, archaeophytic, neophytic, or invasive neophytic species is also given.

114 species were surveyed, eleven of which were cultivated species. Common species include winter wheat (*Triticum aestivum* subsp. *aestivum*), winter barley (*Hordeum vulgare*), winter rye (*Secale cereale*), green pea (*Pisum sativum* L. convar. *medullare*), alfalfa (*Medicago sativa*), and potato (*Solanum tuberosum*). Sorghum millet (*Sorghum bicolor*), caraway (*Carum carvi*), anise (*Pimpinella anisum*) and coriander (*Coriandrum sativum*), fennel (*Foeniculum vulgare* var. *dulce*) are grown in small quantities and as trials.

The Lobau is currently an important gene pool for indigenous and archaeophytic arable weeds, given its long history of organic farming.

In this study, the term "open land species" is deliberately used, as a closer look clearly shows that the hasty evaluation as "arable crop weed " or "field weed " can easily overlook the significance and specific ecological habitat requirements of these plants. The habitat mosaic of the original stream landscape is not only characterized by aquatic and semi-aquatic species, but in many cases also by drought-tolerant species, which were relocated more or less frequently during the dynamics of river flooding. If we look at each species in relation to its individual habitat requirements, it becomes apparent that these species were also originally present in the stream landscape, but are now only able to survive at the edges of the fields. Especially in the case of ground beetles and wild bees, the relationship between primary and secondary habitats is still clearly recognizable, also for species such as the sand lizard. This was also confirmed by our own observations along the natural Danube banks of the lower Danube.

Within agricultural areas generally however, the over-large size of most fields with relatively few margin zones represents a significant obstacle to species diversity.

HABITAT MARGINS

In the Danube Floodplain National Park, the AgriNatur AT-HU project investigated the marginal zones between different habitat types in more detail, as the monitoring results of the target species tended to show a greater species diversity at the edges of the study areas. The analysis of transition zones between forest and water bodies and forest and terrestrial open areas help to better understand habitat structures in the project area. The basis for this is the comparison between the current and the historical structures of 200 years ago.

Method

The development of the transition zone features in the Danube Floodplain National Park was displayed and evaluated using the geographic information system QGIS in the coordinate system Austria GK East. The location of the historical boundary lines was based on the Franziscean Cadastre of Vienna and Lower Austria, which was created between 1817 and 1829 and is available on the homepage data.wien.gv.at for the city of Vienna and on the homepage maps.arcanum.com for Lower Austria.

The 2018 “Orthofoto” from Geoland Basemap (basemap.at) and geodata from MA 49 with information on the current open land areas (arable land, meadow, ‘Heißlände’, rewilding former fields) served as the map basis for the current plans, as well as geodata from MA 45 on the water bodies (standing water, Danube) of the Lobau, which can be accessed on data.wien.gv.at. The Agricultural and Forestry Department of the City of Vienna provided data sets on the national park zoning of the district foresters (nature zone, nature zone with management measures, outer zone - subdivided into outer zone administration, outer zone special areas - navigation channel, arable land, (in Vienna) groundwater works, (in Lower Austria) flood protection dam, tourism). The 17 arable study areas (including Wolfsboden, Franzosenfriedhof, Plattenmais) were taken from previous research reports.

The analysis distinguished between the strip-like habitats of the transition zones between (1) forests/woodland and aquatic/marsh areas and (2) forests/wooded woodland to terrestrial open land areas. The comparison between the historical and current endowment of aquatic and terrestrial transition zones was made by evaluations of the length and the width of the transition zone habitats

Development of the transition zone habitats in the Lobau over a period of 200 years

Historical transition zone habitats

On the Franziscean Cadastre, which was created between 1817 and 1829, the Lobau shows a distinct floodplain landscape. The Danube's network of watercourses is often branched and meanders within the riverbed. The watercourses are mainly bordered by alluvial meadows, grasslands, deciduous forests and swamps. Occasionally there are fields, pastures and gravel areas. Due to the meandering watercourses, there are numerous transition zones between the forest and water bodies (river, standing

water, marsh). The open land consists to a large extent of meadow areas. Riparian strips are found alongside river banks. Arable fields and pastures are few. Especially the large meadows in the north-western part of the project area are often interspersed with woodland.

Current transition zone habitats

The current watercourse areas show a lower percentage of area compared to the Franziscean Cadastre Kataster. The transition zones are hence also slightly less than 200 years ago, at 42 ha. The terrestrial open land areas have shrunk only slightly in historical comparison and currently have an area of 75 ha. Since there is much more arable land today, this type of open land, with 16 ha, occupies 20%. The transition zones along the meadows have decreased by comparison to 47 ha.

The old and new margins are close to each other in many cases. For example, in the area of Oberleitner Wasser and Plättenmais, where past and present water bodies and forest cover largely overlap. Habitats for low-mobility species have thus been preserved here in spite of changes over the centuries. These are found, for example, in ground beetle species of dynamic open ground sites, whose primary habitats have largely disappeared. This distinguishes the Lobau to a large extent from the surrounding area in the Marchfeld and characterizes the habitat suitability for a particularly diverse species community, as confirmed in the monitoring. Such landscape ensembles are rarely preserved outside the national park due to agricultural planning since the end of the 19th century and, above all, hardly any marginal habitats. The present structural configuration of the Marchfeld field landscape is characterized by the more recent addition of windbreaks.

PROPOSALS BASED ON THE EXPERIENCE AND EMPIRICAL KNOWLEDGE OF LOCAL DISTRICT FORESTERS

A new zoning proposal for the Viennese share of the Danube Floodplain National Park was developed based on the extensive experience and detailed local knowledge of the district foresters Harald Brenner, Günter Walzer and Hubert Brandstätter (in Hollinger 2019). Their selection of sites for long-term maintenance and transition in the Viennese share of the national park forms the basis of the scenarios for the Local Implementation Plan Vienna ("LUP-AT"). With this proposal, there is a technical possibility to increase the natural zone in the Viennese share from 61% to about 75% in the next few years.

PROPOSAL FOR A NEW ZONING

Due to the conversion (rewilding) of old afforestation areas and former arable land, the nature zone (mainly forest and water bodies) will be expanded accordingly from 2028.

The nature zone with management includes all 'Heißländer' and meadows. These meadow areas have no productive function, but serve exclusively to promote and safeguard biodiversity. The 'Heißländer', species-rich grasslands on dry and shallow gravel soils, some of which are naturally free of forest, are particularly important for biodiversity. In the Viennese share of the Lobau there are 54.04 ha of 'Heißländer'. In addition, there are 0.73 ha of 'Heißländer' in the Lobau part of Lower Austria. In the Mannswörth area there are no 'Heißländer'. Another 210.90 ha of meadows are located in the Viennese share of the Lobau and 39.68 ha in the Lower Austrian part of the Lobau. Another 48.74 ha are located in the Mannswörth South area. In total, the share of grassland in the part of the Danube Floodplain National Park administered by the City of Vienna amounts to 354.09 ha, of which 54.77 ha are 'Heißländer' and 299.32 ha are meadows.

The possibility of expanding the natural zone takes place within the already forested areas, specifically through two groups of measures:

- Conversion of pine stands from old afforestations.
- Conversion of hybrid poplar stands from old afforestations

The remaining organic arable land - including rewilding former fields - covers 185.13 ha. This corresponds to 7.66% of the Viennese share or 1.77% of the entire national park.

Two scenarios were developed for these 180 ha:

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STARTING POINT FOR THE LOCAL IMPLEMENTATION PLAN VIENNA LUP-AT

The survey and analysis of the current inventory of forest, water, meadow and arable land in the Viennese share of the Danube Floodplain National Park shows the starting point. The area under investigation covers the entire areas administered by the City of Vienna, i.e. also areas in Lower Austria: the Lower Lobau and Mannswörth. The focus lies in perspectives for the existing arable land in the protected area.



Fig. 1 Initial situation for the creation of the scenarios (Editing: TBK, 2021).

The topics in the scenario development are summed up as follows: In **scenario A**, in implementation of the segregative nature conservation concept, the move towards as pristine a state as possible with as little human activity as possible is proposed. In this wilderness perspective, the existing organic cropland sites are primarily converted to forest. Meadows are expanded only in particularly sandy sub-areas such as Schusterau.

Scenario B does not fundamentally question the existence of organic arable farming in an integrative nature conservation concept, but attempts to transform the current deficits into biodiversity-enhancing organic farming through targeted improvements. In view of the already low proportion of arable land in relation to the total area, this means a barely measurable change for the forest species community but is highly relevant for the open land species.

SCENARIO A:

"DONAU-AUEN NATIONAL PARK AS A WATER-DOMINATED FOREST LANDSCAPE WITH AREAS OF PROTECTED MEADOWS"



Fig. 2 Visualization scenario A (Editing: TBK, 2021).

Instead of arable land, the following developments are possible:

1. Spontaneous rewilding with a high risk of neophytes: this requires intensive accompanying measures for nature conservation reasons and in accordance with the EU IAS regulation.
2. Managed “rewilding” with the goal of combining forest and rough grassland development with targeted structuring of the open land areas.

Target species for the different stages of forest redevelopment are, for example, the warbler (*Phylloscopus trochilus*) in the pre-forest stages, and the expansion of the populations of the warbler (*Phylloscopus sibilatrix*) and the black woodpecker (*Drycopus martius*) in the emerging forest areas.

Field sites

On dry sites, rapid and successful repopulation can be expected, on nutrient-rich and wet sites, invasive plants can emerge to a particularly high degree. In this case, it is advisable to prepare the site by nutrient removal, e.g. cultivation of rye or sowing of a demanding meadow mixture. Only after an appropriate transition period (2-5 years) the actual conversion to the target species community begins.

Possible grazing as a perspective for open land management in the Lobau

The City of Vienna, Forestry and Agriculture Department, has many years of experience with nature conservation-oriented grazing of open areas with cattle, sheep and goats, e.g. in the Lainzer Tiergarten, in the Upper Lobau and the "Old Trenches" (Alten Schanzen) on the Bisamberg.

From 2004 onwards, sheep were grazed on 8.4 hectares of 'Heißlände' and meadows in the Fuchshäufel area. The grazing took place between 2006 and 2011 with an average of 20 sheep, i.e. between 0.13 and 0.5 livestock units (LSU). Scientific monitoring revealed positive effects on vegetation, such as orchid populations (see Grass et al., 2012).

Maintaining constant grazing supervision and the upkeep of forest boundaries proved to be obstacles. In addition, there was regular vandalism to the grazing infrastructure, such as damage to or removal of fences, solar panels, and grazing equipment. As a result, grazing had to be suspended in 2018. The grazing projects in the Lainzer Tiergarten, on the Bisamberg and on the Steinhof grounds are still ongoing, new grazing projects in the Vienna Woods are in preparation.

Between 2003 and 2006, a nature conservation-oriented cattle grazing project was carried out on former arable land in the area of the Festwiese in the Upper Lobau under scientific supervision. Three sub-areas of three to four hectares each were grazed with a maximum of 27 cattle. The effects on the structure and composition of the vegetation were investigated as well as possible nutrient enrichment in the soil. In an accompanying interdisciplinary expert working group, the grazing was analyzed in terms of location with regard to an expansion to up to 126 hectares of meadow, former arable and arable land. A major obstacle for a long-term implementation was the distribution over numerous individual areas. From the point of view of nature conservation, the use of mowing pastures was considered to be a possible perspective in conformity with the national park, since the FFH habitat type of lowland mowing meadows can be created as a development goal. A purely cattle grazing method was not considered sufficient from a technical point of view. Since then, the areas have been managed as mowing meadows.

For the development of scenario A, the horse grazing of the WWF in the Marchauen in Marchegg was visited as a best practice example, where Konik horses have been kept on about 80 ha of contiguous area all year round since 2015. This visit showed that while in Marchegg there is a large contiguous area along the flood control dam with partial grazing of forest areas, grazing in the Lobau would be divided into a higher number of individual areas due to the complex landscape structure and trail network. This would necessitate the use of protective fencing, on the one hand, to prevent large-scale forest grazing, and on the other hand, due to the existing network of paths and the high number of visitors. The fence lengths thus required would conflict with the natural use of space by the existing

larger mammal species red deer, roe deer and wild boar and lead to a fragmentation of wildlife habitats. Due to the high number of visitors in the Lobau, which is many times higher than in the Marchauen, paths crossing the grazing areas would be associated with a high risk of accidents, for example in connection with dogs. In the metropolitan environment, unfortunately deliberate endangerment, injury or killing of grazing animals must be considered. The labor required to maintain fences and daily security checks against vandalism would also have to be taken into account when designing a grazing scheme. Furthermore, grazing of large areas would result in changes in the habitat mosaic in Lobau, particularly local increases in scrub encroachment with loss of specific open land habitats, local diversification due to nutrient input from excreta and the selection or promotion of individual species through feeding behavior and tread. The length of distinct transition zones would decrease and with it the habitat suitability for species associated with them.

For these reasons, the option of extensive grazing was deferred in the course of developing Scenario A.

Possible forest redevelopment of arable land in the Lobau

Extensive experience has already been gained for the forestation of current arable land as, since the establishment of the Danube Floodplain National Park, about two thirds of the former arable land has already been abandoned in favor of forest and meadow areas. In view of the currently existing site conditions, it is in particular the species communities of the "Harten Au" with lime (linden), elm and oak species as well as field maple that are suitable as target communities in addition to pioneer species such as the silver poplar.

Existing forest areas in the Upper Lobau

→ **Field maple rich woodland** is mainly found in insular form in the field landscape of the Upper Lobau or around the 'Heißlände'. Their broad shrubby margins often merge into dry meadows or semi-arid grasslands. In the tree layer, besides the field maple, mostly field elm, sometimes oak, wild apple, small-leaved lime (linden) and occasionally silver poplar are found. The shrub layer is usually relatively dense and species-rich.

→ **Silver poplar** sites: These populations are "extensively developed in Lobau" in the current forest composition (Hollinger 2019). The pioneer character of this species should be noted and there is a possibility for expansion into additional farmland with a focus on adjacent areas.

→ **Black poplar** sites: the pioneer character of the sites should also be noted for areas with black poplar communities. The former contiguous populations have largely thinned out. Thus, the occurrence is now limited to scattered individuals throughout the area.

SCENARIO B:

"DONAU-AUEN NATIONAL PARK AS A WATER-DOMINATED FOREST LANDSCAPE WITH PROTECTED MEADOWS AND BIODIVERSITY-PROMOTING ORGANIC AGRICULTURE"



Fig. 3 Visualization scenario B (Editing: TBK, 2021).

Foundations for a scenario of biodiversity-promoting organic farming on the remaining seven percent of Vienna's share of the Danube Floodplain National Park:

- - The distinctive landforms of the individual field areas represent a cultural-historical heritage from the former river landscape
- - This habitat mosaic produces an exceptionally high length of transition zone habitats, which in many places is closely related to the traces of the original backwaters before the Danube was regulated and has since safeguarded the habitat of open land species that used to live on riparian banks.
- - The soils are of a high quality as a result of about forty years of organic farming and, due to their isolated location, they are also better protected against problematic weed species than arable land outside the national park.

- - The sizes of the fields vary between 0.5 and 28 hectares and require individual concepts for re-structuring.

An important basis for the development of regionally suitable structuring features with high effectiveness in species protection is the concept of **multi-use hedges** of Bio Forschung Austria (Ableidinger et al. 2020) and the structuring approaches described in the practice manual Naturschutzbrachen im Ackerbau (Berger et al. 2011).

On this basis, the Local Implementation Plan LUP-AT for Vienna has focused on permanent habitat features. There is a serious deficiency of these in modern farming practice and they are not sufficiently taken into account in current agricultural policy. Effective examples are therefore all the more important to illustrate the real possibilities of their use in sustainable and nature friendly land management.

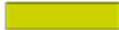







When assessing the effectiveness of new landscape elements, it is important to keep in mind that the large number of existing transition zones, which are very diverse in terms of nature conservation, can also be maintained within this concept and can even be optimized in terms of their effectiveness through structured landscape management. The proximity of new landscape elements to existing older habitats is a prerequisite and guarantee for rapid recolonization by low-mobility small animal species.

The type of restructuring is developed to take account of deficits of the landscape area: In the specific situation with high visitor pressure, there is a lack of low-disturbance small structures. Linear elements in the field are therefore developed in such a way that they are surrounded by a 30 meter wide strip of arable field. In this way, trespassing can be effectively prevented, which is extremely difficult with the existing rough pastures.

The location as well as the quantity and extent of the landscape elements determine their effectiveness in terms of nature conservation.

Ways of implementation

The following elements were used to structure the field areas in Lobau, and are shown with the number of sub-plots planned and the extent.

Permanent elements				
Linear elements		Partial areas	Area/ Number	Length
	Linear elements as ruderal meadow with single shrubs and single trees	15	21.870 m ²	7.290 m
	Singe shrub	15	630 pcs.	
	Single tree e.g. black poplar/grey poplar	15	160 pcs.	
	Fruit trees	5	145 pcs.	1.000 m
	Silver willow Head trees	2	60 pcs.	340 m
Area elements		Sub areas	Total	
	Rough meadow	14	63.950 m ²	
Annual elements				
	Annual flowering strips	9	14.450 m ²	2.890 m
	Winter greening		500.000 m ²	

Step 1: Comprehensive creation of permanent landscape features: Targeted restructuring of field areas to protect and promote open land species: linear elements along transition zones (margins), islands within the fields

In a first step, the different interests were analyzed for each field area:

- - Which species of the investigated indicator groups are currently present or have realistic colonization potential on this field area?
- - What is the connectivity to other field areas or the location within the entire protected area?
- - Which crop species are cultivated, how are the crop rotations composed?
- - What is the potential for other crop types?
- - What is the location of recreational trails and how are possible disturbance effects to be assessed?

On this basis, practical solutions for re-structuring were sought in several rounds of talks with the estate management Karl Mayer and Gerhard Wehofer from the Lobau Biocenter of the City of Vienna. From an operational point of view, any restructuring affects the management possibilities. This is relevant, since production conditions are also constantly changing and require corresponding adjustments. For this reason, permanent re-structuring of fields has hardly been included in national agricultural programs for more than twenty years.



Fig. 4 Working map for re-structuring a field area with linear elements and rough pastures (Editing: TBK, 2021).

Step 2: Optimization of current management: adaptation of crop types, crop type sequences, intercropping or seeding in marginal zones.

As part of the local implementation plan, permanent structures will be elaborated in detail as a contribution to climate adaptation and biodiversity enhancement. The measures to optimize ongoing management cannot be meaningfully drawn up in a long-term plan, as this would not take into account any future situation-adapted responses in agriculture that may become necessary.

On the level of a basic concept within the AgriNatur strategy, the scientific analysis can however complement the practical experience of farm management with goals and objectives. Therefore, the basic aspects are outlined but specific relevance to farm planning is not defined.

ECONOMIC PLANNING AND AGRICULTURAL ECONOMIC MODEL FOR LOCAL IMPLEMENTATION PLAN AT ("LUP-AT").

In this part of the project, the actual monetary added value from the production of raw materials for food production that can be achieved on the agriculturally used land within the project area, was determined. This was done on the basis of the contribution margin, which is a frequently used yardstick for the evaluation of different production processes, especially in agricultural economics.

A number of recently published research reports demonstrate the importance of maintaining agricultural soils that are highly resilient to changing climatic conditions for future food security. In a study commissioned by the Federal Ministry of Agriculture, Forestry, Environment and Water Management, data from the Financial Soil Estimate were used to calculate how the natural yield capabilities of Austria's arable and grassland soils will be in a changing climate (increasing average annual temperatures and changing rainfall distributions) in the future (2035-2065). The results showed a reduction of the yield capacity of the soils, which in the worst case will be up to 19% on average throughout Austria.

In terms of food security, the protection of agriculturally productive areas is of great importance. This is especially true for those areas whose soils have favorable properties (sufficient humus content, favorable grain size composition, etc.). The soils of the Lobau fields have such favorable properties. In addition, the location in the alluvial landscape offers a more favorable microclimate than the areas outside of it, as well as a partial influence on the groundwater and thus the guarantee of a balanced water supply.

Results

The crops used on the Vienna farm correspond to a marketable crop rotation. Fig. 5 shows that edible potato and green pea are responsible for the majority of the total cover contribution. However, not least because of irrigation measures during spring dry spells, these two crops are also the most intensive crops in terms of labor input.

Potato is the most important food crop worldwide after cereals (Lutaladio & Castaldi 2009). In developed countries, potato contributes 540 kJ (130 kcal) of daily energy intake per person (Burlingame et al. 2009). If this figure is used to calculate the number of people who can be fed by the amount of potatoes produced on the Lobau land in the reference year, taking into account the energy content of potatoes (approx. 300 kJ/100 g), this results in a figure of 1.8 million, which is roughly equivalent to the population of the city of Vienna.

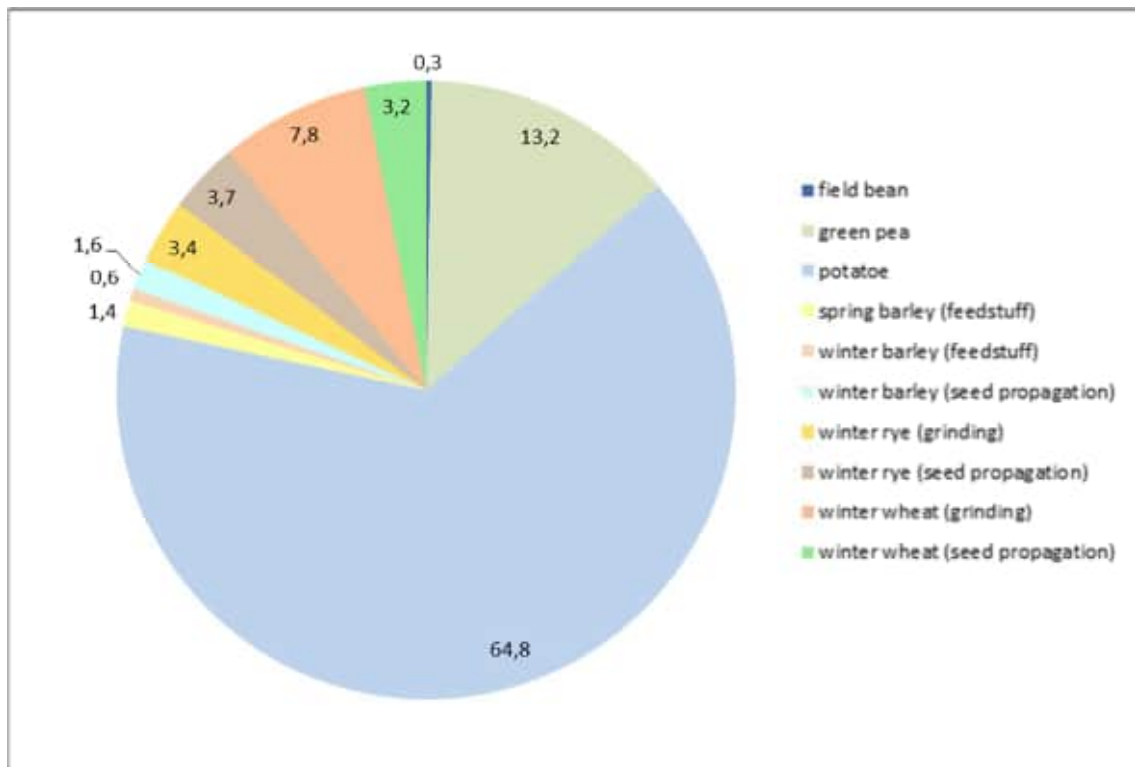




Fig. 5 Representation of the shares [%] of the individual crop types in the total coverage contribution of the arable land in the Lobau region.

Summary comparison of the scenarios - an AgriNatur strategy.

For the Viennese share of the Danube Floodplain National Park, a proposal for re-zoning was elaborated on the basis of experience and detailed monitoring by the district foresters, raising the natural zone to 75 percent. The AgriNatur strategy deals with possible perspectives for the remaining approximately 180 hectares of open land that have been developed as organic cropland for about forty years.

In order to be able to provide a sufficiently secure basis for long-term effective and far-reaching decisions in ecosystems and species communities, comprehensive surveys, including species-rich species groups, were carried out in a species-specific monitoring. In addition, the aspects of research, environmental education, recreation and agriculture were taken into account in the AgriNatur Strategy to ensure a differentiated view. The subject of both scenarios are the perspectives for this 1.77 percent share of the Danube Floodplain National Park, on which organic farming is currently still practiced.

The contents of the Local Implementation Plan AT ("LUP-AT") for the Viennese share of the Danube Floodplain National Park were discussed in numerous coordination meetings with regional partners, international experts and in public discussions. These took place in 4 bilateral workshops, from May 27, 2020 to May 26, 2021, as well as in a research evening on November 3, 2020. The conclusions of these discussions are reflected in subsequent impact statements and reports.

Scenario A "Water-dominated woodland landscape with preserved meadow component"	Scenario B "Water-dominated forest landscape with preserved meadow share and biodiversity-enhancing organic farming".
	
Biodiversity, process protection, research, environmental education and recreation	
Summary of the effects on the national park objectives under consideration	
<p>The previous strengths of the national park concept are preserved over a large area. There is only a small added value from the expansion of forest areas on the remaining organic farmland, as the forest species community is already well developed. A large amount of transition zones between forest and cropland in the area will be lost. As a result, minor decreases in shrub species are anticipated</p> <p>For the open land species affected by this, it must be noted that the open habitats in the Danube foreland largely do not have comparable habitat suitability and development potential and therefore a regional decline of these species must be expected.</p> <p>For the recreation-seeking population, a significant reduction in the quality of visit is to be expected due to the loss of the fruit tree alleys and semi-open landscape.</p> <p>The potential for recreation is also reduced by the abandonment of farm roads.</p>	<p>A multifaceted proposal for a comprehensive environmental education on climate adaptation, food security, cultural landscape and species protection in the semi-open, richly structured organic field landscape, the preservation and promotion of local open land species in the National Park in an innovative and model project for permanent landscape elements: Species protection for endangered species of the NP Danube Floodplain such as field hamster, sand lizard, red-backed shrike, whitethroat, Argus blue butterfly, Viennese night peacock, copper ground beetle, narrow bees, perennial yellow-woundwort and field gromwell.</p> <p>The increase of habitat diversity is essential for more than 300 open land species by creating permanent landscape features.</p> <p>Maintaining a near-natural, unpaved condition of recreational and management trails as habitat for open land species.</p>
Impacts on the biodiversity conservation goal	
Detailed consideration of the selected indicator groups of the open landscape habitats. <i>(own processing Team TBK)</i>	
<p>Ground beetles (90 species):</p> <p>31 Species Decline > 25 % Habitat area</p> <p>38 Species Decline < 25 % Habitat area</p> <p>1 Species no effect</p> <p>20 Species Increase < 25 % Habitat area</p>	<p>Ground beetles (90 species):</p> <p>0 Species Decline > 25 % Habitat area</p> <p>0 Species Decline < 25 % Habitat area</p> <p>0 Species no effect</p> <p>29 Species Increase < 25 % Habitat area</p>

0 Species Increase > 25 % Habitat area Wild bees (209 Species): 28 Species Decline > 25 % Habitat area 139 Species Decline < 25 % Habitat area 3 Species no effect 39 Species Increase < 25 % Habitat area 0 Species Increase > 25 % Habitat area Butterflies (45 Species): 5 Species Decline > 25 % Habitat area 22 Species Decline < 25 % Habitat area 0 Species no effect 18 Species Increase < 25 % Habitat area 0 Species Increase > 25 % Habitat area Birds (73 Species): 9 Species Decline > 25 % Habitat area 18 Species Decline < 25 % Habitat area 9 Species no effect 37 Species Increase < 25 % Habitat area 0 Species Increase > 25 % Habitat area Field herbs (99 Species): 70 Species Decline > 25 % Habitat area 0 Species Decline < 25 % Habitat area 0 Species no effect 17 Species Increase < 25 % Habitat area 12 Species Increase > 25 % Habitat area	61 Species Increase > 25 % Habitat area Wild bees (209 Species): 0 Species Decline > 25 % Habitat area 0 Species Decline < 25 % Habitat area 2 Species no effect 142 Species Increase < 25 % Habitat area 65 Species Increase > 25 % Habitat area Butterflies (45 Species): 0 Species Decline > 25 % Habitat area 0 Species Decline < 25 % Habitat area 0 Species no effect 21 Species Increase < 25 % Habitat area 24 Species Increase > 25 % Habitat area Birds (73 Species): 0 Species Decline > 25 % Habitat area 0 Species Decline < 25 % Habitat area 9 Species no effect 50 Species Increase < 25 % Habitat area 14 Species Increase > 25 % Habitat area Field herbs (99 Species): 0 Species Decline > 25 % Habitat area 0 Species Decline < 25 % Habitat area 3 Species no effect 96 Species Increase < 25 % Habitat area 0 Species Increase > 25 % Habitat area
Summary of the effects of the two scenarios studied on the populations of the open landscape species studied in the Donau-Auen National Park	
<p>Of the 516 species studied, 361 are expected to experience negative population trends as a result of the implementation of scenario A. Of these, 143 species are even expected to experience strong declines of more than 25 % of the total habitat areas up to extinction of the populations.</p> <p>for 143 species a positive population trend is expected, of which a clear positive trend is foreseen for 12 species.</p> <p>No trend can be identified for 12 species, so no relevant impacts are foreseen.</p> <p>This is to be expected, since these are the last open land areas with soil dynamics (worked soil) in the Danube Floodplain National Park.</p>	<p>Of 516 species studied, no species is expected to experience negative population trends as a result of Scenario B. This is not surprising, since it ensures a basic preservation of the open land area.</p> <p>For 502 species a significant safeguarding and improvement of the habitat area is expected of which for 164 species it is considered certain. The restructuring of field plots with linear elements, rough pastures, avenues, pollarded willows and annual flowering strips creates a permanent and sustainable habitat improvement for open land species.</p> <p>For 14 species, no clear trends could be derived.</p>
Total (516 species): 143 Species Decline > 25 % Habitat area 218 Species Decline < 25 % Habitat area	Total (516 species): 0 Species Decline > 25 % Habitat area 0 Species Decline < 25 % Habitat area

<p>12 Species no effect</p> <p>131 Species Increase < 25 % Habitat area</p> <p>12 Species Increase > 25 % Habitat area</p>	<p>14 Species no effect</p> <p>338 Species Increase < 25 % Habitat area</p> <p>164 Species Increase > 25 % Habitat area</p>
<p>Effects on the protection of ecological systems and the goal of rewilding</p>	
<p>The proposed re-zoning brings a significant increase in the size of the natural zone in the Viennese portion of the Danube Floodplain National Park, giving more space for rewilding. This is the basis of both scenarios.</p>	
<p>Scenario A creates a larger contiguous forest area for large-scale active species with expansion near the city, creating larger buffer zones for areas farther east, to the extent of about 1.5 percent of the national park area. Positive effects for the protection of ecological systems can be achieved by abandoning management roads that are no longer needed.</p>	<p>Protection of ecological systems is well developed in much of the national park. No negative effects on these will result from Scenario B compared to the current situation.</p>
<p>Implications for research</p>	
<p>In the Danube Floodplain National Park, research into natural species communities and the dynamics of their habitats is a particular focus</p>	
<p>The conversion processes from arable land to meadows and forests have been researched in the upper Lobau for years. Methods of conversion to meadows and forests have also been investigated, which form a valuable basis for further projects. The management of 'Heißländer' forms a specific research topic in the upper Lobau as well as the change of the water balance and the development of perspectives to promote the forested floodplain character. Scenario A does not limit this research potential and it can be deepened at the additional sites.</p>	<p>Within the biodiversity research in the Lobau, the documentation of the emergence of organic agriculture has represented a central role for 30 years through the continuous activity of Bio Forschung Austria. Thus, in view of the possibility of research independent of agricultural policy framework conditions, one of the best-studied organic farming areas has emerged. The perspective of a further development to a biodiversity-promoting organic agriculture opens a new field with great contemporary relevance. The existing research direction is not restricted by scenario B and can be supplemented by further topics.</p>
<p>Effects on regional recovery</p>	
<p>The distribution of recreational users in the Danube Floodplain National Park is very heterogeneous. Corresponding to the general conditions, the consequential effect of the scenarios on recreation is also different. For people seeking recreation, the quality of visit and, in the specific case, the opportunities to experience nature are particularly important.</p>	
<p>The Viennese share carries the largest share of visitor flows in the Danube Floodplain National Park. Estimates for the annual number of visitors to the Lobau are currently around two million. Due to the nearby catchment area of the federal capital, the Upper Lobau with its semi-open landscape structure carries most of this public.</p> <p>Large-scale forestation results in a significant reduction in the quality of the experience, since large forest areas have a lower quality of visit for the majority of people than a semi-open landscape with varied views and better orientation possibilities.</p> <p>An increased concentration of the population seeking recreation can therefore be expected in other areas.</p>	<p>Structuring is directly linked to an increase in recreational value and the opportunity to experience a near-natural environment (forest, backwaters, marshland, 'Heißländer') combined with a cultural landscape with avenues of fruit trees, rows of pollarded willows, groves with rough meadow elements, wild rose bushes and old trees.</p> <p>In arable areas, the creation of a network of undisturbed retreats for diverse species groups ensures a significant reduction of the negative effects of visitor flows on biodiversity. This is achieved through the creation of natural strips of land and shrubby islands within the field plots with a distance of approximately 30 m to the field margin.</p>

	In meadow areas, visitor control is limited as access cannot be effectively regulated in view of the large visitor numbers.
Effects on environmental education	
As part of the AgriNatur strategy, a network of high quality rest areas is being developed in the foreland of the Danube Floodplain National Park close to settlements, offering information on animal and plant species in an interesting and diverse way.	
Within the framework of scenario A, there is a significant increase in the size of the rough pastures in the area of the Schusterau, creation of a contiguous complex of rough pastures in the area of the Schusterau adjacent to existing rough pastures, which, like the succession areas of the future forest sites, can be the basis for environmental education measures.	Enhanced opportunities for environmental education and recreation. Encouragement of comprehensive environmental education on climate adaptation, food security, cultural landscape and species conservation in the semi-open, richly structured organic field landscape as well as in the varied natural zones.
Withdrawal of human influence by abandoning cultivation paths.	Climate adaptation and safeguard of regional food supplies through microclimate enhancement.

Decisions for specific nature conservation goals of the two scenarios also have social consequences. The regional economic consequences for the city of Vienna are presented on the basis of the changes in agricultural yields and the effects on regional food security.

Scenario A “Water-dominated woodland landscape with preserved meadow component“	Scenario B "Water-dominated forest landscape with preserved meadow share and biodiversity-enhancing organic farming"
<p align="center">Summary of the effects on the regional economy</p> <p>In many large protected areas, there is a lack of personnel and funding for the effective administration of conservation areas and landscape management, which, despite comprehensive legal safeguards, leads in practice to many losses of biodiversity. In addition to the ecological aspects, a regional economic assessment is therefore also an essential prerequisite for the long-term achievement of objectives.</p>	
<p align="center">Reduction of agricultural yields</p>	
<p align="center">As a basis for the overall evaluation of the changes in agricultural operations, our own above-mentioned economic evaluation of the agricultural operation in the Lobau was carried out (calculation of contribution margin).</p>	
<p>Since there is a permanent cessation of agricultural production in scenario A, the average annual decrease in agricultural yields due to abandonment of all arable land is 100 percent:</p> <p>Average € 290,000.00 contribution margin pa., less current expenses for personnel and inputs and overhead costs.</p>	<p>Decrease of agricultural yields due to reduction of available arable land in scenario B by approx. 6 percent, taking into account the agri-structural optimizations in the course of the land reorganization: max. € 17,000.00 pa., since synergistic effects occur as a result of land readjustment.</p> <p>Further annual measures on up to 2 percent of the area according to the crop types: € 5,900.00 p.a.; Proportionate to the total farm expenses, the current costs for personnel and operating resources are to be deducted.</p>
<p align="center">Effects on food security</p>	
<p>Since 1927, the world human population has more than tripled, and a fivefold increase is expected by 2050. A simple separation or even decoupling of global and local trends is no longer possible.</p> <p>The city of Vienna has also experienced a population increase of about 25 percent in the last generation and is one of the most important cities in the Danube region in a metropolitan network with Brno and Bratislava. These regional conditions are included.</p>	
<p>Moderate reduction in the supply of organic food to the regional population for the following crops</p> <ul style="list-style-type: none"> - rye - wheat - barley - potato - green pea <p>The loss of propagation areas (for our own organic seeds) which are in isolated locations and thus exposed to low impacts from neighboring crops and associated risks from plant diseases is considered critical. Seed propagation is an essential component of a regional food self-sufficiency.</p>	<p>Value-determining criteria for regional food security are the high quality of the production sites in the Lobau and their specific location: due to decades of organic farming, the soils are largely toxin-free, in a healthy condition and only exceptionally require supplementary fertilizers, as the crop rotation is mature.</p> <p>Inclusion of biodiversity-promoting organic farming with 40 years of experience in the research mission of the national park. Economic improvement by reducing the acute angles of the field pieces, while increasing the length of field margins, soil protection through near-natural crop rotation and winter greening.</p>

For a comparable economic evaluation of the two scenarios, the direct follow-up costs were estimated in a differentiated manner.

Scenario A “Water-dominated woodland landscape with protected meadow component“	Scenario B "Water-dominated forest landscape with protected meadow share and biodiversity-enhancing organic farming"
<p align="center">Follow-up cost estimate</p> <p align="center">(own calculations Team TBK)</p>	
<p align="center">The cost calculations listed were derived from comparable landscape maintenance measures on the basis of our own calculations. The specific structural situation of the agricultural and forestry enterprise of the City of Vienna was taken into account in the cost calculation.</p>	
<p>Scenario A</p> <p>One-time € 540,000.00 for creation of forest development areas and rough pastures</p> <p>Annually € 8.000,00 meadow maintenance</p>	<p>Scenario B</p> <p>One-time € 70.000,00 for the production of the landscape elements</p> <p>Annually € 60.000,00 maintenance of the landscape elements</p>
<p>Scenario A (approx. 180 hectares, estimate based on our own calculations)</p> <p>160 ha creation of forest development areas, managed rewilding, initial plantings and neophyte management: € 320.000,00 within five years</p> <p>160 ha development maintenance of forest development areas, managed rewilding, initial planting and neophyte control: € 160.000,00 within five years</p> <p>Costs for creation of approx. 20 ha of rough grassland: € 60.000,00</p> <p>Costs for annual maintenance of approx. 20 ha of rough grassland: € 8.000,00 pa.</p>	<p>Scenario B (approx. 180 hectares, estimate based on our own calculations)</p> <p>Winter planting on the arable land not occupied by winter cereals (approx. 60 hectares), operational requirements still to be clarified so that no difficulties arise due to weed pressure: € 8,000.00 p.a.</p> <p>Establishment of the 10.7 hectares of permanent elements (soil preparation, spontaneous and controlled seeding, planting, professional supervision): € 70,000.00</p> <p>Maintenance costs for the upkeep of the permanent elements: one full-time position for the farm € 60.000,00 pa.</p>

Target developments in nature reserves with varying protection statuses are sensitive societal processes and require differentiated concepts. These are discussed in many regions worldwide (e.g. Campedelli et al. 2015). In the Mid-term Review of the EU Biodiversity Strategy of the European Commission by the Umweltdachverband, the specific target 6 was formulated as: "By 2020, increase the EU's contribution to preventing global biodiversity loss" (Umweltdachverband 2015). The facts presented in the AgriNatur strategy show the concrete effects of biodiversity loss with reference to particular species and solutions.

In many protected areas, linking sustainable land use and conservation concepts is seen as an opportunity. A position paper of the Organization of Protected Areas in Europe clearly advocates this path (Europarc Federation 2018). For the next period of Natura 2000 landscape expansion under the Biodiversity Strategy 2030, a differentiated approach will be crucial, as the focus will

be within cultural landscapes. However, there still seems to be a lack of experience and successful model examples. The AgriNatur strategy developed in this project gives innovative recommendations for the improvement of biodiversity in Natura 2000 areas of the project region and can provide an important impulse for the future European agricultural policy. It can also effectively safeguard the continued survival of many hundreds of animal and plant species.

In summary, it can be stated that both scenarios have comprehensive and different effects on the future development of this European Protected Area, although only small areas of the entire national park are affected. With both scenarios the objectives regarding the proportion of natural zones can be achieved. The above overviews summarize the aspects of the national park objectives, regional economic aspects and consequential costs that were identified during the preparation of the Local Implementation Plan AT ("LUP-AT").

In the summarized technical evaluation of the scenarios, Team LUP AT recommends the further pursuit of Scenario B "Donau-Auen National Park as a water-dominated forest landscape with protected meadows and biodiversity-promoting organic agriculture", especially from the perspective of species protection, since under these framework conditions positive population developments can be expected for 502 of the 516 species studied, while no species is impaired. Scenario B is also more effective when evaluating the other aspects such as research, regional recreation, environmental education, synopsis of impacts on the regional economy such as reduction of agricultural yields and impacts on food security. Scenario A "Donau-Auen National Park as a water-dominated forest landscape with areas of protected meadows" does not contribute any relevant additional effectiveness in view of the process protection goals already implemented on a large scale on 9400 hectares, but significant negative population trends are to be expected for 361 species.

The AgriNatur LUP-AT Team

For this project we have come together as a thematically broad team of agroecologists, environmental and bioresource managers, biologists and landscape planners with existing project experience and many new, innovative ideas to be able to implement the complex project idea in the best possible way. The individual team members were also enthusiastic about the importance of sustainable development in the Danube Region in the Expert Group Sustainable Development & Public Participation (EG SDPP) of the International Association for Danube Research (IAD). In this expert group IAD EG SDPP we are working on the realization of the ideas of the EU Strategy for the Danube Region (EUSDR). A current goal is the development of a Danube Landscape Task Force (DL:TF) in the Action Plan of the EUSDR Priority Areas 6 Biodiversity, Landscape, Air and Soil Quality. This serves our goal to be active on a strategic policy level in the Danube Region on the one hand, while focusing on concrete implementation on the other.

Names	Function in the project	Focus in the processing
Barbara Brandstätter BSc	Project Manager-Vice,	Data preparation and data analysis of monitoring results and target species, local implementation plan LUP-AT, conception and realization of expert workshops, video
Dipl.-Ing. Anna Dopler	Agroecologist	Data preparation and analysis of boundary lines and zoning proposal, local implementation plan LUP-AT, conception and realization of expert workshops
Dipl.-Ing Dr. Hans Peter Haslmayr	GIS project coordination, landscape planner	Data preparation and data analysis of the economic basics of agriculture in the study area
Dipl.-Ing. Daniela Hofinger	Project manager-deputy, economic evaluation, soil science expert	Data preparation and data analysis of monitoring results and target species, local implementation plan LUP-AT, conception and realization of expert workshops
Dr. Gabriele Kutzenberger	Coordination target species, environmental and bioresource manager	Local implementation plan LUP-AT, preparation of the visualization of the scenarios
Dipl.-Ing Dr. Harald Kutzenberger	Biologist	Project coordination, analysis of monitoring results and target species, local implementation plan LUP-AT, conception and realization of expert workshops
Dipl.-Ing. Milena Mc Innes	Project manager, expert for nature conservation and landscape design, member of Steering Group PA6 EUSDR	Data preparation and data analysis of boundary lines and zoning proposal, Local Implementation Plan LUP-AT, conception and realization of expert workshops
Tatiana Meshkova BA	Landscape Planner	Local implementation plan LUP-AT, conception and realization of expert workshops
Dipl.-Ing. Valentin Rakos	Student Environmental and Bioresource Management	Data preparation and data analysis Monitoring results and target species, Local Implementation Plan LUP-AT, conception and realization Expert workshops

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Annex II: LUP HU



Local AgriNatur Plan Overview

LOCAL STRATEGY TO IMPROVE THE
BIODIVERSITY AND RESILIENCE OF THE
MOSON PLAIN

2021

Széchenyi István University
Faculty of Agricultural and Food Sciences

Local AgriNatur Plan - Overview

Local strategies to improve biodiversity and resilience of the Moson Plain

Széchenyi István University, Faculty of Agricultural and Food Sciences



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MOSONMAGYARÓVÁR

2021

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The Moson Plain

Location

The Moson Plain High Nature Value Area (HNVA) is located in the Kisalföld, part of the Győr Basin, in Győr-Moson-Sopron County. It is bordered by the Danube to the north-east, the Hanság to the south-east and the Parndorf plateau to the west. Its altitude is 110-130 m above sea level. Due to the minimal differences in altitude, no comprehensive network of valleys could form (Moson Plain, Special Protection Area Conservation Plan, 2007). The total area of the Moson plain is 13,209 hectares, which falls under the jurisdiction of the Fertő-Hanság National Park (Figure 1). Together with Austria, the Fertő-Hanság National Park is a natural reserve that stretches beyond our borders. As a cultural landscape, it is also a UNESCO World Heritage Site (Natura2000.hu, maps). The Moson Plain was designated as an Environmentally Sensitive Area (ESA) in the Joint Decree No. 2/2002 of the Ministry of Environment and the Ministry of Agriculture and Rural Development. More than 80% of the area is privately owned by various individuals and companies.



Figure 1: The operational area of the Directorate of the Fertő-Hanság National Park. Source: Falutur.hu

The wooded alluvial plain, with its high floodplain position, joins the Szigetköz from the south-south-west. The major watercourses of the Moson Plain are the Hungarian section of the Lajta and its left-bank channel, and the Rét-árok (State Nature Protection website, 2020).

General description of the area

Due to the excellent physical and chemical properties of the soils in the Moson Plain, almost the entire area is under cultivation. In the central, more prominent parts of the region, there are Pleistocene alluvial fans, and calcareous chernozem soil. The soils, characterised by a thin layer of humus in part of the area, are very fragile, covering the landscape in only a thin layer, so they are particularly susceptible to drought. Soil erosion is significant in the Moson Plain, with eroded areas reaching up to 20-30%. Although there are natural reasons for this, human activities such as landscape management have also accelerated the process (Moson Plain, Wikipedia).

The area has a low proportion of grassland, woodland, and natural communities. The main objective of establishing the Moson Plain as an important ESA was to combine agriculture with the maintenance and development of bird habitats, thus helping to maintain and increase the population of the great bustard, among other species. Thanks to a long-standing agricultural system, animal species that are particularly adapted to agricultural habitats are common in the area. The area is a popular and important habitat for the great bustard population in the Little Hungarian Plain. Since they build their nests on the ground, the use of bird-friendly mowing methods, as defined in the NATURA 2000 regulations, and the use of the "mowing from the inside out" method are of particular importance in areas with rich bustard populations on the Moson plain. In addition to the great bustard, there are a large number of valuable native birds, including the saker falcon, the eastern imperial eagle, the red-footed falcon, the short-eared owl, the Eurasian stone-curlew, Montagu's harrier, the European bee-eater and the great grey shrike. The Plain is also home to the only significant population of great bustards and red-footed falcons in Transdanubia (Natura 2000 website, 2020).

Meteorological description of the Moson Plain

Data from the Meteorological Station of the Faculty of Agricultural and Food Sciences of the Széchenyi István University in Mosonmagyaróvár, Hungary, are used to characterise the climate of the area. Data collection was partly automated and partly manual.

Climate: the area has a humid continental climate with a strong influence from the Atlantic Ocean.

Irradiance: annual average of 4300-4400 kJ/m², dominated by cloud cover. The Moson Plain is frequently overcast, with an annual average of more than 60%.

Sunshine: the number of hours of sunshine ranges from 1900-1960, as seen in the country's data, but it is lower in the western regions.

Temperature: Figure 2 shows the monthly average temperature trends in the area. Based on the data measured between 1971 and 2015, the average annual temperature in the Moson Plain is 10.3°C, which corresponds to the average temperature in Hungary of around 10°C. The coldest month in the area is January, which is slightly colder than in the rest of the country. The warmest month is July, which is slightly cooler than elsewhere due to marine air masses. The temperature variations (18-20 °C) are also lower than the Hungarian average.

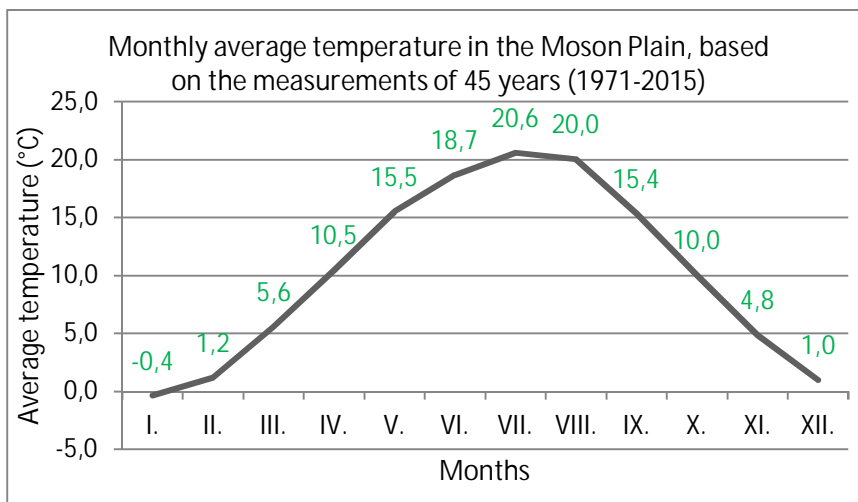


Figure 2: Changes in the average monthly temperature of the Moson Plain in the period 1971-2015. Source: SZE MÉK

Wind: Due to the Devín Gate, the Little Hungarian Plain is the windiest landscape in the country, with the prevailing wind direction being north-west. The average wind speed is 3.0-3.5 m/s. Precipitation: Figure 3 shows the annual distribution of monthly average precipitation in the Moson Plain. The annual precipitation for the period 1971-2015 is 561 mm.

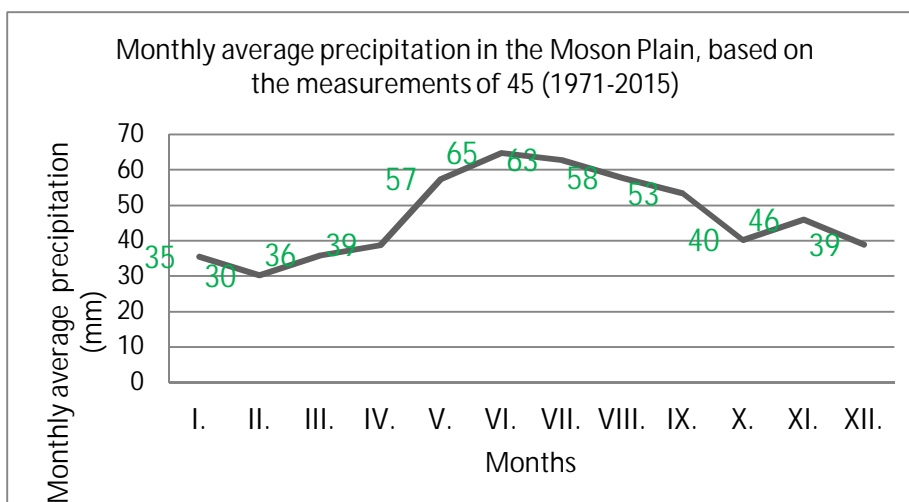


Figure 3: Monthly average precipitation in the Moson Plain over a long period of time (45 years). Source: SZE MÉK

The Moson Plain area has a late spring to early summer rainfall with an average monthly maximum of around 60 mm. Most of the rain is typical during the summer due to the maximum water vapour content of the atmosphere and the forms of precipitation caused by upflowing warm air, as well as high-humidity air masses flowing in from the Atlantic Ocean. The favourable precipitation distribution also includes an autumn rainfall maximum, usually in November, of about 50 mm. In autumn, maximum precipitation is caused by frequent Mediterranean storms. Overall, we can state that **the water balance is likely to further deteriorate due to climate change**, in the area of the **Moson Plain**. This can be explained by an increase in evaporation as temperatures rise, along with an unfavourable change in precipitation.

Historical utilization of the land

The Moson Plain's location close to the border has played, and continues to play, a significant role in shaping the current landscape. In ancient times, the border of the Roman Empire, the Limes, ran here as well. The region has often been at the centre of wars and migrations. As a result, the unique image of the Moson Plain is now barely recognizable. The area did not require the same degree of water control and drainage as the Great Hungarian Plain to bring the land into cultivation. Large parts of the area are located in such a way that they are protected from the major floods, and there is no risk of inland water due to the excellent hydrological characteristics of the soils. As a result, even centuries ago, the proportion of land under cultivation was much higher than in other parts of the country. In 1858, the proportion of arable land was 51% and that of meadows and pastures only 38%, while in 1877 these two figures reached 63% and 28%, respectively. The proportion of forests was already below 6% (Moson Plain, Special Protection Area Conservation Plan, 2007).

The major water control on the Moson Plain was the regulation of the Lajta, which was completed by 1932. In the 20th century, the irrigation system for the arable lands of the Moson plain was developed over almost the entire plain. Its wells can still be found today, but, apart from a few exceptional cases, they are currently only used for irrigation on neighbouring Austrian lands.

Two major processes took place in the 18th and 19th centuries, the impact of which on the landscape is still evident today. The demesne latifundiums were established and the Germans settled. (Moson Plain, Special Protection Area Conservation Plan, 2007).

The presence of latifundiums has fundamentally determined the local production structure. Even in the early 1800s, farming was typical only in the immediate vicinity of the villages, the rest being pasture or fallow land (Horváth, 2013). Antal Wittmann ruled the Archduke's manor in Magyaróvár between 1814 and 1840. In the fallow land of the three-field system. First, he sowed alfalfa to improve the soil, provide fodder for livestock and increase the proportion of the field of root crops. He considered it very important to make good use of the organic manure produced by livestock farming, and he supported the plantation of trees (Horváth, 2013).

Subsequently, until the early 1990s, the region was at the forefront of agricultural innovation, unfortunately often without regard for the preservation of natural resources and biodiversity. The area is characterised by an even, well-planned parcel structure bordered by protective stretches of woods, the beginnings of which can be seen on a map from 1852, in a layout similar to today's.

A significant part of the land was privatised after the change of regime and is in permanent private use, and the production structure has undergone further changes. The portion of grassland in the total area has continued to decrease, while the proportion of arable land increased significantly. In woodland areas no substantial changes were observed.

With the intensification of production, large parcels of land are becoming increasingly popular, while cultivation in small parcels is becoming much less common. A greater number of areas are being integrated, in which farmers are growing seeds under the supervision of larger local agricultural companies. An important step forward is the increasing emphasis of farmers on environmentally friendly farming techniques. More and more people are using precision farming tools and precision farming cultivation methods. Thanks to extra subsidies and favourable marketing opportunities, an increasing number of farmers are switching to organic farming, either for their entire

farm or for a few hectares or parcels of land in addition to conventional farming, with zero use of pesticides and fertilisers.

Main legislation in the area

The obligations and regulations for nitrate vulnerable zones are laid down in Decree No. 59/2008 of the Ministry of Agriculture and Rural Development. The Decree contains the Good Agricultural Practice (GAP) requirements, which apply to all farmers who farm in nitrate-vulnerable areas and keep more animals than needed for self-consumption. The most important of the main regulations are highlighted: No more than 170 kg/ha active substances can be applied to the lands by organic manner, including the method of grazing animals. The application of manure is prohibited between 31 October and 15 February, except for topdressings in winter cereal cultivations from 1 February. Winter grazing is allowed if the nitrogen content of the manure of the grazing animals does not exceed 120 kg/ha per year. When calculating the amount of nutrients to be applied, the nutrient supply of the soil, the needs of the crop to be grown and the conditions of the growing area should be taken into account for the preparation of a nutrient management plan. Applied farmyard manure must be worked immediately and uniformly into the soil, and liquid manure must be applied only by machinery that applies it to the soil surface or into the soil and mulches in one operation. Temporary manure heaps may be maintained for a maximum period of two months in one place *(Decree No. 59/2008 (IV. 29.) of the Ministry of Environment and the Ministry of Agriculture and Rural Development.)*

The Decree No. 50/2008 of the Environment and Ministry of Agriculture and Rural Development on the Good Agricultural and Environmental Conditions (GAEC) is also worth mentioning. This is also a country-wide law that sets out the conditions for accessing EU-funded grants. The Decree aims to maintain good agricultural and ecological conditions on arable lands and sets out minimum management requirements to qualify for the subsidies. These include NATURA 2000 compensation payments that are relevant to research *(Decree No. 50/2008 (IV.24 of the Ministry of Environment and the Ministry of Agriculture and Rural Development).)*

Legislation specific to the areas covered by the study

The procedure for the designation of NATURA 2000 areas, the conditions for the designation and the action plan and activities required for their maintenance were set out in Government Decree No. 275/2004. The list of bird species to be protected, which includes both resident and migratory birds, is annexed to the same Decree. It also lists the types of habitats of Community importance and special protection areas for birds, and it includes the necessary conservation requirements *(Government Decree No. 275/2004. (X.8).)* Decree No. 14 of 2010 (V. 11.) of the Ministry of Environment and Water Management lists the plots of land belonging to the NATURA 2000 network by lot number for the plots of land of European Community importance. The *Government Decree No. 269/2007 (X. 18.)* on the rules of land use for the maintenance of NATURA 2000 grassland areas contains specific provisions. The Moson Plain was designated as an Environmentally Sensitive Area in the Joint Decree No. 2/2002 (I. 23.) of the Ministry of Environment and the Ministry of Agriculture and Rural Development. In cases of nationally protected areas, the applicable legislation is Act LIII of 1996 on the Protection of Nature, which applies implicitly to the Moson Plain as well.

Natura 2000

In our country there are three types of NATURA 2000 sites. These are grasslands, forests, and arable lands. There are no regulations for arable lands, and they are not eligible for subsidies. There are, however, regulations for forests and grasslands, the compliance of which is monitored by the competent authorities. Hungary also had to designate sites in the NATURA 2000 network on the basis of two EU directives, which was a prerequisite for joining the EU *(State Nature Protection website, 2020).* For the purposes of this document, only the conditions applicable to grasslands are discussed.

During the utilization of the Moson Plain the farmers might encounter NATURA 2000 coverages in multiple locations, which means they are protected by the state rather than by local authorities. The provisions applicable to NATURA 2000 areas are general provisions, and not specifically tailored to local conditions. The value of the

area lies in the uniqueness of its flora and fauna. These are the species that increase the floristic and faunistic value of the Moson Plain, as they do not occur within a radius of several hundred kilometres, and their occurrence here is unique even at a national or European level. The great bustard and the Adonis vernalis are good examples.



Figure 4: NATURA 2000 areas on the Moson Plain. Source: MePAR

The most important of the requirements for NATURA 2000 grasslands is that the area may only be used for grazing or mowing. Irrigation, overgrazing, and permanent damage to the lawn surfaces are prohibited. Drainage of inland water from another area is prohibited. Fertilizing the grasslands is not allowed, only manure from grazing animals can be applied. 5-10% of the grasslands should be left unmown in a place where mowing methods vary. In NATURA 2000 grassland areas, no mechanical work is allowed from sunset to sunrise. There are also restrictions on the species of grazing animals. This means that only cattle, sheep, goats, horses, donkeys, and buffaloes may graze in areas subject to these requirements.

Government Decree on the rules of land use for NATURA 2000 grasslands

In the Annex to Government Decree No. 269/2007 there is a list of invasive herbaceous and woody plant species that require immediate control in case of their occurrence in certain areas. Invasive and alien species must be prevented from spreading on the site, and specific plant protection products may be used where necessary. The invasive and alien plant species that threaten species of community importance and habitats in NATURA 2000 sites are: Black Locust (*Robinia pseudo-acacia*), Green Ash (*Fraxinus pennsylvanica*), Ailanthus (*Ailanthus altissima*), Russian olive (*Elaeagnus angustifolia*), Austrian pine (*Pinus nigra*), Scots pine (*Pinus silvestris*), Desert false indigo (*Amorpha fruticosa*), Black cherry (*Prunus serotina*), Box elder (*Acer negundo*), American pokeweed (*Phytolacca americana*), Fallopia (*Fallopia* spp.), Canada goldenrod (*Solidago canadensis*), Giant goldenrod (*Solidago gigantea*), Common ragweed (*Ambrosia artemisiifolia*), Common milkweed (*Asclepias syriaca*), Wild cucumber (*Echinocystis lobata*) (Government Decree No. 269/2007. (X. 18.))

Agricultural Environmental Management programme (AEM)

The National Agro-Environmental Management programme was launched in 2002 (NAK, 2020). Subsequently, between 2004-2009, the National Rural Development Plan (NDP), and between 2009-2014, the New Hungary Rural Development Programme (NURDP), provided the opportunity to join the Agricultural Environmental Management programme (NAK, 2020). In the last EU programming period (2014-2021), the Agricultural Environmental Management programme (AEM) was launched twice. The main objectives of the programme are to support the sustainable development of rural areas, to preserve and improve the environment, to reduce the environmental impact of agriculture, to provide environmental services, and to strengthen agricultural practices based on the sustainable use of natural resources. It also seeks to promote the preservation of biodiversity in its natural habitat (on the farm), the protection of nature, water, and soil by developing a production structure

adapted to local conditions, environmentally friendly farming, and sustainable land use (NAK, 2020). Participation in the programme is voluntary.

In the case of High Nature Value Areas (HNVA), the possibility to apply for non-productive investments for habitat improvement is also of great importance, as it can provide plantation grants for perennial crops in the framework of the existing standards. For example: for the installation of permanent green fallows, bee pasture fences, natural lawns, hedges (palyazat.gov.hu).

With regard to the Moson Plain, it is worth mentioning the standards for the protection of the great bustard and the red-footed falcon, and the requirements for arable lands under bird protection on the Great Hungarian Plain, which covers most of the area in the study.

Under the bustard protection field thematic group of standards, farmers can receive the equivalent of €366 per hectare per year with the basic standards. This can be supplemented with additional optional provisions to get an even higher amount. In the case of the Moson Plain, it is the thematic group of regulations that covers the largest area.

Nitrate-vulnerability

Recognising the effects of nitrate contamination, the Council of the European Union created the Nitrates Directive (91/676/EC), which covers all Member States, to prevent pollution. Compliance with this is also mandatory for Hungary, which is why the Good Agricultural Practice (GAP) requirements have been established in our country and must be met in all nitrate-vulnerable areas (Hungarian State Treasury, 2020). **The issue of nitrate vulnerability is particularly important in the Moson Plain**, as the northern part of the area is the gateway to the Szigetköz, where the Moson-Danube, the Rét-árok canal and the Lajta River cross the plain. **Protecting these surface waters from nitrate pollution** is an important issue from both an ecological and an economical point of view. However, it should be noted that while the northern areas of the Moson Plain (Rajka, Bezenye, Hegyeshalom) are 100% nitrate vulnerable areas, in the southern areas (Jánossomorja, Várbalog, Mosonszolnok) there are some non-nitrate vulnerable areas that are not subject to the same standards and restrictions. The justification for the designation of nitrate vulnerable zones is set out in the Annex to Decree No. 43/2013.

Farming on the Moson Plain

The Moson Plain is located in the Little Hungarian Plain, which means that both climatologically and in terms of soil conditions, the area is perfectly suited for agricultural cultivation (arable land, grassland, plantations). The traditional production structure can be observed here as well (Table 1). **The proportion of arable lands in the area is close to 90%** and is mainly used to grow cereals, **maize, rapeseed, phacelia, and sunflowers**. **The proportion of fallow land under arable cultivation is about 7%**, which is a very important bustard rutting and nesting site in the area. **The proportion of forests is 6.7%**, of which a significant proportion is field protective forest belts. **The proportion of grasslands (meadows, pasture) is about 0.5%**, also in small patches and in places more disturbed by people. Fruit cultivation is also insignificant (below 0.5%) and no considerable change is expected in the near future. (Moson Plain, Special Protection Area Conservation Plan, 2007.) The proportion of non-agricultural lands exceeds 4%, as these are mainly roads, farmsteads, and mining pits (State Nature Protection website, 2020).

Land use	Extent (ha)	Proportion (%)
forest	875	6.7
grassland (pasture)	189	1.4
grassland (meadow)	9	0.1
orchard	6	0.0
non-agricultural	551	4.2
arable land	11487	87.6

total	13116	100.0
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Table 1: Extent and proportion of the cultivation branches of the Moson Plain Special Protection Area according to the land register. Source: Moson Plain, Special Protection Area Conservation Plan, 2007.

A significant part of the arable land is still used for the cultivation of **small seeds such as phacelia, mustard, olive radish and trifolium**. In addition, a large area is also used for the cultivation of **fibrous and granular protein crops**. The most prominent of these are alfalfa, peas, and the previously mentioned trifolium.

Along the Austrian and Slovakian borders, where most of the great bustard and red-footed falcon protection areas are located, you will also find the majority of the plain's grasslands. These **grasslands are mostly used for mowing**, and the amount of grazed grassland has decreased significantly with the intensification of livestock production. Most of the pastures still in use are grazed by cattle and sheep.

In terms of farming practices, most of the Moson Plain is farmed using **conventional methods**. The majority of farmers work on hundreds of hectares, but there are also smaller farms of a few tens of hectares or even less. Livestock production has fallen significantly as compared to previous decades. In terms of division of the agricultural lands, strip farming that is common in the West, is less typical in Hungary. It was more common in the period of privatisation following the change of regime in the 1990's. Nowadays, larger field divisions are more common, but in the immediate vicinity of settlements, one can still find fields split into smaller parts.

Conventional farming is the most typical way of cultivating the land, but thanks to the financial support available in recent years, the slow change in farmers' attitudes and the beginning of a generational change, **organic farming and precision farming methods are becoming more widespread**.

Thanks to the abundant water supply in the area, **irrigated farming** is practiced in many places. Irrigation can be done from surface waters and wells. Although the canals of irrigation systems built in the 19th century still run all over the area, most of them are no longer in use due to lack of maintenance. Further, in many cases, the canal corrections and regulations that followed the construction of the system reduced the water levels of the rivers in the area to such an extent that the canals became unusable.

Traditional and organic farming on the Moson Plain

The attitudes of farmers in the study area towards conventional and organic farming were assessed through personal interviews and a questionnaire. The questionnaire was available online and was sent electronically to the people concerned. The interviews were carried out personally with farmers of the areas under study. The survey is not representative, but it can still provide a satisfactory picture of the attitudes of farmers in the area towards eco-consciousness and nature-friendly production methods.

We were seeking answers for the following questions:

Does the farmer continue organic/environmentally friendly production (Figure 5)? How much do the market and government policies influence farmers' attitudes towards agriculture? What changes have they seen in their own farmland since they have been farming the way they are now? What do they think about the market situation and how does it influence their production decisions? How do they make decisions about their economy? Which crops do they grow under conventional and organic conditions and what are the results? How much emphasis is placed on integrating leguminous plants into crop rotation? We were also interested in whether the farmers, regardless of their farming practices, had experienced the emergence of new, previously unknown, invasive neophyte species in their farmlands.

The majority of the farmers who completed the questionnaire (10 people) only farm on conventional lands and do not practice organic farming. They explained that, in their opinion, this type of production is not economical, and the technology is "complicated".

Which type of farming do you practice?

15 answers

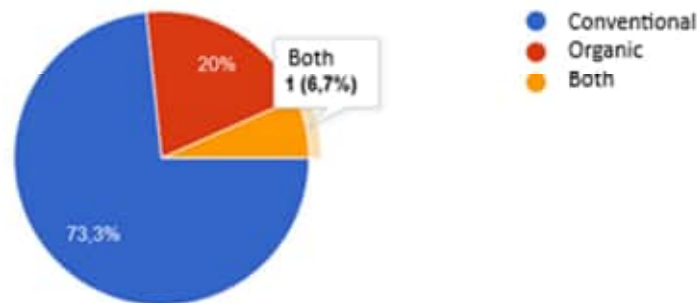


Figure 5: Distribution of farms surveyed by farming type. Source: Gazda Kontroll Kft., 2021.

One farmer among the respondents said that they practice both organic and conventional farming but stressed that they only do organic farming for their own part, and that the products from this are only used in their own livestock production, and not for sale. They do not participate in any certification system, they produce only out of curiosity, and farm only a few hectares of organic land, which is negligible compared to their total area of more than 10 hectares.

The other four farmers, on the other hand, practice organic farming all over their farms under the supervision of the Hungarian certification bodies, Biokontroll Hungária or Hungária Ökogarancia. Each of these farms operates on more than 50 hectares of land.

Some farmers do this without receiving extra subsidies, but within the framework of the certification system. They are motivated mainly by the extra income they can get from selling the crops they grow, not by environmental concerns. In their opinion, the marketability of organically grown products is good, but demand for them is subject to considerable annual fluctuations and the domestic market is not yet ready for integrating these products.

When asked about the positive effects farmers have observed on their fields since switching to organic farming, we received the same two answers from each farmer: increased biodiversity in the area, and improved soil nutrient supply.

It is also important to note that farmers have undergone a change of mindset just by practising organic farming, which has also changed the way they utilize the by-products produced on their land. The by-products (e.g. straw), which the farmer would not use for anything else, remain on the land and are recycled back into the soil, thus improving the soil structure and its nutrient management. This technology has also become increasingly popular among conventional farmers in recent years. The responses show that farmers are also putting a lot of emphasis on the incorporation of leguminous plants into crop rotation to achieve improved nutrient supply.

The impact of climate change on the thermal growing season (TGS) of agricultural crops in the Moson Plain

Reaching the 5, 10 and 15 Celsius baseline temperatures in spring and autumn

The data analysed are meteorological values between 1871 and 2013, from the **agrometeorological database of the Department of Water and Environmental Sciences of the Széchenyi István University**. The values after 2013 were not displayed, but their evolution was examined.

In **Figure 6**, trend lines illustrate the **spring temperature trends of the three baseline temperature values for the period 1871-2013**. The graph clearly shows that **the average time of exceeding the three values in spring has shifted earlier**, with the magnitude of this shift being almost the same for 5 and 15 degrees, at around 8 days. The shift of the average time of exceeding 10 degrees can be estimated to be about 5 days in the studied period.

As compared to spring, there are no significant shifts in the autumn. Based on the trendlines, the average time of exceeding 5 degrees in autumn has been delayed by about 6 days, based on the data for the period under study. At 10 degrees, there is minimal variation of only 1 day. The average time of exceeding 15 degrees is essentially the same.

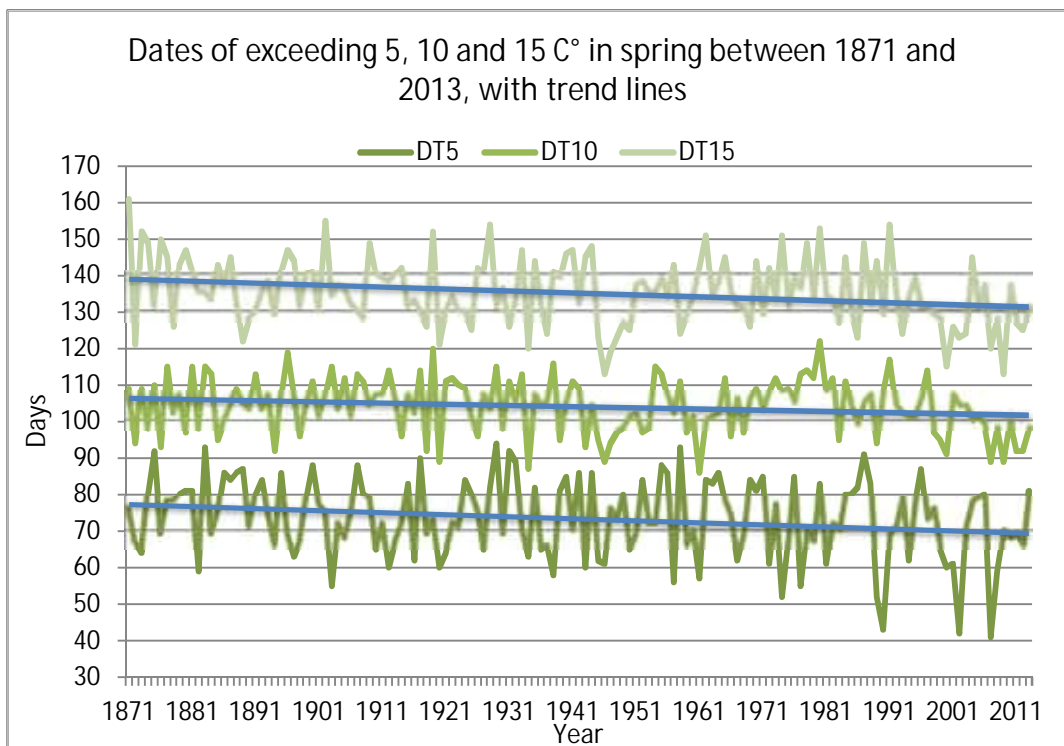


Figure 6: The dates of exceeding the temperatures of 5, 10 and 15 °C between 1871 and 2013, with trendlines. Source: SZE MÉK

Evolution of TGSs between 1871 and 2013.

Figure 7 shows that the length of the thermal growing season for a base temperature of 5°C increased significantly, with an average of 13 days longer by the end of the study period. This trend follows the prolongation of the spring and autumn exceeding dates described in the previous chapters. Furthermore, the TGS for 10 and 15 degrees has been extended by about 8 days. The evolution of the length of TGSs shows an upward trend, which will continue to show these values in the following years.

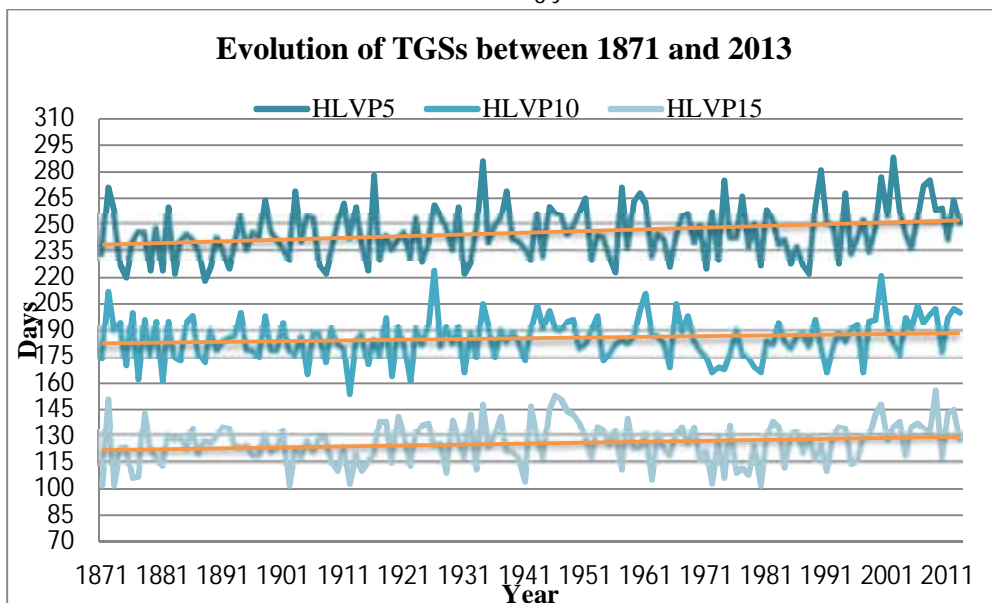


Figure 7: Evolution of TGSs between 1871 and 2013. Source: SZE MÉK

Table 2 shows the evolution of the length of thermal growing season (TGS), averaged over 30 years, and, in the last case, 23 years. For all three TGSs calculated for base temperature values, it can be seen that between 1871 and 1990 the averages were essentially stagnant, while in the last 23-year period the TGSs were 8-11 days longer than in earlier periods.

PERIOD	TGS5	TGS10	TGS15
1871-1900	240	184	123
1901-1930	244	183	123
1931-1960	247	187	130
1961-1990	244	183	122
1991-2013	255	191	132

Table 2: Evolution of TGS averages between 1871 and 2013. **Source: SZE MÉK**

The sharp increase in the length of the TGSs is evidence of the warming of the last few decades. However, it is impossible to draw precise conclusions for the future, and we can only make a rough estimate of the trends that will play out over the coming decades.

Expected impacts of the elongation of the TGSs on crop production

A further increase in mean annual temperatures is expected to lead to shorter winters and longer summer and autumn periods, resulting in longer thermal growing seasons.

The cultivation of **winter wheat** (one of our most important cereal crops) could be threatened by the shortening of the winter period. Where the duration of the winter period with temperatures between -1 and +1 °C, is less than the minimum of 40 days required for the crop, winter wheat can no longer be grown economically. It can therefore be concluded that if the trends mentioned above, including the shortening of the winter period continue in the long term, **winter wheat production might even be threatened in our country**. In this case, however, a switch to spring wheat could be a solution, so it is unlikely that wheat will completely disappear from our country.

The cultivation perimeter of **maize** has been shifting northwards by about 50 km per year since 1960 and this trend is likely to continue as temperatures continue to rise. The significance of these changes is that maize production in Hungary can become more economical and safer in the future by using the right hybrids and taking into account the different needs of the ripening categories. Increased greenhouse effects may result in reduced night-time radiation, which could further reduce daily temperature fluctuations and even **lead to a greater spread of hybrids with longer growing cycles**.

While our country is on the northern border of maize production, it is on the southern border of **potato** production. In terms of the temperature requirements of potatoes, further warming could have a negative effect, and **the cultivation of this crop may not only become uneconomic** but could almost completely disappear from our country (**Varga-Haszonits et al, 2006**).

In general, if warming continues then **crops that require colder climates and a long vernalization period may disappear from domestic agriculture in the future**. Nevertheless, the elongation of the TGS holds opportunities not only for the agricultural crops described above, but also for all crops grown in our country. At the same time, climate change is a complex process, and its other components (e.g. an increase in the frequency of extreme weather events) can be dangerous for crops.

Warming **improves the conditions for double cropping** as temperature increases the length of TGSs while shortening the length of the actual growing season (by accelerating development). The longer thermal growing seasons allow more time for the development and ripening of the crops sown in double cropping, which has the advantage of allowing two crops to be grown and harvested simultaneously in the same area and in the same growing season. From an ecological point of view, the importance of double cropping lies in the **maintenance of good soil conditions**, as higher crop coverage affects water balance and the use of the second crop as **green manure** affects nutrient content.

AgriNatur studies

The aim of the **study** is to examine the varieties of “**ancient**” and **traditional grain crops** currently in public cultivation from a **crop production point of view**, and the **comparative evaluation of the nutritional content qualities** of these varieties. The study was carried out in an area with cultivation conditions that are typical for the landscape. In terms of the varieties chosen, we tried to go back to the more ancient varieties, especially to the einkorn - emmer - spelt lines in the case of cereals of bread-making quality.

An important task was to **identify traditionally cultivated plant species/varieties typical of the area** and to survey existing material. We surveyed the seed bank materials of SZE MÉK and selected those varieties that are typical of the region, since their breeding and maintenance is also done in Mosonmagyaróvár. Along with the varieties we found, we have always included recent varieties, especially those that have proven to grow well in the area and are preferred by the farmers.

Small plot experiments

Period 1 / 01/01/2019-30/06/2019.

The study area is located in the Moson Plain, on the outskirts of Jánossomorja. The parcel is 13 ha, and the study area is 0.5 ha (Figure 8).

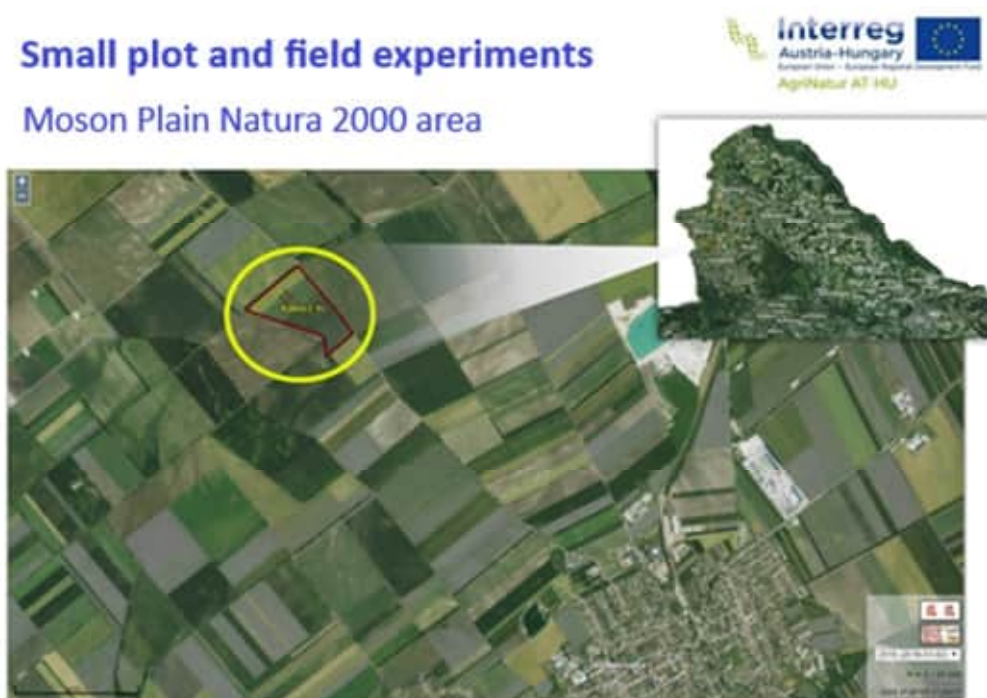


Figure 8: Study area Source: MePAR, Takács K.

Soil test results for the area: Liquid limit according to Arany is 48, clay loam soil. Humus content: 3.21%, which is considered medium. Calcium Carbonate: 3.97%, pH 7.14, i.e. neutral. The phosphorus and potassium contents are excellent, while the magnesium content is in the good category. No sodium accumulation was detected in the tested soil layer. Its micronutrient supply is in medium category. The meteorological characteristics of the area make it suitable for agricultural production, but the constant winds that are typical of the Little Hungarian Plain dry out the soils very quickly.

The preceding crop in 2018 was winter wheat (*Triticum aestivum*), MODERN variety with a yield of 7.5 tonnes/ha. In addition to the observation area, Phacelia (*Phacelia tanacetifolia*), ANGELIA was planted on the parcel.

In this summary, we present as an example the setup of small plot experiments and the work done and methods used in the first experimental period. Detailed descriptions and data of the experiment can be found in the full Hungarian AgriNatur Local Strategy and in the detailed documentation of the experiments.

Sowing

In the study area, a randomized block design was used, but narrowly randomized due to different sowing dates and sowing technologies (Figure 9). Plots were sown in four replicates with a net plot size of 10 square metres. The sowing took place on two dates: On 20/03/2019 and on 03/05/2019 (alfalfa and soya beans). The varieties included in the study are listed in Table 3.

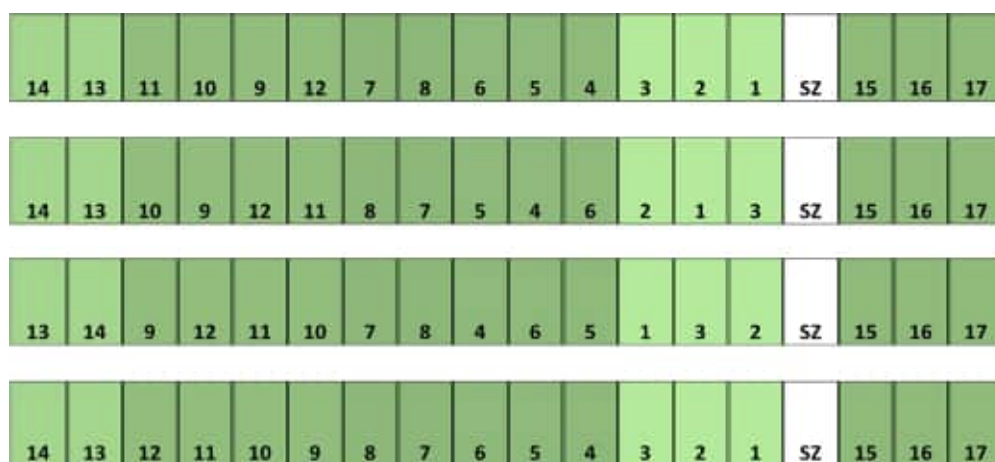


Figure 9: Sowing map of the study Source: SZE MÉK, 2019

Nr.	Species of plant	Species	Plant breeder	Country of origin	YSA (Year of state approval)	Maintainer
1.	Spring wheat	Castrum 1	Ernő Polhammer, Mrs. Polhammer Ernőné, Ferenc Kajdi	Hungary	1998	SZE
2.	Spring durum wheat	Floradur		Austria		
3.	Spring durum wheat	IS Duragold		Austria		
4.	Common Vetch	Beta 11	Antal Csitkovics	Hungary	1951	SZE
5.	Common vetch	Flora		Germany		
6.	Common vetch	Novi Beograd		Serbia		
7.	Shell pea	Lincoln				
8.	Field pea	Assass		France		
9.	Mangelwurz	Red mangel beet	Gábor Ludván	Hungary	1977	SZE
10.	Mangelwurz	Beta pink (Rózsaszínű beta)	András Varga	Hungary	1944	SZE
11.	Sugar beet	Toreador		Belgium	2014	
12.	Sugar beet	Hurrican		Belgium	2010	
13.	Soy	ES Mentor		France	2010	
14.	Soy	Sigalia		France	2010	

15.	Medicago	Eride	István Késmárki, Tibor Győri, Ferenc Kajdi	Hungary	2002	SZE
16.	Medicago	Gea		Italy		
17.	Medicago	Plato		Germany		

Table 3: Species included in the study Source: SZE MÉK, 2019.

Works during the spring period

- Plant protection: none
- Weed control: no chemicals used, only continuous manual weeding was done
- Irrigation: there was no irrigation as it is not provided in the study area.

2019 spring study

Only beet varieties could be harvested in sufficient quantities for the study. The mineral composition of the tested samples is shown in [table 4](#). The results obtained correspond to the mineral content stated by the literature for different beet varieties. The values clearly show that mangelwurz variety 2 (Beta pink) has a high content of Ca and K in dry matter, but lower values of Mg, P and N than the other mangelwurz varieties (Red mangel beet). It was important to test the beet from the spring 2020 experiment to see if the mineral composition varies from year to year, or if it is approximately constant.

	Ca M/m% dry matter	K M/m% dry matter	Mg M/m% dry matter	P M/m% dry matter	N M/m% dry matter
Mangelwurz 1	0.16	1.72	0.16	0.15	0.22
Mangelwurz 2	0.25	2.19	0.13	0.13	0.11
Sugar beet 1	0.13	0.93	0.19	0.11	0.16
Sugar beet 2	0.2	2.02	0.13	0.14	0.09

Table 4: Nutritional content qualities of the cultivated beets. Source: SZE MÉK, 2019.

Details of further experimental periods can be found in the local AgriNatur plan study, called “Developing local strategies to improve biodiversity and resilience”, and in the detailed documentation of the experiments.

2020/2021 large plot experiments

Based on the results of the spring and autumn experiments, the cereals sown in the autumn were selected for the third-year large plot experiments. We sowed 3 hectares of ancient grain varieties and locally bred spelt varieties. The ancient grain varieties were obtained from the Agricultural Institute of the Centre for Agricultural Research of the Hungarian Academy of Sciences, and the spelt varieties from the breeder and maintainer of the variety.

Nr	Species of plant	Species, variety	Plant breeder	Country of origin	YSA (Year of state approval)	Maintainer
1.	Einkorn wheat	Mv. Alkor	MTA ATK MGI	Hungary	2008	MTA ATK MGI
2.	Emmer	Mv. Hegyes	MTA ATK MGI	Hungary	2008	MTA ATK MGI
3.	Spelt	Mv. Martongold	MTA ATK MGI	Hungary	2013	MTA ATK MGI
4.	Spelt	Lajta	Dr. Gergely Kalmár Dr. Ferenc Kajdi	Hungary	2002	Dr. Gergely Kalmár Dr. Ferenc Kajdi

5.	Spelt	Öko10	Dr. Gergely Kalmár Dr. Ferenc Kajdi	Hungary	1998	Dr. Gergely Kalmár Dr. Ferenc Kajdi
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Table 5: Varieties included in the autumn 2020 sowings. Source: SZE MÉK, 2020.

The sowing took place on two dates: 08/11/2020: Mv. Alakor, Mv. Martongold, Mv. Hegyes; 10/11/2020: Lajta, ÖKO-10

We sowed one round of each species and variety, so the size of the plots: 2X 6mx 534m= 6408 m², that is 0,64 ha. Thus, the area of the entire large plot experiment: 5 x 0,64 ha = 3,2 ha.

Sowing standards: Mv. Alkor 60 kg/ha, in case of other varieties 110 kg/ha

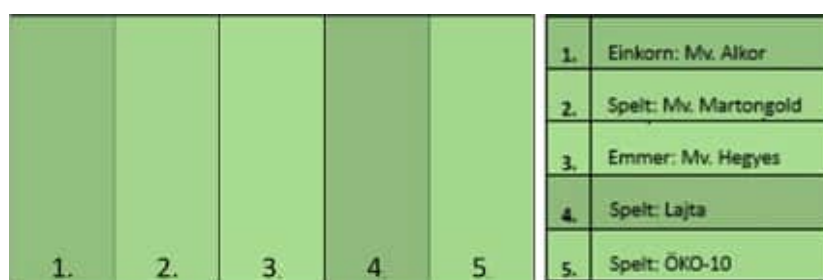


Figure 10: Sowing map of the large plot experiment. Source: SZE MÉK, 2020.

Statistical methods

The basic statistical characteristics (minimum, 1st quartile, median, average, 3rd quartile, maximum) were determined for the parameters studied, and the average value of the 4 replicates with 95% confidence intervals was determined for each variety studied. Before further statistical analyses, the normality of the data set was tested using the Shapiro-Wilk test and the homogeneity was tested using the Bartlett test. Comparisons between varieties were made using a one-factor analysis of variance without block formation, and then tested for differences between varieties using Tukey's procedure, and by determining the smallest significant differences. Statistical calculations were carried out according to [Sváb \(1973\)](#), [Clewes and Scarisbrick \(2001\)](#) and [Szűcs \(2002\)](#). Microsoft Office Excel 2016 and RStudio 1.4.1106 were used to evaluate the experimental results.

Results

From the results of the study we presented below the most important parameters, which are the most important value-measuring properties for crops. The results clearly showed that **there are significant differences between the performance of regional varieties and the winter wheat varieties used today during production.**

The yield data obtained for each variety included in the study are illustrated below, and the graph shows the mean values and 95% confidence intervals.

There is a significant difference in yield between the varieties used in the past and those currently in cultivation, even though the differences in cultivation technology were insignificant. In terms of yields, we can expect a substantial increase in the cultivation of modern varieties.

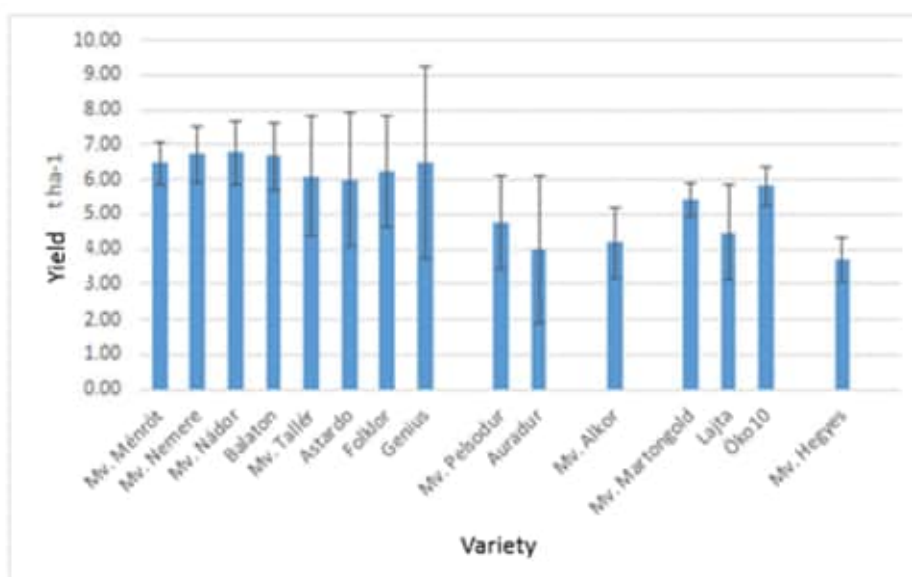


Figure 11: Graph showing the average yield of the varieties included in the study. Source: SZE MÉK

The crude protein data obtained for each variety included in the study were as follows below. The figure shows the mean values and 95% confidence intervals. Significant differences can be observed between the crude protein content of the samples analysed, but in this case the balance is tipped more in favour of the regional varieties.

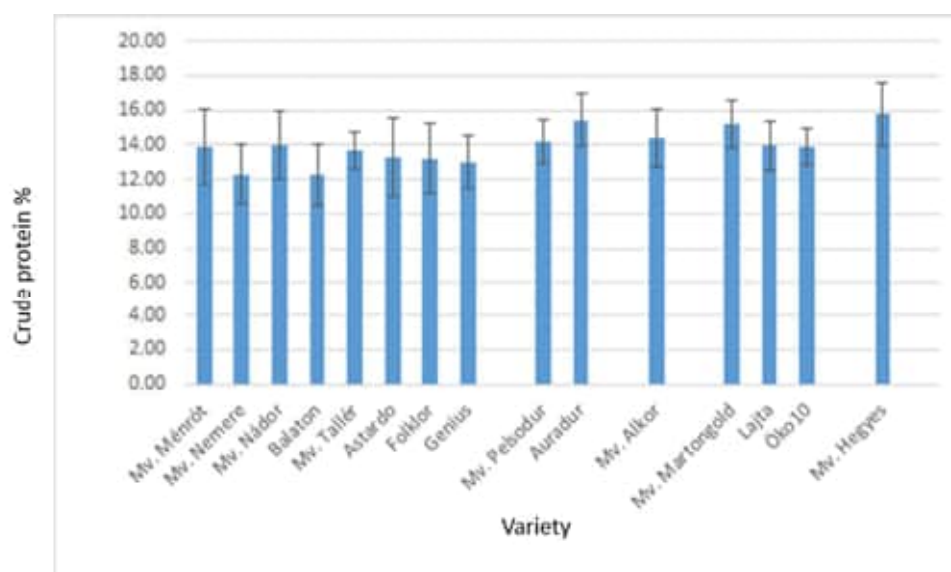


Figure 12: Graph showing the average crude protein content of the varieties included in the study. Source: SZE MÉK

The graphs show that farmers can expect much higher yield averages when growing the varieties used today, while the higher crude protein content of the regional varieties compensates for this shortfall.

Ornithological observations

An important task of the project is to assess the ecological networks in the area of Mosonmagyaróvár. This activity takes place in several locations. The Moson Plain NATURA 2000 Special Protection Area is the site of a habitat improvement project for bird protection, where a baseline survey was carried out in 2019 as part of a bird monitoring scheme, followed by the installation of bird boxes in the winter of 2019/20. This section presents the results of the ornithological survey carried out in spring-early summer 2020. (Király, 2020).

The Moson Plain Special Protection Area, which covers an area of 13,096 hectares, covers the north-western part of Győr-Moson-Sopron County, in the area of the Hungarian-Austrian-Slovakian triple border (Figure 13). Mostly agricultural land, the biodiversity of which is greatly enhanced by the mosaic of grassland and woodland. Its special ornithological importance is mainly due to the bird species associated with the forest-steppe areas. Since the early 1990s, the area has been the subject of a very thorough ornithological survey due to the “Lajta Project”, a bustard and small game conservation research project (Faragó, 2012).

The website of the area (<http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=HUFH10004>) indicates the presence of 7 distinctive bird species that are highly protected: **Red-footed falcon** (*Falco vespertinus*), **eastern imperial eagle** (*Aquila heliaca*), **white-tailed eagle** (*Haliaeetus albicilla*), **saker falcon** (*Falco cherrug*), **great bustard** (*Otis tarda*), **greater white-fronted goose** (*Anser albifrons*), and the **bean goose** (*Anser fabalis*).

Applied methods

The recording method was based on BirdLife Hungary’s “Monitoring our Everyday Birds” project (Szép, 2000; Szép and Nagy, 2002), with some modifications. This method was developed specifically for surveying songbirds dispersed in a mosaic of diverse habitats and is suitable for monitoring large, heterogeneous areas over several years. Basically, it aims to sample the area in a network where regular visits to sample points allow long-term trends to be outlined. In addition to ornithological surveys, mapping of associated habitats is also required. In the case of the Moson Plain, the recording protocol was slightly modified as it was expected that the diversity of the large intensively cultivated agricultural fields would be minimal. Therefore, we did not record in a network-like manner, but along a pre-designated recording route, and we also condensed the recording points, with the distance between adjacent points being 100-150 m instead of 200 m.



Figure 13: Location of the Moson Plain Special Protection Area. The numbered circles show the location of the observation areas of the project. Source: Király, G., 2020.

In the project area, two transects were designated for recording (Figure 14), which adequately represented the NATURA 2000 habitat structure of the Moson Plain, i.e. the intensive agricultural areas separated by forest belts and grass strips. The first transect runs between Jánossomorja and Várbalog, encompassing a forest belt system and a planted pine forest belt, in addition to the adjacent fields. The second transect was designated in the area of the gravel road between Mosonszolnok and Várbalog, in a similar setting to the first.

The counting method is double counting. Observations should be carried out twice during the first half of the growing season, with at least 14 days between the two survey dates. **The study of the Moson Plain observational areas was carried out on 10 May and 8 June 2020**, according to the above protocol. Map processing of the data collected in the field was carried out using Quantum GIS software. Minox 10×42 hand binoculars were used for the ornithological observations, and in addition to visual observations, several bird species were identified by sound (Király, 2020).

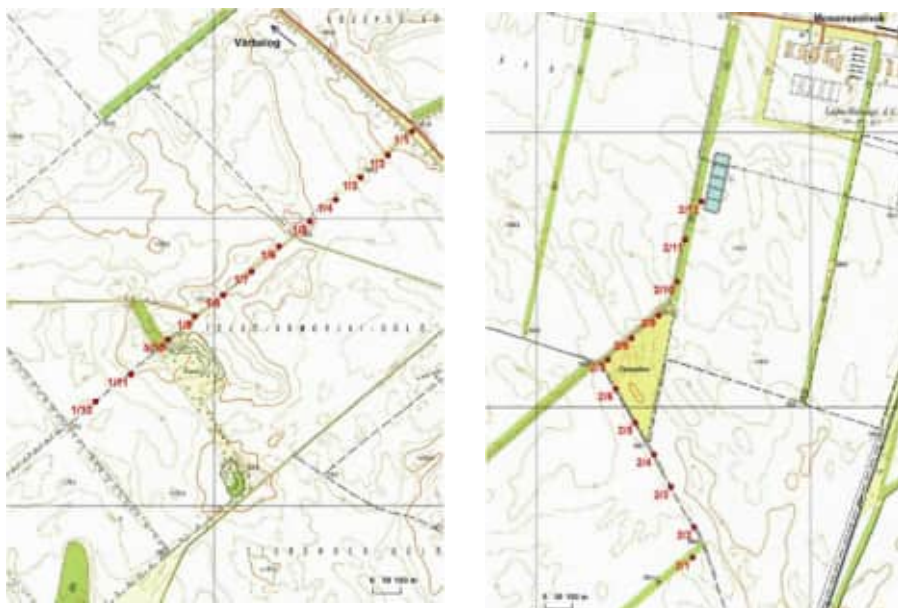


Figure 14: Location of project areas 1 and 2. Each point represents the centre of the sub-areas. Source: Király G., 2020.

The studies:

Within the framework of the project, on 25 February 2020, 20 **bird boxes were installed** in the Moson Plain NATURA 2000 area. A total of 20 type B bird boxes were installed on the trees at a height of 4-5 metres. 9 bird boxes were installed in project area 1, and 11 in project area 2 (Király, 2020).

A total of 48 bird species were recorded during the 2020 survey of two observation plots on the Moson Plain (representing about 100 hectares). Of these, 33 species probably or definitely bred in the narrow sample area (50 m radius circles), 6 additional species are likely to breed in the 200-200 m wide band along both sides of the recording route, and the remaining 9 species are occasional or regular foragers (Király, 2020).

A total of 40 species were recorded in sample area 1, of which 21 species probably or definitely bred in the narrow sample area (50 m radius circles), and 9 additional species are likely to breed in the 200-200 m wide band along both sides of the recording route. The remaining 10 species, migratory or foraging birds, were just passing through the area. A total of 39 species were recorded in sample area 2, of which 25 species probably or definitely bred in the narrow sample area (50 m radius circles), and 3 additional species are likely to breed in the 200-200 m wide band along both sides of the recording route, while the remaining 11 species were migratory or foraging birds (Király, 2020).

Detailed results on the species observed in the study area, their estimated amount and status can be found in the local AgriNatur plan study, called *"Developing local strategies to improve biodiversity and resilience"*.

Recommendations for raising public awareness of the environmental value of anthropogenic land use

The importance of eco-consciousness

When restarting the economy after the closures due to the coronavirus pandemic, it is important to take into account the objectives of the EU and national and local strategies for the restoration and protection of our nature and biodiversity. This is not only about compliance with the law, as it is in our 'own' interest to **live in a healthy environment and produce healthy food on our farmlands**. We must, however, recognise that the **promotion of biodiversity is not in conflict with agriculture**, but it is rather an "economic necessity" (EU Biodiversity Strategy).

“Restoring healthy nature is not only crucial for our physical and mental well-being, but also helps us fight climate change and epidemics. This is at the heart of our growth strategy, the European Green Deal, and is part of a European economic recovery approach that aims to give more back to the Earth than we take from it.” (Von der Leyen, 2020).

We can only achieve these goals effectively if we stop thinking of nature conservation and biodiversity enhancement as abstract concepts and “top-down”, distant guidelines, and try to bring them closer to ordinary people, so that they recognise that it is in their own best interest to change their often-destructive lifestyles and farming practices. At the same time, it is important that **“consciousness raising” should not be a one-way process**, where we “tell” farmers what to do, but instead we should cooperate with them by getting to know their opinions and experiences and jointly developing a strategy for the application and promotion of a “greener” approach in the given area.

One of our methods was to carry out a questionnaire in addition to our personal interviews with farmers, where the farmers’ attitudes towards organic farming, their farming experiences and the factors hindering the application of organic farming in the Moson Plain area were investigated.

Due to the coronavirus epidemic, it has become especially important to spread ecologically conscious thinking, and to understand the importance of conscious landscape management and the conscious use of natural resources. At the time of the pandemic more people outside the narrow professional circles and people interested in this field became aware of **the importance of locally produced, quality food** and the vulnerability of global supply chains. The importance of **short supply chains** has come to the fore, of which in Hungary the most common form of food shopping has been at local farmers' markets, but the emergence of the epidemic also boosted online shopping.

An opinion of the European Committee of the Regions on ‘Local and regional incentives to promote healthy and sustainable diets’ (2018/C 387/05), point 11, stresses that “local food production can contribute to the economic and social development of a region, **preventing the depopulation of rural areas**”.

A further opinion of the European Economic and Social Committee on ‘An integrated approach for the EU’s rural areas’, with particular emphasis on vulnerable regions (2020/C 429/09), Action 3.18 highlights **the role of agriculture in vulnerable areas and its role in maintaining the landscape and environmental services**, and the risks of agricultural land abandonment: “The abandonment of land... will result in the disappearance of the landscape and environmental services associated with the active care of the area. **Agricultural and forestry activities contribute to** maintaining population, combating erosion, reducing the frequency and extent of fires, and avoiding desertification. It is essential that the Common Agricultural Policy ensures that agricultural production is maintained in vulnerable areas.”

One of the important objectives of AgriNatur is to raise awareness among the population and farmers and to encourage deeper understandings of environmentally sustainable lifestyles, methods, and opportunities among different age groups. To this end, the project has also produced a publication for farmers, which presents useful methods for environmentally friendly farming (**Practical instructions** for environmentally friendly farming), which can be freely downloaded from the website of the SZE MÉK: (https://food.sze.hu/images/Gyakorlatiutmutato_AgriNatur%20ATHU.pdf)

Target groups and methods of eco-awareness education

The project promotes this objective at the local level, targeting different age groups (children, secondary school students, university students, adults) and groups (local population, agricultural/environmental/nature pedagogy professionals, non-governmental organisations, researchers, decision-makers), using a variety of entertaining methods.

Within the framework of the project, a **common approach**² was also formed in 2020 to raise public awareness and develop an eco-conscious approach which defines the cross-border links and themes of the visitor programmes, and also makes methodological proposals for their implementation.

² Overall content concept of the visitor programs: educational trails, workshops, visitor-outdoor areas. (K. Hissek, K Fuchs et al. 2020)

The study identifies the following themes as common points for the visitor areas and awareness-raising events to be implemented during the project:

- The Lobau and the Moson Plain as historic cultural landscapes
- Agrobiodiversity and its importance for the resilience of the cultural landscape
- Birds
- Flowering plants and their importance for insects/pollinators
- Biodiversity / agricultural cycles (soil, plants, insects, birds)

Suggestions for methods to develop eco-awareness

One of the main considerations when choosing methods to develop eco-conscious thinking is how to attract the attention of the target group in the flood of information that surrounds us, and, if successful, how we can engage them in collective thinking and, going further, make them sensitive and committed to nature protection. One way of doing this is to focus on the interests and needs of a specific age group or social group, and to not use one-way communication or information transfer (of course, when applied properly it can be useful), but rather choose learning by doing, and entertaining learning through activities. Due to the current epidemic situation, more emphasis should be placed on online events, training, and, where possible, blended learning.

Methods that can be used in the AgriNatur project:

University students, professionals, adults:

- workshops involving students, the public, and experts
- information website, blog, social media, AgriNatur newsletter
- paper-based publications (leaflets, flyers)
- educational paths, demonstration garden with information panels, microlearning elements
- outdoor "classrooms"

elementary and secondary school students:

- organizing thematic days, classes at school
- organizing playful quizzes and photo competitions
- information website, blog, social media
- creating multimedia content with the help of teachers (e.g. using a phone to make video and photos of plants, animals, environmental topics)
- educational paths, demonstration garden with information panels, microlearning elements, and playful educational tools
- an "eco-playground" - made of natural materials, with eco-conscious toys (e.g. Log climbing frame, willow tunnel, plant/animal shaped toys)
- Outdoor "classroom"

Recommendations for farmers on how to achieve environmentally friendly farming

Farmers can do much to conserve and restore biodiversity. By making a few small changes to their management, which in most cases does not involve significant expenditures, they can take a huge step towards a more sustainable and greener future.

The **resident and migratory bird species** found in the area include predators and herbivores, as well as tree- and ground-nesting birds. Different measures are effective for each species if we want to protect them or increase their populations. In the case of ground-nesting birds (in our case, for example, the partridge and the bustard), it is most effective to plant **green zones** (woodlands, shrubs, herbaceous) **that provide shelter for birds and the small mammals and insects they feed on**, and the species planted can also serve as a food source for them.

For this green zone, the most obvious solution is the installation of a **green fallow**, which is also an optional provision in the AEM. It is advisable to install it on the edges of the field, 3-5 metres wide, so that the **damage to the crop caused by wild animals can be reduced**, especially if your green fallow mix includes species that wild animals enjoy. Another positive effect of using flowering plants in our green fallow mix on biodiversity is that insects also find excellent living and feeding space in this medium.

In addition to green fodder, the establishment of bee pastures is of particular importance, partly for the feeding of **domestic bees** and partly for the survival and reproduction of **wild pollinators**.

The **protection of bird nesting sites** deserves further attention. It is important for farmers to pay attention to the birds nesting on the ground, their chicks, and the mammals hiding in the area when using the meadows. One effective option **for mechanical mowing is the use of flushing bars**, which disturbs the area next to the mower and scares away any nearby animals. Of course, this alone may not be a sufficient precaution, as the most important thing is for the farmer to be aware that there may be a nest on the ground with eggs or chicks in it and to be more careful than usual. If a farmer finds a nest of a protected bird on his land, he must establish a one-hectare protection zone around the nest. He must not disturb the nest and must report it to the National Park authority. **Mowing "from the inside out"** can also be very useful in the case of such areas. The idea is that the animals in the area should not be trapped in a small area in the middle of the field during mowing, as they do not dare to go out to the area that has already been mowed. In this case, it is recommended to start mowing in the middle of the field and gradually move outwards from there, providing an escape route for the animals. There are some grant schemes for which it is compulsory, but those who do not take up such grants should also consider **leaving some areas unmown** as animals use these areas partly for shelter and partly for feeding.

In the case of **tree-nesting birds**, there are also many small ways in which farmers can contribute to the growth of bird populations and the emergence of new species. Due to legal restrictions, forest belts cannot be cut down during the breeding and rearing season, i.e. from 1 March to 31 August. By **installing bird boxes in forest belts**, farmers can provide habitats for several species.

To increase the biodiversity of plant species, farmers are encouraged to **switch to organic farming**. **Weed control of crops can also be achieved by mechanical methods**, which is also a much more favourable solution for both the plant and animal species living in the area. This often spares plant species that may be the primary food source of protected insects but are only seen by farmers as weeds that suppress cultivated plants.

Farmers are also encouraged to **use regional varieties** previously cultivated in the area, or even on the Moson Plain, which are adapted to the local climate and have a balanced and stable yield under local climatic and soil conditions. Due to their resilience, adaptation, and other characteristics, these plants are in many cases a better choice than other varieties currently in use. By the integration of each regional variety into cultivation, the farmer takes a huge step towards increasing biodiversity.

Crop production and soil conservation methods

Hungary has excellent soil and climate conditions for agricultural production. Year after year, farmers produce crops with excellent yield averages, which is fundamental aspect of agriculture in order to generate income.

But intensive farming comes at a high price:

- the organic matter supply of our soils is steadily declining due to industrial farming,
- the quality of organic matter deteriorates in many cases,
- the structural integrity of our soils, which is responsible for water, heat, and air management, is deteriorating year by year,
- their biological activity, and therefore their ability to take up and supply nutrients, is reduced in many cases.

The deterioration of the "health" of our soils, which over time manifests itself in a loss of productivity, is now present in some form in almost all of our agricultural areas. Our arable land is also less and less able to compensate for periods of drought caused by climate change. Due to the reduced stability of the soil's structural elements, in

the event of an intense rainfall, more and more agricultural fields might experience waterlogging or run-off which can greatly hinder the living conditions of our crops and lead to further degradation of our soils. **Due to the deteriorating structure, the water management properties of our soils are also deteriorating**, as a result of which our lands are not able to fulfil their water storage and supply functions, or not to the maximum extent, thus intensifying the adverse effects of water scarcity in the summer term.

The primary objective of soil cultivators should be to **create and maintain a soil structure that allows for the deepest possible soil absorption (100-120 cm, if applicable) and storage of precipitation** during winter and growing season. Water stored in this way contributes significantly to efficient farming.

To achieve this, cultivated soils **must be made as permeable as possible in the depth of the entire arable layer**, for the roots of our cultivated plants as well as for the movement of water. We need to maintain a soil structure that ensures that the 3-phase system of the soils functions, thus providing the best possible habitat for our crops to the greatest extent possible.

We must break away from “soil extortion” farming, that ignores soil properties and ecological contexts without a scientific physiological basis, often **based solely on “habits”**, the most critical drawbacks of which are summarised in the following points:

- We have virtually no organic matter management,
- We do not address the water management properties of our soils
- Too many rounds, trampling damage, compaction and cultivation errors characterise our farming.

There is no single “one-size-fits-all” recipe for making our farming sustainable, and obviously we must be aware that, as with any change, it takes time because our society also needs to be prepared for it.

The organic matter and humus content of the soil affect almost all practical soil properties. During the mineralization of the organic matter content of the soil, the nutrients in it are released and become available to the plants. Other organic compounds in the soil (enzymes, antibiotics, vitamins, hormones, and hormonal compounds) also have a direct effect on our crops.

Today's **intensive farming has led to a decline in the humus content of our soils**. Intensive tillage, regular “disturbance” of the soils, ploughing, harrowing, soil pulverization with various tillage tools all activate aerobic microbial respiration processes. As a consequence of increased mineralisation, the amount of humified and non-humified organic matter in soil decreases, the soil structure deteriorates, and the nutrient uptake capacity of our crops is reduced.

Organic fertilisers play an important role in increasing the humus content of soils. Two-thirds to three-quarters of the farmyard manure is mineralised, providing nutrients, while one-third to one-quarter (the organic matter that is difficult to mineralise) enriches the humus content of the soil.

According to **Rühlmann (2000)**, **if the agricultural land is dominated by cereals**, the humus balance can be ensured with an **annual application rate of 8-10 t/ha of farmyard manure**. Based on the above, the **amount of farmyard manure to be applied under the root crops**, taking into account its utilisation and effect, is **30-40 t/ha**. In the case of root crops, cereal **rotation**, the average annual amount of farmyard manure needed to maintain the humus balance would be lower, around **10-12.5 t/ha/year**.

The effect of **liquid manure** on the humus content of the soil is negligible. This can be explained by fact that most of the liquid manure consists of rapidly degradable organic compounds with a narrow C:N ratio. Therefore, to increase the humus content of the soil, liquid manure should be used in combination with materials with a high C content (straw, plant stem residues, etc.).

As the availability of proper farmyard manure is limited due to the decline in our livestock population and the “modern” farming techniques used, it is also advisable to help maintain the organic matter supply of our soils by integrating green manure crops into our farming systems. Despite the fact that this is often difficult in our drought-prone climate, and with tight cultivation techniques, we must aim to **integrate green manure crops into our agricultural lands**, which increase the organic matter supply of the soil, stimulate microbial activity in the long term, help the drainage, loosen the soil, and recycle nutrients.

If we had to describe the essence of sustainable soil management broadly in one sentence, we could do so as follows:

Our water and organic matter-preserving tillage system must be harmoniously adapted to the range of crops grown and the needs of crop rotation.

- Our aim should be to preserve and increase the organic matter of the soil
- Do not dry the soil unnecessarily
- Plough only when justified
- Preserve and improve the structure of our soils
- Preserve and improve the functioning of the 3-phase system of our soils
- Preserve and improve the water management of our soils
- Stimulate/restore the biological activity and health of our soils.

To do this, we must **take a step-by-step look at our technology**, keeping our thinking simple and clean. Only leave the technological element that is absolutely necessary for the success of our cultivation.

- Reduce the number of operations
- Use machine combinations if possible
- Use periodic deepening techniques
- Avoid unnecessary rotation of soils as much as possible
- Avoid unnecessary trampling and compaction of soils
- Never walk on damp, wet ground (after rain), no matter what walking structure it has
- All operations should be carried out at the optimum soil moisture level for the operation
- Our work should focus on improving soil structure and soil water management.

Recommendations to mitigate the effects of climate change

On a geological and evolutionary scale, climate change is a rapid, and even sudden event that natural adaptation processes cannot keep up with. We are facing a **serious decline in the diversity of fauna and flora** and its impact on food production. Droughts, storms, and floods caused by climate change, and the possible spread of pests and competing wild plants are expected to cause widespread crop losses.

For both the Carpathian Basin and the **Moson Plain**, climate change is likely to **further worsen the water balance**, i.e. the difference between the amount of water leaving and entering the basin will increase. This can be explained by an increase in evaporation as temperatures rise, and an unfavourable change in precipitation.

What can agriculture do?

1. Real, relatively rapid adaptation to climate change (one of the EU's new climate strategy elements)
2. Water retention - where possible, taking into account ecological considerations
3. Irrigation and water/soil moisture conservation farming
4. Following our fathers' strategy no longer works. Arable farming practices should be adapted to the drying climate: e.g. stubble cleaning, ploughing time, crop protection techniques
5. We need to be prepared for the growing role of new types of pests.

Sources

Figures

Figure 1: The operational area of the Directorate of the Fertő-Hanság National Park. Source:

http://www.falutur.hu/program/termeszeti/ferto-hansag_np.html

Figure 2: Changes in the average monthly temperature of the Moson Plain in the period 1971-2015. Source: SZE MÉK

Figure 3: Monthly average precipitation in the Moson Plain over a long period of time (45 years). Source: SZE MÉK

Figure 4: NATURA 2000 areas on the Moson Plain. Source: MePAR: <https://www.mepar.hu/mepar/>

Figure 5: Distribution of farms surveyed by farming type. Source: Gazda Kontroll Kft., 2021.

Figure 6: The dates of exceeding the temperatures of 5, 10 and 15 °C between 1871 and 2013, with trendlines. Source: SZE MÉK

Figure 7: Evolution of TGSs between 1871 and 2013. Source: SZE MÉK

Figure 8: Study area Source: MePAR, Takács K.

Figure 9: Sowing map of the study. Source: SZE MÉK, 2019.

Figure 10: Sowing map of the large plot study. Source: SZE MÉK, 2020.

Figure 11: Diagram showing the average yield of the varieties included in the study. Source: SZE MÉK, 2020.

Figure 12: Graph showing the average crude protein content of the varieties included in the study. Source: SZE MÉK, 2020.

Figure 13: Location of the Moson Plain Special Protection Area. Source: Király, G. Ecological network assessment in Natura 2000 sites: Ornithological observation in the Moson Plain Natura 2000 area. 2020

Map: Moson Plain, Special Protection Area Conservation Plan, 2007.

Figure 14: Location of project areas 1 and 2. Source: Király, G. Ecological network assessment in Natura 2000 sites: Ornithological observation in the Moson Plain Natura 2000 area. 2020

Tables

Table 1: Extent and proportion of the cultivation branches of the Moson Plain Special Protection Area for birds according to the land register (2007). Source: Moson Plain, Special Protection Area Conservation Plan.

Table 2: Evolution of TGS averages between 1871 and 2013. Source: SZE MÉK

Table 3: Species included in the study Source: SZE MÉK, 2019.

Table 4: Nutritional content qualities of the cultivated beets. Source: SZE MÉK, 2019.

Table 5: Varieties included in the autumn 2020 sowings. Source: SZE MÉK, 2020.

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Annex III: Newsletters



ANNEX III NEWSLETTERS

For Download a German version, see https://cbc.wien/Projekte/umwelt_nachhaltigkeit_energie/Projekte%20aus%20der%20F%C3%B6rderperiode%202014-2020/Agrinatur










AZ ÉLŐHELYEK ÉS A FAJOK SOKFÉLESÉGÉNEK JAVÍTÁSA

Miért lehet az AgriWater projekt útmutató a földrajzi térségünk gazdálkodásához? Wolfgang Hutter, a biológiai közgazdaságtudományok igazgatója (MA 22) vezetőhelyettesének gondolatmenete.

A Duna-Auen National Park az az élőhelyek sokféleségének és sokszínűségének (biodiverzitás) javítására szolgáló terület. Ez a terület a biológiai sokféleség és a társadalmi értékek közötti kapcsolatot szemlélteti. A területen a természetvédelem és a természetbarát gazdálkodás közötti egyensúlyt kell megtalálni.

Az AgriWater projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

Az AgriWater projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.



AGRINATUR AT-HU

A 2. LÉPÉS: AZ ALAPOK ÉS A KÖZÖS ÚT

Meg a 2023. május 10-én AgriWater workshop a megvalósítás, az alapok és a közös út megvalósítása. A workshop célja a természetbarát gazdálkodás előmozdítása a területen.

Az AgriWater projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

Az AgriWater projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

PROF. BERND LÖTSCH

AgriWater: A vadon élőhelyek és a természetbarát gazdálkodás közötti kapcsolat.

A természetbarát gazdálkodás célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

A természetbarát gazdálkodás célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

DR. PHIL. BERNHARD KRONP

AgriWater: A természetbarát gazdálkodás előmozdítása a területen.

A természetbarát gazdálkodás célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

A természetbarát gazdálkodás célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

DR. PHIL. BERNHARD KRONP

AgriWater: A természetbarát gazdálkodás előmozdítása a területen.

A természetbarát gazdálkodás célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

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DR. PHIL. BERNHARD KRONP

AgriWater: A természetbarát gazdálkodás előmozdítása a területen.

A természetbarát gazdálkodás célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen. A projekt célja a természetbarát gazdálkodás előmozdítása a területen.

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AGRINATUR-STRATÉGIA: SIKERES ÉS MEGVALÓSÍTHATÓ MÓDSZEREK FELFEDEZÉSE

A projektpartnerek segítségével Harald Kutzemberger és csapata interaktív előadások az AgriNatur-Stratégia keretében és tartalmán. A 2020. június 17-i szakértői workshopon a Biologische Pflanzengärten és az AgriNatur-Stratégia keretében.

Bismara Lepich, Harald Kutzemberger, ...

... Miért szükséges a szakértői előadások a 2020. június 17-i workshopon? Egy szűk körű, de a közvéleményben is a tudás terjedése. Az előadás tartalmán az AgriNatur-partnerekkel közösen és a szakértői előadások is a közvéleményben is a tudás terjedése. Az előadás tartalmán az AgriNatur-partnerekkel közösen és a szakértői előadások is a közvéleményben is a tudás terjedése.

... Hogyan lehet a közvéleményben is a tudás terjedése? A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

Szakértői előadások

Előadások a projektpartnerek és a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

3. június, 2020, június

Bismara Lepich

Vezető tanácsadó és a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

Harald Kutzemberger

Vezető tanácsadó és a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

AGRINATUR AT-HU AZ EGYÜTTMŰKÖDÉS ÚJ ÚTJAI

Az AgriNatur projektben a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

3. június, 2020, június

Bismara Lepich

Vezető tanácsadó és a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

Harald Kutzemberger

Vezető tanácsadó és a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

VIRTUÁLIS SZAKÉRTŐI TALÁLKOZÓK AZ AGRINATUR-STRATÉGIA KIDOLGOZÁSÁRA



Hat szakértői előadások a 2020. június 17-i workshopon. A workshopon a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

előadások. Az AgriNatur-Stratégia kidolgozására. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

Bismara Lepich

Vezető tanácsadó és a közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése. A közvéleményben is a tudás terjedése.

2020. ÁPRILIS 22.

Vezetői előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger
Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger

2020. ÁPRILIS 29.

Helyi előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger
Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger



2020. MÁJUS 6.

Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger
Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger

2020. MÁJUS 13.

Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger
Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger



2020. MÁJUS 20.

Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger
Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger

2020. MÁJUS 27.

Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger
Bismara Lepich előadások (AgriNatur projektben a közvéleményben is a tudás terjedése.)	Harald Kutzemberger



From several perspectives, the following factors are likely to contribute to the success of the program:










HELYI ÁTÁLLÁSI TERV (LUP) MAGYARORSZÁGON

A LUP kidolgozása a SZÉ. Irányító egy központosított, biológiai és mezőgazdasági szakértőkkel közös munka során zajlott, melynek célja a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.


Az Ágritatur programban agrár-környezeti és klíma-átmeneti programok is kidolgozódnak, amelyek napi kapcsolatban állnak a természetvédelmi és a mezőgazdasági szakértőkkel, így a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.



AGRINATUR AT-HU

VALASZOK A MIK ÉS A HOLNAP SZÁMÁRA

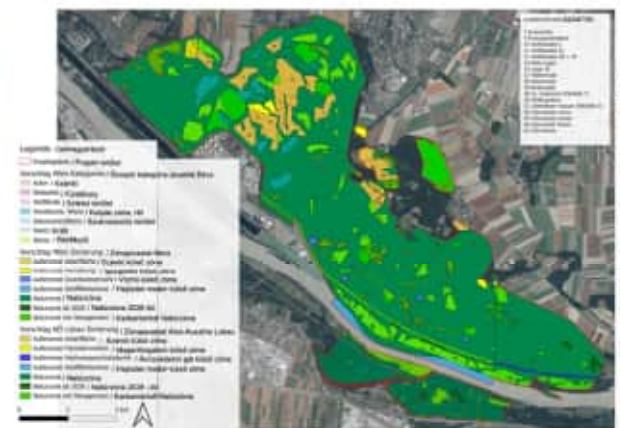
Az Ágritatur programban agrár-környezeti és klíma-átmeneti programok is kidolgozódnak, amelyek napi kapcsolatban állnak a természetvédelmi és a mezőgazdasági szakértőkkel, így a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.



RÉGI ÁRTERÜLET TERVEZÉSI TERV

2020. június 17-én a Lakas-tervezési bizottságban tartott megbeszélésen az Ágritatur Program keretében a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása céljából kidolgozott tervet tárgyalta.

A terv célja a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása. A tervben meghatározottak szerint a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása céljából kidolgozott tervet tárgyalta.




CÉLJAI

Melyek a Lakas-tervezési bizottságban megbeszéltek céljai? Az Ágritatur Program keretében a területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása céljából kidolgozott tervet tárgyalta.

1. Cél: A területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.

2. Cél: A területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.



1. Cél: A területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.

2. Cél: A területen élő növény- és állatvilág megőrzése és a társadalmi használatának előmozdítása.



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AGRINATUR - TOVÁBBI INFORMÁCIÓK ÉS EGYÜTTMŰKÖDÉS

➤ <https://www.interreg-at-hu/AGRINATUR/>
Az Interreg európai agrárfejlesztési program honlapja
V A Ausztria Magyarországgal 2014-2020

➤ <https://www.at-hu/AGRINATUR/>
A helyi vállalkozások megvalósuló "ABC" (közösségi értéklánc) programjának honlapja

➤ <https://www.at-hu/AGRINATUR/>
A helyi vállalkozások megvalósuló "ABC" (közösségi értéklánc) programjának honlapja

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AGRINATUR - TOVÁBBI INFORMÁCIÓK ÉS EGYÜTTMŰKÖDÉS

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➤ <https://www.at-hu/AGRINATUR/>
A helyi vállalkozások megvalósuló "ABC" (közösségi értéklánc) programjának honlapja

AGRINATUR AT-HU KÖZÖS MEGOLDÁSOKAT KERESÜNK

3. június, 2022. Április

Interreg

Városi és vidéki együttműködés
Stadt Wien, Párizs és
Ludwigshafen am Rhein
között a mezőgazdasági együttműködés

Interreg

Városi és vidéki együttműködés
Stadt Wien, Párizs és
Ludwigshafen am Rhein
között a mezőgazdasági együttműködés

3. június, 2022. Április

Interreg

Városi és vidéki együttműködés
Stadt Wien, Párizs és
Ludwigshafen am Rhein
között a mezőgazdasági együttműködés

Interreg

Városi és vidéki együttműködés
Stadt Wien, Párizs és
Ludwigshafen am Rhein
között a mezőgazdasági együttműködés

ÁTELHETŐ AGRINATUR: LÁTOGATÓI TERÜLETEK

30. MÁJUS AT

Wittmann-Park - BÉLYÉKES ÉS PÁRKERŐS KÖZSÉGEK MEGVÁLTÁSA

A projekt megvalósítása során fontosnak tartottuk a vendégek jóléteinek fejlesztését a projektterületen. Ezért a WITTMAN-PARK területén a Mezőgazdasági és Élelmiszeripari Minisztériummal együttműködve a vendégek jóléteinek fejlesztését tartottuk fontosnak.

A látogatók számára a látogatás során a látogatók jóléteinek fejlesztését tartottuk fontosnak. Ezért a WITTMAN-PARK területén a Mezőgazdasági és Élelmiszeripari Minisztériummal együttműködve a vendégek jóléteinek fejlesztését tartottuk fontosnak.

08. JÚNIUS HU

Wittmann-Park - BÉLYÉKES ÉS PÁRKERŐS KÖZSÉGEK MEGVÁLTÁSA

A projekt megvalósítása során fontosnak tartottuk a vendégek jóléteinek fejlesztését a projektterületen. Ezért a WITTMAN-PARK területén a Mezőgazdasági és Élelmiszeripari Minisztériummal együttműködve a vendégek jóléteinek fejlesztését tartottuk fontosnak.

A látogatók számára a látogatás során a látogatók jóléteinek fejlesztését tartottuk fontosnak. Ezért a WITTMAN-PARK területén a Mezőgazdasági és Élelmiszeripari Minisztériummal együttműködve a vendégek jóléteinek fejlesztését tartottuk fontosnak.

15. JÚNIUS HU

Wittmann-Park - BÉLYÉKES ÉS PÁRKERŐS KÖZSÉGEK MEGVÁLTÁSA

A projekt megvalósítása során fontosnak tartottuk a vendégek jóléteinek fejlesztését a projektterületen. Ezért a WITTMAN-PARK területén a Mezőgazdasági és Élelmiszeripari Minisztériummal együttműködve a vendégek jóléteinek fejlesztését tartottuk fontosnak.

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Notes



