Newsletter Nr. 1



A service to measure and improve biodiversity using satellite data for monitoring, evaluation and optimization of CAP greening initiatives



Horizon Europe Research and Innovation Programme

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BirdWatch. а Horizon Europe research & innovation project, will establish a new service to support the European Green Deal's aims to improve biodiversity on agricultural land and promote environmentally sustainable approaches in agriculture. The first part of this newsletter introduces the project and its Consortium.

The Consortium of Bird-Watch met last February to officially launch the project, meet face to face and discuss the next steps.

We will share glimpses on what happened before, during and after the Kick-off in Turnhout, Belgium. As we are still at the very beginning, the road ahead is long and not everything is quite clear yet. Many aspects need to be explored and discussed. What those aspects are is also part of this newsletter.

Please don't hesitate to get in touch! Contact details are at the end of the newsletter.

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BirdWatch, with the support of the EU Agency for the Space Programe (EUSPA), will develop a web-based service to evaluate and monitor the farmland bird habitat suitability of agricultural land in the EU. It will identify possible pathhabi-tat ways for improvement. considering the eco schemes proposed under the new Common Agricultural Policv (CAP), speciesspecific habitat requirements and the constraints of farmers needing to implement the policies.

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Farmland birds, including meadow and arable farmland bird species, (e.g., Yellowhammer, Eurasian Skylark, Meadow Pipit, Black-tailed Godwit) are especially impacted by agricultural intensification*.



The Black-tailed Godwit (*Limosa limosa*), one of the many bird species impacted by agricultural intensification; image source: *Ivan Dalen*

BirdWatch will provide maps of farmland bird habitat suitability, supporting stakeholders in monitoring and predicting the development of biodiversity in their agricultural region.

BirdWatch will also optimise the choice of eco schemes available for a region, considering both the associated economic consequences and the habitat preferences of local farmland birds.

Our Approach

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BirdWatch evaluates biodiversity by specifically focussing on birds, as they are known to be a good indicator for ecosystem health. Their presence can point to a sufficient supply of food (e.g., insects, invertebrae), shelter (for hiding or nesting) and foraging possibilities.

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BirdWatch will measure landscape features on agricultural land using satellite imagery. The **European Space Agency's** Copernicus Programme. continuously provides new data, allowing us to also capture important changes on the ground.

*: Farmland practices are driving bird population decline across Europe

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Satellite-derived landscape features will be combined with speciesspecific habitat models to evaluate the presence or absence of necessary habitat features.

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Habitat models are based on bird observations in the field, while accounting for the inherent difficulty to capture information on the absence of a bird.

Machine learning will play an important role in analysing satellite data as well as in deriving habitat models.



Matching landscape features with habitat models, the habitat suitability can be derived, telling us the likelihood with which a bird species would choose an area as a habitat.



Knowing both the necessary criteria of a habitat and the current suitability of an area, pathways for habitat improvement can be identified. BirdWatch will use а spatially explicit optimisation algorithm to obain the greening measures most appropriate for a specific location. This includes the consideration of the national and regional policy guidelines, the species-specific habitat requirements and the cost-benefit calculations of the farmers in the region.

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As satellite data are essentially two-dimensional, BirdWatch will provide habitat suitability in form of maps, showing where birds are likely to occur.



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During the project's three-year lifetime, the BirdWatch service will developed in four test regions:

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Lithuania, South Tyrol, Flanders and Germany.



These regions are sufficiently different to capture various types of biophysical environments in Europe, including coastal and intracontinental low-land to the alpine region.

Once the monitoring and optimisation services are implemented, the Bird-Watch service will be made available via a web-based application. With the **BirdWatch** service. farmers will be able to evaluate their parcels' habitat suitability and pick greening measures most effective for their situation. Supervisory institutions will have the data to more efficiently evaluate compliance with national and regional guidelines. Nature conservation organisations. environmental agencies as well as research & academia will have access to a wealth of data to study and monitor biodiversity and to define future guidelines to restore and preserve our environment. Policymakers will be able to assess the impact of the CAP's eco schemes. supporting them in designing polimore suscies for а tainable. resilient agriculture in the EU.

Our Consortium

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То develop the Bird-Watch service, a variety of disciplines need to be combined. This is reflected in the makeup of the BirdWatch Consortium. The project is led by the Luftbild Umwelt Planung GmbH. a SME from Potsdam, Germany, with 27 years of experience in environmental and geospatial information management and remote sensing, strongly involved in research and development in various subject areas, including climate change mitigation and adaption or the large-scale monitoring of environmental parameters. Apart from the coordination of BirdWatch. LUP will lead the user and software requirement analyses, the identification of relevant geospatial features and

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the development of the web-based application. Sinergise, is a Slovenian company with strong expertise in the development of Geo Information Systems (GIS) and experience in providing ITsolutions for agriculture. land administration and Earth Observation. With Sentinel Hub*, they built a powerful, widely known platform which combines various EO data with machine learning.

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Sinergise shares its responsibility to retrieve and analyse geospatial features, necessary to evaluate habitat suitability, with **EURAC**, a private non-profit research centre from South Tyrol, Italy.

EURAC's Institute of Earth Observation specialises in monitoring of environmental dynamics and the impact of climmate change in mountainous regions, using interdisciplinary approaches, including EO, climate & data science, modelling and risk assessments.

The Ecology & Macroecology lab of the University of Potsdam focuses on patterns and drivers of biodiversity dynamics global under change. They combine methods from macroecology, conservation biogeography, movement ecology and modelling to improve the understanding and predictability of spatiotemporal biodiversitv patterns across scales. The lab is headed by Prof. Damaris Zurell, a leading expert on species distribution modelling, who has contributed to the development methods of and standards in her field.

Prof. Zurell and her team will be responsible for the development of the species-specific habitat models, establishing a species distribution modelling framework with which to derive farmland bird habitat suitability.

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VITO is a Flemish technological research institute, which provides a supply chain optimisation service, the MooV model^{**}. MooV is used to determine the optimal supply chain configuration (in terms of economic, environmental or social constraints).

VITO will adapt its MooV service to the requirements of the BirdWatch Service, establishing a decision-support tool for the choice of optimal greening measures under various ecological, operational and financial constraints.

*: please visit https://www.sentinel-hub.com/

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**: please visit <u>https://moov.vito.be/en</u>

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National The Paying Agency of Lithuania (NPA) is in charge of distributing EU and national subsidies to farmers. businesses and communities in rural areas. The yearly amount paid to the clients amounts to about 1 billion Euros. The NPA has in depth experience with the usage of EO data and artificial intelligence for the monitoring of agricultural and environmental activities. The agency also educates farmers on the benefits of EO and on innovative solutions and tools for sustainable, more effective farming.

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The NPA will bring its expertise and stakeholder viewpoint into BirdWatch, focusing on the user and usability aspects of service development. The NPA shares this responsibility with Agro Digital Solutions (ADS), a Lithuanian non-governmental and non-profit organisation which develops and promotes EOenabled solutions, Geo Information Systems. drone-based. software and mobile solutions in Lithuania, the EU, the Balkans and in East Asia. ADS' clients are farmers and public institutions, to whom they promote the use of efficient. environment- and biodiversity-friendly farming approaches.

Finally, BirdWatch is also supported by the **Re**search Institute for Nature and Forest (INBO), as well as by the German **Bioland e.V**. INBO is the independent research institute of the Flemish government that underpins and evaluates biodiversity policy and management.

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Bioland e.V. is the largest organic-food association in Germany, known for its high standards in organic food certification of farms.

Both INBO and Bioland will support the Bird-Watch project in the analysis of stakeholder requirements and in the evaluation of BirdWatch's demonstration phase.

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To officially kick off the BirdWatch project, the Consortium met in the picturesque, little Flemish town of Turnhout, at the end of February.

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Providing a stark, visual contrast to the historic location, the meeting ook places at "Gustaaf Klimt", which serves both as a beautiful conference venue and great opportunity for (after-hours) bouldering.



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Turnhout, Belgium, the location of BirdWatch's Kick-Off Meeting; left: location via Google Maps; above: Turnhout's impressive Kasteel van de Hertogen van Brabant in the middle of town; image source: BirdWatch consortium



BirdWatch Consortium and Partners, gathering in the colourful lounge of "Gustaaf Klimt", Turnhout, Belgium; image source: BirdWatch consortium

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To get to know each other more closely and as an excellent occasion to be introduced to the topic of habitat management, we started with an excursion to the location of the LIFE Nardus & Limosa project, just to the North of Turnhout. The project tackles the challenges of restoring species-rich Nardus grassland well as as providing the environ-

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mental conditions for rare, vulnerable species, such as the Black-tailed Godwit (Limosa limosa). Guided by Rik Hendrix from VITO, we explored the impacts of habitat fragmentation, eutrophication and acidification due to high nutrient input from agricultural activities and learned about how combining mowing and grazing

with phosphor-mining can help reverse the impact of intense agricultural practices.

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Access to more information on this project can be found in the link collection at the end of this newsletter.





Too early in the year for Limosa limosa but not for the BirdWatch Consortium: Left: VITO's Rik Hendrix, guiding the BirdWatch Consortium to various sites of the LIFE Nardus & Limosa project; Above: afternoon impression of the Nardus grasslands; image source: BirdWatch consortium

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The official kick-off took place on the 28th of February. Most of the consortium was able to take part in person. Our Project Officer, Chiara Solimini, from EUSPA, joined us remotely via live-stream.

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Official BirdWatch Kick-Off at the conference venue "Gustaaf Klimt" ; image source: BirdWatch consortium

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Ms. Solimini set the stage by presenting the funding framework within which BirdWatch is situated as well as the reporting modalities, accompanying the project in the next few years. Afterwards, the Consortium members had the opportunity to introduce themselves and their individual work packages, followed by the definition of the tasks for the upcoming months. To help us digest all the information and clear our minds, the team of Gustaaf Klimt organised a climbing challenge, of which you can find some impressions on the next page.

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Tackling the climbing challenges of "Gustaaf Klimt"; image source: BirdWatch consortium



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Before the BirdWatch service can be established, the requirements have to be defined.

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This includes collecting requirements from the different potential stakeholders. This will occur in close communication with representatives of each of the stakeholder groups, involving them in via workshops, as well as involving them in testing and service demonstrations.

In parallel, the habitat criteria of farmland bird species are gathered, serving as input to the habitat models and the optimisation workflows. The criteria will have to also reflect agricultural factors, especially those which can be linked to eco schemes and other agri-environmental interventions. LUP, EURAC and Sinergise will select the geospatial features to be derived from satellite data, such as vegetation indices, texture or landcover types for each of the four test regions. These features will need to reflect, e.g., the presence or absence of landscape elements or the structural makeup of the region, important for the evaluation of both, habitat suitability and the impact of the regional eco schemes.

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The thematic maps will then serve as input to both, the species distribution models, to be developed by the University of Potsdam, and the optimisation workflow of VITO's MooV service.

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Once we have all components together in one service, phases of iterative testing and adaption will be necessary to get BirdWatch ready for the demonstration phase. Depicted below is a first idea of how the Bird-Watch user interface could look like in the near future.

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Updates on our progress will be communicated in future editions of this newsletter!



Might the future BirdWatch service look like this?

Draft view of the web-application, showing the distribution of the regional habitat suitability, together with regional farmland statistics and potential pathways for the improvement of habitat suitability. image source: *BirdWatch Consortium*

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In case you like to explore BirdWatch further, please visit our project website: https://birdwatch-europe.org/

or contact us! You'll find the contact details on the next page.

Gustaaf Klimt: https://gustaafklimt.be/

LIFE Nardus & Limosa Project: https://www.natuurpunt.be/pagina/doelstellingen-life-nardus-limosa

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