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Defining ecoregions and developing an EO-based Vector-borne zoonotic disease surveillance system

From North Africa to the Western Balkans and Caucasus

PROVNA2

PROVBAC

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PROVNA 1

2022-2024

Main objective: ECOREGIONS IN NORTH AFRICA

To define the "**ecoregions**" of the North African territory (Mauritania, Morocco, Algeria, Tunisia, Libya, and Egypt), each one **characterized by distinct environmental and climatic factors.**

Assumption: similar areas (in space and/or time) are subject to similar diseases (especially vector-borne diseases)

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Ecoregionalisation

The process through which a territory is classified into similar areas according to specific environmental and climatic factors.

*The climate and the environment strongly influence the **presence and distribution of vectors** responsible for significant human and animal diseases worldwide.*

→ *It is then useful to develop **a map of similar eco-climatic regions** adopting a data-driven spatial clustering approach using recent and detailed spatial data on climatic and environmental factors.*

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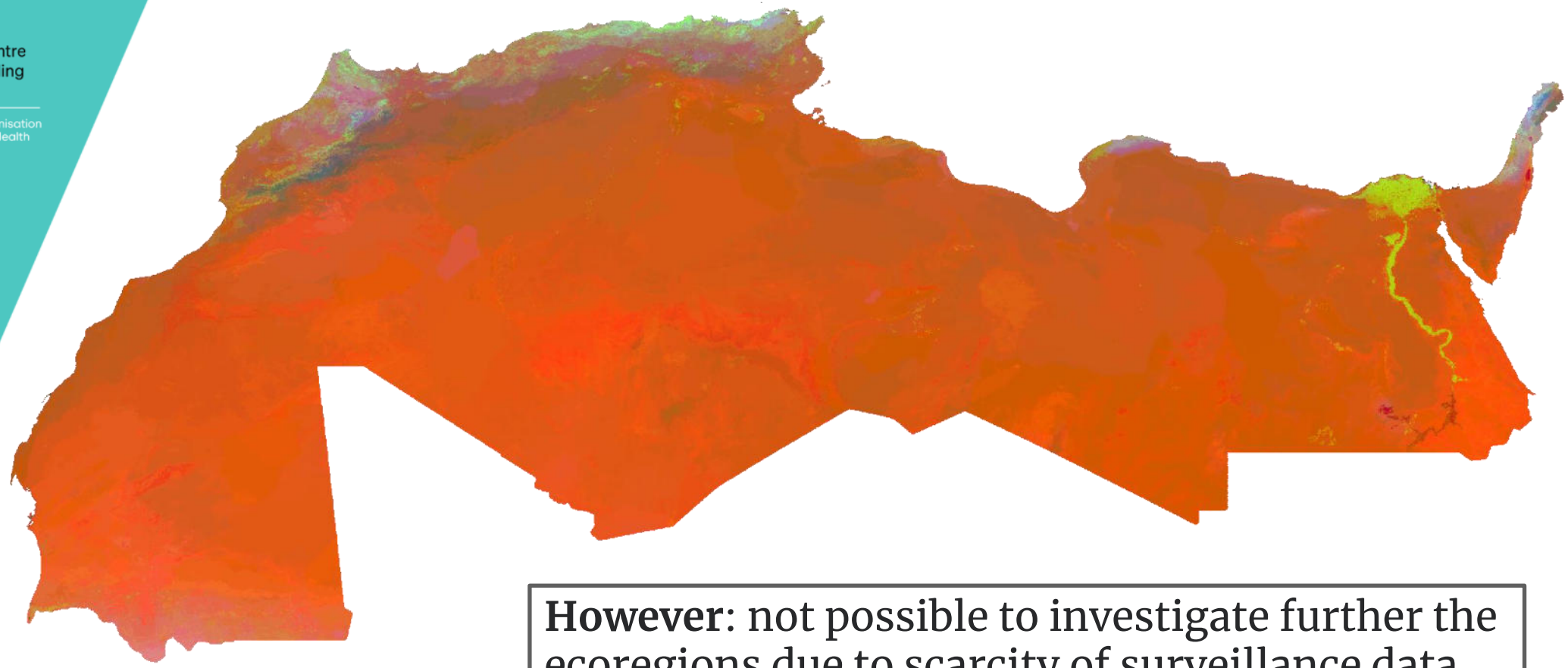
Result: identified the "**ecoregions**" of the North African territory



However: not possible to investigate further the ecoregions due to scarcity of surveillance data

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PROVNA 1

Given the work done, it was considered crucial to combine the decision-making tools based on eco-regionalization with data from in-field surveillance.

Ecoregions in NA

Targeted surveillance in specific ecoregions

→ Essential to strengthen the capacity of the National Veterinary Authorities to effectively prevent, predict, detect and respond to diseases – with the optimisation of the available resources.

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APPENDIX 1

PROJECT PROPOSAL

Establishment of a risk-based surveillance system for Mosquito-Borne Diseases in North Africa (PROVNA2)

End 2024 - early 2026 (18 months)

General Objective

To establish a **risk-based surveillance system** across the North African countries,

using the eco-regionalization method,

to monitor the emergence and spread of key animal and zoonotic diseases transmitted by mosquitoes.

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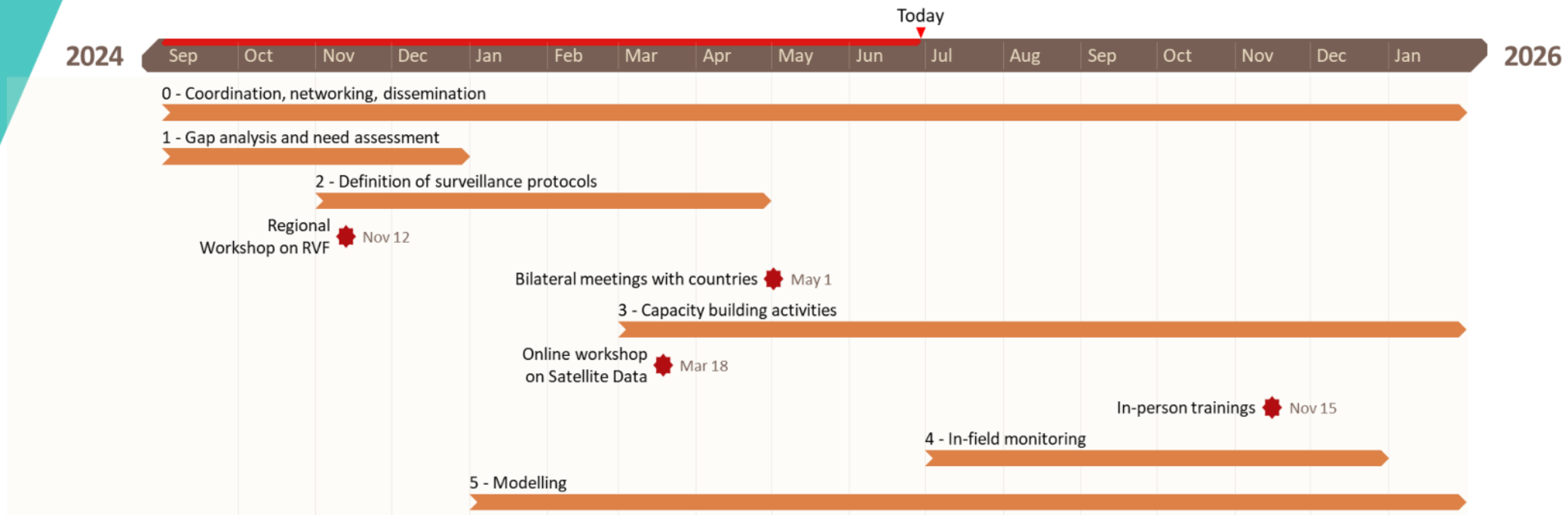

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PROVNA 2

Three sessions, followed by plenary discussions, during which possible goals and targets for RVF surveillance in each country were highlighted.

Operational protocols, **training and laboratory needs** were also discussed.

12-14 Nov, 2024 – Tunis

→ **PROVNA 2 WORKSHOP**

- **Proposal of surveillance protocols per country**
- **Discussion on training and laboratory needs**

PROVNA 2

RVF surveillance activities - OBJECTIVES
(proposal of surveillance protocols as discussed during the workshop)

Countries with RVF outbreaks in the past:
- Reducing the risk of spreading Rift Valley Fever in selected regions (Mauritania)
- Assess the risk of introduction of RVF through the southeastern border (Libya)

Countries where RVFV has never been identified:
- To characterise the spatio-temporal evolution of RVF vectors in high-risk areas (Tunisia)
- Reinforcing surveillance, early warning and rapid detection of RVF (Morocco)
- Defining and identifying the vectors responsible for RVF (Algeria)

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Laboratory support:
- Mosquito traps
- Laboratory reagents

Trainings:
- Use of satellite data
- GIS
- Entomology (sampling)
- Entomology (identification)
- Molecular Biology
- WGS and sequencing

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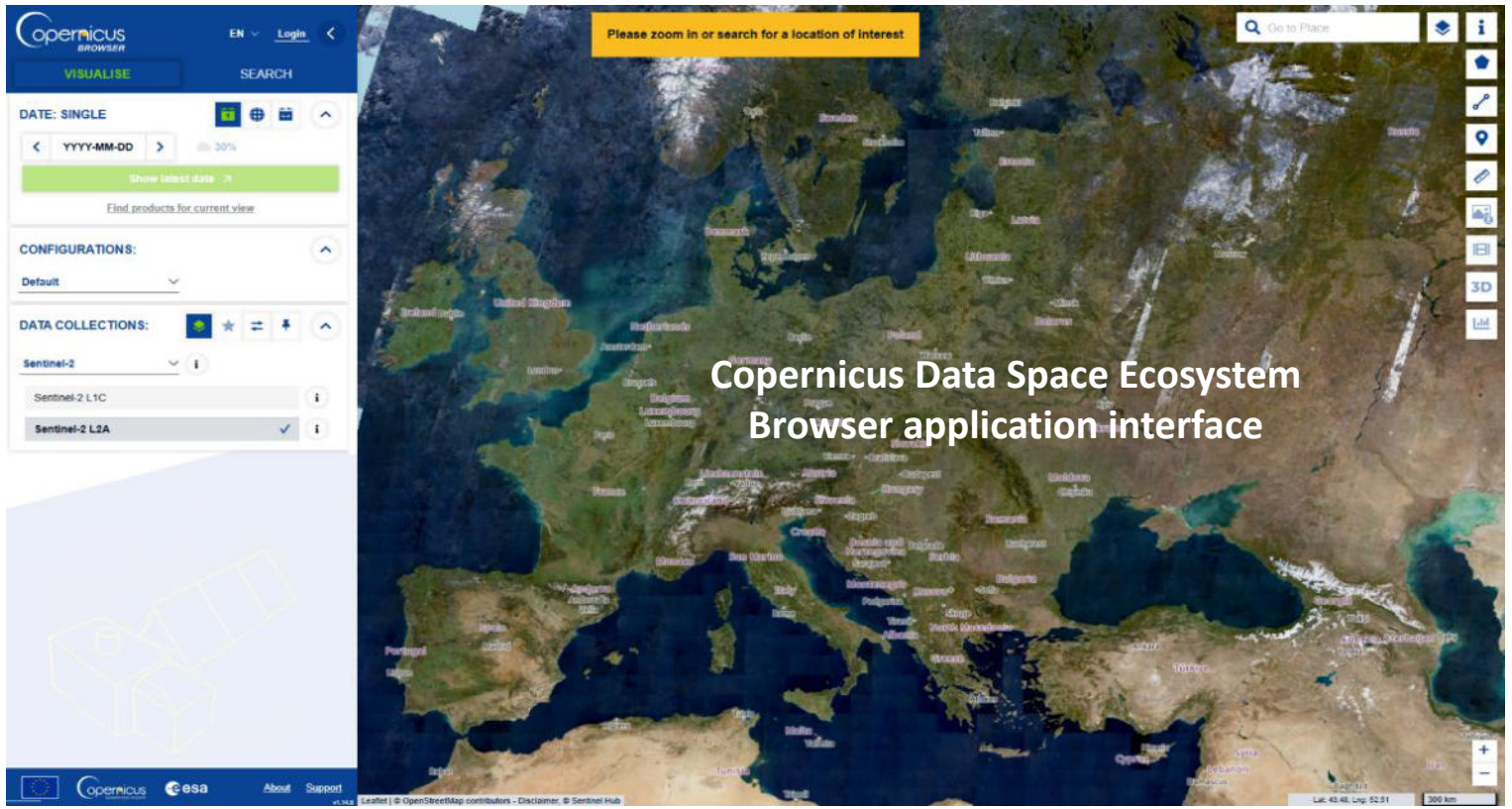
Trainings:

- Use of satellite data (18/03)
- for veterinarians or experts from the countries participating in the PROVNA 2 project.

"Satellite data: what, where & how to use them"



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Laboratory support and training (ENTOMOLOGY)

- 15 BG Pro traps + accessories per country
- Shipments are in progress (2/4)

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Laboratory support and training (ENTOMOLOGY)

- Then, online seminar on how to use the traps in the field
- Video and manual on vector collections (ENG/FR)
- Later the year: in person training (at IZS-Teramo) on vector identification.

PROVNA 2

- Quantification of the sampling to be performed
- In the meantime, sampling protocols in animals and case definitions on RVF cases developed

- Later the year: in person training (at IZS-Teramo) on molecular biology.

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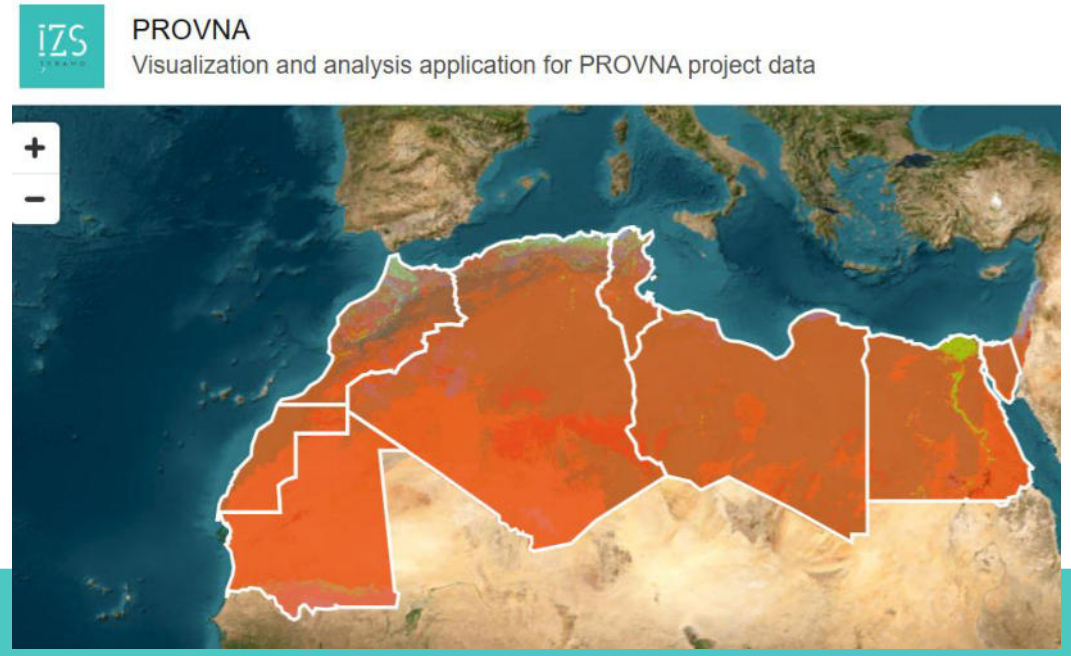
→Surveillance activities are **country-specific**, but will provide important insights in the understanding of the disease / vector pattern / distribution of the study area

→Which will be investigated together with the ECOREGIONS already provided (updated with more recent EO data)

→**Results can be applied to the whole study area (regional strategy)**



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Conclusion

PROVNA2 is in progress, providing:

- **Support to the Veterinary Services in implementing and/or improving risk-based targeted surveillance of VBDs**,

- In order to collect field-data and implement an **innovative approach (ecoregions) to further guide surveillance strategies,** optimising financial and human resources through **strategic planning**.

→ In line with WOAH's approach to a **common regional strategy for vector-borne and transboundary animal disease control**

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- *Regional strategy for vector-borne and transboundary animal disease control*
- *One Health is a hot topic*
- *Growing interest in innovative surveillaince tools*
- *Earth Observation Data – powerful allies in monitoring the planet*

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ANNEX 1

SUB-GRANT AGREEMENT

For the implementation of the project: Defining ecoregions and developing an EO-based Vector-borne zoonotic disease surveillance system in Western Balkans and Caucasus

- **Duration**: *9 months*

- **General Objective**: *To establish a risk-based surveillance system for priority vector-borne zoonotic diseases in Western Balkans and Caucasus based on ecoregions characterization through earth observation data collected from satellites.*

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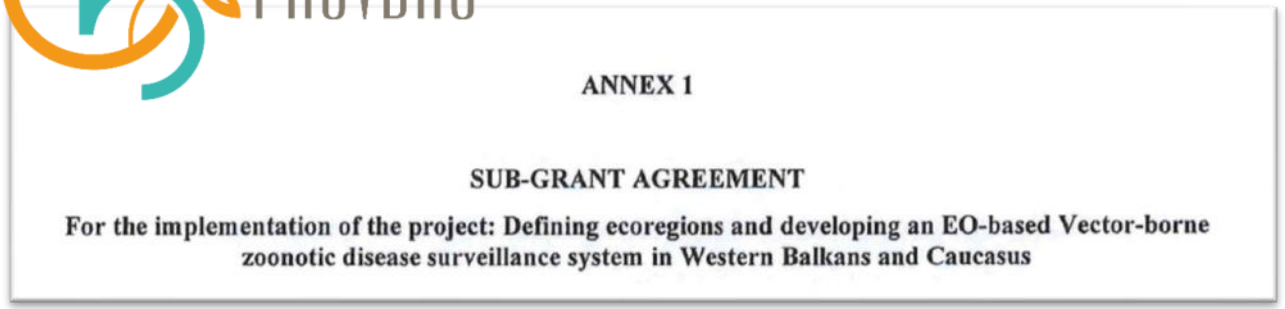

ANNEX 1

SUB-GRANT AGREEMENT

For the implementation of the project: Defining ecoregions and developing an EO-based Vector-borne zoonotic disease surveillance system in Western Balkans and Caucasus

Summary

The project aims to establish a **risk-based surveillance system** across Western Balkans and Caucasus for zoonotic vector-borne diseases (VBDs),

using the **eco-regionalization method** developed in a previous project (Defining Ecoregions and Prototyping on EO-based Vector-borne Disease Surveillance System for North Africa - PROVNA)

and surveillance data already available.

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Summary

Ecoregions will be characterised for the whole region identifying those **areas with similar environmental and climatic conditions**, potentially favourable for the presence of vectors and, therefore, vulnerable to specific vector-borne diseases.

Ecoregions maps will be **investigated with the analysis of already available surveillance data** on the occurrence of selected priority zoonotic VBDs, and the spatial distribution of related vectors.

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Specific Objectives

- **To define the ecoregions** of the western Balkan and Caucasus territories, characterising the distinct environmental and climatic factors **and identifying similar areas, potentially favorable for the presence of vectors** and, therefore, vulnerable to specific vector-borne diseases;

- **To investigate the association** between specific ecoregions and priority vector-borne zoonotic diseases **through the analysis of historical and already available data on vectors and diseases distributions** (with accurate and validated geolocation with latitude and longitude) in the region;

- **To promote the use of a risk-based approach** in the surveillance of vector-borne diseases in the region.

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5 Working Packages

Project activities to be carried out by 5 work packages (WP):

- WP0 - Coordination, networking, dissemination
- WP1 – Collection of available data
- WP2 – EO data identification and preparation
- WP3 – Ecoregionalisation
- WP4 – Maps evaluation for WNF

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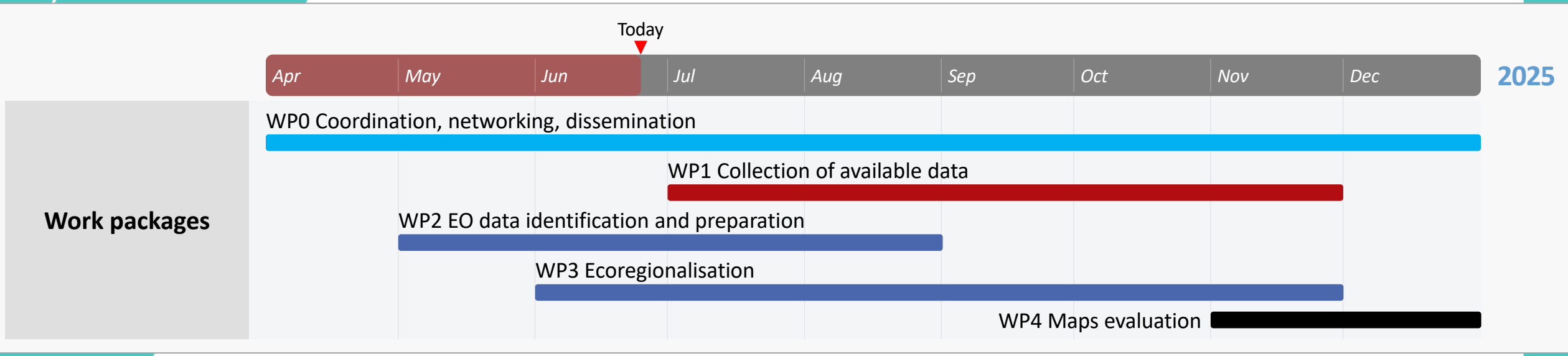

So many activities... in such a short time!

When the participating countries would be actively involved?

IZS-Teramo will engage with local experts in WP1 and WP4

... and in what, specifically?

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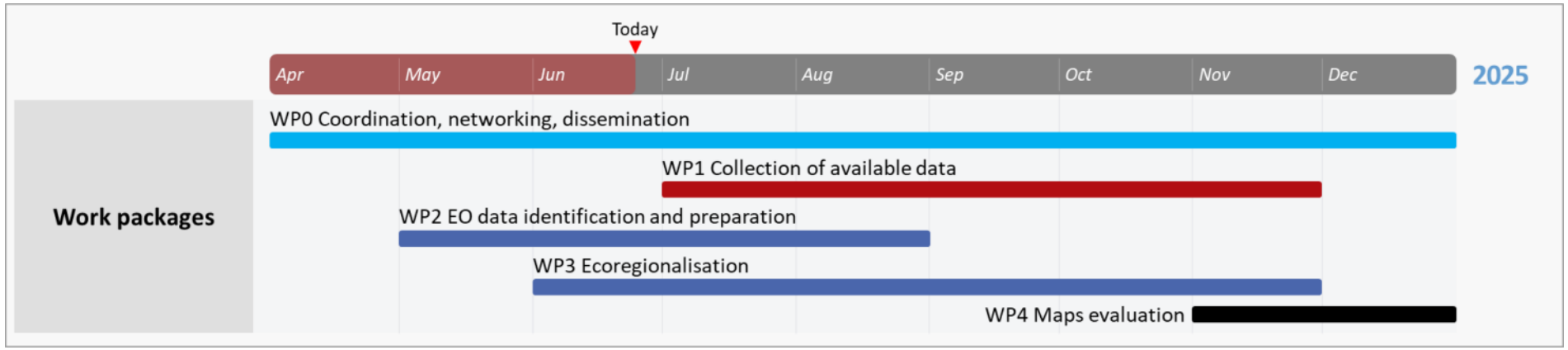

- **WP1 → Country-by-country**
  - Bilateral virtual meetings / joint assessments on the available data on **WNF occurrence and distribution** in the region, as well as data on **vectors presence and abundance**.
  - Data standardisation and sharing with WP1 for the investigation of ecoregions

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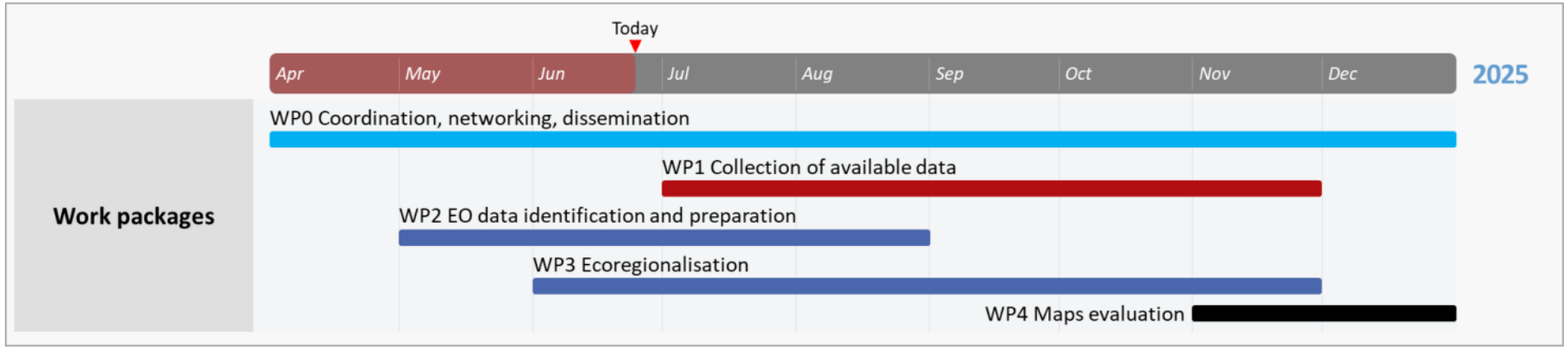

- **WP2 & WP3 (in the meantime, similarly to PROVNA)**
  - To identify, prepare, collect, and collate relevant EO data from multiple sources;
  - To process EO data for **identification of ecoregions** and the preparation of relative maps and tools.

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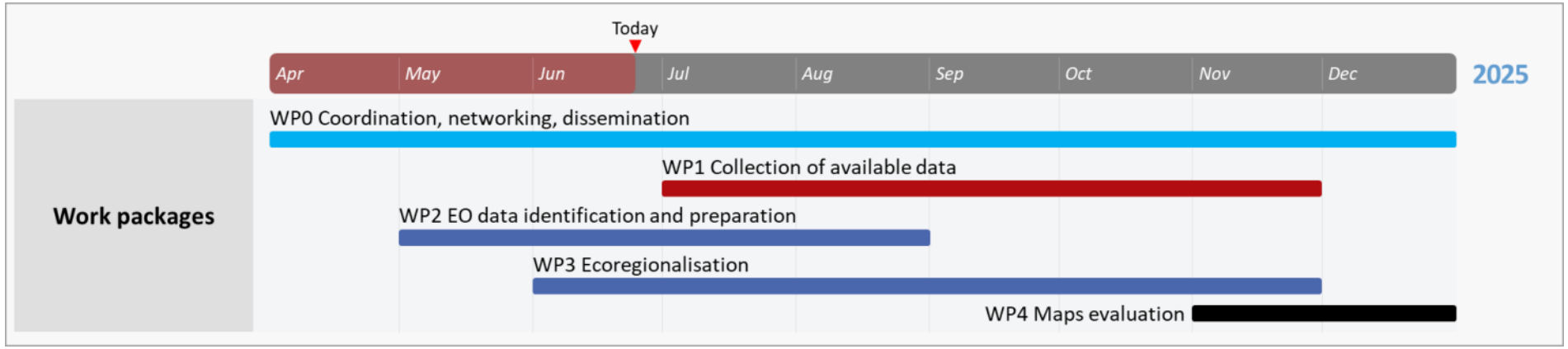

- **WP4 → Results applied to the regional context**
  - WNF surveillance data collected will be **overlayed** and, if possible, statistically analysed on the ecoregions map to verify **possible association between geographic distribution and specific ecoregions**.
  - The results will be discussed in a **final workshop** with the beneficiary countries.

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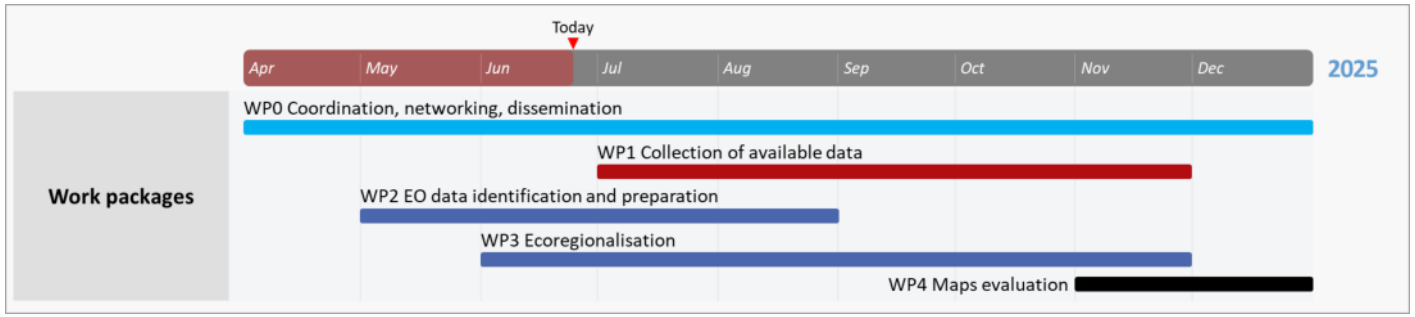

To conclude:

- The project has been launched (until end of 2025) – TIME IS SHORT!

- Bilateral meetings to be organised with the countries to understand availability of data on **WNF occurrence and distribution** in the region, as well as data on **vectors presence and abundance**

- **Data available** → Data standardisation and sharing for the investigation of ecoregions *(…but also for modelling, where possible!)*

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Thank you

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