Defining Ecoregions and Prototyping an EO-based VBDs Surveillance System for North Africa (PROVNA)

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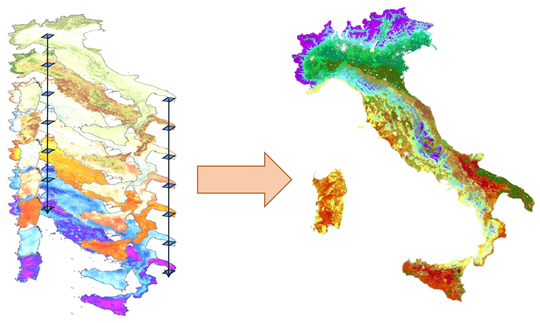
Introduction

In the framework of the Mediterranean Animal Health Network (REMESA), WOAH entrusted the Istituto Zooprofilattico Sperimentale of Abruzzo and Molise "G. Caporale" (IZS-Teramo) as WOAH Reference Center for several domains (e.g., horizontal topics: epidemiology, modelling and surveillance; specific diseases: e.g., West Nile, Bluetongue, Brucellosis, CBPP) to implement the "PROVNA" project in collaboration with the Goddard Earth Sciences Technology and Research (GESTAR) II Center, which is a cooperative entity between University of Maryland Baltimore County (UMBC) and NASA Goddard Space Flight Center.

Background

What's ECOREGIONALIZATION?
It's the process through which a territory is classified into similar areas ("ecoregions") according to specific environmental and climatic factors (e.g., elevation, vegetation, rainfall, temperature).



Ippoliti et al, 2019. PLoS ONE 14(7): e0219072

Project objectives

General objective:
Supporting the local competent authorities in North Africa (Mauritania, Morocco, Algeria, Tunisia, Libya and Egypt), for the identification of specific areas on which to carry out entomological/serological surveillance for vector-borne diseases.

Specific objectives:

1. to define the "ecoregions" in the study area. By identifying them, it will be possible to identify similarly vulnerable territories, on the assumption that similar areas (in space and/or time) are subject to similar diseases (especially vector-borne diseases - VBDs);
2. to build a customised prototype application, named PROVNA, that considers both static and dynamic variables, to forecast climatic and environmental changes for vector surveillance activities (early warning, identification of hotspot areas, assessment of introduction and persistence), to model for potential vector-borne disease emergence (critical events), and to investigate the evolution of these regions under different climate change scenarios.

The disease selected for the first application is **Rift Valley Fever**.

Materials and Methods

Start: 26/04/2022

Phase 1: Definition of the requirements
- Activity 1.1: literature review
- Activity 1.2: definition of Earth-Observation (EO) data
- Activity 1.3: definition of system architecture and statistical analysis

Phase 2: Earth-Observation (EO) data preparation
- Activity 2.1: data retrieval
- Activity 2.2: manipulation and processing of EO data

Phase 3: Statistical model/analysis
- Activity 3.1: multivariate clustering at regional/multi-country level, at a multiresolution scale
- Activity 3.2: multivariate seasonal clustering at regional/multi-country level, at a multiresolution scale

Phase 4: Ecoregion map evaluation/validation/application and prototype development
- Activity 4.1: entomological data/risk areas and ecoregions comparison
- Activity 4.2: Web Based Prototype Application Development

Phase 5: Communication and dissemination

End: 31/10/2023

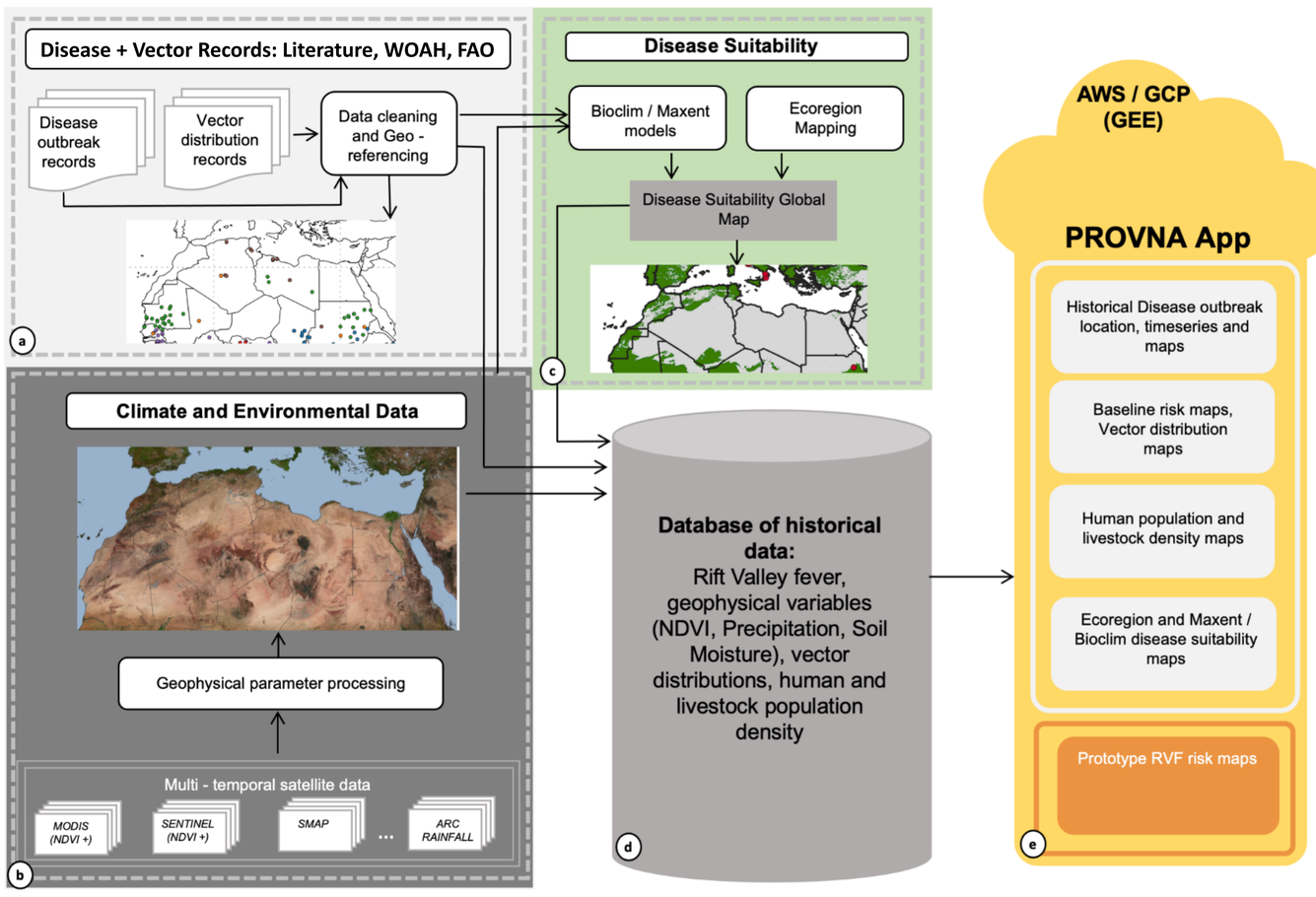
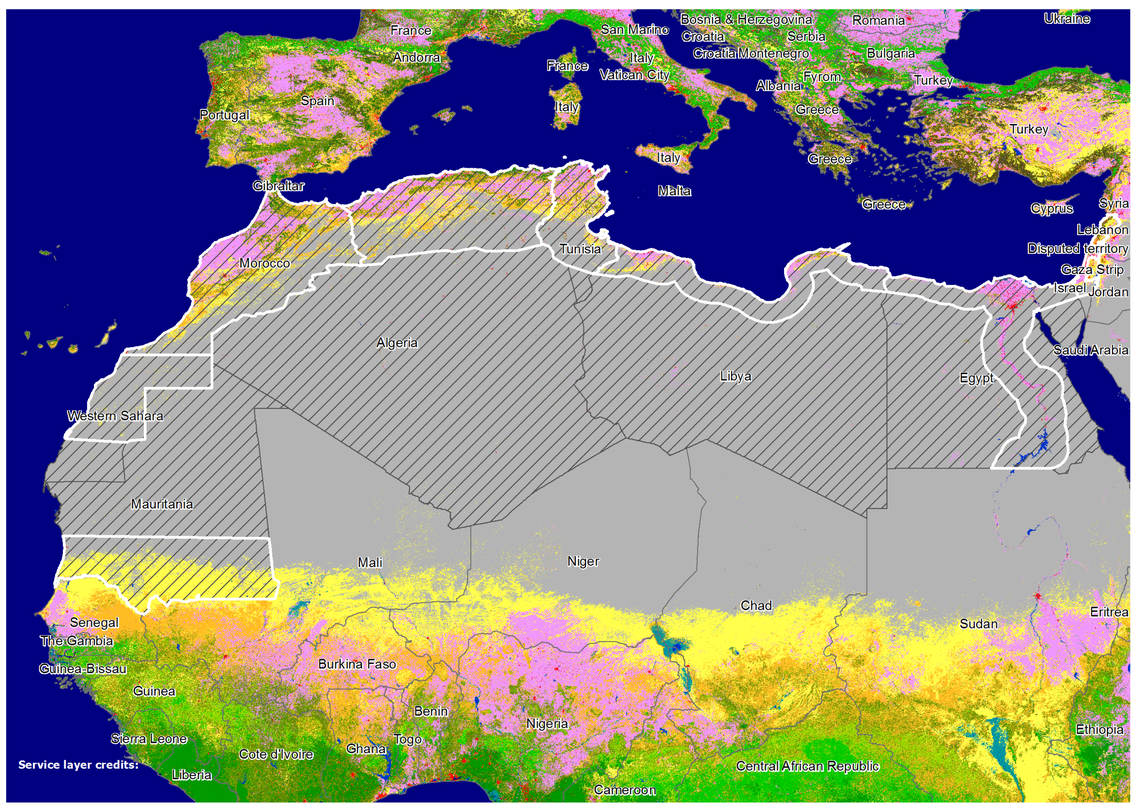


Illustration of workflow, data integrations and analyses to be undertaken in the project

Milestones/achievements



Potential mask area (white boundary area)

Phase 1 has been completed, although it may be further implemented (if necessary)

Phase 2 has begun, with the acquisition of datasets currently underway

Phase 3 and 4 have yet to be developed

Phase 5 has already started and will continue throughout the course of the project

Conclusions

The tool developed by the project will support Veterinary Services in:
- developing a customized predictive and innovative model to improve the risk-based targeted surveillance of VBDs
- optimizing financial and human resources through strategic planning.

Future activities

- On-field implementation of the predictive model with entomological and serological surveillance
- Implementation of a predictive model for the surveillance of other VBDs.

Funders

PROVNA is one of the Outputs of the Project for the Prevention and Control of Transboundary Animal Diseases (PC-TAD), funded by the German Ministry of Economic Cooperation and Development (BMZ) and implemented by the WOAH.

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