

IT Innovations for Nutrient Modelling and Water Quality Monitoring in Romania (RAPID Project)

RAPID (Romania Rural Pollution Prevention and Reduction) Project Overview

Value: 60 million EUR (Loan Number 9505-RO – World Bank)

Effectiveness date: 13 Dec 2023

Closing Date: 30th of June 2028

Objective:

Strengthen public institutions' capacity to monitor agricultural pollution and transfer knowledge to farmers for adopting pollution-reduction practices.

RAPID Project Structure

Component 1: Modernization of Public Institutions

MEWF – monitor, evaluate, and report on investments, including on the NRRP's environment-related components

NARW – laboratory equipment for water quality monitoring, LIMS, nutrient modelling (MONERIS/MOORE /...), GIS, DataCentre, web portal etc.

NFA – laboratory equipment, LIMS, mobile inspection centers. App for early warning system for pests, IT tools for tracking pesticide use and strengthening monitoring and reporting

MARD / LILIF - Diagnostic analysis of the Romanian agriculture sector,



Component 2: Knowledge-Sharing, Awareness, and Information/Innovation Transfer for Participating Farmers

- Sub-grants for modernization existing farms as role-model demonstration sites
- National networks for training and knowledge exchange on reducing agricultural pollution
- Implementing large-scale awareness campaigns on pollutants, environmental impacts, emission reduction, and climate-smart practices



Main investments for NARW

01.

ArcGIS licences – to be used also for waters cadastre

02.

IT equipment (graphical station, laptops, desktop systems, electronic equipment for monitoring)

03.

Procurement of
Subscription Licenses for
Software and Cloud and
Related Services for
NARW IT system.

04.

Laboratory equipment for microplastics analysis

05.

Software solution for
Design and development
Laboratory Information
Management System (LIMS)

06.

Nutrient modelling software for reporting in accordance with the requirements of European Directives

Development of nutrient modeling software



Objective

Develop a nutrient flow IT model to track the nutrients at the level of Romanian water systems, including the nutrients (nitrogen and phosphorus) from Danube River and from land-based sources into Danube River and the Black Sea, in order to support water quality planning, reporting, and management processes



Assessment and modeling of nutrient loads and transport

Tracking nutrient sources and simulating their movement in rivers, lakes, and groundwater, including evaluation of reduction scenarios.



Use of modeling results for national and EU water management

Supporting 2027
Management Plans,
Nitrates Directive
reporting, Danube Basin
planning, and decisionmaking at all levels.





Collection and transformation of all necessary datasets (climate, land use, soils, pollution sources, etc.) into model-ready formats



Structuring the data into a consistent database (GIS/relational) and delineating sub-basins or grid cells that form the basis for model simulations and interpretation.

Steps



Simulation of management, climate and land-use scenarios to assess future nutrient reductions.

Defining scenarios, running simulations, validating results, and delivering GIS maps and reports to support water management planning and EU reporting (WFD & Nitrates Directive).



Implementation, calibration and validation of the nutrient model (2021–2024).

Running the model for water balance and nutrient flows, adjusting parameters to match observed data, validating results with the Beneficiary, and preparing the technical report on the current status.



COMPONENT2

Sub-grants for farmers

Supporting farmers through sub-grants for modern manure-management technologies (e.g., manure spreaders, barn cleaning robots, storage and handling equipment) and for improved practices that reduce pesticide and antibiotic pollution

knowlegde Transfer Networks

Thematic farmer groups promoting good practices in manure management, fertilizer application, and the responsible use of pesticides and antibiotics.

Public awareness

The awareness campaign will promote KTN good practices through testimonials, success stories, and awareness ambassadors, in close collaboration with the KTNs' Advisory Hub.

Multispectral drones - for monitoring crop conditions and identifying stress areas (diseases/pests/nutrient deficiencies)

Agricultural drone for localized application of phytosanitary treatments in areas with disease and pest pressure identified through multispectral mapping



Agricultural monitoring system with soil sensor (NPK, moisture, pH) integrated with a weather station, for optimizing fertilization and reducing environmental impact by applying the necessary doses according to the actual condition of the crop

Herbicide sprayer with GPS and automatic section to eliminate overdosing and overlaps, anti-drift nozzles, as well as variable application depending on movement

- UV Boosting;
- Insects traps;
- o Robots for autonomous PPP application.



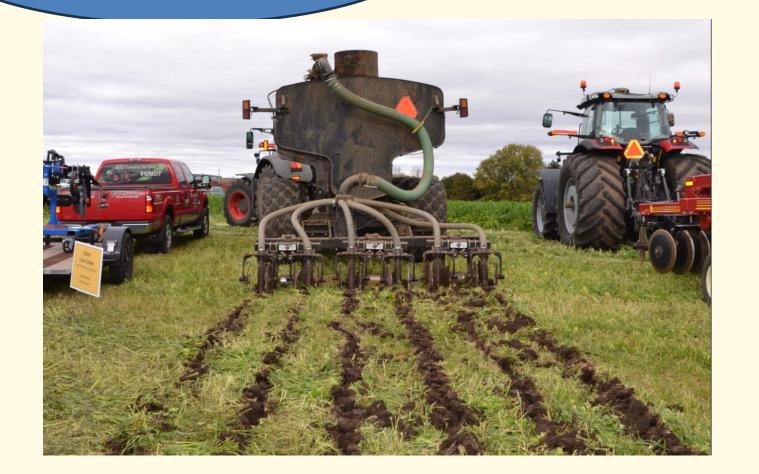


Spraying machines with GPS and automatic control systems to prevent overlaps





Robots for automated cleaning the animal barns



Manure spreader trailer with controlled distribution system for uniform application

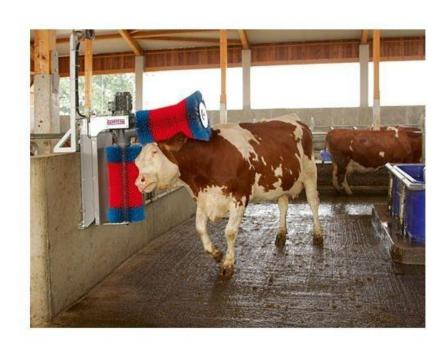
- Frontloaders for manure;
- Slurry storages and equipment for application with hoses, or by injection;
- Drones/Equipment for foliar fertilsers.







- Automatic feeding machines with monitoring system on consumtion
- Scractching brushes & Resting mattresses;
- Fences for resting areas;
- Basins for toes and nails care;
- Nebulizer for applying antiparasitic solutions to reduce animal stress;
- Integrated transponder system.





Precision direct seeder with a fertilizer tank that allows fertilization simultaneously with sowing





Cultivator with integrated liquid fertilization system, which allows localized application of fertilizers during operation, reducing nutrient losses and the number of passes over the soil

Direct pneumatic seeder for no-till technology, which allows sowing without soil preparation, contributing to moisture preservation, reduced compaction, and lower CO₂ emissions



THANK YOU

Water pollution harms ecosystems, but with action, we can reduce its effects and protect aquatic life and the planet's health.

VERONICA RADU, MEWF ROMANIA Email address: veronica.radu@mmediu.ro