A FRAMEWORK FOR TARGETING MITIGATION MEASURES TO REDUCE PESTICIDE IMPACTS ON WATER

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Background

- Pesticide residues frequently occur in surface waters in Belgium (VMM, 2017)
- Control of diffuse sources of pollution from agriculture remains a challenging task, and no unique solution can deal with pesticides input in the aquatic environment. Targeted mitigation measures in agriculture can reduce the environmental impact of pesticides and improve water quality.
- Assessment frameworks can assist in the comparative analysis and selection of options for change through clear steps providing evidence for better decisions

Objetives

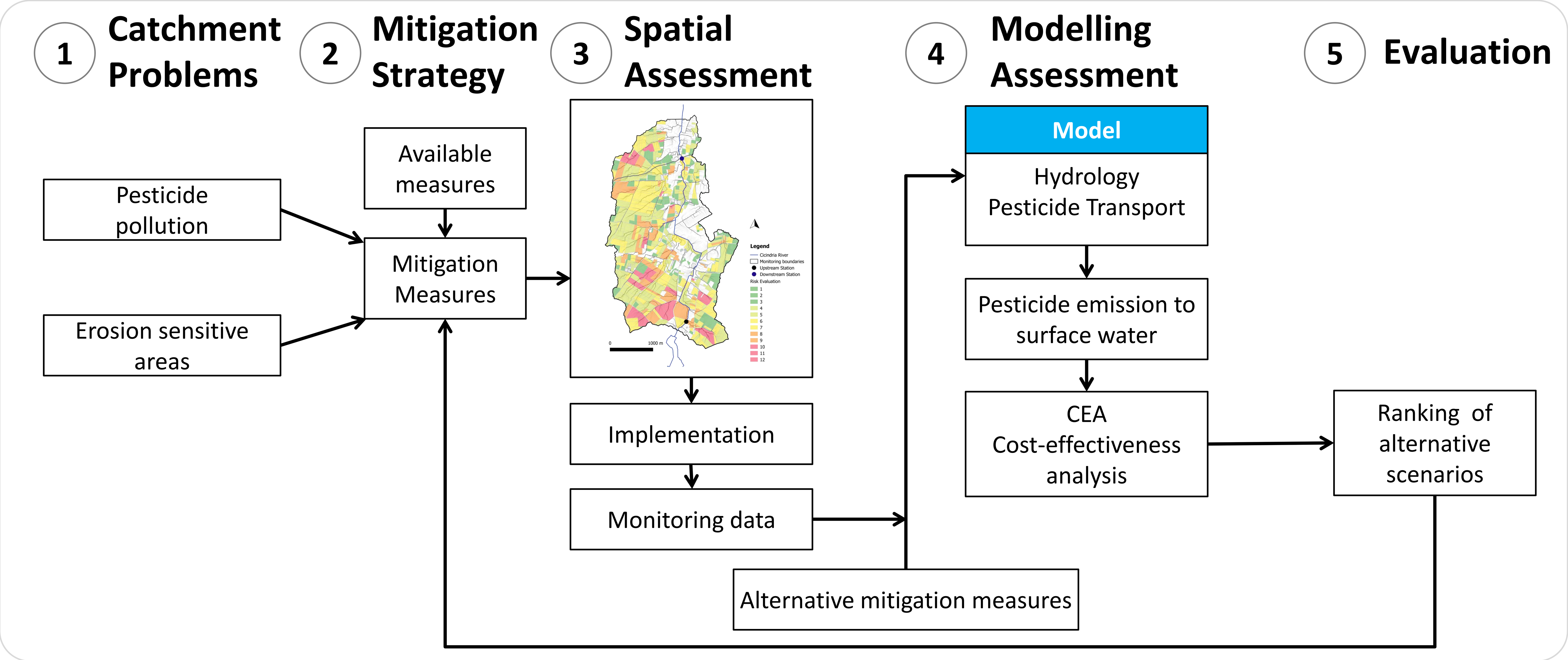
- To understand catchment processes through monitoring data and modelling
- To develop a framework to select and target spatially cost-effective mitigation measures to reduce pesticide loads in water at catchment scale.

Methods

An assessment framework was developed and tested in a case study: several steps were established to mitigate pesticide pollution at the study site: 1) catchment problem identification, 2) evaluation of available mitigation measures, 3) spatial assessment to priority area identification, 4) modelling assessment to evaluate the monitoring results and other mitigation alternatives, 5) Cost-effectiveness analysis (CEA) of the alternative scenarios.

Monitoring: water samples were taken at the inlet and outlet of the catchment to analyse glyphosate (herbicide) and AMPA (main metabolite) for 6 years (2014-2019) from May to October. The results from monitoring are inputs for the modelling assessment.

Mitigation measures: grass buffer strips were available for farmers to implement through a voluntary program. For the scenarios, different locations within the catchment and alternative landscape measures (vegetative buffers and retention structures such as constructed wetland) will be evaluated.



Study Area

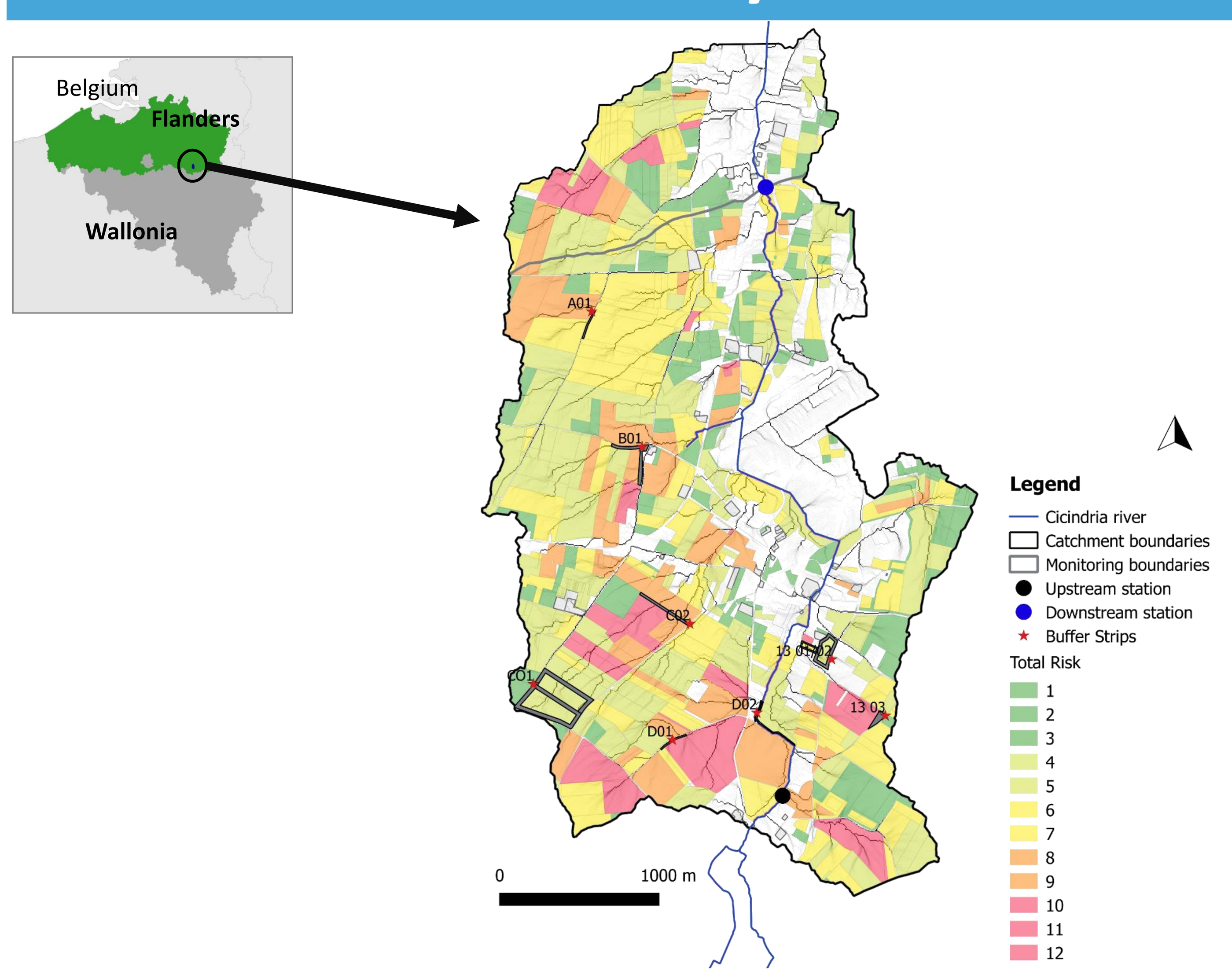


Figure 1. Study area: Cicindria catchment. Resulting map from the spatial assessment with the total risk for glyphosate pollution in agricultural areas (Quaglia et al., 2019). Higher total risk represent priority areas for mitigation measure implementation. The location of the grassed buffer strips implemented during 2016/2017 are indicated with stars and the two monitoring stations: Muizen (upstream) and SintTruiden (downstream).

Results

- The initial steps of the assessment (1 to 3) were performed.
- The results from the spatial assessment with the risk evaluation and prioritization of the parcels is shown in Figure 1. Details on the methodology published in Quaglia et al. (2019).
- Grass buffer strips were implemented in target parcels (stars in Figure 1). Farmers joined a voluntary program for 5 years for the implementation.
- 6 years of monitoring: 2 initial without new measures (baseline), 4 with measures (mitigation phase).

Next Steps

- Complete monitoring campaign 2019
- Evaluation of the monitoring results to estimate the efficiency of the implementation of mitigation measures and improve process understanding.
- Modelling of the catchment to evaluate the scenarios
- CEA to assess and rank cost-effective measures to reduce pesticide pollution

References: Quaglia, G., Joris, I., Broekx, S., Desmet, N., Koopmans, K., Vandaele, K., Seuntjens, P., 2019. A spatial approach to identify priority areas for pesticide pollution mitigation. J. Environ. Manage. 246, 583–593; VMM, 2017. Pesticiden in de waterketen 2015-2016 (in Dutch). Flemish Environment Agency, Flanders, Belgium.

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