



Guidance on model-supported application of EU water directives



Key Policy Messages

- ✓ ICT tools may help simplifying the application of EU water-related Directives
- ✓ The feedback provided by the FREEWAT application to different case studies helped developing a guidance document on the use of models
- ✓ The guidance support stakeholders in developing models to comply with WFD, GWD, and other directives

WHAT H2020 FREEWAT is

FREEWAT is an HORIZON 2020 project financed by the EU Commission, aiming at promoting water resource management through innovative ICT tools and participatory approach.

Main result of the project is the free and open-source FREEWAT software: a QGIS integrated environment, where several simulation codes, based on the hydrological cycle, hydrochemical or economic-social processes, are integrated in a unique GIS project for conjunctive use of surface- & ground-water.

This Policy Brief is part of series of seven whose goal is to illustrate the FREEWAT approach and achievements.





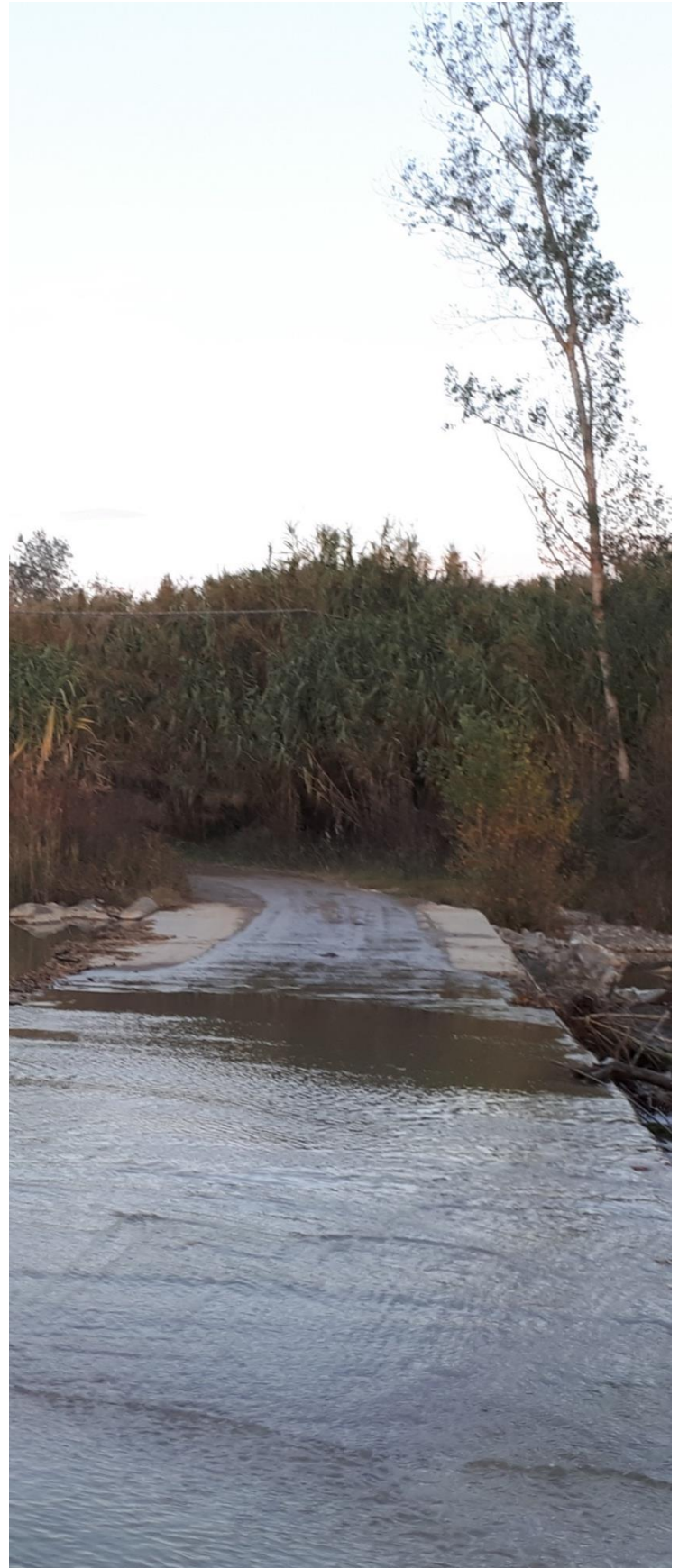
Guidance on model-supported application of EU water-related directives

From Barnett et al. (2012), “A groundwater model is any computational method that represents an approximation of an underground water system (modified after Anderson and Woessner, 1992). While groundwater models are, by definition, a simplification of a more complex reality, they have proven to be useful tools over several decades for addressing a range of groundwater problems, supporting the decision-making process, and estimating the potential hydrologic effects of management activities”.

Developing and applying models for sustainable groundwater management have multiple benefits to stakeholders. Constructing and calibrating models improve understanding the critical processes that influence the good status of water bodies. The application of a model for testing the influence of projects and management actions on watershed conditions may provide a framework for stakeholders to screen and select the most appropriate strategies for the achievement of a good status of water resources.

Further on, models have been used in forecasting effects resulting from climate change or human-related changes in water use, that occurred during the 15-year planning and implementation horizon envisaged within the EU Water Framework Directive (WFD; started between 2000 and 2002).

The objective of this Guidance on the model-supported application of EU water-related Directives is to assist with the use and development of groundwater models, and the necessary interactions with surface-water, including data analysis and development of water management scenarios, and model results reporting, using GIS-based ICT (Information and Communication Technologies) tools. This document is extensively based on the experience from the development of water management models applying the FREEWAT platform to 14 selected case studies in EU and non-EU Countries.





Modelling in the Water Framework Directive (WFD)

Some articles of the WFD suggest, but not always explicitly requires, the use of models as possible efficient tools to comply with the requirements:

- The WFD introductory text, at (28): “Surface waters and groundwaters are in principle renewable resources; in particular, the task of ensuring the good status of groundwater requires early action and stable long-term planning of protective measures...”.
- Article 1 (a, b, c, d, e) establishes the framework for the protection of water, highlighting the components of the water bodies that need to be protected and how water quality and quantity can be improved.
- Article 4 (b) “Member States shall implement the measures necessary to prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the status of all bodies of groundwater...”, and “protect, enhance and restore all bodies of groundwater, ensure a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater status at the latest 15 years after the date of entry into force of the Directive...”.
- Article 5 for each river basin “an analysis of its characteristics, a review of the impact of human activity on the status of surface waters and groundwater; and an economic analysis of water use” should be addressed.
- Article 7 deals with establishing drinking water protected areas, where protected areas are defined as the entire water bodies. Therefore, the protected area is the whole aquifer, not the protection zone around the well.
- Article 8 lists requirements for monitoring both the chemical and quantitative status of groundwater, surface waters and protected areas.





Guidances in a broader context

The purposes of groundwater modelling in the broader context of the EU Water Framework Directive include:

- understanding the status of groundwater bodies, collating together the information generated under the Directive's characterization exercises into a comprehensive/advanced understanding of the water body;
- establishing the goal of the model and the expected results, and supporting the objectives of the Directive;
- supporting identification and development of potential planning and management actions to assure the future good status of the groundwater basin;
- supporting the justification of exemptions (natural conditions) and the setting of less stringent objectives under Articles 4.4 and 4.5 of the WFD;
- supporting the refinement of monitoring networks in a basin over time (Article 8);
- assessing the impact of measures under the Directive's Programme of Measures towards the achievement of good status conditions;
- supporting the interpretation of monitoring results for good status determination;
- supporting the identification of safeguard zones;
- enhancing the understanding of groundwater – surface water linkages and hence enabling the better protection of groundwater-dependent terrestrial ecosystems and surface water bodies.

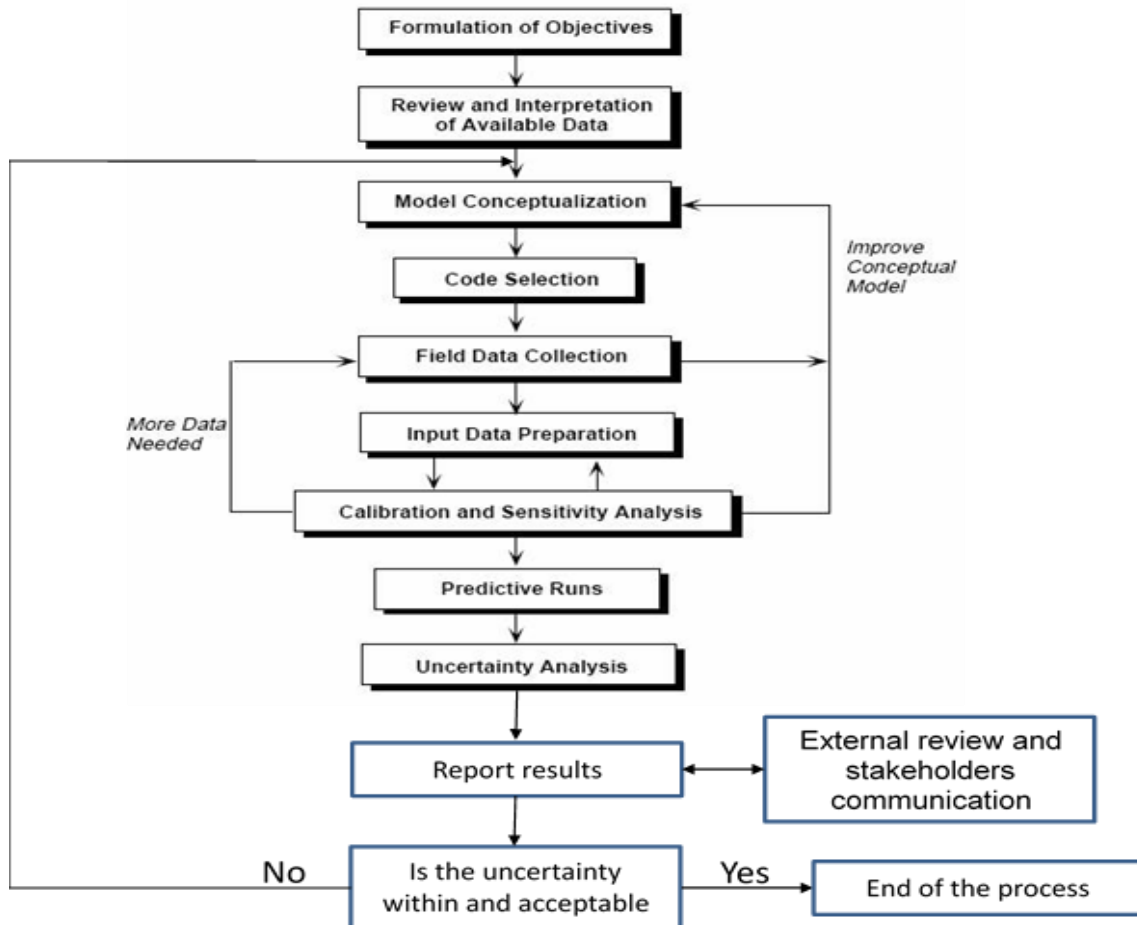


Figure 1: The modelling procedure (modified from Bear et al., 1992)

REFERENCES

For further details, the reader is referred to:

H2020 FREEWAT, Guidance on model-supported application of EU water related Directives for water quantity and quality

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