

Survey and Review of Decision Support Tools



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A comprehensive overview of decision support tools (DSTs) used by farmers, farm advisors, water managers and policy makers in the EU for water, nutrient and pesticide management was undertaken encompassing paper-based guidelines, farm-level software and phone apps, and complex models intended for research studies. The overall purpose of the review was to select a subset of DSTs that could be further assessed by the Multi Actor Programme (MAP) leaders for their potential suitability in managing water quality within the case study catchments of the FAIRWAY project.

Structured searches of the scientific literature largely returned details of research-based modelling tools; therefore the unique combination of expertise and practical experience of the project participants was used to identify farm-scale tools and other locally developed DSTs that were assessed as being important in a national context. More than 150 DSTs were identified in total, of which 36 were selected for further investigation based on their national importance and relevance to the project aims (Table 1). For these DSTs, a set of Information Sheets were produced to provide an easily accessible source of key information on tool capabilities, and a subset were demonstrated to a group of project partners and MAP leaders at a Workshop.

A classification scheme was devised to better understand the target users of the DSTs and the types of support they were intended to provide. The DSTs were separated into those developed to support water quality/agri-environment policy makers operating at a regional or national level, and those intended to support sustainable nutrient management at the farm level. The DSTs were further divided into groups depending on whether they provided support for i) evaluation of current practices; ii) strategic advice for farm management and implementation of measures; or iii) on-farm operational management (Table 2 and 3).

Few of the selected DST were primarily aimed at improving water quality. Rather they were farm (nutrient/pesticide) management tools and their inclusion in this review was based on the assumption that the efficient use of nitrogen and pesticides indirectly improves water quality; most participants reported using this type of DST. Only 3 of the shortlisted DSTs were explicitly developed to consider the impact of mitigation methods on water quality: FARMSCOOPER (UK), Environmental Yardstick for Pesticides (NL) and Catchment Lake Modelling Network (NO). However, tools that support the efficient and smart application of nutrients or pesticides (e.g. by taking into account weather forecasts), can be said to provide indicative information on management measures for reducing losses to the water environment. Economic and financial impacts of mitigation methods were infrequently represented by the shortlisted DSTs.



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All the DSTs examined in this review operate within the context of the wider advisory frameworks in place in their respective countries, and this will clearly impact on the uptake of a DSTs and its usefulness/effectiveness. It may not always be straightforward to transfer a DST from one country to another because the advisory framework is likely to be different, in addition to issues around language and requirements for country-specific data or calibration.

Table 1. Decision support tools selected for further investigation.

No.	Country	DST name	Nutrient tool	Pesticide tool	WQ indic.*	WQ**	Mitigation***
1	DE	Düngeplanung 1.6	Y		Y		
2	DE	ISIP	Y			Y	
3	DK	Mark Online	Y	Y	Y		
4	DK	Dyrkningsvejledninger	Y	Y			
5	DK	Plant Protection Online		Y			
6	DK	CTzoom/CTtools	Y			Y	
7	DK	BEST Kemi	Y			Y	
8	DK	TargetEconN	Y		Y		
9	FR	PHYTOPIXAL		Y	Y		
10	FR	SIRIS		Y			
11	IE	Teagasc NMP online	Y				
12	IE	FarmHedge		Y			
13	NL	ANCA	Y		Y		
14	NL	Adviesbasis CBGV	Y				
15	NL	Beregeningswijzer	Y				
16	NL	BedrijfsWaterWijzer (BWW)	Y			Y	
17	NL	Bodemoconditiescore	Y	Y			
18	NL	NDICEA	Y				
19	NL	Environmental Yardstick		Y		Y	Y
20	NL	STONE	Y				
21	NO	Catchment-lake modelling network	Y			Y	Y
22	NO	Skifteplan	Y		Y		
23	NO	Agro-meteorological service	-	-			
24	SI	Načrtovanje gnojenja	Y				
25	SI	Smernice za strokovno gnojenje	Y				
26	SI	OECD/EUROSTAT N balance	Y		Y		
27	SI	GROWA-SI	Y			Y	
28	SI	State network of groundwater monitoring points	Y	Y		Y	
29	SI	FITO-INFO		Y			
30	UK	PLANET	Y		Y		
31	UK	FARMSCOOPER	Y			Y	Y
32	UK	Check it out		Y			
33	UK	Sentinel Online		Y			
34	UK	Procheck		Y			
35	UK	SCIMAP	Y			Y	
36	UK	WaterAware		Y			

*Represents indicators of water quality such as inputs (use of fertiliser/pesticides), nutrient balance/surplus/efficiency.

**Water quality is explicitly represented (e.g. amount or risk of nitrate/pesticide leaching)

***Mitigation methods are specifically represented

Primary users/scale of DST

Farmers or advisors/field or farm scale (mostly farm nutrient/pesticide management tools)

Water quality manager or policy maker/catchment scale

Modellers or researchers

Table 2. Nutrient decision support tools

Target	Support for:		
	Evaluation current practices	Strategic advice, farm management and implementation of measures	Operational management (climate smart, innovations for equipment, IT-apps, instructions/rules for sustainable application)
<i>Targeted to support regional (water quality, agri-environment) policy makers</i>	[6] CTtools [7] BEST kemi [20] STONE [21] Catchment-lake modelling network [26] OENBA [27] GROWA [28] SNGMP [30] FARMSCOOPER [34] SCIMAP	[8] TargetEconN [20] STONE [21] Catchment-lake modelling network [26] OENBA [30] FARMSCOOPER	
<i>Targeted to support sustainable farm (nutrient) management</i>	[1] Düngeplanung [2] ISIP [3] Mark Online [13] ANCA [16] BWB [17] Bodemconditiescore [25] SSG/GPBF	[1] Düngeplanung [2] ISIP [3] Mark Online [4] Dyrkningsvejledninger [11] Teagasc NMP Online [13] ANCA [16] BWB [24] NG/FP [25] SSG/GPBF [29] PLANET	[12] Farmhedge [14] CBGV [15] BeregeningsWijzer [18] NDICEA [22] Skifteplan [29] PLANET

Table 3. Pesticide decision support tools.

Target	Support for:		
	Evaluation of current practices	Strategic advice on farm management and implementation of measures	Operational management (climate smart, innovations for equipment, IT-apps, instructions/rules for sustainable application)
<i>Targeted to support regional (water quality, agri-environment) policy makers</i>	[7] BEST kemi [9] Phytopixal [10] SIRIS [19] Yardstick [28] SNGMP	[9] Phytopixal [10] SIRIS [29] FITO-INFO	
<i>Targeted to support sustainable farm crop protection (Integrated Pest Management)</i>	[3] Mark Online [9] Phytopixal [10] SIRIS [19] Yardstick [29] FITO-INFO	[3] Mark Online [4] Dyrkningsvejledninger [5] Plant Protection Online [19] Yardstick	[5] Plant Protection Online [12] FarmHedge [32] Check it Out [34] Procheck. [35] Sentinel Online [36] Water Aware