

THE „ENFO” KNOWLEDGE BASE TO SUPPORT EFFICIENT MANAGEMENT OF WASTE UTILIZATION ON SOIL



Vaszita, Emese¹; Gruiz, Katalin¹; Siki, Zoltán²; Feigl, Viktória¹; Klebercz, Orsolya¹; Ujaczki, Éva¹; Fekete-Kertész, Ildikó¹

Department of Applied Biotechnology and Food Science¹
Department of Geodesy and Surveying²
Budapest University of Technology and Economics
emvaszita@mail.bme.hu, gruz@mail.bme.hu



About „ENFO”

„ENFO” (ENvironmental inFORmation) is a comprehensive web based environmental knowledge base and expert system, supporting decision-making with systematically organized and searchable information on environmental legislation, assessment and monitoring methods, risk and impact assessment tools, environmental remediation methods and a Decision Support Tool (DST).

„ENFO” includes legal, scientific and practical engineering levels. Within these levels the information are presented in versatile forms : glossary, relational databases, maps, picture galleries, e-courses, available from the entry page of the ENFO portal (Fig. 1).

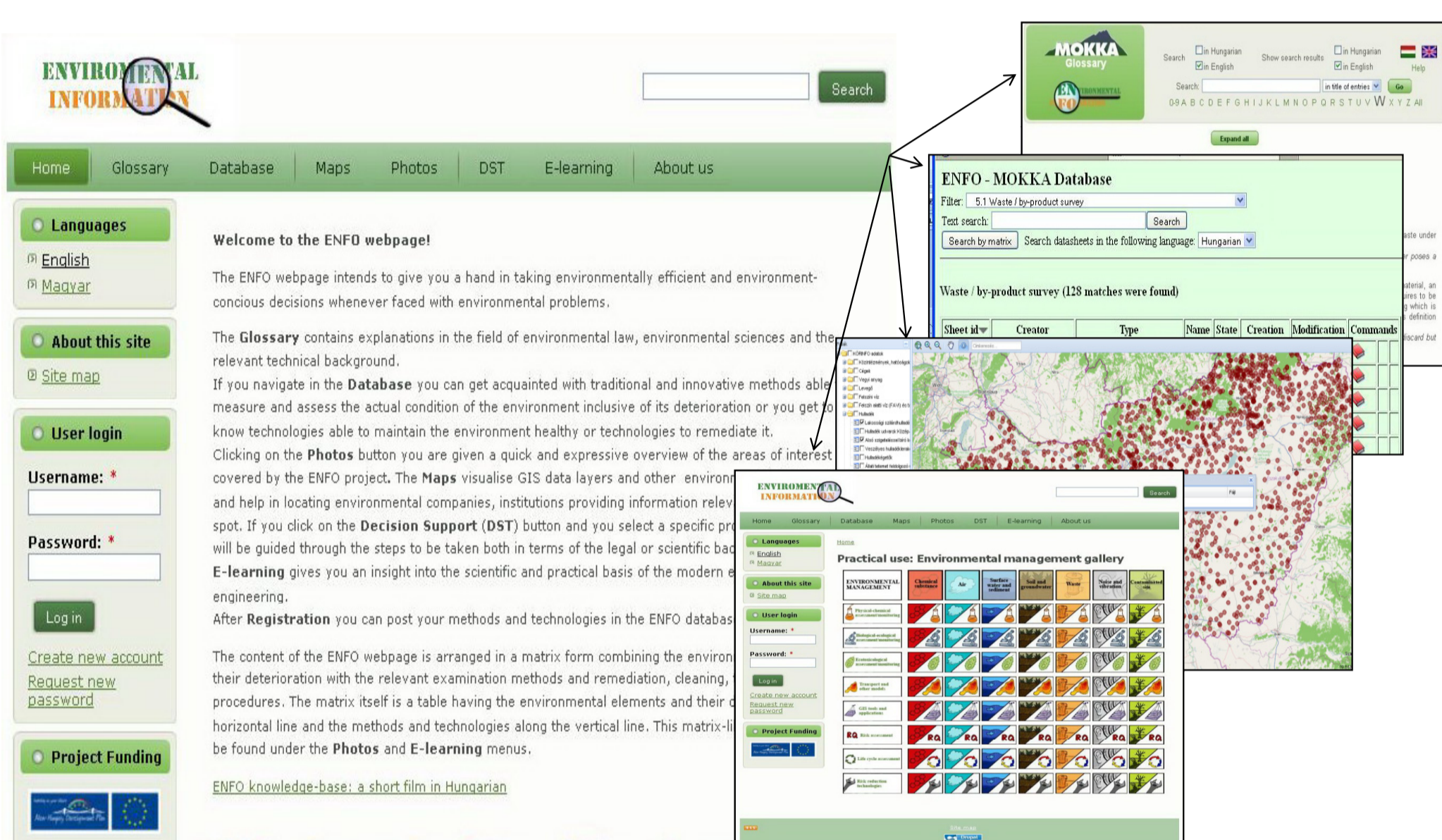


Figure 1. Entry page of the ENFO portal and the information behind the main menus

Waste utilisation on Soil

The SOILUTIL project has developed the „Waste „ and „Soil” topics within „ENFO”, focusing on the interaction between „Soil” and „Waste” in terms of waste utilization on soil.

The „Waste characterisation” data sheets provide description of various wastes. The „Soil amelioration technology” datasheets present case studies about waste utilization on soil (Figure 2.)

ENFO - MOKKA Database					ENFO - MOKKA Database				
Filter: 5.1 Waste / by-product survey					Filter: 3.4 Soil amelioration technology				
Text search: [] Search					Text search: [] Search				
Search by matrix					Search by matrix				
Search datasheets in the following language: Hungarian					Search datasheets in the following language: Hungarian				
Waste / by-product survey (131 matches were found)					Soil amelioration technology (17 matches were found)				
Sheet id	Creator	Type	Name	State	Sheet id	Creator	Type	Name	State
812	feigl	Waste / by-product survey		✓	894	horvathilla	Soil amelioration technology	Crop residue burning	✓
813	feigl	Waste / by-product survey		✓	899	eskati	Soil amelioration technology	Mulch technology	✓
821	bartazsolt	Waste / by-product survey		✓	905	gruiz	Soil amelioration technology	Use of sugarcane factory wastes as soil amendments	✓
822	bartazsolt	Waste / by-product survey		✓	932	barbo87	Soil amelioration technology	Use of wood waste materials for erosion control	✓
825	bartazsolt	Waste / by-product survey		✓	939	szabolujzs	Soil amelioration technology	Residue and tillage management	✓
827	boronditamas	Waste / by-product survey		✓	952	lacilla	Soil amelioration technology	Application of wood ash for soil nutrition	✓
832	bartazsolt	Waste / by-product survey		✓					
833	bartazsolt	Waste / by-product survey		✓					
834	boronditamas	Waste / by-product survey		✓					

Figure 2. List of „Waste Characterisation” and „Soil Amelioration” datasheets in the ENFO-MOKKA database

Acknowledgments

KMOP-2008.3.3.4 („ENFO” project) funded by the Central Hungary Operative Programme and TECH_09-A4-2009-012 („SOILUTIL” project) funded by the National Innovation Office

References

ENFO project (2008-2010) Environmental Information Dynamic information system to support environmentally efficient and environmental-conscious decisions, KMOP-2008.3.3.4, <http://enfo.agt.bme.hu/drupal/en>

SOILUTIL project (2009-2014) SOIL amelioration by innovative waste UTILisation technologies, TECH_09-A4-2009-012, <http://soilutil.hu/en>

„Matching” software-supported DST

The matching software system is a decision making tool planned to match the utilizable characteristics of the waste to the amendable characteristics and/or missing components of the deteriorated soil to produce an efficiently remedied/amended soil. Data availability and matching capability of the current „Waste” database has been tested versus some soil degradation cases (Fig. 3).

Waste types and categories	Id. number of the data-sheet in the database	Denomination of the waste characterised in the database	Soil deficient in humus	Soil deficient in Nitrogen	Soil deficient in Phosphorus	Soil deficient in Kalium	Soil deficient in Sulphur	Soil deficient in Lime	Acidic soils	Loose soils	Compacted soils	Contaminated soils	Artificial soil inorganic fraction	Artificial soil organic fraction
3 Ca-containing	1204	Cement kiln dust												
3 Ca-containing	1248	Mussle shells												
3 Ca-containing	1254	Gypsum from gas desulfurisation												
4 Phosphorous containing	1219	Phosphogypsum												
5 Water treatment sludge	1040	Water treatment sludge from Nyirtelek												
5 Water treatment sludge	1060	Water treatment sludge from Csepel												
6 Municipal soil waste fra	868	Paper and cardboard waste												
6 Municipal soil waste fra	869	PET bottle wastes												
6 Municipal soil waste fra	1098	Tires shreds												
7 Inert waste and mining v	837	Crushed concrete												
7 Inert waste and mining v	838	Crushed brick												

Figure 3. Preliminary testing matrix matching the „Waste” datasheets in the database to the listed „Soil” problems.

Matching works according to the typical indicators (priority parameters) of the soil problem (i.e. bulk density, humus content, lime content in case of compacted soil). The priority parameters of the degraded soil (based on which the diagnosis is given) are grouped according to the main soil degradation cases (loss of nutrients, loss of organic matter, salinisation, acidification, sodification, compaction and pollution).

The navigation algorithms (Fig. 4.) within the system lead the user to various decision points, where they offer further problem specific navigation possibilities to reach the matching waste.

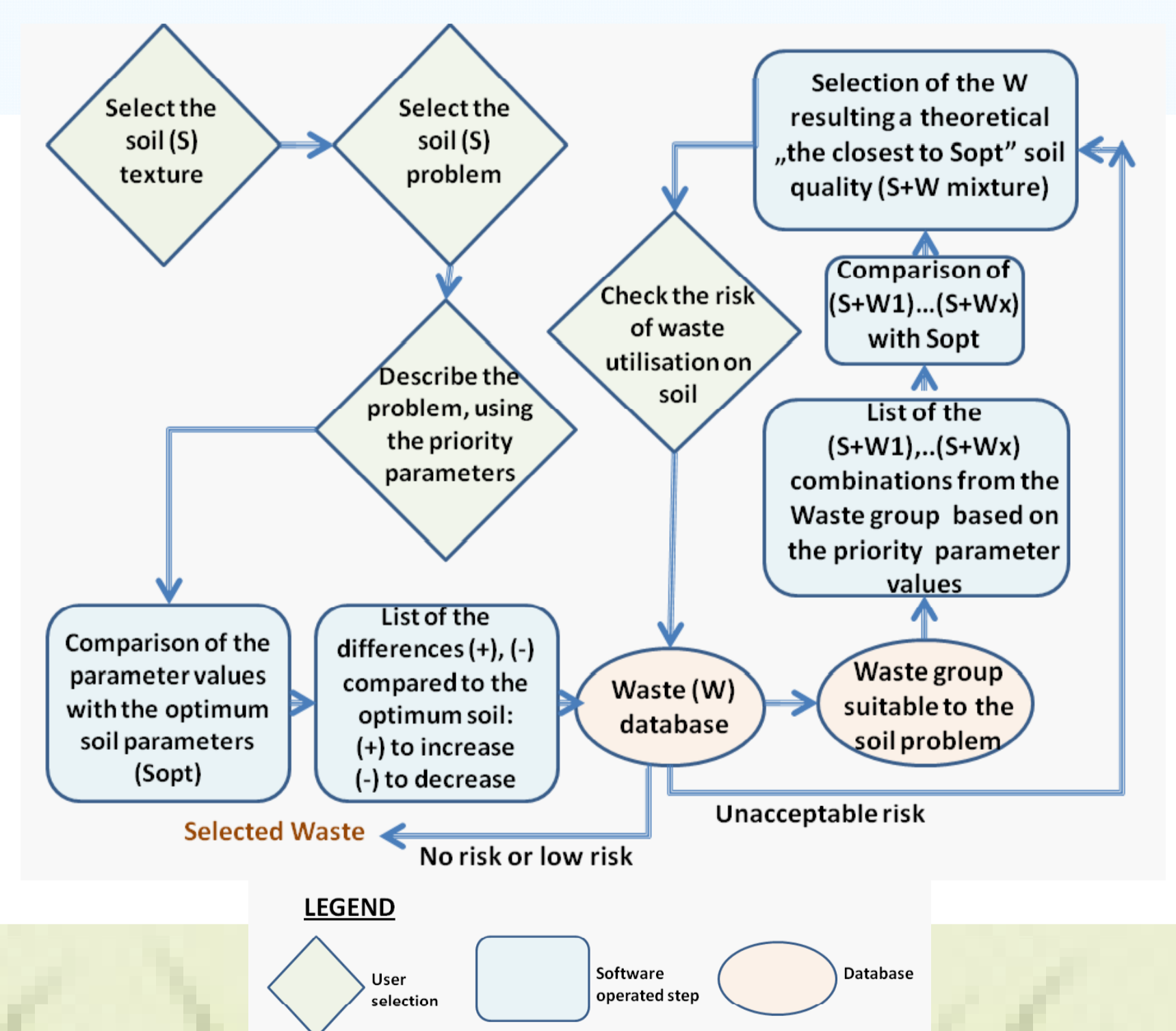


Figure 4. General navigation algorithm aimed at finding the suitable waste to amend a certain degraded soil

Conclusions

ENFO combines IT tools with scientific, engineering and management knowledge to help the systematic arrangement and easy search of information at various user levels.

The software-supported DST contributes to preliminary decisions on the sustainable, risk- based and efficient utilization of wastes for remediation of degraded and contaminated soil.