IRRIGATION REGULATIONS AT FARM SCALE: A MEASURE TO A POLITICAL STRATEGY OF WATER SAVING

INTRODUCTION - There are technological challenges facing irrigation. Particularly in Mediterranean countries, characterized by strong variability in climate and soils, the increasing risks of climate changes and droughts determine the need for more suitable farm projects, according to each specific soil-plant-atmosphere system. The purpose of this presentation is to show the interest of an "irrigation practical guide" development on farm scale. This tool may be useful to certify the accomplishment of rules, needed to define the project adequacy level.

OVERVIEW - Design and management solutions in the irrigation sector shall solve conflicts concerning technical, environmental and socio-economic issues. This proposal is based on the elaboration of a matrix of 17 indicators and 4 indices, to be integrated into a methodological tool. The first step is to create a wide inventory of parameters, taking into account the irrigation conditions of the alternative methods, to properly support that matrix. A final ranking and selection shall point to an accepted compromise between the multi-disciplinary issues evaluated.

IRRIGATION EVALUATION:

SCIENCE BASE FOR DEVELOPING A PRACTICAL GUIDE

OBJECTIVES:

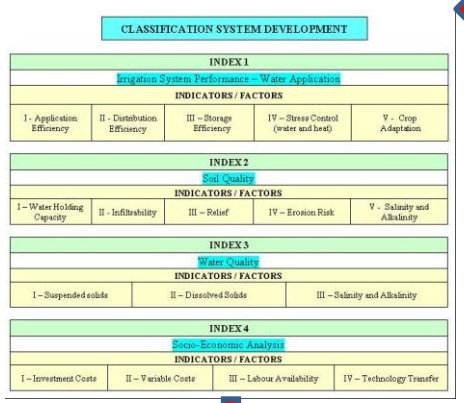
Definition of best options and solutions to establish a framework of reference

USE PURPOSES:

Evaluation processes related to:

Performance, risk, decision support, control, diagnosis, monitoring, optimization, monitoring, selection

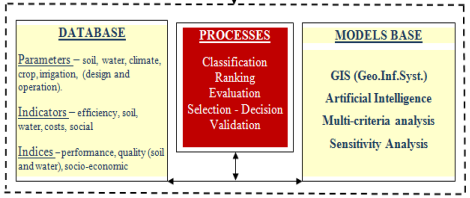
Scientific Fields - Thematic Issues	Basic Procedures (Approaches and Methodologies)	Structuring Tools (Methodological support)
Production System (technology) - crop - mechanization - irrigation **Resources Conservation** - water - soil - air - runoff - erosion - polluiton - salinization **Climatology** - climate factors - evapotranspiration - droughts - desertification - carbon emissions - greenhouse effects - cliamte change **Techno-economic** - economic analysis - financial analysis - planning and management **Rural Development: Territory and Social** - protection areas – ecological interest - appropriate use of resources - economic and social cohesion - abandonment of farming - poverty and development - farming systems	**Indicators** **Descriptive formulation** **Classification frame** (qualitative – quantitative approaches) **Artificial Intelligence** (Expert systems, Fuzzy logic, Neural networks, Genetic Algorithms e Hybrid systems) **Benchmarking** **Numerical models** **Sensitivity Analysis** **Geographic information systems** **Multi - and interdisciplinary approach** **Multi-criteria analysis** **Multi-objetive functions** **Trade-off analysis** **Linear programming methods** **Multifunctional approach** **Multi-scale analysis** **Multi-level hierarchy** **Multi-perspetive logic** **Multi-target functions**	**Handbooks** **Classification models** **Decision support systems** **Hybrid information systems**



STRUCTURING TOOL

END USER

Objective: Solution for irrigation alternative methods



IRRIGATION SYSTEM: CENTER-PIVOT (as an example)

GUIDELINES: Techno-economic parameters to evaluate irrigation methods (micro-level)

STANDARDS: 5 numeric levels. Qualitative and quantitative data.

SPECIFIC CLASSIFICATION: 5 – GOOD; 4 – ADEQUATE; 3 – REASONABLE; 2 – LIMITATIONS; 1 – ADVERSE

Parameters		Levels 5	4	3	2	1
		Limits – Risk (Characteristics)				
a	Pumping pressure (efficiency)	average	high		low	
b	Pumping pressure (costs)	low		average	high	
c	Water application rate (cm/h)	< 5		average	> 10	
d	Water application depth (mm)	15		20 10	> 25 < 7	
e	Saturated hydraulic conductivity (cm/h)	1	1 - 2	< 1 > 2	1 – 0,25 > 5	< 0,25
f	Soil moisture: before irrigation) (% Holding capacity)	75	70 - 90	average	> 95 < 30- 50	
g	Potential runoff (%)	< 5	5 - 15	15-30	30 – 50	> 50
...						

The number of parameters to classify depends on data availability, and shall enable the elaboration of a complete indicator matrix (considering an effective assessment of the irrigation methods alternatives)

CONCLUSIONS - The implementation of political strategies, promoting irrigation evaluation frameworks with consistent criteria and indicators, may assure an integrated and appropriate water management. Thus, farm irrigation projects (micro-scale) should be subject to prior impact assessments from irrigation authorities. Agriculture institutional regulations and policies (as European Directives) should focus the development of tools for such actions. Portuguese Institutions, OECD and FAO, in particularly, have been publishing several volumes along the last years, focusing those issues, (DGA, 2000); (FAO, 1985); (OECD, 2008).

DGA. 2000. *Propostas para um Sistema de indicadores de Desenvolvimento Sustentável*. Ministério do Ambiente e Ordenamento do Território. Lisboa.

FAO. 1985. *Guidelines: land evaluation for irrigated agriculture*. FAO soils bulletin 55. FAO Land and Water Development Division. Rome.

OECD. 2008. *Towards sustainable agriculture. OECD contribution to the United Nations*. Commission on sustainable development (UNCSD16). New York.

Irrigating and "looking around"... in Babylon (many centuries ago).

Observed Effect

Irrigating with "best practices"... at Negev Desert (Israel).

Observed Effect