

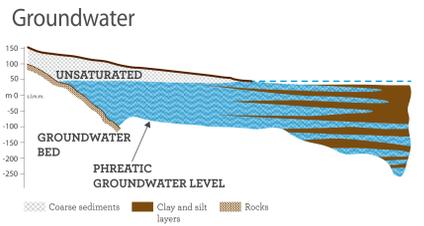
IRRIGATION EFFICIENCY

«Irrigation is the practice of applying water to soils to allow crops to grow in arid regions, or to increase the agricultural production of an area, providing water diverted from surface water bodies or pumped from groundwater sources in addition to the normal rainfall amount.»

(Cit. Dizionario Treccani)

THE IRRIGATION SYSTEM

Irrigation source



Conveyance and distribution network



Irrigation methods

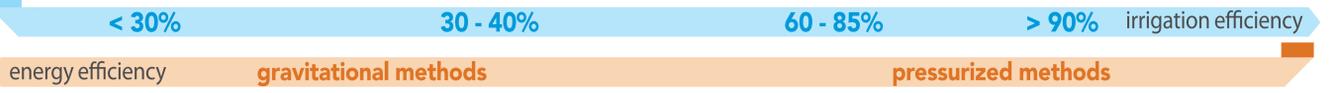


IRRIGATION EFFICIENCY AT THE FIELD SCALE

It is the ratio between the amount of water used by the crop and that delivered to the field by the farmer... The less water is used the better it is! But attention must be paid also to energy:

the more "efficient" irrigation methods require a greater energy to power the pumping plants. And attention must be paid also to the environment: for instance, the large paddy

area between the Piedmont and Lombardy regions in northern Italy, despite the water consumption, create a unique ecosystem included in the European network for biodiversity protection "Natura 2000".



IRRIGATION EFFICIENCY AT THE REGIONAL SCALE

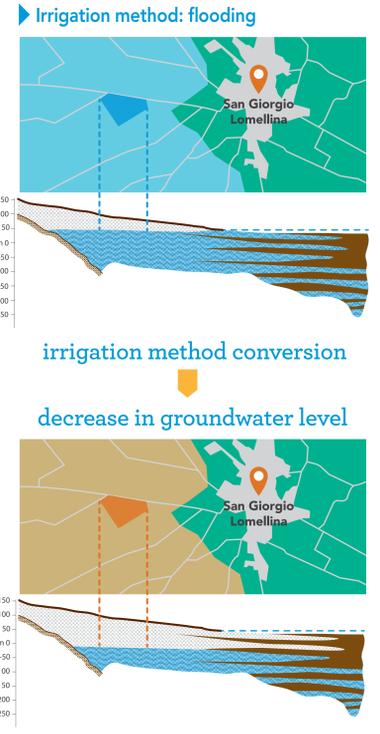
It is the ratio between the amount of water used by the crops in a given territory and the water amount provided by the different irrigation sources to the same territory.

In this case, we can not consider as «water losses» all the water volumes classified in this way when looking at the single field or channel stretch.

In fact, water percolating into the soil out of the root zone (which is more abundant when less efficient irrigation networks and methods are considered!) recharges

the phreatic aquifer, which provides water to the main rivers and, in areas in which the groundwater level is particularly shallow, contributes directly to the satisfaction of crop water needs through the capillary rise and can originate pseudo-natural sources systems with a high environmental value, such as the «fontanili» line in northern Italy.

Thus, it is important to distinguish between «non-beneficial» water losses and «beneficial» water losses.



To give an example

An irrigation district of 500 hectares in northern Italy is cropped with rice irrigated by the traditional flooding method. From a conversion of the irrigation method from flooding to border irrigation in a single field, we could expect an increase in irrigation efficiency of about 40%. However, if the conversion of the irrigation method is carried out over the whole district, the increase of irrigation efficiency would be limited to about 20%, since the decrease in percolation due to the more efficient irrigation method would lead to a decrease in the groundwater table level. Additionally, the disappearance of submerged areas would modify completely the environment and the rural landscape of the area.

CONCLUSIONS

Irrigation efficiency depends on the structural components of the irrigation system as well as on the way they are managed. The efficiency can vary as a function of the spatial scale taken into account. When the regional scale

is considered, the efficiency strongly depends on the interaction with the unconfined superficial aquifer, and thus it can not be simply calculated from the efficiency of their irrigation network and of the irrigation methods adopted in

the single fields. In general, it is important to distinguish between «beneficial» and «non-beneficial» irrigation water losses.

