

Usa di risorse idriche non convenzionali in agricoltura: un'alternativa imprescindibile.
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Water is an increasingly scarce and valuable resource. Of principal concern is our failure to recognize and accept that there is a finite supply of water. The consensus is that the growing water scarcity and misuse of freshwater pose serious threats to sustainable development.

In the coming years the increase in water demand will likely be driven by **population growth** (increasing the demand for drinking water supply and agricultural production), **changes in food preferences** (change in food habits toward richer and more water demanding diets), **economic growth** (raising the water demand for industrial production and power generation, including bioenergy). In addition, as society becomes more aware and concerned about the potential impacts of human activities on the environment, the demand for water to **support aquatic ecosystems** and in-stream water uses will also rise (resulting in environmental regulations such as establishing minimal flows and levels for streams, or more restrictive water quality regulations).

Other factors that could reduce the stock of available water resources are weather and climate. Although the forecasts on regional scale are subject to considerable uncertainty, it is expected that **climate changes** and **rising sea levels** in coastal areas will intensify negatively affecting qualitatively local water resources.

Competition among agriculture, industry and cities for limited water supplies will obviously intensify as consequence of all the above factors.

As for agriculture, taking into account that more than two-thirds of the water withdrawn from the earth's rivers, lakes and aquifers is used for irrigation, to meet the future challenge of reduced water availability the use of **alternative or unconventional water resources** will play an ever more important role in satisfying the increasing water requirements particularly in arid and semi-arid regions, as most of the Mediterranean countries.

It is quite difficult to make a classification of unconventional water resources. Water quality is the most important factor dealing with unconventional water resources: quality is a complex factor since there are many water quality parameters which vary with continuity. Very often, not water quantity, but inadequate water quality and water transport energy are limiting factors ("Water-Energy Nexus").

Two major categories of unconventional water resources can be identified, the first including waters with high organic matter and microorganisms content (such as municipal wastewater) and the second one including waters with high saline concentration (such as sea and brackish water, some industrial and agro-industrial wastewater, etc.).

In many Mediterranean countries municipal wastewater reuse has been practiced for a long time and actually represents the most relevant use of unconventional resources. Particularly in the absence of environmentally safe recipients for the effluents, irrigation is regarded as a sanitary mean of disposal, which makes wastewater treatment economical. The nutrients content of municipal effluents is also appreciated. Water scarcity has driven farmers, engineers, scientists

and government officers to collaborate in developing wide scale wastewater reuse operations and associated equipment and control methodologies.

As for desalination of seawater and brackish water, it is progressively becoming a technologically and economically available solution to water scarcity particularly as a source of drinking water. In fact, desalination for drinking purposes is a practice widely implemented. On the contrary, for many countries, the current costs of such technology is unaffordable for irrigation purposes.

In any case, the choice of the most appropriate alternative water resource is clearly a site-specific question to be managed carefully comparing not only the cost-effectiveness of alternative option but even the local socio-economic context.