

## Reusing waste water for irrigation: a local solution for forthcoming critical situations

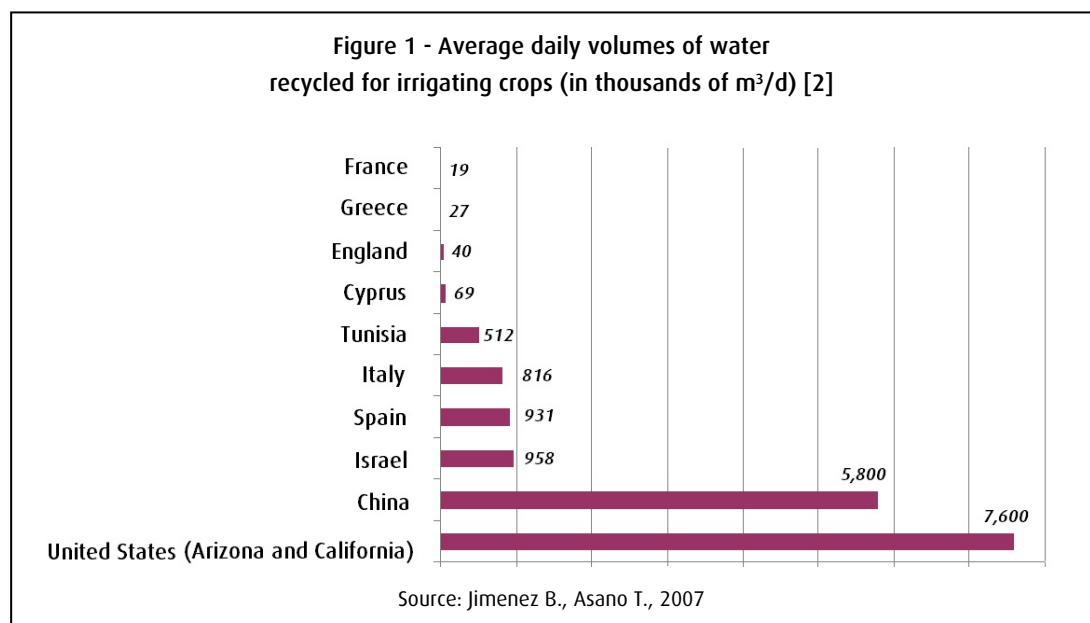
*The regulations allow for the reuse of waste water—after treatment—for the irrigation of crops. However, this option is rarely used because firstly, France rarely faces water shortages and when such situations do arise, they remain localised and occasional; secondly, there is no incentive to do so, given that treated water is more expensive than water abstracted from the environment. French people are reticent to adopt this practice of reuse and do not wish to pay the full additional cost of treated water compared to the price of abstracted water. However, this practice provides a way to increase the water supply in critical areas, and is already carried out in several foreign regions and countries. The practices in Israel, where costs are shared between the different users, could be used as a path to deepen on how to anticipate shortages in affected areas in France.*

The reuse of waste water is one of the measures set out in the Road Map produced after the environmental conference of 2013. This measure is intended as a contribution to securing water resources in the short and long terms in a local and seasonal context (spring/summer) of increased demand for water, driven by rise in the population and in irrigated agricultural production, combined with a drop in the availability of water, due to climate change in particular [1]. Waste water

is collected as the exit of the treatment plant, instead of being returned to rivers, as it is normally the case. The reuse of waste water after treatment mainly concerns irrigation. The French regulations also provide for the watering of public or private green spaces (such as golf courses). The reuse of recovered rainwater, which is another way to increase the water supply for irrigation, is not covered in this document.

### *The reuse of waste water is still very rare in France*

Figure 1 - Average daily volumes of water recycled for irrigating crops (in thousands of m<sup>3</sup>/d) [2]



The reuse of waste water is still preliminary in France (19,200 m<sup>3</sup>/day), with the volumes concerned corresponding to approximately 2% of the volumes reused in other European countries such as Spain and Italy (*cf.* Figure 1). Worldwide, there may be 20 million hectares of crops irrigated by treated waste water, which presents nearly 10% of irrigated surface areas but only 1.7% of the world's agricultural surface areas [2]. It is a widespread practice in regions of the world affected by water shortages. In certain countries, this practice is governed by regulations and for these countries, estimates of the volumes concerned are available. The simple and unplanned reuse of waste water may exist in other countries, particularly in developing nations. In such cases, reliable estimates of the volumes in question are not available.

France only experiences local and seasonal incidences of water shortages. Consequently, the reuse of waste water is confined to specific regions (islands in particular).

In the islands of Ré, Noirmoutier, Oléron and Porquerolles, the reuse of waste water has allowed for the maintenance or development of agricultural activities in an island context in which water is scarce. Other examples of the reuse of waste water concern uses that require large volumes of water and where there are potential conflicts with drinking water. This applies to golf courses such as the Sainte-Maxime course (Var).

Waste water is also used to irrigate green spaces (public parks, sports fields and golf courses), primarily in countries subject to significant water stresses. Examples include public gardens and golf courses in Abu Dhabi in the United Arab Emirates, in addition to the Olympic Park, a zoo and public gardens in Australia [2].

### ***The regulatory framework limits health and environmental risks***

The reuse of wastewater falls within the regulatory framework for the protection of public and environmental health. Waste water is reused after treatment that is designed to ensure compliance with the regulatory requirements defined by the countries. These requirements govern at the same time the quality standards for the water that is used and the minimum distances to be observed between areas irrigated with

treated waste water and the activities or environments to be protected.

These regulatory requirements depend on the type of use: therefore, crops eaten raw (e.g. fruits and certain vegetables) and areas open to the general public are subject to more stringent quality standards than crops eaten after processing or crops intended for non-food uses (horticulture).

In France, the regulations define four categories of use for treated waste water. The category in which the associated standards are the most stringent (category A) concerns the irrigation of non-processed market garden crops and the watering of areas open to the general public (such as golf courses). The category with the least stringent standards (category D) concerns the irrigation of commercial woodlands with restricted public access [3].

### ***The cost of reusing waste water is an important factor in its development***

The stricter the quality standards for waste water, the more complex the associated treatments, and the more complex the associated treatments, the higher the production cost of reusable waste water. However, the development of such a practice is highly dependent on its cost in relation to other sources of water supply (especially abstraction from the environment).

The standards adopted by France are similar to those in California, Australia, Spain and Italy, countries that have a similar standard of public health protection to France [2].

To reduce the difference in cost between water abstracted from the environment and treated waste water, certain countries such as Israel and Spain support the development of projects that involve the use of waste water by implementing cost transfer policies in which the additional costs associated with the treatment of waste water are "shared" between all users of the water in the geographical area in question (*cf.* box). This "sharing", which distributes the additional costs, helps to prevent conflicts of use through the deployment of alternative resources that are more economically profitable for the users (farmers) because they are subsidised.

### **Box: Support policies for increasing the reuse of waste water for irrigation in Israel [4]**

Israel has embarked on a proactive policy of increasing the use of treated waste water for irrigation by “sharing” the cost of treating the reused water with other users of the water. Israel has thus implemented a set of measures to encourage the development of projects concerning the reuse of waste water in the agricultural sector:

- Implementation of non-exchangeable quotas per agricultural holding (one quota for water abstracted from the environment and one quota for treated waste water).
- Introduction of an increasing block pricing scale based on the quotas allocated per agricultural holding.
- A significant increase in the price of water in order to reflect the local scarcity of water resources. Between 1995 and 2005, the prices of water for agricultural use rose by 68%.
- Subsidies for the reuse of waste water for irrigation that have allowed for the creation of an attractive price difference between pure, unaltered water and treated, recycled domestic waste water. Treated domestic waste water is thus three times cheaper than pure, unaltered water (US\$0.34/m<sup>3</sup> as opposed to US\$1/m<sup>3</sup> in 2010). The difference between the production cost of treated waste water and the price at which it is sold to farmers is billed to domestic users.
- The allocation of a bonus of 20% in the volume of waste water to farmers who agree to exchange a proportion of their annual quota of water abstracted from the environment for a volume of waste water.

Furthermore, Israel has also developed a policy of reducing household demand by implementing a sliding pricing scale in two blocks (2013 data):

- US\$2.5/m<sup>3</sup> – for consumption of below 3.5 m<sup>3</sup>/pers./month
- US\$4.0/m<sup>3</sup> – for consumption of above 3.5 m<sup>3</sup>/pers./month

In comparison, the average consumption in France is approximately 4 m<sup>3</sup>/pers./month and the average price of water in France is approximately €3.4/m<sup>3</sup>, or US\$4.6/m<sup>3</sup> (SOeS 2008 data).

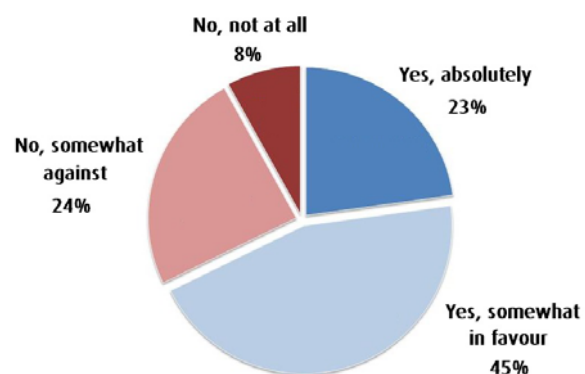
These reforms have encouraged the use of more efficient irrigation techniques and alternatives to water abstraction, such as the reuse of recycled and treated waste water. 85% of domestic effluents were reused in the Israeli agricultural sector in 2010. Between 2000 and 2005, the fruit sector increased its production by 42% despite a 35% reduction in the volumes of water abstracted from the environment.

### ***The uncertainty of the French population with regard to the social acceptability of the practice could hinder its development***

In addition to the scarcity of the water resource and the importance of the regulatory requirements, the reuse of waste water may also be determined by its social acceptability.

French people already eat fruits and vegetables imported from countries in which waste water is frequently reused for irrigation (Spain in particular). However, one third of French people state that they are not prepared to eat fruits and vegetables which have been irrigated with treated waste water (*cf.* Figure 2) [5]. This implies that consumers are largely ignorant of the existence of these practices abroad.

**Figure 2 - Acceptability of the consumption of fruits and vegetables that have been watered with treated waste water with a view to participating in efforts to conserve water resources**



Source: CGDD, May 2014, Survey results

### French people are reluctant to pay the full additional cost of this practice

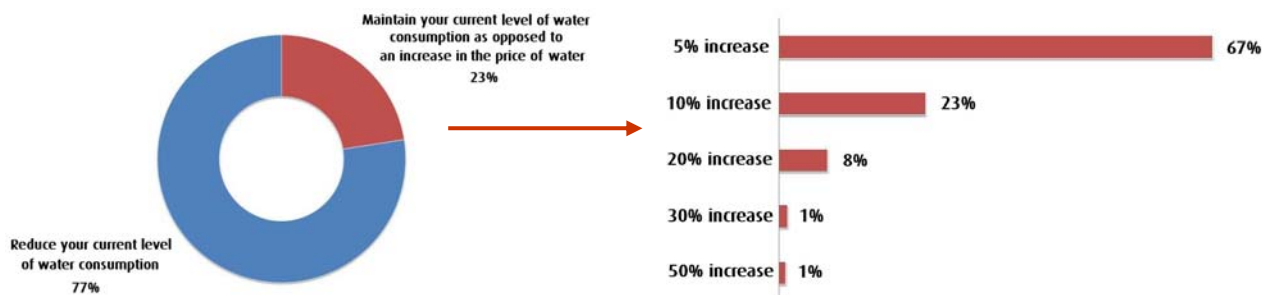
Should the scarcity of water resources become more pronounced, then the reuse of waste water for irrigation could allow households to maintain their levels of consumption. However, French people remain quite reluctant to pay higher prices in order to avoid having to reduce their consumption of water in a context of growing scarcity of the resource.

Indeed, only a quarter of French people state that they would prefer to maintain their current level of consumption in return for an increase in the price of water.

Moreover, this quarter of French people would be willing to accept an increase in their water bill of around €14.50/year [5] in this situation. This would correspond to a rise of €0.26 /m<sup>3</sup> in the price of water, which is 8% of the current average price (cf. Figure 3).

This low level can probably be attributed to the fact that households find it hard to imagine themselves in a position of real stress concerning water resources, including in critical areas. In general, they have never suffered the consequences of a drought because drinking water is preserved as the priority use in crisis situations. Indeed, a majority of French people believe that the quantity of water available in France is sufficient and will remain that way in the future.

Figure 3 - Evolution scenario favoured by respondents in the event of a drop in the quantity of water available in France



Source: CGDD, May 2014, Survey results

#### For further information:

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[2] Jimenez B., Asano T., 2007, International survey of wastewater reclamation and reuse practices

[3] French Order (*Arrêté*) of 2 August 2010 relating to the use of water originating from the purification of urban waste water for the irrigation of crops and green spaces

[4] OECD, 2011, Environmental performance review in Israel

[5] MEDDE/CGDD, March 2014, *Études & documents n°106 - Ressources en eau : perception et consommation des Français - Résultats d'enquête* (Studies & documents no. 106 - Water resources: perceptions and consumption of French people - Survey results)

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