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Wastewater as a Resource

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***Abstract**: Non-Renewable resources are getting depleted day by day. Therefore, the one of the alternative is to reuse the resources. Wastewater can also be considered as a resource, since it contains many resources like organic matter, phosphorus, nitrogen, heavy metals, thermal energy, etc. This study focused on the reuse of organic matter and phosphorus and other minerals obtained from wastewater. There is a wide variety of possible alternatives, and the technical options are growing. The problem is not the availability of technology for resource recovery, but the lack of a planning and design methodology to identify and deploy the most sustainable solutions in a given context. The incorporation of wastewater use planning into national water resource and agricultural planning is important, especially where water shortages exist.*

Keywords : organic matter, phosphorus, nitrogen, heavy metals, thermal energy

Introduction In many arid and semi-arid regions of the world water has become a limiting factor, particularly for agricultural and industrial development. Water resources planners are continually looking for additional sources of water to supplement the limited resources available to their region. Several countries of the Eastern Mediterranean region, for example, where precipitation is in the range of 100-200 mm, rely on a few perennial rivers and small underground aquifers that are usually located in mountainous regions. Drinking water is usually supplied through expensive desalination systems, and more than 50 per cent of the food demand is satisfied by importation[1]. In such situations, source substitution appears to be the most suitable alternative to satisfy less restrictive uses, thus allowing high quality waters to be used for domestic supply. Low quality waters such as wastewater, drainage waters and brackish waters should, whenever possible, be considered as alternative sources for less restrictive uses. Agricultural use of water resources is of great importance due to the high volumes that are necessary. Irrigated agriculture will play a dominant role in the sustainability of crop production in years to come.

Types of reuse

Water is a renewable resource within the hydrological cycle. The water recycled by natural systems provides a clean and safe resource which is then deteriorated by different levels of pollution depending on how, and to what extent, it is used. Once used, however, water can be reclaimed and used again for different beneficial uses. The quality of the once-used water and the specific type of reuse (or reuse objective) define the levels of subsequent treatment needed, as well as the associated treatment costs.

Urban uses

In urban areas, reclaimed wastewater has been used mainly for non-potable applications[2] such as:

• Irrigation of public parks, recreation centres, athletic fields, school yards and playing fields, and edges and central reservations of highways.

• Irrigation of landscaped areas surrounding public, residential, commercial and industrial buildings.

• Irrigation of golf courses.

• Ornamental landscapes and decorative water features, such as fountains, reflecting pools and waterfalls.

• Fire protection.

• Toilet and urinal flushing in commercial and industrial buildings.

The disadvantages of urban non-potable reuse are usually related to the high costs involved in the construction of dual water-distribution networks, operational difficulties and the potential risk of cross-connection. Costs, however, should be balanced with the benefits of conserving potable water and eventually of postponing, or eliminating, the need for the development of additional sources of water supply.

Industry

The most common uses of reclaimed water by industry are:

• Evaporative cooling water, particularly for power stations.

• Boiler-feed water.

• Process water.

• Irrigation of grounds surrounding the industrial plant.

The use of reclaimed wastewater by industry is a potentially large market in developed as well as in developing and rapidly industrialising countries[3]. Industrial reuse is highly cost-effective for industries where the process does not require water of potable quality and where industries are located near urban centres where secondary effluent is readily available for reuse.

Recreation and landscape enhancement

The use of reclaimed wastewater for recreation and landscape enhancement ranges from small fountains and landscaped areas to full, water-based recreational sites for swimming, boating and fishing[4]. As for other types of reuse, the quality of the reclaimed water for recreational uses should be determined by the degree of body contact estimated for each use. In large impoundments, however, where aesthetic appearance is considered important it may be necessary to control nutrients to avoid eutrophication.

Socio-cultural aspects

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Public acceptance of the use of wastewater or excreta in agriculture and aquaculture is influenced by socio-cultural and religious factors. In the Americas, Africa and Europe, for example, there is a strong objection to the use of excreta as fertiliser, whereas in some areas of Asia, particularly in China, Japan and Java, the practice is performed regularly and regarded as economical and ecologically sound. In most parts of the world, however, there is no cultural objection to the use of wastewater, particularly if it is treated. Wastewater use is well accepted where other sources of water are not readily available, or for economic reasons[5]. Due to the wide variability in cultural beliefs, human behavior and religious dogmas, acceptance or refusal of the practice of wastewater reuse within a specific culture is not always applicable everywhere. A complete assessment of local socio-cultural contexts and religious beliefs is always necessary as a preliminary step to implementing reuse projects (Cross, 1985).

Conclusions

The incorporation of wastewater use planning into national water resource and agricultural planning is important, especially where water shortages exist. This is not only to protect sources of high quality waters but also to minimize wastewater treatment costs, safeguard public health and to obtain the maximum agricultural and aqua cultural benefit from the nutrients that wastewater contains. Wastewater use may well help reduce costs, especially if it is envisaged before new treatment works are built, because the standards of effluents required for various types of use may result in costs lower than those for normal environmental protection. It also provides the possibility of recovering the resources invested in sewerage and represents a very efficient way of postponing investment of new resources in water supply[6]. The use of wastewater has been practiced in many parts of the world for centuries. Whenever water of good quality is not available or is difficult to obtain, low quality waters such as brackish waters, wastewater or drainage waters are spontaneously used, particularly for agricultural or aqua cultural purposes. Unfortunately, this form of unplanned and, in many instances unconscious, reuse is performed without any consideration of adequate health safeguards, environmentally sound practices or basic agronomic and on-farm principles.

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