

# Implementation of Water Reuse in Cyprus

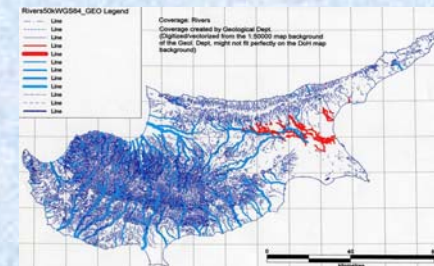
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## **INTRODUCTION**

- Integrated water management programs (arid, semi-arid areas) incorporate the use of reclaim water in their water conservation measures.
- Water Reclamation and Reuse has been subject to numerous technical scientific seminars/workshops.
- Most of the efforts to promote the use of recycling water has been focused on technical issues related to the water quality standards and treatment processes.

- Numerous attempts to adopt a set of international criteria and guidelines, particularly for the microbiological quality of the reclaim water. Difficulties to reach to common guidelines mainly due to the different public and political perceptions.
- The knowledge and lessons learned from numerous demonstration projects provides sufficient experience.
- Little attention has been given to public perception and acceptance.

# **MAJOR REASONS FOR REUSE**

- **Water value** (revenue)
- **Water scarcity** (need to consider additional supplies)
- **Environmental constrains** (zero discharges)
- **Strinker and higher effluent quality requirements**
- **Sustainable development**

# REUSE IN CYPRUS

## Organization Structure

“**Sewage Boards**” are responsible for Collection, Treatment and disposal (Law).

**CY Government** finance certain costs and:

- **Water Development Department** undertakes the management of recycling water.

# Driving Forces for Reuse in CY

- **Sewage Boards Prospectives**
  - Provide solution to effluent discharge/
  - Transfer of Responsibility to Water Authorities
  - Since in Cyprus disposal into surface waters is prohibited, the options available are discharge into the sea/reclamation.
  - **Reclamation** – Limited application
  - Public opposition to sea outfalls (harm to tourist industry).

- Discharge into the sea requires high quality standards, advanced treatment and high investments for sea outfalls.
- High investments lead to non sustainable projects with high sewage rates and public oppositions.
- Consequently sustainability imposes water reclamation (SB).

## **Water Authorities (WDD) Prospective**

- Integrated Water Management imposes Reuse (directed/indirect)
  - Augment the available water resources
  - Means to supplement freshwater supplies
  - Reduce stress on the water resources
  - Valuable source
  - Sustainability (Desalination/sea)



Driving forces for Reuse should lead to mutually benefits and not to conflicts, as a result of different prospectives between the organizations.

For sustainability: one organization for Water + Sewage.

# Water Reuse in CY is feasible if:

- Acceptable in the existing irrigation schemes (policy)
- Demand/farmers, municipalities, privates
- Possibility to create demand (golfs, forest, parks, new agricultural areas)

## CY Experience to promote Reuse

- Presently Demand meet the supply  
~ 10 mill m<sup>3</sup> (agriculture, Park, Lawns, Stadiums etc).
- Difficulties to promote Reuse, in existing irrigation schemes.
- Acceptable for urban uses, golfs, parks, new agricultural areas.

# Planning for the Future

Expected Quantities 2012: more than 30 mill m<sup>3</sup>

- Difficulties and uncertainties to utilize additional quantities
- Implementation of Reuse schemes require high investments and (O+M) cost
  - Advance treatment
  - Conveyance pipelines
  - Storage (Ponds, Dams)
  - Distribution networks
- Formulation of New Projects/sustainability
- **Provide flexibility for disposal and try to promote reuse**

# **COMPONENTS TO PROMOTE REUSE**

- Technical issues
- Public health issues
- Economical and financial aspects
- Legal/Regulatory aspects
- Management/Institutional Arrangements
- Public Perception/Acceptance
- Political will

## Technical Aspects: Treatment

- Provide treatment that will make the water reusable.
- Psychological problems to promote reuse related to the microbiological quality (acceptable risk).
- Activated sludge plus tertiary filtration and disinfection is worldwide considered to produce an acceptable effluent quality for irrigation of all crops (microbiological quality).
- (CY:  $BOD_5 < 10$  mg/L  $SS < 10$  mg/L  $FC < 10/100$  ml, Intestinal worms: zero)

- Problems to implement reuse due to the chemical composition of the effluents (salinity/conductivity/P,N).
  - Several crops sensitive to salinity.
  - Difficulties to isolated irrigated areas.
  - Storage Lead to Eutrophication.
- Provide for appropriate Technologies to achieve acceptable quality/change of irrigation practice.

## Public Health Aspects

- Origin of Effluents → health risks → Restrictions
- Guidelines restrictions (additional barriers for protection public health).
  - Specify treatment technologies.
  - Irrigation techniques/Irrigation Periods/ Harvesting/Disinfection methods etc.
  - No irrigation of leafy vegetables.



# BUT

- Restrictions alleviate concerns to the farmers using good quality water without any limitations (health aspects, marketing of crops).
- To alleviate restrictions provide for more advance treatment (membrane Filtration/Disinfection???) /Desalination.

## Economical Aspects

- **Reclaim water have a value from which both the Water Authorities and Farmers can benefit.**
- **Water Authorities Prospective (WDD).**
  - Reuse for existing plantations result to water conservation of fresh waters (drinking water - avoid desalination)

- Environmental constraints require high quality standards for discharge/Waste of good quality water treated at high cost.

- Reuse brings a Revenue (water rates)

- **Farmers prospective**

- Benefit from the lower water rates

- Save fertilizers

- Benefit from the continuous used of their land

## **Legal and Regulatory Aspects**

### **Laws and Regulations provide more confidence to the Users**

- Authorization of discharges/Permitting
- Enforcement of Guidelines and Code of Practice
- Environmental impact studies
- Enforcement of Monitoring System

## **Management and Institutional Arrangement**

- Adequate management and Institutional arrangements to built up the confidence of the farmers.
  - Ensure proper O+M Treatment facilities
  - Ensure distribution of GOOD QUALITY Effluent all times
  - Provide for continuous inspection of the facilities
  - Provide for communication with farmers

## **Political Will**

- **Major requirement to implement water reuse is the political will to:**
  - consider recycling water as an essential component of integrated water resources management
  - utilised recycling water in the existing infrastructure and use it for irrigation of existing plantations
  - designate waters for irrigation uses
  - allow discharges into surface or ground waters
- Political will is closely related to the public acceptance (votes).

## Public Perception and Acceptance

### **Most crucial aspect for implementing Reuse**

- Ignorance (afraid of something new)
- Restriction imposed by the Code of Practice and standards → Fear (public health)
- Marketing of the crops (competition)
- Devalue of the land
- No consensus of scientist → confusion
- No reason/Psychological

## What to Do ?

- Education (ignorance )/public participation (before project).
- Research for Public opinion for the “need of the project” .
- Demonstration projects.
- Use new terms (Recycled, Repurified, New)
- Provide for more advance technologies (Fear/less risks).
- Formulation of Guidelines to minimised restrictions.



## **Conclusion and Recommendations**

- Recycling water is a valuable source which must be used in order to supplement the existing water supplies and may even bring a revenue.
- Reuse shall optimises between wastewater treatment level/options of Reuse or Disposal.
- Reuse provides a solution for discharge.

- **To promote reuse provide for:**
  - Adequate treatment (high quality standards, No Restrictions)
  - Regulations
  - Good Management and Institutional arrangements
  - Public Education and
  - Public Involvement.

**Thank you !!!**

