Implementation of Water Reuse in Cyprus

1. Introduction
2. Major Reasons for Reuse
3. Reuse Practice in Cyprus
4. Components to Promote Reuse
5. Conclusions and Recommendations

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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 m³ (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 m³

- Difficulties and uncertainties to utilized 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: $\text{BOD}_5 < 10 \text{ mg/L}, \text{SS} < 10 \text{mg/L}, \text{FC} < 10/100 \text{ ml},$ 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 constrains 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 minimise 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 !!!