COROADO Project
Technologies for Water Recycling and Reuse in Latin American Context:
Assessment, Decision Tools and Implementable Strategies under an Uncertain Future

Christos A. Karavitis
Agricultural University of Athens
FP7 – Collaborating Project
FP7 - ENV.2011.3.1.1-1

Total Cost: 4,584,166.00 €
EC Contribution: 3,411,507.00 €
Duration: 48 Months

Start Date: 1st of October 2011
Water scarcity due to droughts, insufficient or ineffective supply infrastructure, high demand, degraded water systems, or even due to lack in freshwater access has emerged as one of the most pressing socio-ecological problems of the 21st century. Pertinent research indicates that by 2025 more than half of the nations worldwide may face water shortages. Furthermore, climatic uncertainty related scenarios estimate that such conditions might become even worse.
The field of Water Recycling and Reuse research and application is rapidly growing and therefore, it may constitute an important water scarcity option as all the previous issues are significant drivers in an Integrated Water Resource Management Approach.
TECHNOLOGIES FOR WATER RECYCLING AND REUSE IN LATIN AMERICA CONTENT: ASSESSMENT, DECISION TOOLS AND IMPLEMENTABLE STRATEGIES UNDER AN UNCERTAIN FUTURE

http://www.coroadoproject.eu

Coordinator:
Ass. Prof. Christos A. Karavitis
Agricultural University of Athens
E-mail: ckaravitis@aua.gr

Technologies for Water Recycling and Reuse in Latin American Context

Assessment Decision Tools and Implementable Strategies under an Uncertain Future

Venue
São Paulo
Iguazu
Brazil

http://www.coroadoproject.eu

2nd Plenary meeting in São Paulo & Itaipu Dam
May 7th-11th 2012
Project Consortium:
13 Partners from 11 Countries
<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Short Name</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AGRICULTURAL UNIVERSITY OF ATHENS</td>
<td>AUA</td>
<td>Greece</td>
</tr>
<tr>
<td>2</td>
<td>STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK</td>
<td>ALTERA</td>
<td>Netherlands</td>
</tr>
<tr>
<td>3</td>
<td>AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS</td>
<td>CSIC</td>
<td>Spain</td>
</tr>
<tr>
<td>4</td>
<td>UNIVERSIDADE DO PORTO</td>
<td>UPORTO</td>
<td>Portugal</td>
</tr>
<tr>
<td>5</td>
<td>NATIONAL TECHNICAL UNIVERSITY OF ATHENS</td>
<td>NTUA</td>
<td>Greece</td>
</tr>
<tr>
<td>6</td>
<td>UNIVERSIDADE DE SAO PAULO</td>
<td>USP</td>
<td>Brazil</td>
</tr>
<tr>
<td>7</td>
<td>PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE</td>
<td>PUC</td>
<td>Chile</td>
</tr>
<tr>
<td>8</td>
<td>T.C. GEOMATIC LTD</td>
<td>GEOMATIC</td>
<td>Cyprus</td>
</tr>
<tr>
<td>9</td>
<td>NORWEGIAN INSTITUTE FOR AGRICULTURAL AND ENVIRONMENTAL RESEARCH</td>
<td>BIOFORSK</td>
<td>Norway</td>
</tr>
<tr>
<td>10</td>
<td>FACHHOCHSCHULE NORDWESTSCHWEIZ</td>
<td>FHNW</td>
<td>Switzerland</td>
</tr>
<tr>
<td>11</td>
<td>TECNOLOGIA DE CALIDAD SA DE CV</td>
<td>TDC</td>
<td>Mexico</td>
</tr>
<tr>
<td>12</td>
<td>UNIVERSIDAD NACIONAL DE CORDOBA</td>
<td>UC</td>
<td>Argentina</td>
</tr>
<tr>
<td>13</td>
<td>SISTEMAS ESPECIALIZADOS PARA AGUA SA DE CV</td>
<td>SEA</td>
<td>Mexico</td>
</tr>
</tbody>
</table>
MAIN CHALLENGE

Is not the lack of treatment techniques and technologies, but rather how such schemes may become more efficient and implementable in conjunction with Integrated Water Resources Management.
1. Assessment, mapping and valuing of various water recycling and reuse technologies – based on the latest scientific achievements cross-linked with local knowledge for informed IWRM.

2. Quantification of the actual benefits and costs of those technologies.

3. Evaluation of their social acceptance and perception – through public participation procedures.
3. Provision of affordable, efficient and effective solutions for water supply in the context of climate change and water scarcity mitigation.

4. Combating the degradation in both quality and quantity of water systems and the loss of associated ecosystem services.

5. Incorporation of the recycling and reuse technologies in an integrated management scheme.
STUDY SITES

a) The Metropolitan Region of São Paulo, Brazil

b) The Copiapó River Basin, Chile

c) The Lower Rio Bravo/Rio Grande, Mexico

d) The Suquia Basin, Argentina
a) The Metropolitan Region of São Paulo, Brazil

High population and industrial growth rate in the last thirty years created an imbalance between water supply and demand. The upper Tiete river basin was urbanized at a very high rate.
b) The Copiapó River Basin, Chile

Represents a paradigm of a basin under tremendous water stress. It is located in a semiarid region in which the constantly growing demands from many different users are increasingly stressing the scarce water resources.
c) The Lower Rio Bravo/Rio Grande, Mexico

Conventional management of water resources cannot sustain development in the watershed any longer. Long term projections of water supply and demand are needed to provide information to plan the water recycling/reuse technologies and to plan for the sustainable management.
d) The Suquia Basin, Argentina

The area is used as the water source for the city of Cordoba, and also for irrigation purposes. It receives the storm water and the sewage effluents from the city of Cordoba, thus inducing the situation to unsustainable condition.
An open **web based toolbox** to support anticipatory planning processes from policy making to implementation and providing operational guidelines for R&R Technologies Application
The DSS may act as an instrument to:

1. Assist decision-making by using predefined options

2. Perform “what-if” scenarios (gaming tool)

3. A multi-criteria tool, which includes socio-economic and institutional aspects, indicator assessment, and scenario inter-comparison

4. A mapping tool for information transfer from case to case

5. An economic tool for cost effective solutions
1. The areas current conditions regarding R&RT potential

2. The most suitable R&RT per case – Criteria based decision

3. The vulnerability of that specific technology/policy that would be based on numerous factors (indicators)

4. The required strategies for the vulnerability mitigation

5. Support Guidelines regarding the technology policy application.
EXPECTATION – THE DAY AFTER

COROADO project is designed to assess the potential of water R&R technologies in Latin America based on the latest scientific achievements in engineering, ecology, agronomy, hydrology, social science, economics, and eco-technology, cross-linked with local available knowledge.

The project provides a fully integrated approach to deal with water reuse and recycling technologies problems at local and regional scales, with cooperation, consultation and interaction of end-users and stakeholders using advanced participatory, monitoring, and modeling techniques.

The whole process will be facilitated by providing a continuous and appropriate set of guidelines and manuals so that policy relevant standards may be applied by the end-users – ranging from scientific community to practitioners and other interested groups – after the project completion without any further support.
The promotion of water reuse and recycling technologies in Latin America is seen as a large scale opportunity for the market and for that reason COROADO Project aims to identify the use of existing economic instruments of alternative market-based mechanisms in water reuse, recycling technologies and sanitation services in the case study areas.
Potential market oriented development:

<table>
<thead>
<tr>
<th>Study Site</th>
<th>Irrigation</th>
<th>Urban use</th>
<th>Industrial use</th>
<th>Environmental enhancement</th>
<th>Recreational use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Chile</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mexico</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Argentina</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
2- How COROADO approached the social innovation that is needed to engage society in this thematic?

COROADO approached with a plethora of tools built around thematic workshops. Public participation as a legal mandate has become part of its planning theory and practice.
The effectiveness of the public participation process is the mechanism for providing opportunities for members of the public who wish to participate to do so; that the public should be made aware of the availability of such participation opportunities so that they can make that choice; that adequate information should be made available to the public so that they can participate effectively; and that finally, relevant agencies (and COROADO-Project) should be able to respond effectively to the input and activities of public participants.
3 – What were the main bottlenecks detected in Latin America in this thematic?

In general, WR&RT application has to deal with:

- Complex systems
- Integrating planning
- Social acceptance
- Funding issues
More specific, in the four case study areas the main issues raised:

<table>
<thead>
<tr>
<th>Study Site</th>
<th>Water availability</th>
<th>Economic issues</th>
<th>Social issues</th>
<th>Environmental issues</th>
<th>Institutional issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>+</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mexico</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Argentina</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>
4 – How water scarcity and eco-innovation is seen in Latin-America?

- Social perception: health risks, fees for reclaimed water, lack of knowledge of benefits, confidence in authorities
- Technical capacity
- Institutional issues
- Funding issues
5 – What are the main lessons to be learned and actions to be taken into consideration to change behaviors and create market opportunities in this thematic?

- Introduction of WR&R regulations/guidelines
- Enforcement of sanctions for non-compliance
- Administrative reforms
- Collaboration among different institutions
- Building public confidence in water governance institutions
- Building technical & institutional capacity for innovation
- Coordination mechanisms among authorities
Lessons Learned

- WR&RT Application has great market potential,
- Integrated Planning may provide great opportunities for development in the Study Sites,
- The Stakeholders need to be approached with caution for their fears regarding WR&RT to be minimized...
QUESTIONS ??