



**INTERNATIONAL SYMPOSIUM  
ON WASTEWATER  
RECLAMATION AND REUSE**

**CASTELL PLATJA D'ARO  
COSTA BRAVA, GERONA, SPAIN  
24 - 26 SEPTEMBER 1991**



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# INTERNATIONAL SYMPOSIUM ON

The continued population growth, contamination of both surface and groundwater, uneven distribution of water resources, and periodic droughts have forced water agencies throughout the world to search for innovative sources of water supply. The use of treated wastewater effluent, which is now discharged into the environment from municipal wastewater treatment plants, is receiving more attention as a reliable source of water.

In many parts of the world, particularly in arid and semi-arid regions, wastewater reclamation and reuse is already an important element in water resources planning. Through integrated water reuse planning, the use of reclaimed water may provide sufficient flexibility to allow a water agency to respond to the short-term needs as well as to increase long-term water supply reliability. Reclaimed water is, after all, a water resource existing right at the doorstep of the urban environment. It is a reliable source even in drought years; therefore, it is capable of replacing potable water for non-potable and sub-potable water uses.

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COSTA BRAVA, GERONA, SPAIN  
24 - 28 SEPTEMBER 1987



## Organized by

- UPC Universidad Politécnic de Cataluña, Spain.
- IAWPRC Specialist Group on Wastewater Reclamation, Recycling and Reuse. International Association on Water Pollution Research and Control.

## Sponsored by

- CCB Consorcio de la Costa Brava, Gerona, Spain.
- JS Junta de Saneamiento, Departamento de Medio Ambiente de la Generalitat de Catalunya, Spain.
- DGOH Dirección General de Obras Hidráulicas del Departamento de Política Territorial y Obras Públicas de la Generalitat de Catalunya, Spain.
- DGOH Dirección General de Obras Hidráulicas del Ministerio de Obras Públicas y Transportes, Spain.
- CEC Commission of the European Communities.
- IAWPRC International Association on Water Pollution Research and Control.

## ORGANIZING COMMITTEE

- Prof. Rafael Mujeriego, Universidad Politécnica de Cataluña.  
Prof. Takashi Asano, Chairman of the IAWPRC Specialist Group on Wastewater Reclamation, Recycling and Reuse.  
Prof. Aurelio Hernández, Universidad Politécnica de Madrid, Spanish National Committee of IAWPRC.  
Mr. Manel Serra, Consorcio de la Costa Brava.  
Mr. Manel Suárez, Junta de Saneamiento, Departamento de Medio Ambiente de la Generalitat de Catalunya.

## SCIENTIFIC PROGRAMME COMMITTEE

- Prof. R. Mujeriego, Universidad Politécnica de Cataluña, Spain.  
Prof. T. Asano, University of California at Davis, and California State Water Resources Control Board, USA.  
Mr. P. Odendaal, Water Research Commission, South Africa.  
Prof. G. Shelef, Israel Institute of Technology, Israel.  
Dr. N. Khouri, The World Bank, USA.  
Dr. A. Arar, Consultant, Jordan.  
Prof. M. B. Pescod, University of Newcastle upon Tyne, UK.  
Dr. J. Crook, Camp Dresser and McKee, Inc., USA.  
Eng. M. Helena F. Marecos do Monte, LNEC, Portugal.  
Ing. F. Croce, Studio Ambiente, Italy.

## OBJECTIVES

The main objective of the International Symposium is to provide an appropriate forum for discussing the scientific and technological advances made in water reuse, especially through case studies on full-scale water reuse projects in agriculture, industry, forestry, and urban utilities. Water reuse for potable purposes may also be considered.

The specific objectives of the International Symposium are:

1. To examine the planning, economic, financial, social, institutional and legal aspects of wastewater reclamation and reuse, as they have evolved in different parts of the world.
2. To evaluate currently applied wastewater reclamation and reuse technologies, and particularly their reliability and adequacy for both industrialized and developing countries.
3. To assess the quality requirements of reclaimed water for various uses, and the health and environmental considerations associated with wastewater reuse.
4. To identify research needs for the future implementation of water reuse, including water reclamation technologies and analytical and toxicological monitoring techniques.

## PROGRAMME

### TUESDAY 24 SEPTEMBER

- 08.30 Registration
- 09.30 Opening Ceremony

#### SESSION 1: WATER REUSE PLANNING

*Chair: Prof. Rafael Mujeriego, Spain.*

- 10.00 **KEYNOTE PAPER:** Planning and Implementing Wastewater Reclamation and Reuse Projects. *Takashi Asano, USA.*
- 11.00 Coffee Break
- 11.30 Long-Range Planning for Water Reuse in the City of Los Angeles. *Bahman Sheikh, USA.*
- 12.00 Wastewater Treatment and Reuse Aspects of Lake Valencia, Venezuela. *M. Lansdell and L.M. Carbonell, Venezuela.*
- 12.30 Planning for Reuse: Developing a Strategy for the Northern Territory, Australia. *M.D. Burgess, Australia.*
- 13.00 Significance and Current Status of Wastewater Reuse in Sicily. *F. Croce and L. Dardanoni, Italy.*
- 13.45 Lunch

## SESSION 2: PUBLIC HEALTH AND ENVIRONMENTAL CONSIDERATIONS

*Chair: Prof. Luigi Dardanoni, Italy.*

- 15.30 **KEYNOTE PAPER:** Public Health and Environmental Considerations for Wastewater Reuse. *Robert C. Cooper, USA.*
- 16.30 Human Waste Use: Health Protection Practices and Scheme Monitoring. *Martin Strauss, Switzerland.*
- 17.00 Nonpotable Reuse: Development of Health Criteria and Technologies for Shower Water Recycle. *W.D. Burrows, M.O. Schmidt, R.M. Carnevale, and S.A. Schaub, USA.*
- 17.30 Coffee Break
- 18.00 Residual Faecal Contamination of Effluent-Irrigated Lettuces. *S.M. Vaz da Costa-Vargas, D.D. Mara, and C.E. Vargas-Lopez, Brazil and UK.*
- 18.30 Fate of Viruses in Treated Sewage During Soil Aquifer Treatment Designed for Wastewater Reclamation and Reuse. *C.P. Gerba, D.K. Powelson, M.T. Yahya, L.G. Wilson, and G.L. Amy, USA.*
- 19.00 Effluent Reuse by Trickle Irrigation. *G. Oron, Y. DeMalach, Z. Hoffman, and Y. Manor, Israel.*
- 19.45 Round-table Discussion on the WHO Health Guidelines for the Use of Wastewater in Agriculture and Aquaculture.
- 20.45 Cocktail

## WEDNESDAY 25 SEPTEMBER

### SESSION 3: WATER QUALITY CRITERIA

Chair: Prof. Takashi Asano, USA.

- 09.00 **KEYNOTE PAPER:** Quality Criteria for Different Uses of Reclaimed Water. *James Crook, USA.*
- 10.00 The Clogging Capacity of Reclaimed Wastewater: A New Quality Criterion for Drip Irrigation. *B. Teltsch, M. Juanico, Y. Azov, and I. Ben Harim, Israel.*
- 10.30 Guideline for Environmental Enhancement in Japan. *Masahiro Takahashi, Japan.*
- 11.00 Coffee Break
- 11.30 Reuse of Treated Wastewater in Metro Chicago. *E.W. Knight, and R. Sokol, USA.*
- 12.00 Reclaimed Wastewater for Industrial Application. *J-H Tay, and P-C Chui, Singapore.*
- 12.30 Golf Course Irrigation with Reclaimed Wastewater. *R. Mujeriego, and L. Salas. Spain.*
- 13.00 The Scientific and Technical Programme of IAWPRC. *Thomas M. Keinath, Scientific and Technical Committee Chair, USA.*
- 13.45 Lunch



## SESSION 4: WATER RECLAMATION TECHNOLOGIES

Chair: Prof. Thomas M. Keinath, USA.

- 15.30 **KEYNOTE PAPER:** Wastewater Reclamation Technologies and Monitoring Techniques. *Peter Odendaal, South Africa.*
- 16.30 Infiltration Percolation for Reclaimed Stabilization Pond Effluents. *F. Brissaud, M. Restrepo-Bardon, M. Soulié, and C. Joseph, France.*
- 17.00 Reclamation and Reuse of Wastewater by Biological Aerated Filter Process. *S. Adachi, and Y. Fuchu, Japan.*
- 17.30 Coffee Break
- 18.00 Appropriate Wastewater Treatment and Reuse in Morocco Boujad: A Case Study. *S.B. Niedrum, A. Karioum, D.D. Mara, and S.W. Mills, UK and Morocco.*
- 18.30 Reverse Osmosis Technology for Wastewater Reuse. *Benito J. Mariñas, USA.*
- 19.00 Mechanism for the Purification of Effluents with High Nitrogen Content by a Plant Cover of Water Hyacinths. *A. Basseres, and Y. Pietrasanta, France.*
- 19.30 Anaerobic/Aerobic Pretreatment of Sugarcane Mill Wastewater for Application of Drip Irrigation. *P.Y. Yang, L.J. Chang, and S.A. Whalen, USA.*
- 21.30 Symposium Dinner

THURSDAY 26 SEPTEMBER

**SESSION 5: WATER REUSE AND WATER RESOURCES MANAGEMENT**

*Chair: Prof. Jean Bontoux, France.*

- 09.00 **KEYNOTE PAPER:** Water Reclamation and Water Resources Management. *Gedaliah Shelef, Israel.*
- 10.00 Monitoring the Quality of Secondary Effluents Reused for Unrestricted Irrigation after Underground Storage. *Y. Azov, M. Juanico, G. Shelef, A. Kanarek, and M. Priel, Israel.*
- 10.30 Reuse of Wastewater from Meat Processing Plants for Agricultural and Forestry Irrigation. *J.M. Russell, R.N. Cooper, and S.B. Lindsey, New Zealand.*
- 11.00 Coffee Break
- 11.30 Wastewater Treatment by Infiltration Basins: Usefulness and Limits - Sewage Plant in Créances, France. *J. Carré, and J. Dufils, France.*
- 12.00 Role of Groundwater Recharge in Treatment and Storage of Wastewater for Reuse. *Herman Bouwer, USA.*
- 12.30 Wastewater Reclamation and Reuse at the Sugar Beet Factory ACOR-1, Valladolid, Spain. *C. Kuzminski, J.I. Palencia, F. Fernández-Polanco, P.A. García, and J. Iza. Spain.*
- 13.00 The EEC Programme "Life Sciences and Technologies for Developing Countries". *Mario Cattizone, EEC.*
- 13.45 Lunch

## SESSION 6: PUBLIC EDUCATION AND ACCEPTANCE

*Chair: Manel Serra, Spain.*

- 15.30 **KEYNOTE PAPER:** Public Education and Public Attitude Towards Wastewater Reuse. *Joyce Wegner-Gwidt, USA.*
- 16.30 Demonstrating Residential Water Conservation and Reuse in the Sonoran Desert: Casa del Agua and Desert House. *M.M. Karpiscak, R.G.Brittain, C.P. Gerba, and K.E. Foster, USA.*
- 17.00 A Decision Support System for an Artificial Recharge Plant. *C. Masciopinto, V. Palmisano, F. Tangorra, and M. Vurro, Italy.*
- 17.30 Coffee Break

## SESSION 7: INNOVATIVE APPLICATIONS IN WATER REUSE

*Chair: Maria Helena F. Marecos do Monte, Portugal.*

- 18.00 **KEYNOTE PAPER:** Dual Distribution systems: The Public Utility Perspective. *William D. Johnson, USA.*
- 19.00 Reclaimed Water - An Urban Water Resource. *Daniel A. Okun, USA.*
- 19.30 Closing Ceremony

**Posters display:** Posters will be on display throughout the Symposium period.

**Sessions time limits.** Keynote papers: 45 min for presentation and 15 min for discussion; papers: 20 min for presentation and 10 min for discussion.

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