



MINISTERIO  
DE FOMENTO

**CEDEX**  
CENTRO DE ESTUDIOS  
Y EXPERIMENTACIÓN  
DE OBRAS PÚBLICAS

# **Information and training seminar for EMWIS NFP data managers**

**Madrid**

**España**

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2004-11-22



**Information and training  
seminar for EMWIS NFP data  
managers**

**Study on: Use of non-  
conventional water resources  
in Euro-Med countries**

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**Madrid 2004-11-22**



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- 1) Introduction and background**
- 2) Study planned tasks**
- 3) Non-conventional water resources**
- 4) Survey of existing and planned activities**
- 5) Conclusions**



# **1. INTRODUCTION & BACKGROUND**

**The origin:**

**A decision of EMWIS Steering  
Committee at Malta meeting  
(2004-05)**



# 1. INTRODUCTION & BACKGROUND

**Title:**

**Study on the use of non-  
conventional water resources in  
the Euro-Med countries**



# 1. INTRODUCTION & BACKGROUND

**The concept “non-conventional water resources” includes those water resources that become available through the intensive use of technology.**



## 2. STUDY ACTIVITIES (1)

1. **Bibliography , resource centres list & web publishing**
2. **Report on the state of the art on NCWR.**
3. **Inventory of existing and short-term planned initiatives**



## **2. STUDY ACTIVITIES (2)**

**4. Moderating an EMWIS  
electronic forum**

**5. Organisation of a session  
during an EMWIS  
conference**

**6. Preparation of reports**





## **3. NON-CONVENTIONAL WATER RESOURCES (NCWR)**

- 1. Desalination/desalting**
- 2. (Waste)water reuse**
- 3. (Artificial) rainfall  
enhancement**
- 4. Water transport & Virtual  
water**



# Desalination/desalting

## Feed water:

- **Brackish**
- **Seawater**



# Desalination/desalting

## Product water use:

- **Potable**
- **Irrigation**
- **Industry**



# Desalination/desalting

## Product water quality:

- Ionic content
- Sodium ( $\text{Na}^+$ )
- SAR index:

$$\text{Na}^+ / (0,5 * (\text{Ca}^{++} + \text{Mg}^{++}))^{0,5}$$



# Desalination/desalting

## Desalting processes:

- **With phase change**
- **Without phase change**



# Desalination/desalting

## Desalting processes with phase change:

- **Distillation: MSF, MED, VC**
- **Freezing**
- **Hydrate separation**



# Desalination/desalting

## Desalting processes without phase change:

- **Membranes: ED, RO**
- **Ion selective properties: IE, solvent extraction**



# Desalination/desalting

## Energy consumption:

- **Feed water pumping**
- **Desalting process**
- **Product water pumping**
- **Brine disposal**





# Desalination/desalting

## Source of available energy:

- **Heat-> dual plants**
- **Electricity**



# **(Waste)water reuse**

**The goal:**

**Reuse of 100% of treated  
waste water.**



# **(Waste)water reuse**

**The purpose of treated waste water:**

- **Irrigation**
- **Barrier against seawater intrusion**
- **Washing down**



# **(Waste)water reuse**

## **The frameworks:**

- **Technological**
- **Administrative**
- **Legal**
- **None**



# **(Artificial) rainfall enhancement**

**Sometimes (and equivocally)  
called “artificial rain”.**



# **(Artificial) rainfall enhancement**

**Included in the most general  
concept of “weather  
modification”:**

**cloud seeding <-> hail**



# **(Artificial) rainfall enhancement.**

## **The mechanism of precipitation**

- **Cooling/water vapour saturation**
- **Condensation/phase change**
- **Growth of cloud droplets**
- **Input of more water vapour**



# **(Artificial) rainfall enhancement**

**Just a figure: the average content  
of water vapour in the  
atmosphere is ...**

**25 mm = 1 inch**





# **(Artificial) rainfall enhancement. The other side.**

**Convention on the prohibition of  
military or any other hostile  
use of environmental  
modification techniques**

***Signed in Geneva, 1977-05-18***

***Entered into force , 1978-10-05***



# Water transport & Virtual water

virtual water is the water  
that is used in the  
production process of an  
agricultural or industrial  
product.



# Water transport & Virtual water

virtual water is measured in  
 $\text{m}^3$  of water per unit of  
product.



# Water transport & Virtual water

## Net importers (top 30):

- **Egypt (8<sup>th</sup>)**
- **Algeria (14<sup>th</sup>)**
- **Morocco (21<sup>st</sup>)**
- **Israel (25<sup>st</sup>)**
- **Jordan (26<sup>th</sup>)**
- **Tunisia (28<sup>th</sup>)**



# Water transport & Virtual water

## Net exporters (top 30):

- Syria (14<sup>th</sup>)



## **4. SURVEY OF EXISTING AND PLANNED ACTIVITIES**

**Geographical scope: Euro-Med  
countries**

**Domains:**

- **Operational**
- **Projects**
- **Research**
- **Training**



## **4. SURVEY OF EXISTING AND PLANNED ACTIVITIES**

**The pivotal role of the EMWIS  
NFP as information  
providers should be stressed**



## **5. CONCLUSIONS**

**Still an open question.**

**We will get some answers  
throughout the next 12  
months**