# DEPARTMENT OF GEOSCIENCES
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# SEMINAR
# WATER, ETHICS, AND RELIGION


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# 1. INTRODUCTION (I)

- Most of these ideas come from two activities: a) the UNESCO Working Group on the Ethics of Freshwater Uses( 1988-2004); and b) the Third Botin Foundation Water Workshop on WATER ETHICS ( Santander, Spain, June 2007).
- Good Water Governance requires an equilibrium between the utilitarian aspects and the intangible (religious, cultural) aspects.

# 1. INTRODUCTION (II)

- This presentation also follows partially my contribution to the Seminar “Water, Ethics, and Religion”, convened in Stockholm in August, 2007. The proceedings of the Seminar have not been published and the continuation of this Seminar is in jeopardy.
- Some religious leaders may think (wrongly) that all scientists are againts religious values.
- For some scientists experimental knowledge is the only way to know. This was rejected in the 2006 IAP Statement on the Teaching of Evolution.

# 2. SHORT DESCRIPTION ON SOME ACTIVITIES RELATED TO THE ETHICS OF WATER (I)

- COMEST was created by UNESCO in 1998.
- UNESCO appointed in 1998 a working gropup (WG) on the ethics of freshwater uses.
- The WG produced an overview of the situation (published in 2000).
- The conclusions of the WG were accepted by COMEST in 2000 and published in 2001 by the Chair of the COMEST Section on Water.

# 2. SHORT DESCRIPTION ON SOME ACTIVITIES RELATED TO THE ETHICS OF WATER (II)

- In 2002 UNESCO WATER SCIENCE DIVISION continued the topic.
- The chapters were presented in a CD-Rom in the 2003 World Water Forum. In 2004 and published them in the UNESCO WATER AND ETHICS SERIES.
- In 2007 an Spanish Foundation organized a Workshop on Water Ethics. The proceeding will bee published within its year.

# 3. MAIN GLOBAL WATER ISSUES (I)

## 3.1. The MDG on drinking water, sanitation and food

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1. About one billion persons have not affordable drinking water and about two and half billion do not have adequate sanitation.

2. About 800 million persons are malnoutrished.

3. By 2015 the number of humans with this situation should be reduced to 50%.

# 3. MAIN GLOBAL WATER ISSUES (II)

## 3.1. The MDG on drinking water, sanitation and food (bis)

- 50L/person/day is the goal.It means about 18 $km^3$/year. This volume is globally irrelevant.
- The funds necessary to solve these supply problems is estimated between 10 and 30 US$ billions per year. Including sanitation my be 100 US$ billion.
- This is less than the money spent in pet food by the billion of humans living in the EU, USA and Japan.
- The global production of food is more than enough to feed those hungry people.
- The problem is mainly political, as recognised by many authors.

# 3. MAIN GLOBAL WATER ISSUES (III)

**3.2. <u>Social Ethics is not enough. Today Environmental Ethics is a must</u>**

- During the last half century water developments in some regions have dramatically impacted ecosystems.
- For example: the Aral sea dried up, the contamination on many rivers, and the degradation of many wetlands.
- This situation demands a new approach.

# 3. MAIN GLOBAL WATER ISSUES (IV)

### 3.3. Collaboration of Scientists and Religion leaders

- The goal of the Seminar WATER, ETHICS, AND RELIGION (Stockholm, August 2007) was to involve religious leaders in order to achieve the BDG in 2015.
- It was recognized that the MDG will not be got without the collaboration of the religious leaders.
- Main causes are waste waters of cities and industries, but mainly the water use for irrigation.
- Water use for irrigation is about 3000-4000 $km^3$/year (more than 200 times the water needed to solve the MDG.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (I)

- Making aware of these facts to religeous leaders might be an relevant contribution.
- I will only mention five activities, which are easyly available and cheap.
- There are others promising advances like Biotechnology or Solar energy, but they have some problems not solved yet.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (II)

### 4.1. Virtual water, hydrological footprint and food security (1)

Virtual water is the amount of water necessary to produce a good or a service.

1 kg wheat ……. 1.000 kg water

1 kg beef ……. 20.000 kg water

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (III)

### 4.1. Virtual water, hydrological footprint and food security (2)

Hydrological footprint is the amount of water (blue and green) that a humans require for all their needs (about 90% for food).

vegetarian diet ~ 800 $m^3$/year

red meat diet ~ 1.500 $m^3$/year

# 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (IV)

## 4.1. Virtual water, hydrological footprint and food security (3)

Total Water resources 110.000 $km^3$/year
Green Water 70.000 $km^3$/year
Blue Water 40.000 $km^3$/year

Human needs

| diet | population | $km^3$/year (blue + green) |
|---|---|---|
| Vegetarian | $7.000.10^6$ | ~ 6.000 |
| Redmeat | $7.000.10^6$ | ~12.000 |
| Vegetarian | $10.000.10^6$ | ~ 8.000 |
| Redmeat | $10.000.10^6$ | ~15.000 |

betwen 5-13% of Total Water Resources

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (IV)

# 4.2. Desalination (1)

- The most common technology today is **REVERSE OSMOSIS (RO)**
- The energy to desalinize one cubic meter of sea water has decreased from almost 20 kwh/m³ to less than 4 kwh/m³.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (V)

### 4.2. Desalination (2)

- The cost of sea water desalination by RO is about US $ 0.5/$m^3$.
- This cost is affordable in most cases for urban water supply in cities near the coast.
- Currently in Spain about 7% of the urban population uses (desalinated) sea water.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (VI)

### 4.3. The Intensive GW use "Silent Revolution" (1)

- It has been carried out by millions of modest individual farmers.
- Water decision makers have seldom paid attention to this phenomenon.
- It has produced great socio-economic benefits, as well as some problems (mainly environmental).

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (VII)

### 4.3. The Intensive GW use "Silent Revolution" (2)

**The Causes**

- Wide availability of cheap well drilling technologies.
- Invention and commercialization of the submersible pump.
- Hydrogeology has become a solid body of science.

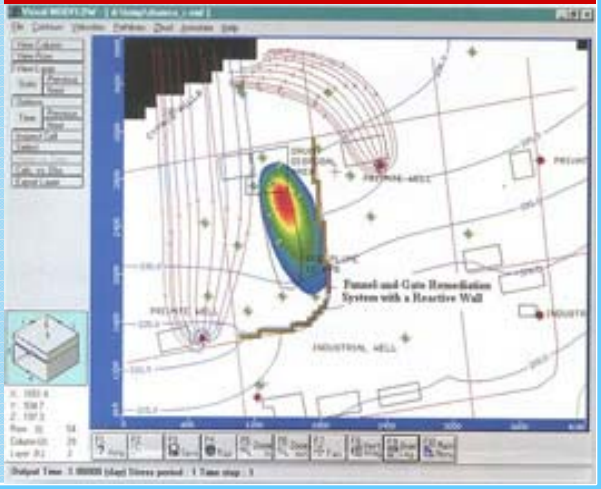
**HOWEVER, THE SILENT REVOLUTION IS MAINLY MARKET DRIVEN, EXCEPT IN POOR COUNTRIES**

# 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (VIII)

**From the dug-well to the deep borehole.**

**From the water wheel to the pump.**

**From the water-witches to Hydrogeology.**



## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (IX)

### 4.3. The Intensive GW use "Silent Revolution" (3)

- Some negative effects may appear.
  - Groundwater quality degradation is usually the most important. It also may be due to poor land-use planning
  - Ecological impacts on surface water courses and wetlands (irrelevant wherever poverty is the main ecological problem).

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (X)

### 4.3. The Intensive GW use "Silent Revolution" (4)

**Frequent "hydromyths"**

- Paraphrasing Hamlet:

  "FRAILTY, FRAILTY, THY NAME IS GROUNDWATER"

- "EVERY WATER WELL BECOMES DRY OR BRACKISH"

- Groundwater development is a "PILLAR OF SAND", prone to collapse.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (XI)

### 4.4. RELEVANCE OF REMOTE SENSING, GIS, AND INTERNET (1)

- A frequent problem in most hydrological conflicts is the illusory accurancy of data. Half-truths are worse than open lies.
- Generally, transparency and availability on these data is scarce.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (XII)

### 4.4. RELEVANCE OF REMOTE SENSING, GIS, AND INTERNET (2)

- The most frequent lack of data are:

  a) Irrigated surfaces and the types crops.

  b) The inventory of groundwater uses and rights.

- Remote sensing can usually facilitate these data in a fast and cheap way.

## 4. CONTRIBUTION OF THE RECENT ADVANCES IN SCIENCE AND TECHNOLOGY TO SOLVE WATER PROBLEMS (XIII)

### 4.4. RELEVANCE OF REMOTE SENSING, GIS, AND INTERNET (3)

- Water management requires strong stakeholders participation.
- To achieve this participation transparency from government and education of the stakeholders are crucial.
- GIS system and internet may facilitate education and participation.

## 5. SCIENCE AND TECHNOLOGY ARE IMPORTANT BUT NOT ENOUGH. WHAT CAN BE DONE? (I)

- There is not a blue print. Each region my be different.
- Ethical communalities seem to exist in water ethics.
- The experience of the Working Group for COMEST (1998-1999) and of the Santander (2007) Workshop allow an optimist outlook

## 5. SCIENCE AND TECHNOLOGY ARE IMPORTANT BUT NOT ENOUGH. WHAT CAN BE DONE? (II)

These ethical communalities may be based mainly in the the three following principles:

- Dignity of every human being.
- Subsidiarity, that requires responsible participation in water governance.
- Solidarity that coordinates personal freedom with the respect to the common good.

## 5. SCIENCE AND TECHNOLOGY ARE IMPORTANT BUT NOT ENOUGH. WHAT CAN BE DONE? (III)

- These principles are less compatible with a non-religious or a materialistic-hedonistic philosophy.
- Groucho Marx: *"I dont care for the future generations, what have they done for me?"*
- *Moreover, it is necessary to avoid what Wolf describes as the RIFT OF THE ENLIGHTENMENT. Water conflicts solution requires not only justice but also mercy or forgiveness, This is also a basic principle of the judeo-christian creeds.*

# 6. CONCLUSIONS

- The described activities and initiatives in relation to Water Ethical Issues seem to be in acceptable agreement with the basic principle of moral codes of most religious denomination.
- There exist still some gaps to be bridged in the mutual understanding between a few extremist scientists and a few extremist religions leaders.
- It cannot be forgotten that good water governance demands an equilibrium between its utilitarian values and its cultural or religious values.

THANKS FOR YOUR ATTENTION