Advancing Human Development and MDG's Role Water and Agriculture

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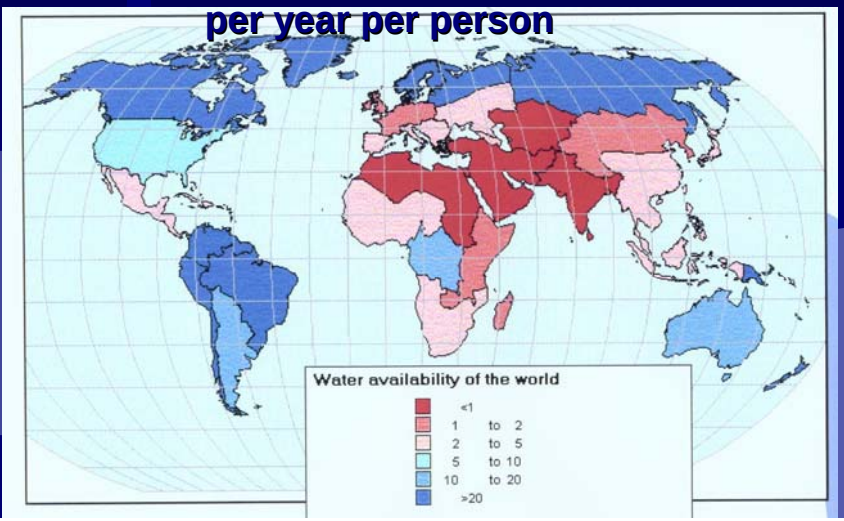
Extension Service

Irrigation with treated wastewater (TWW) for increasing food production in arid regions

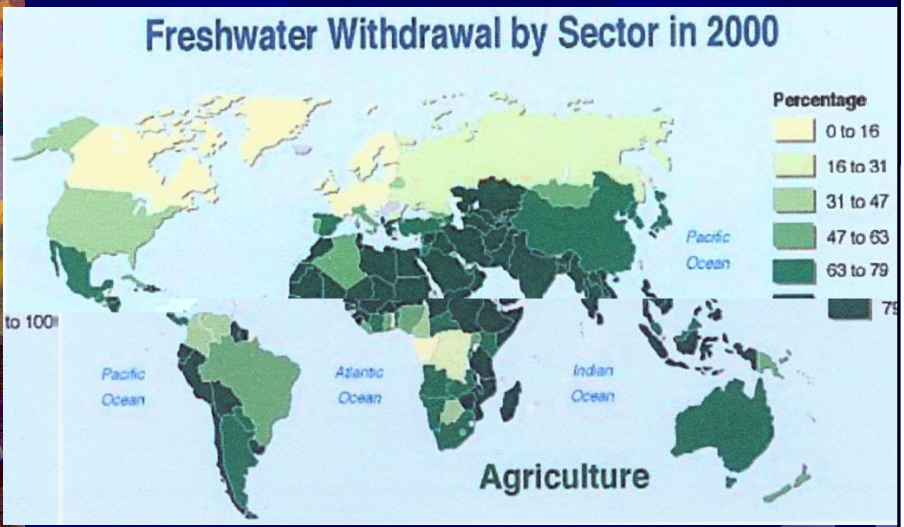
Jorge Tarchitzky, Ph.D.
Director – Soil and Irrigation Division
National Advisor for Salinity and Effluent Water Irrigation

Water availability- 2005- Thousand of cubic meter per year per person



“By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two thirds of the world’s population could be living under water stressed conditions”

Freshwater Withdrawal in agriculture



“Irrigation is crucial to the world’s food supplies”

Confrontation with water shortage

- Developing new groundwater or surface sources
- Developing new water carriage systems
- “New” water production: saline and sea water desalination
- Recycling water: Treated Wastewater (TWW) reuse

Recycling water

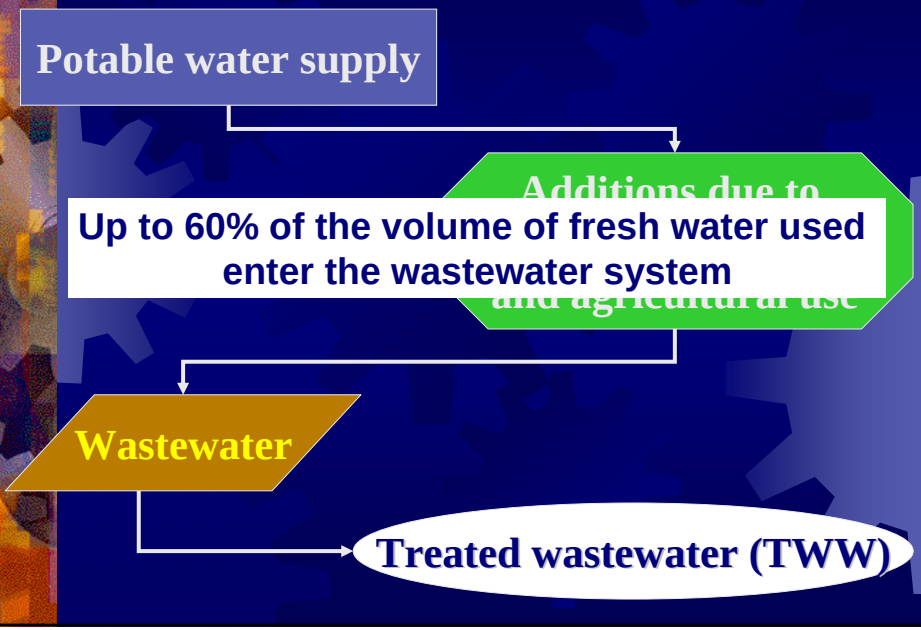
Treated Wastewater reuse in agriculture

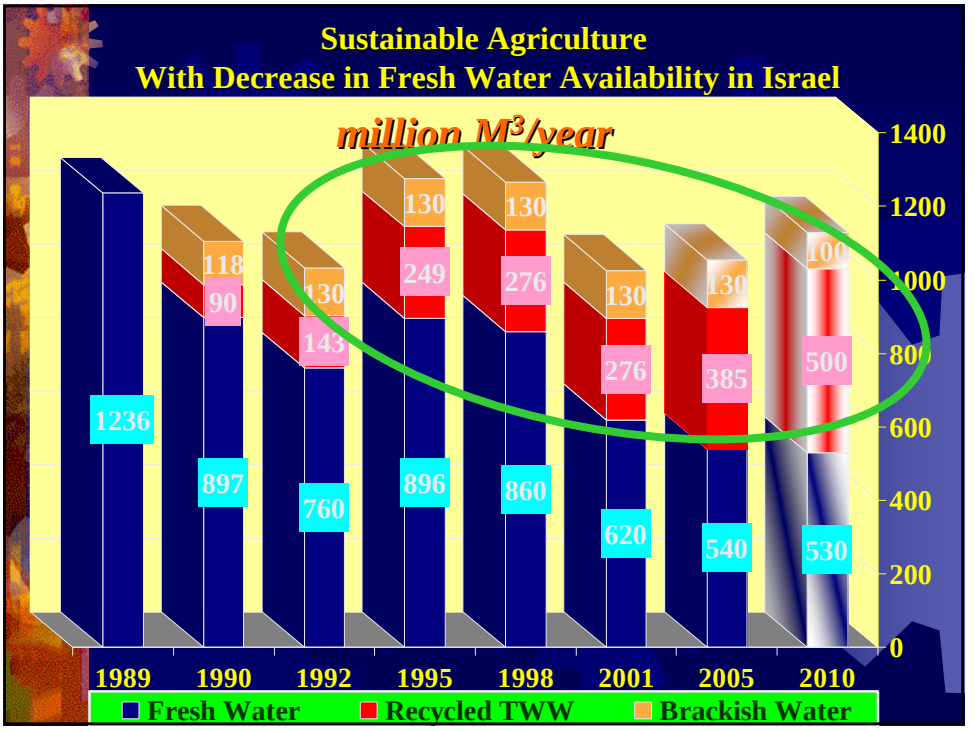
The Reasons for Treating Wastewater

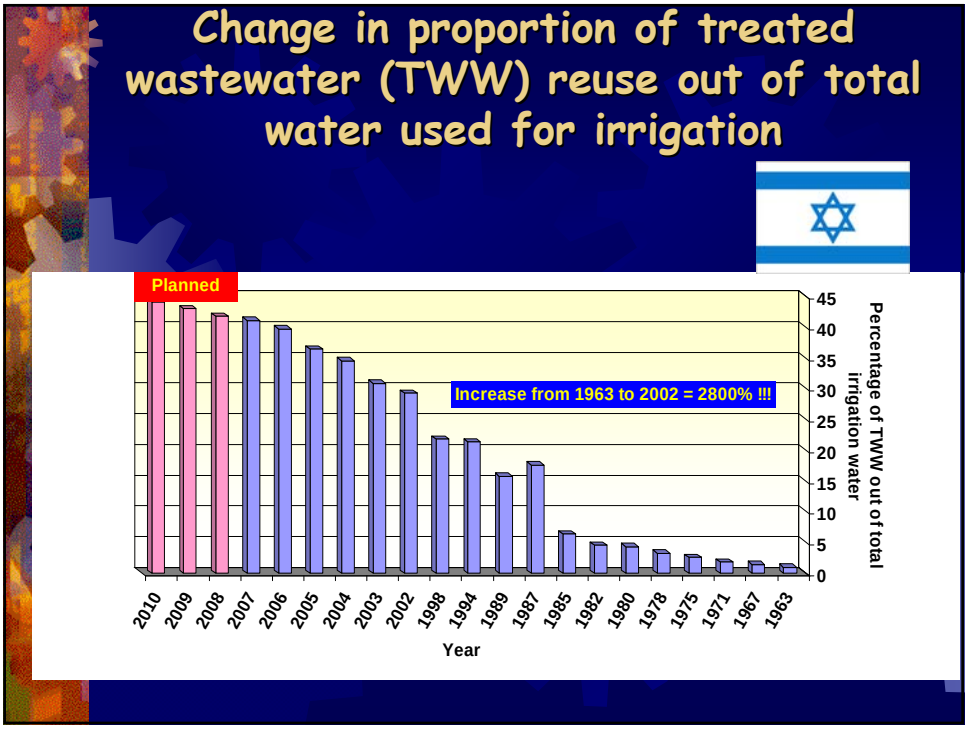
- Treated Wastewater (TWW) disposal through reuse prevents underground and surface water pollution and health ne
- TWW contribute a significant amount of water for all purposes (mainly agriculture), especially in water scarcity conditions

A win-win situation

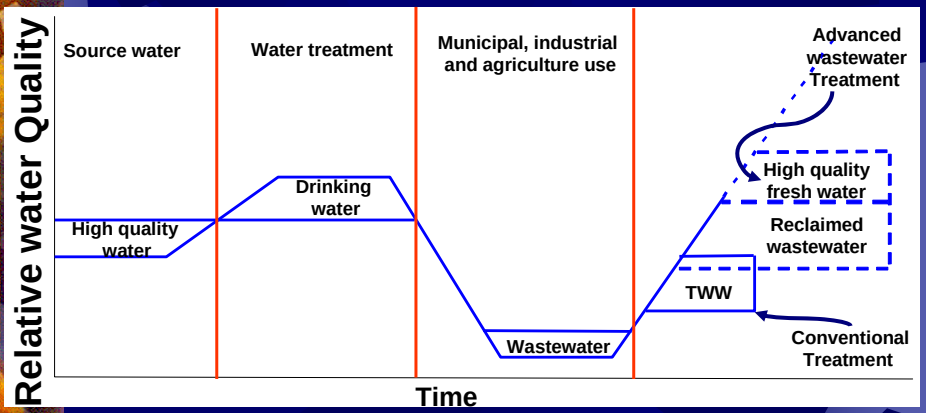
Treated Wastewater




Sustainable Agriculture
With Decrease in Fresh Water Availability in Israel
million M3/year
1400
1200
1000
800
600
400
200
0
1236
118
90
897
130
143
760
130
249
896
130
276
860
130
276
620
130
385
540
100
500
530
1989
1990
1992
1995
1998
2001
2005
2010
Fresh Water
Recycled TWW
Brackish Water


Change in proportion of treated wastewater (TWW) reuse out of total water used for irrigation
Planned
Increase from 1963 to 2002 = 2800% !!!
Percentage of TWW out of total irrigation water
45
40
35
30
25
20
15
10
5
0
2010
2009
2008
2007
2006
2005
2004
2003
2002
1998
1994
1989
1987
1985
1982
1980
1978
1975
1971
1967
1963
Year

Water quality path



(Modified from Asano, 2006)

Main Aspects to Take Into Account

- Health considerations: to the people who eat the agricultural product and for the farmers who come in contact with the water
- TWW chemical quality : nutrients content and salinity parameters (total salt content, sodium, chloride, boron, heavy metals and SAR) in order to prevent land degradation and damage to crops
- TWW storage and distribution
- The irrigation system selected , filtration, monitoring, clogging potential

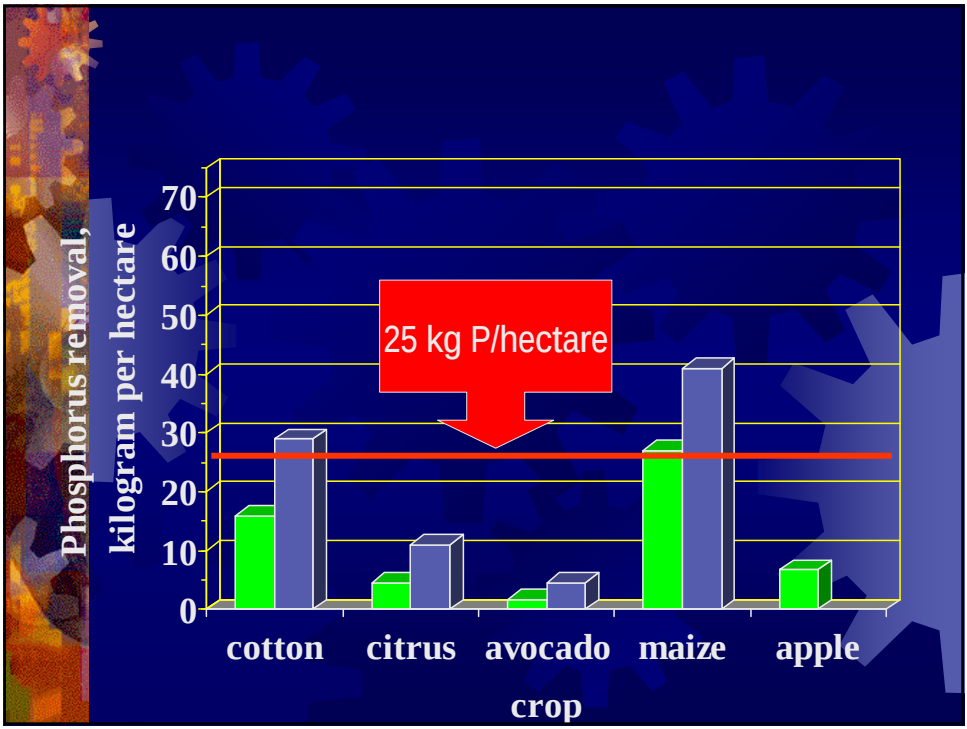
- **The primary means to ensuring reclaimed water can be used for beneficial purposes is:**

1. To provide the appropriate treatment
2. To avoid point and diffuse pollutants
3. To establish Regulations and Guidelines
4. To invest in Research and development
5. To introduce Education and Extension programs

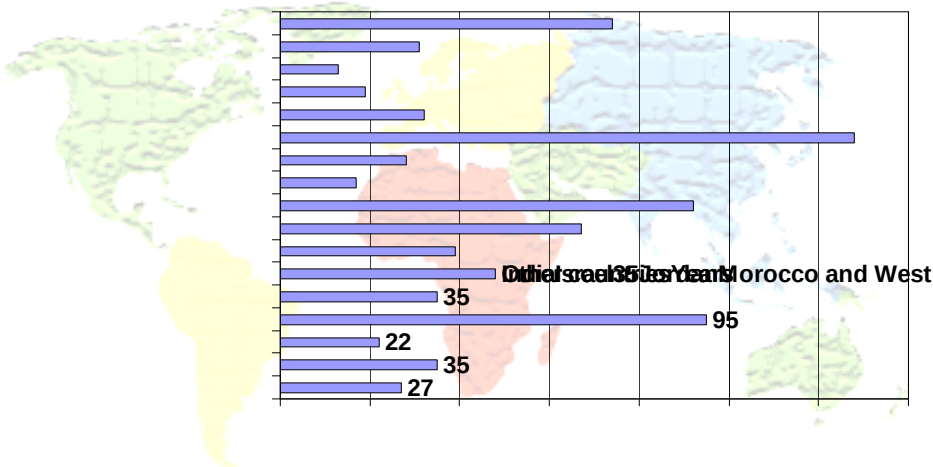
AMOUNTS OF AVAILABLE NUTRIENTS IN EFFLUENTS (Kg/Ha)
(domestic sewage, secondary treatment)

Irrigation Application (mm)	N	P_2O_5	K_2O
300	132	72	72
500	220	120	120
700	310	170	170

(N= 50 ppm; P= 11 ppm; K= 20 ppm)



Phosphate rock – years of extraction remaining based on current reserves from 2005 using a 2% yearly increase (USGS)



A feasible solution for all the sizes

From big metropolitan areas…..

….to small villages

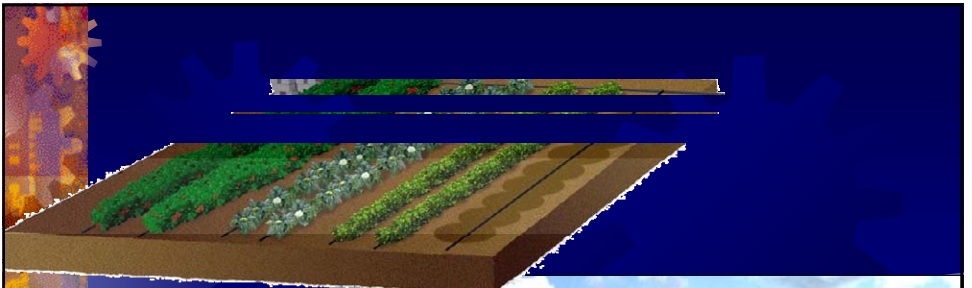
TWW reclamation could be the driving force in the chain: potable water supply – sanitation – irrigation – food supply

Wastewater treatment Plant

Intensive Treatment

Extensive Treatment

Advanced Irrigation Systems



Irrigation Systems – Familiar system

Take a Home Message

- Water scarcity is one of the main limiting factors in agriculture
- Proper irrigation is crucial to the world's food production.
- TWW reclamation is a way to provide a renewable water source, "new water", which has different characteristics than potable water, such as crop nutrients that can change fertilizer use by providing an important source of production growth.

Take a Home Message

- TWW reclamation systems could be a solution for big metropolitan areas with intensive wastewater treatment plants, and big farms with advanced irrigation systems, as well as for family farms with extensive wastewater treatment plants and simple irrigation systems.
- Investment in TWW reclamation in agriculture means investment in health, sanitation and environment, obtaining a "new" water source and resulting in a win-win situation.

Take a Home Message

- However, since we deal here with a “new” water source, in order to use it successfully and in a sustainable manner, the circle of investment in research, technology, capacity building, extension and monitoring is needed.


Thank you