Zero waste in the Mediterranean
Natural resources, food and knowledge

www.ciheam.org
Mediterranean Challenges?
The Mediterranean Context

- Key Region for the Future: **Laboratory for pressing global issues**
- Produce more, better and with stability: **Sustainability Agenda**
- **Multilateral cooperation and local strategies to combat scarcities**
- Linking knowledge and policy-decision
- Geopolitics / Nexus « Agriculture - Food - Rural - Water - Energy - Climate »
- Avoiding Waste and Losses at triple level: An **integrated challenge**
Key data in the Mediterranean

<table>
<thead>
<tr>
<th>Natural resources: rich but depleting</th>
</tr>
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<tbody>
<tr>
<td><strong>Water</strong></td>
</tr>
<tr>
<td>3% Global resources, &gt;50% world water poor</td>
</tr>
<tr>
<td>Water exploitation index &gt; 50%</td>
</tr>
<tr>
<td><strong>Land</strong></td>
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<tr>
<td>Only region with NO Land reserves</td>
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<tr>
<td><strong>Arable Land</strong></td>
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<tr>
<td>1/3 North Med, &lt; 10% South and East</td>
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<tr>
<td><strong>Forests</strong></td>
</tr>
<tr>
<td>300 species including 200 endemic but 60 at risk</td>
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<tr>
<td><strong>Biodiversity</strong></td>
</tr>
<tr>
<td>25,000 to 30,000 species of plants but threatened</td>
</tr>
<tr>
<td><strong>Fisheries</strong></td>
</tr>
<tr>
<td>7% of global marine species but 52% fish stocks: unsustainable exploitation</td>
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</table>
### Key data in the Mediterranean

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Food Loss and Waste</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Global</strong></td>
<td>1/3 produced lost/wasted at all stages of the food chain</td>
</tr>
<tr>
<td><strong>Mediterranean</strong></td>
<td>&gt;USD 50 billion annually in terms of farm gate prices</td>
</tr>
</tbody>
</table>
**Key data in the Mediterranean**

<table>
<thead>
<tr>
<th>Knowledge waste</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local knowledge</td>
<td>Identity of Mediterranean, but in danger</td>
</tr>
<tr>
<td>Family farming</td>
<td>Dominant (85% of farms in MENA but most family farmers are poor &gt; 50, less youth in agriculture)</td>
</tr>
<tr>
<td>Maghreb farmer average age</td>
<td></td>
</tr>
<tr>
<td>Social exclusion and inequality</td>
<td>Highest rates of youth unemployment in the MENA, 28.2% and 30.5% in 2014 (1/4 from the labour force since 1991)</td>
</tr>
<tr>
<td>Women labour force participation</td>
<td>&lt; 25%</td>
</tr>
</tbody>
</table>
Mediterra 2016 highlights the importance of combating waste through the implementation of more sustainable approaches all along the food and agricultural production chain and through the development of public policies

www.ciheam.org
www.fao.org
Water in the Mediterranean, Waste and Reuse:

Drivers, Constraints and Prospects with particular emphasis on Agriculture

CIHEAM – Mediterranean Agronomic Institute of Bari
How Scarce Is Water?
Water Budgets

Global

97.5% Salt Water
2.5% Fresh Water

Freshwater

87% Not Accessible
13% Accessible
MENA (Middle East and North Africa)

1% of Accessible Freshwater
5% of World Population
DEMOGRAPHIC TRENDS

EGYPT:
Urbanization: 43%
With 2.04% annual rate of change (2010-15 est.)

MOROCCO:
Urbanization: 56%
With 1.62% annual rate of change (2010-15 est.)

TUNISIA:
Urbanization: 67%
With 1.34% annual rate of change (2010-15 est.)
Per Capita Availability Shows Huge Variation

<table>
<thead>
<tr>
<th>Country</th>
<th>Water availability m³/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>&gt; 10,000</td>
</tr>
<tr>
<td>Italy</td>
<td>&gt; 2,800</td>
</tr>
<tr>
<td>Tunisia</td>
<td>&lt; 450</td>
</tr>
<tr>
<td>Morocco</td>
<td>&lt; 600</td>
</tr>
<tr>
<td>Egypt</td>
<td>&lt; 800</td>
</tr>
</tbody>
</table>

The World’s water; Pacific Institute 2010
IME, 2010; ACWA, 2010

* Minimum according to WHO is 1000 m³/inhabitant. Countries with minor values are classified as “water scarce countries”
DISTRIBUTION OF WATER RESOURCES IN THE MEDITERRANEAN COUNTRIES

Source: MEDITERRA, 2009
Freshwater availability, cubic metres per person and per year, 2007.

Source: FAO, Nations unies, World Resources Institute (WRI).

February 2018

Scarcity
Stress
Vulnerability

Data non available
IN ADDITION TO POPULATION GROWTH, THE FALL OF WATER AVAILABILITY IS MAINLY THE RESULT OF OVEREXPLOITATION OF MAJOR AQUIFERS

Projected Water Scarcity in 2025

Source: IWMI (2000)
How Much for Agriculture?
One Calorie = One Liter
Estimated Water Withdrawals In the SEMs

- **AGRICULTURE**: 89%
- **DOMESTIC**: 6%
- **INDUSTRY**: 5%

Source: WB WDI (2002)
CURRENT & FUTURE PROBLEM OF WATER RESOURCES IN THE MEDITERRANEAN BASIN

Matching water SUPPLY and water DEMAND in agriculture will be harder and harder, both in space and time.

WATER DEMAND: Increasing

WATER SUPPLY: Fix and Limited

NO MAGIC SOLUTION IS AVAILABLE

In a Nutshell

Climate change uncertainty
Workable Approaches
Reforms

• IWRM

• More efficient use of water

• Promoting P4 (People, Public, Private Partnership)

• New water (Alternative sources)

• Regional and international cooperation
New Water Sources
(US cents /cu.m)

• Reduce demand = 10 - 70
• Leakage repair = 10 - 70
• Desalination = 20 - 40
  – (brackish water)
• Wastewater reuse = 10 - 50
• Desalination = 50 - 90
  – (sea water)

Source World Bank est. 2003 in WB, from scarcity through reform to Security, for
WWF3, Kyoto Japan 2003, p.13
Benefits of Agricultural Reuse

- High concentrations of nutrients
- May eliminate need for fertilizer
- Long-term soil enrichment
- Decreases demand on potable water supply
- Additional treatment in soil
- Water not discharged to receiving waters
Using Treated Wastewater

Sorghum and Topinambur irrigated with Treated Wastewater in Sorbulak area, Kazakhstan – Courtesy ICARDA
Agricultural Irrigation
Larnaca - Cyprus

Jojoba shrubs irrigated with treated wastewater produced higher oil yields than shrubs irrigated with fresh water.
Agricultural Irrigation & Reclaimed Wastewater: Mezquital, Mexico

<table>
<thead>
<tr>
<th>Crop</th>
<th>Yield in tons/ha</th>
<th>Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastewater</td>
<td>Fresh water</td>
<td></td>
</tr>
<tr>
<td>Maize corn</td>
<td>5.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Barley</td>
<td>4.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Tomato</td>
<td>35.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>120.0</td>
<td>70.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>3.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Disadvantages of Agricultural Reuse

• Health risk from associated pathogens
• Health risk from other contaminants (e.g. metals, chemicals, pharmaceuticals)
• Decrease in soil quality
• Infiltration of groundwater
<table>
<thead>
<tr>
<th>Country</th>
<th>Current withdrawal</th>
<th>Wastewater indicator</th>
</tr>
</thead>
</table>
| Egypt     | 69.4 Billion m³    | Waste water generated: 6.5 BCM  
Waste water treated: 3.65 BCM (56%)  
Waste water reuse: 0.7 BCM used in irrigation and 2.95 BCM pumped to drains & canals in Cairo & Delta  
Drainage Water Reuse in irrigation: 4.84 BCM |
| Morocco   | 14 Billion m³      | Waste water generated: 700 M m³  
Waste water treated: 177 M m³ (25%)  
Waste water reuse: 80 M m³ |
| Tunisia   | 2.9 Billion m³     | Waste water generated: 240 M m³  
Waste water treated: 235 M m³ (98%)  
Waste water reuse: 57 M m³  
(39 M m³ reused in irrigation; 18 M m³ disposed in wetlands and rivers) |

The way to go .......
Thank you

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