

Technologies for Sustainable Land Management

EGM on Promotion of South-South Cooperation in Technology
Transfer, April 20-21, 2011, Amman, Jordan



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Outline

1. The Context

1. Sustainability
2. Land Characteristics
3. Challenges
4. Degradation
5. Desertification

2. Bad practices

3. Good practices & Technologies

4. Conclusion

Source:

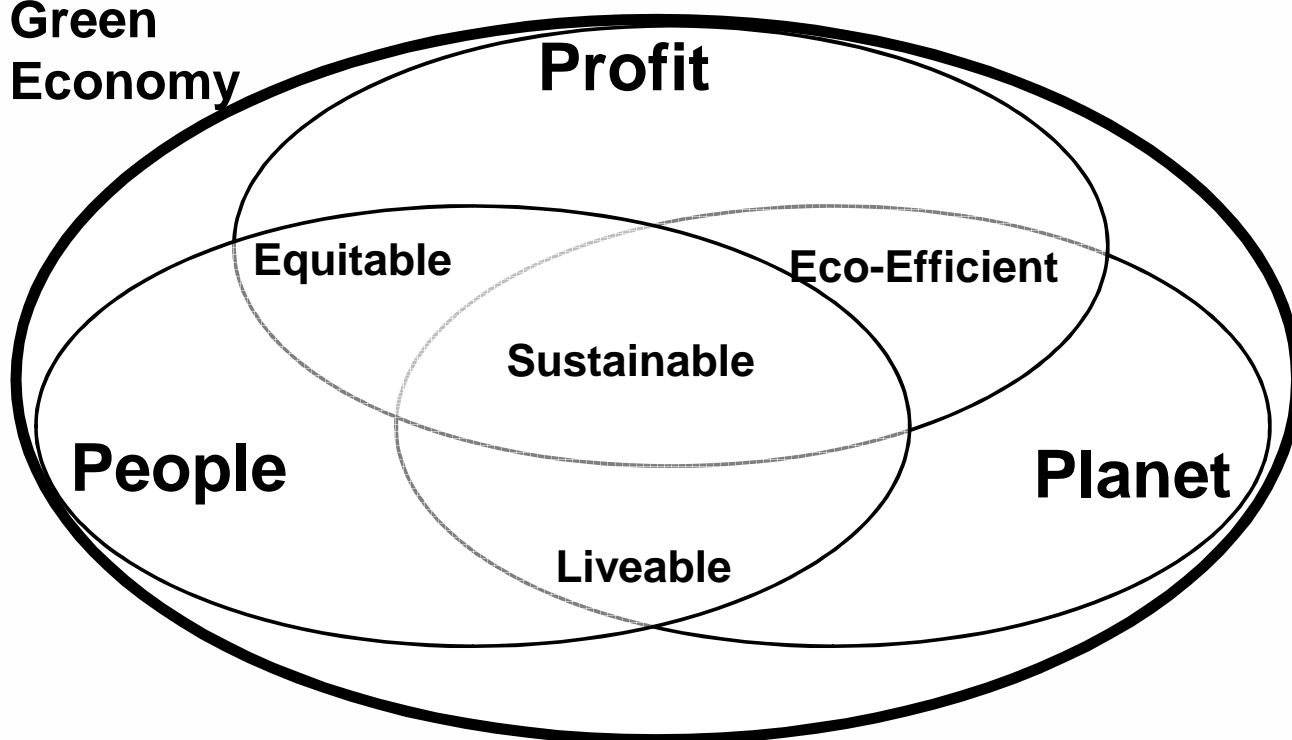
ESCWA; 2008: **ESCWA's Land Degradation Methodological Framework**, ESCWA, Beirut, Lebanon

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The Context: Sustainability



Green
Economy



Source:

UNEP, 2007: *Life Cycle Management: A Business Guide to Sustainability*, United Nations Environment Programme (UNEP).

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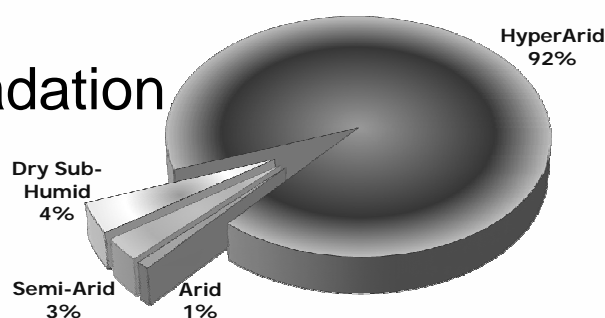
3

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The Context: Land Characteristics



- Limited fertile land
- Different levels of degradation
- Land Scarce,



Source:

ESCWA, 2007: *Land Degradation Assessment and Prevention*, ESCWA, Beirut, Lebanon

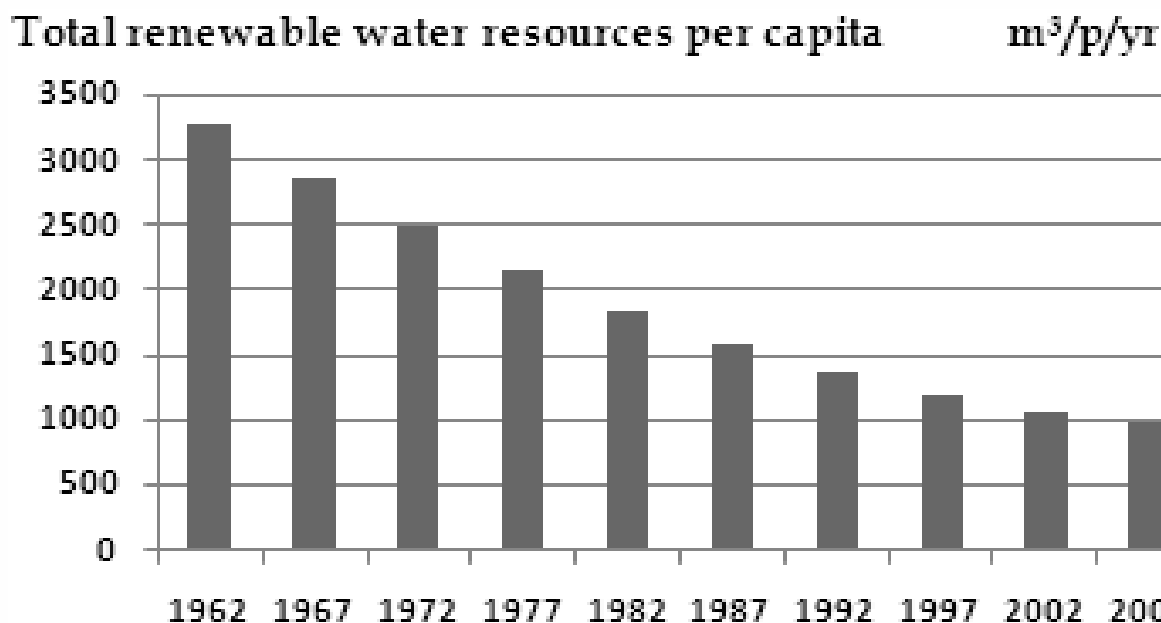
AFED, 2008: *Arab Environment: Future Challenges*, Arab Forum for Environment and Development (AFED)

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- The ESCWA region is water scarce



Source:

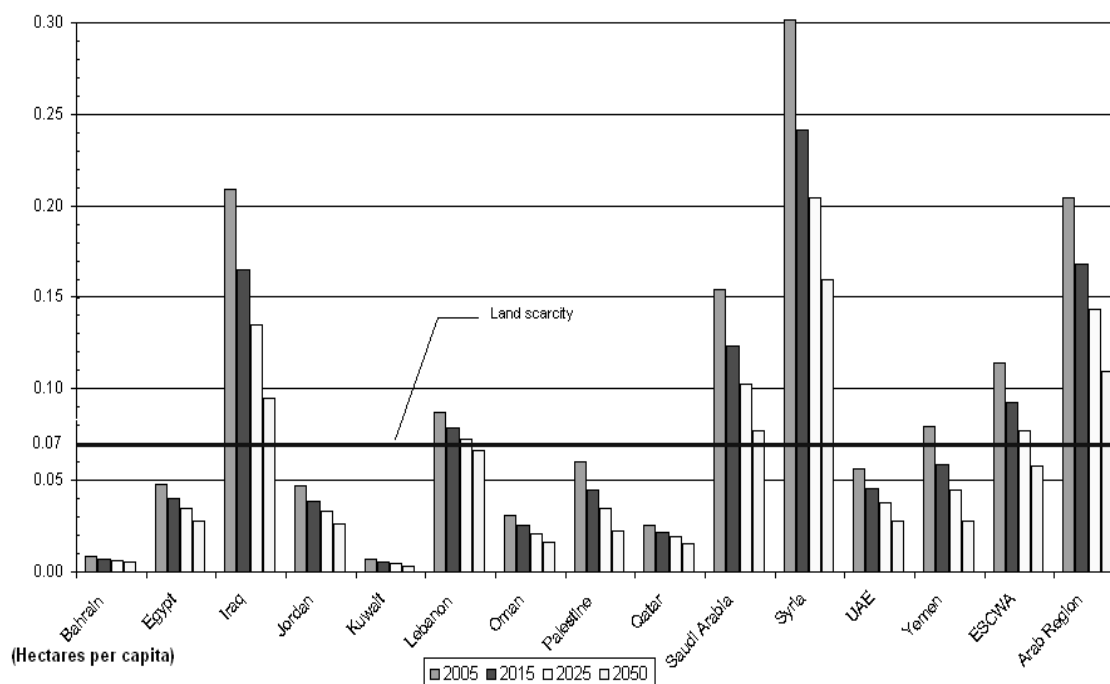
ESCWA; 2008: **Water Resources in the ESCWA Region: Country Fact Sheet**, ESCWA, Beirut, Lebanon

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Limited Fertile Land: Per capita availability



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Land Degradation:

- *Reduction / Loss of the land's:*
 - *Biological / economic productivity,*
 - *Biological and complexity of*

← Human

← Human + Climate

Desertification:

- *Land degradation resulting from:*
 - *Climatic variations and human activities,*
 - *In the presence of complex interactions among physical, biological, political, social, cultural and economic factors*
- *Arid, semi-arid and sub-humid areas*

Source:

ESCWA; 2008: **ESCWA's Land Degradation Methodological Framework**, ESCWA, Beirut, Lebanon

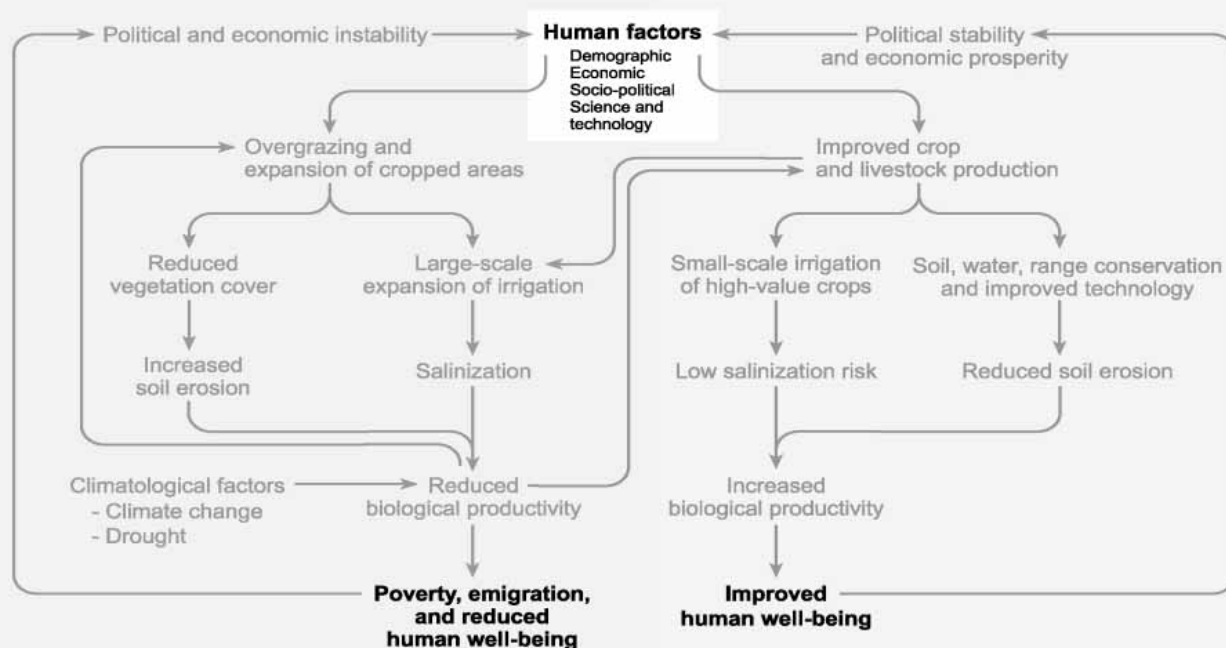
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Downward spiral leading to desertification

Approach to avoid desertification



Source: Millennium Ecosystem Assessment

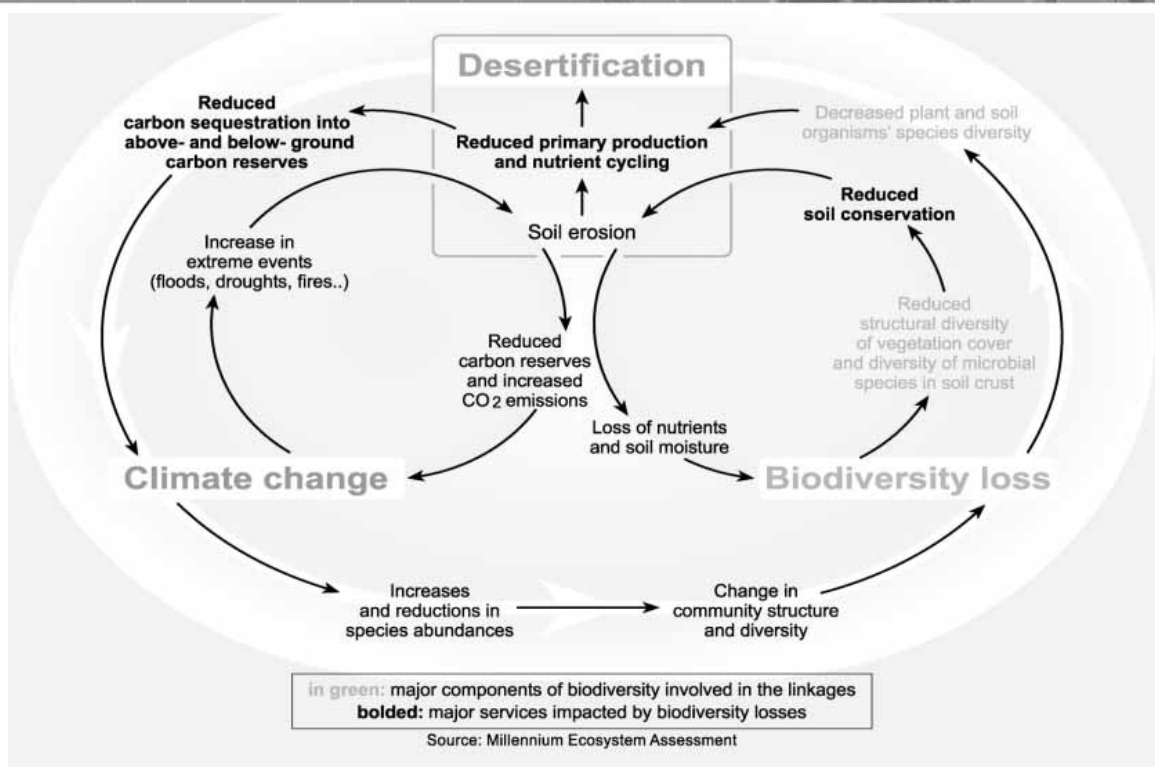
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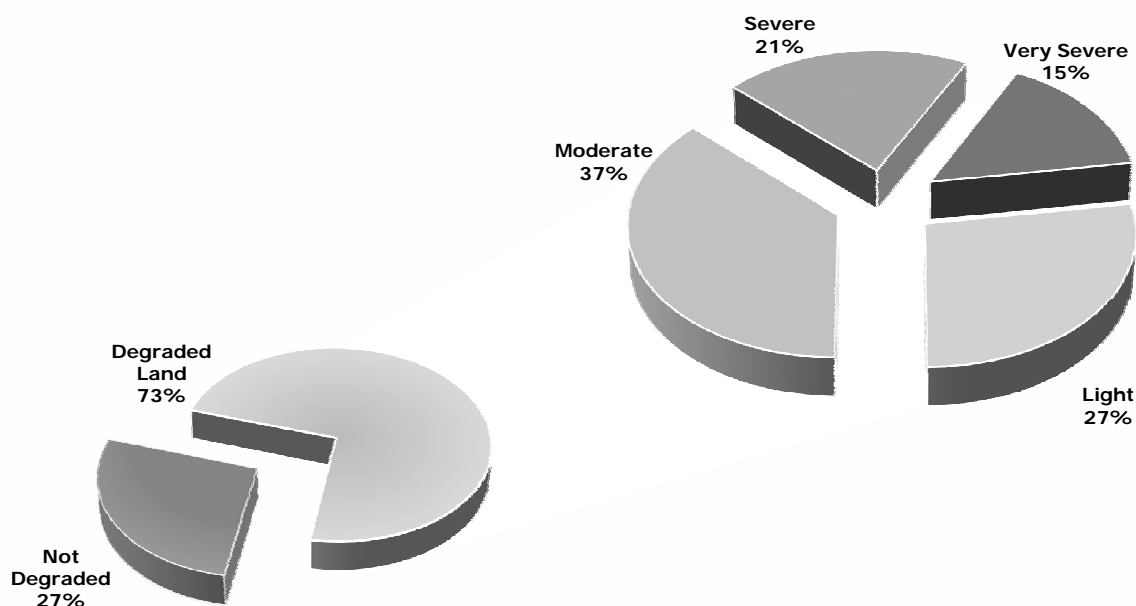
Source:

ESCWA; 2008: **ESCWA's Land Degradation Methodological Framework**, ESCWA, Beirut, Lebanon
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Arable Land: Per capita availability



Source:

ESCWA; 2005: **Assessing Land Degradation in the ESCWA Region: A Methodological Framework**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut
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Outline

1. The Context

2. Bad practices

1. "Input"-Centered,
2. Inappropriate agricultural techniques

3. Good practices & Technologies

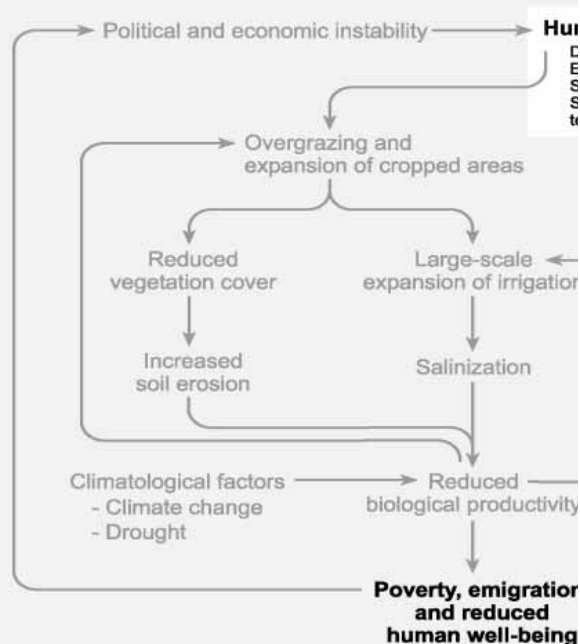
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3 Bad Practices & Land Degradation

Downward spiral leading to desertification



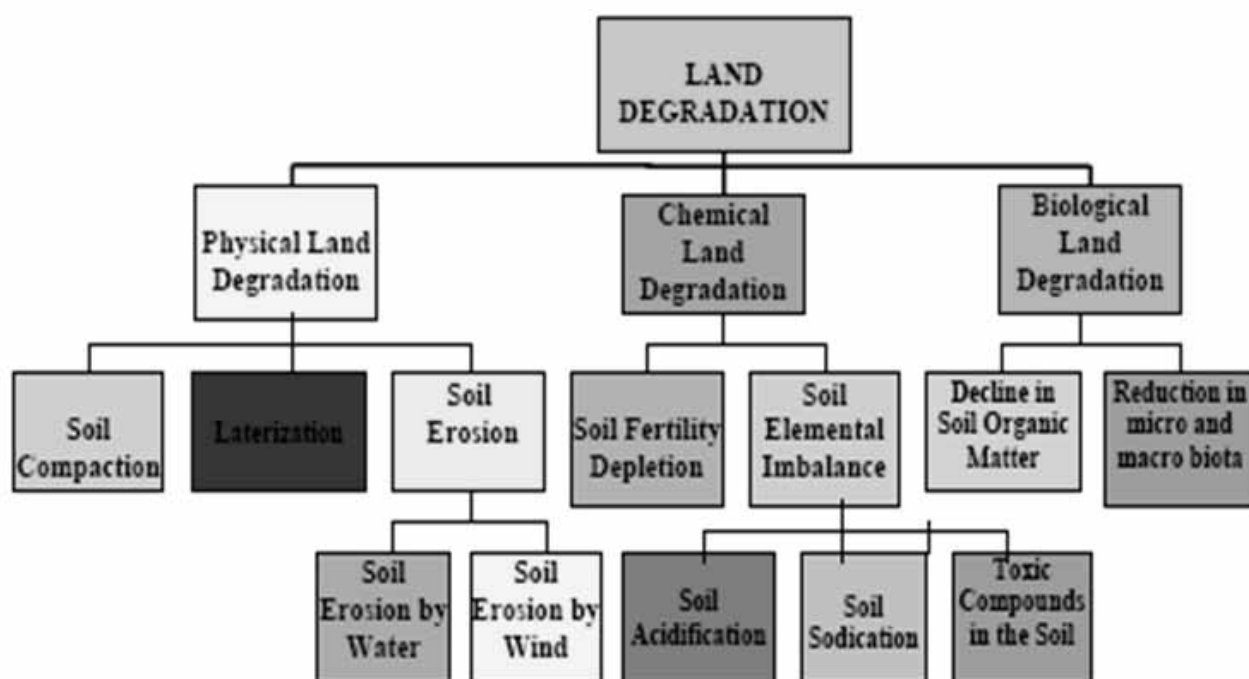
Source:

ESCWA; 2005: **Assessing Land Degradation in the ESCWA Region: A Methodological Framework**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut

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Bad Practices reinforce ...



Source:

ESCWA; 2005: **Assessing Land Degradation in the ESCWA Region: A Methodological Framework**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut
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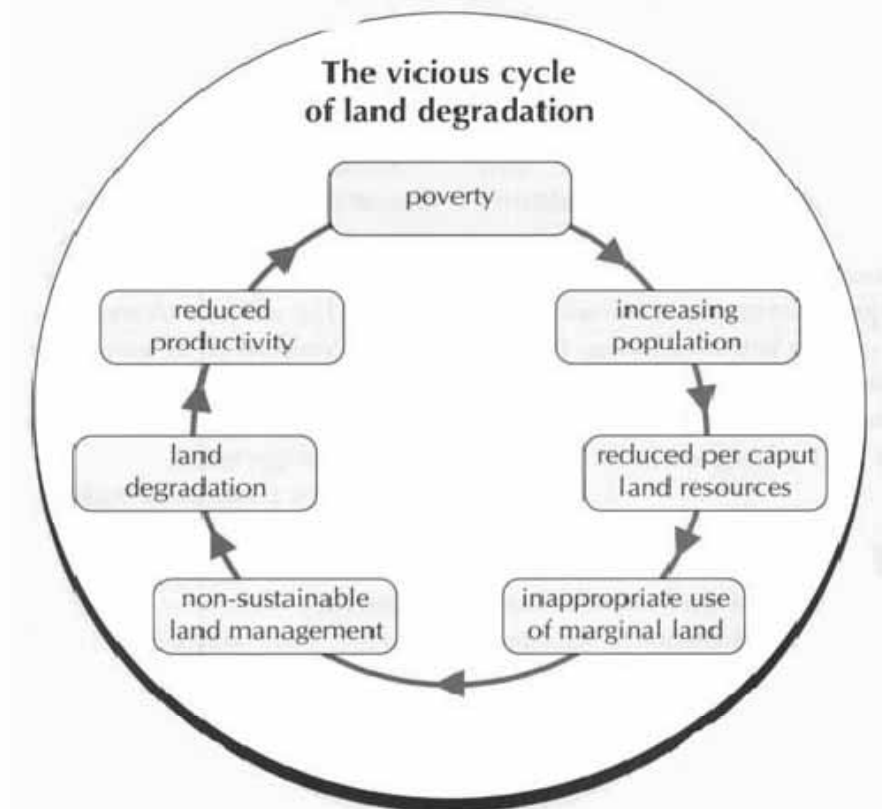
- Intensive agriculture:
e.g. high productivity agriculture with minimum fallow
- Monoculture:
e.g. same crop over wide areas and over the years
- Removal of the vegetative cover:
e.g. soil mining without bringing back the organic matter
- Marginal land cultivation:
e.g. sloped lands, pasturelands, low productivity lands
- Intensive use of modern inputs:
e.g. high use of chemical fertilizers, pesticides, etc.
- Bad crop choice & practices:
e.g. water intensive crops (rice, bananas, sugar cane, etc.), plowing parallel to water runoff, etc.
- Water mining:
e.g. overexploitation of groundwater

Source:

ESCWA; 2005, **The economics of land degradation in the ESCWA Region**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut
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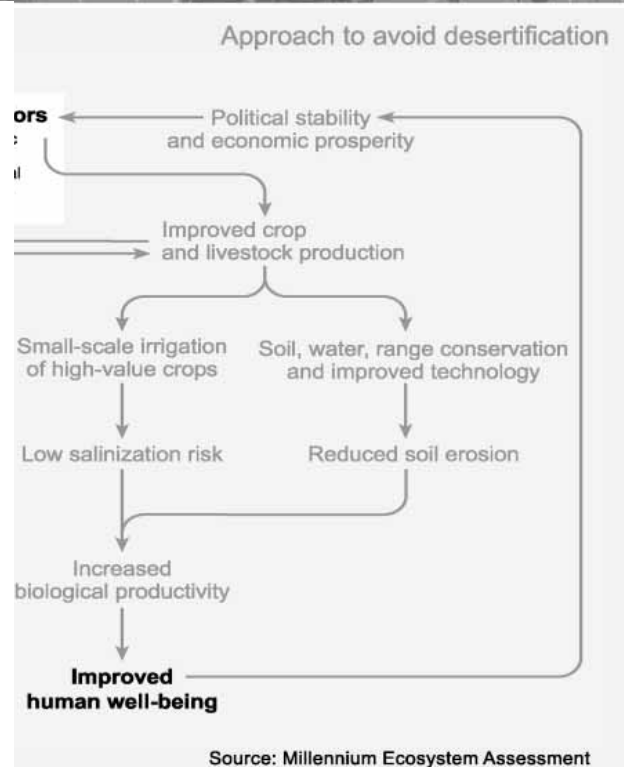
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Outline

1. The Context
2. Bad practices
3. Good practices & Technologies
 - Breaking the Vicious Cycle
4. Conclusion



Source:

ESCWA; 2005: **Assessing Land Degradation in the ESCWA Region: A Methodological Framework**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut
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- ✓ Sustainable Agriculture:
 - Sustainable Land Management (SLM)
- ✓ Eco-agriculture
- ✓ Conservation Agriculture
- ✓ Organic Agriculture
- ✓ Precision Agriculture

4 Sustainable Agriculture



Use of natural resources:

- **For** production of food product and other goods to meet human needs
- **While** assuring the long-term productive potential of these resources

Sustainable Land Management = Managing the land without:

- Damaging ecological processes,
- Reducing biological diversity

Sustainable Land Management =

At the heart of Sustainable Agriculture,

Key component of Eco-agriculture, Conservation Agriculture,
Organic Agriculture

Source:

ESCWA; 2005: **Assessing Land Degradation in the ESCWA Region: A Methodological Framework**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut
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4 Sustainable Land Management



Key Technologies:

1. Control of raindrop and runoff
2. Reduction of slope
3. Land/Soil structure
4. Water harvesting, spreading
5. Soil improvement
6. Land cover/fixation

Source:

ESCWA; 2005: **Assessing Land Degradation in the ESCWA Region: A Methodological Framework**, Expert Group Meeting on Reversing Land Degradation: Issues and Options, 25-27 July 2005, ESCWA, Beirut
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4 SLM Technologies



1- Control of raindrop and runoff

Agroforestry

Dams/micro-dams

Vegetative cover

Watershed management

Contour trenches

- Nitrogen fixing species :
 - Improving yields,
 - Decrease fertilizer use,



Sahel

Source:

ESCWA; 2007: **Land degradation assessment and prevention: Selected case study from the ESCWA region**, Report E/ESCWA/SDPD/2007/4, ESCWA, Beirut

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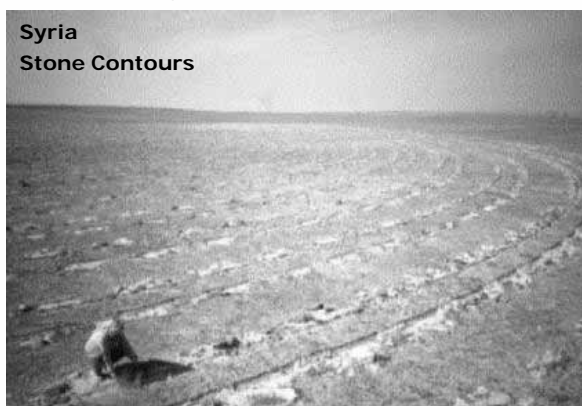
4 SLM Technologies



2- Reduction of slope

Terraces

Stone & vegetative contours



Syria
Stone Contours



Syria
Terraces

- Soil Erosion
- Water Retention

Source:

ESCWA; 2007: **Land degradation assessment and prevention: Selected case study from the ESCWA region**, Report E/ESCWA/SDPD/2007/4, ESCWA, Beirut

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4.3 SLM Technologies



3- Land/Soil structure

No or **minimum tillage**
Green/vegetative cover (fixation)
Composting
Conservation agriculture

- Soil Erosion
- Optimize Water Usage

Minimal tillage

Morocco



Source:

ESCWA; 2007: **Land degradation assessment and prevention: Selected case study from the ESCWA region**, Report E/ESCWA/SDPD/2007/4, ESCWA, Beirut

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4.3 SLM Technologies



3- Land/Soil structure

No-/minimum tillage
Green/vegetative cover (fixation)
Composting
conservation agriculture

- Soil Erosion
- Water Retention
- Higher biodiversity:
Enhanced control of pest species,
- Nitrogen fixing species :
 - Improving yields,
 - Decrease fertilizer use,

Vegetative Bund



Source:

ESCWA; 2007: **Land degradation assessment and prevention: Selected case study from the ESCWA region**, Report E/ESCWA/SDPD/2007/4, ESCWA, Beirut

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4.3 SLM Technologies



3- Land/Soil structure

No-/minimum tillage

Green/vegetative cover (fixation)

Composting,

Conservation agriculture

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4 SLM Technologies



4- Water harvesting, spreading:

Dams: water harvesting, protection against erosion

Retention ditches: against water erosion

Terraces

5- Soil improvement:

Organic matter

Fertilization

Green cover

Sediment harvesting

Source:

ESCWA; 2007: **Land degradation assessment and prevention: Selected case study from the ESCWA region**, Report E/ESCWA/SDPD/2007/4, ESCWA, Beirut

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4 SLM Technologies



6- Land cover/fixation:

Soil fixation: protection against water & wind erosion

Windbreakers: against wind erosion

Green cover: protection against soil erosion, chemical deterioration

- Soil Erosion
- Water Retention
- Higher biodiversity:
Enhanced control of pest species,
- Nitrogen fixing species :
 - Improving yields,
 - Decrease fertilizer use,



Source:

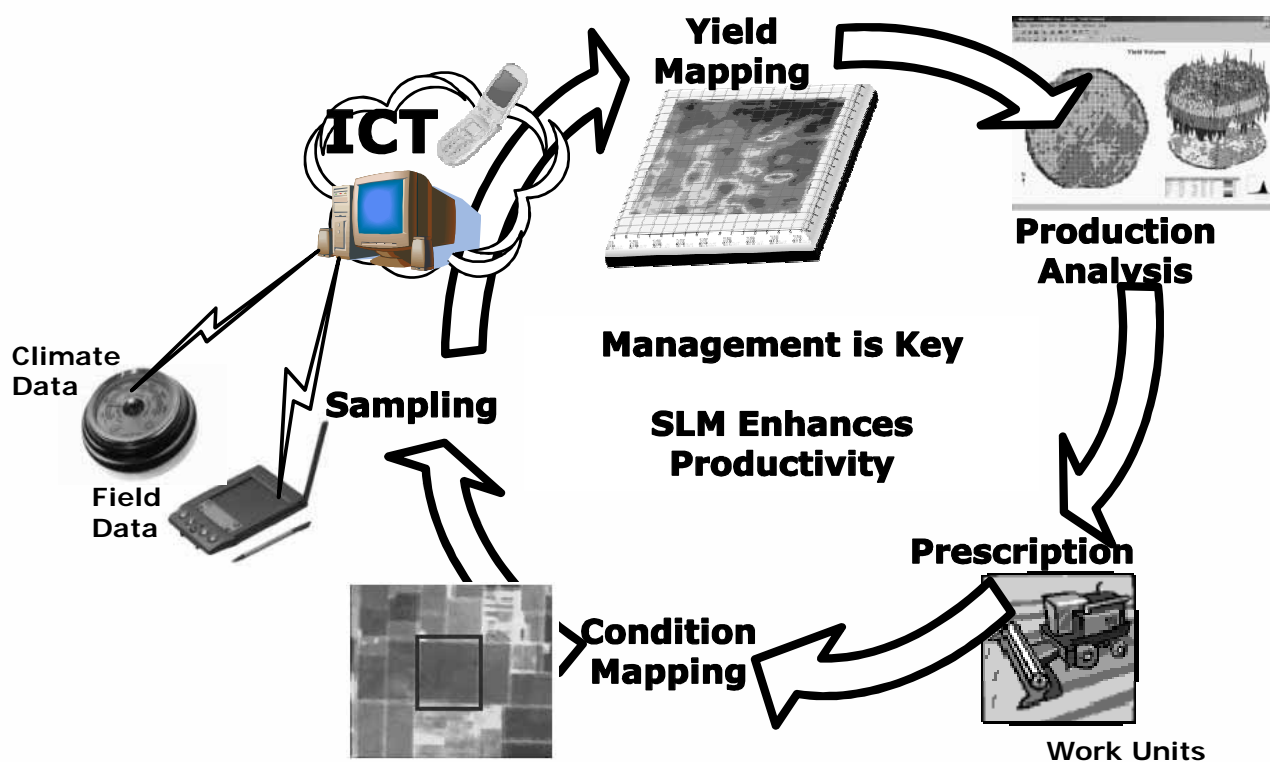
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4 SLM & Precision Agriculture



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Outline

1. The Context
2. Bad practices
3. Good practices & Technologies
4. Conclusion

5 The Virtuous Cycle...



Sustainable Land Management: Managing the land without damaging ecological processes or reducing biological diversity .

- Sustainable Agriculture
- Eco-agriculture
- Conservation Agriculture
- Organic Agriculture
- ...Precision Agriculture

1. Control of raindrop and runoff
2. Reduction of slope
3. Land/Soil structure
4. Water harvesting, spreading
5. Soil improvement
6. Land cover/fixation

