

# Land Degradation/Restoration

## Brief overview

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## • A growing global problem

- Land degradation is a **major problem on every continent** except Antarctica.
- The Food and Agriculture Organization of the United Nations (FAO) estimates the economic impact of land degradation at **more than \$40 billion annually**.
- Among the UN's 17 **Sustainable Development Goals** (SDGs) are specific goals to halt and reverse land degradation (SDG 15.3), and decouple economic growth from environmental degradation (SDG 8.4). In addition to these specific goals, achieving many other SDGs will require addressing land degradation.
- In 2015, the Conference of the Parties to the UNCCD endorsed its land degradation neutrality target setting process. Since then, more than **100 countries have signed up to participate in this voluntary process to achieve land degradation neutrality by 2030**. Credible scientific evidence about the status of land degradation and available restoration measures has therefore never been more important.
- The **Bonn Challenge** launched a global effort in 2011 to restore 150 million hectares of deforested and degraded land by 2020. The IPBES Land Degradation and Restoration **assessment is a vital step toward meeting the Bonn Challenge**, with a comprehensive assessment of the extent, causes and processes of land degradation and their consequences for biodiversity and people. The assessment also evaluates responses to the restoration and rehabilitation of degraded land, options for the avoidance of future degradation and the benefits that this will deliver to people.

# Land degradation

Refers to any reduction or loss in the biological or economic productive capacity of the land resource base.

Land degradation and desertification are associated with climate variability and human influences.

Examples include extended droughts, increased temperature, soil erosion, and human activities such as unsustainable agricultural practices, overgrazing and deforestation.

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**DEGRADED ECOSYSTEM**

**RECOVERED ECOSYSTEM**

# Effects of Land Degradation

- Land degradation harms ecosystems and communities by reducing their capacity to ensure food and water security, generate livable incomes and cope with the impact of climate change.
- The most visible impact of land degradation is reduced land productivity and destruction of properties.
- Effects also include increased vulnerability to droughts and water scarcity, extreme weather events such as flash floods and heat waves, greater desertification and reduced resilience.
- Desertification
- refers to land degradation in arid, semi-arid and dry subhumid areas

# Impacts of Land Degradation

Land degradation is a significant barrier to sustainable development and contributes to:

- climate change
- biodiversity loss
- poverty
- loss of adaptive capacity
- increased environmental risks
- food, water and energy insecurity
- human displacement through greater impacts from natural hazards such as droughts, flash-floods, heat-waves and dust storms.

# Cost of ecosystem loss



Flooding  
cost



Livelihood  
loss



Water  
pollution  
cost



Cost of ecosystem loss 2-5% of GDP per year (*Science*, 2002)  
(2-3 Trillion\$ damage-costs, replacement & restoration costs, etc.)



Air  
pollution  
cost

Crop  
loss



Erosion  
cost

+ 1-2 trillion US\$ Perverse Subsidies ..

# Ecosystem Services

Biol. control

Recreation

Regulating

Habitat/Support

C-seq

Pollination

Air quality

Cultural

Timber

Inspiration

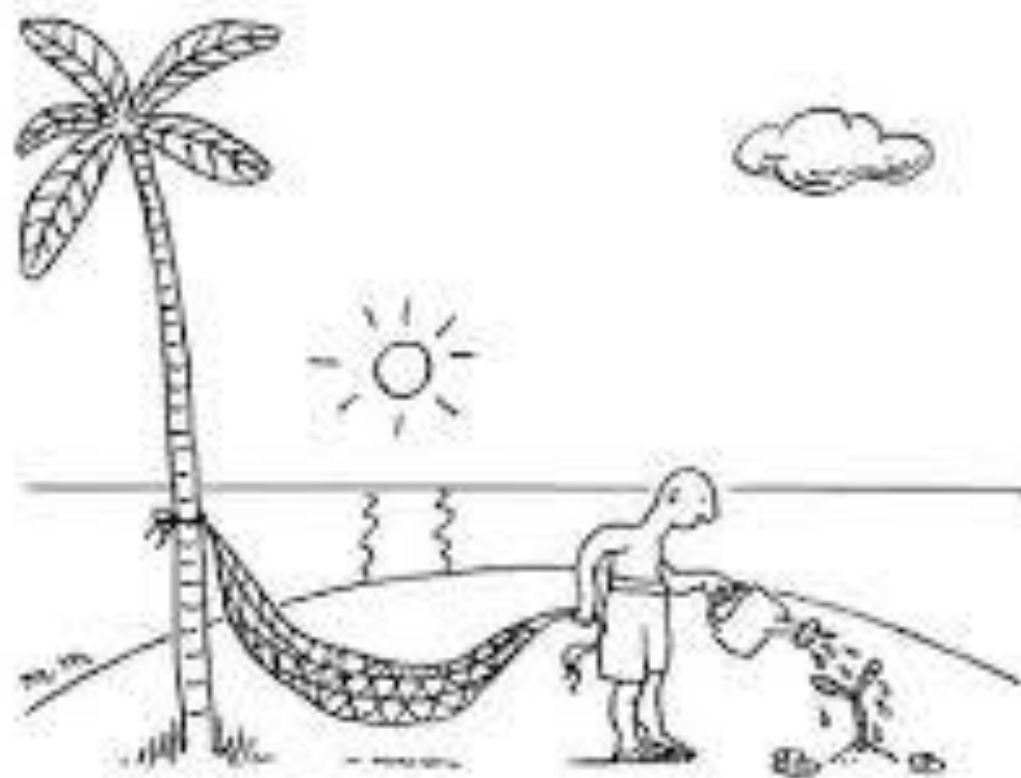
Provisioning

Water

Medicins & models

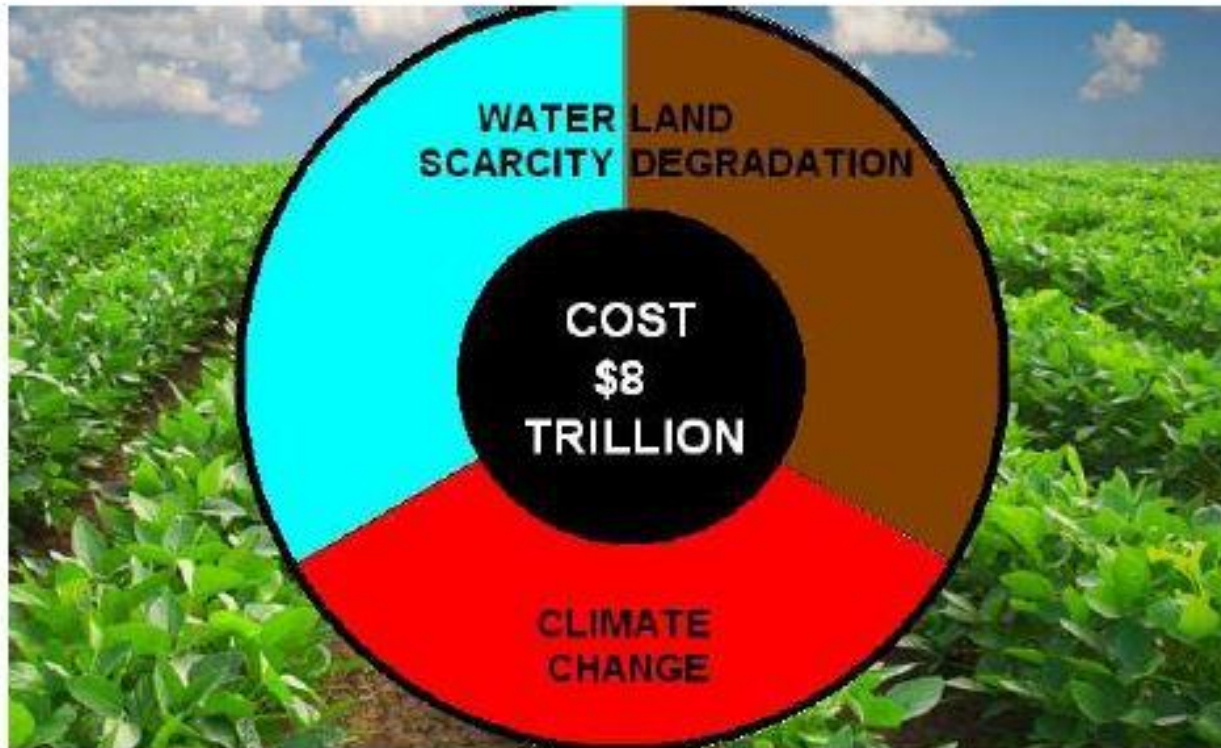
Food







## Cost of Degradation (i.e. do nothing) 2013 -estimate



300 billion is 10% of  
**COST of do-nothing!**  
(i.e if land degradation is 1/3 of total cost)

Global GDP 2017: 78 Trillion US\$  
-> degradation costs 10% of GDP

<http://www.thegreenmarketoracle.com/2013/09/agricultural-costs-of-climate-change.html>

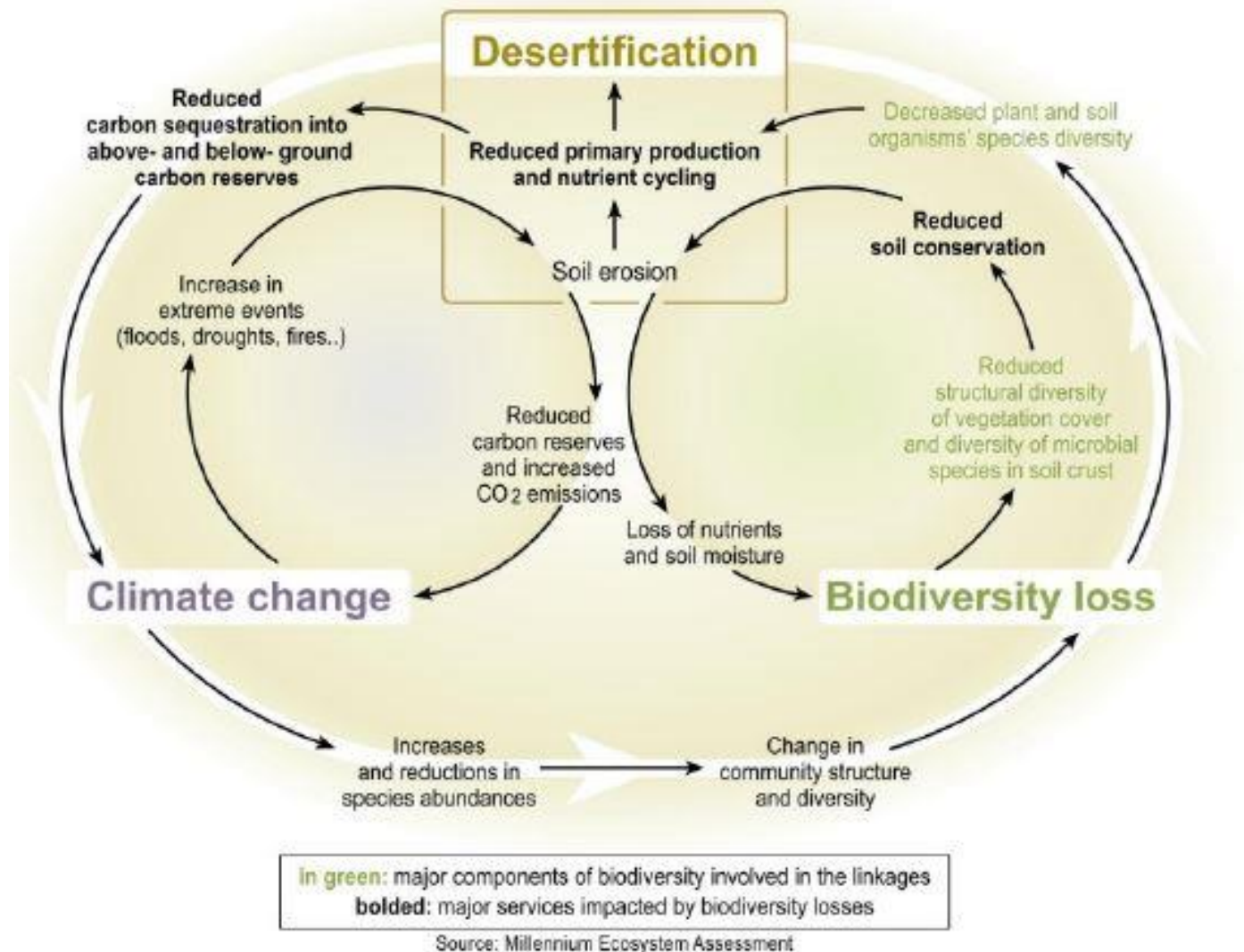


Figure 1: Feedback loop between land degradation, biodiversity loss and climate change

# Land Degradation in the Arab World

**The Arab region is highly susceptible to land degradation**, which is exacerbated by the growing scarcity of **water Resources** and high levels of aridity.

The long coastal stretches are threatened due to the combined effect of falling water tables and rising sea levels.

Climate change is increasing the intensity and frequency of **extreme weather events**, and the region is more likely to be affected by rising temperatures than others.

According to predictions, the Arab region will experience growing variability in precipitation and more **extreme weather events**, such as droughts

## Main causes of Land degradation in the Middle East

- increased cultivation of marginal lands
- poor management of rangelands
- Overexploitation has also caused high to extreme levels of soil erosion in about 35 per cent of the Middle East area.
- Over 130 million hectares of rangeland have degenerated.

### **High risk areas include :**

- the mountains in Lebanon and Yemen
- coastal plains susceptible to seawater intrusion such as in Gaza or the Nile Delta
- desert encroachment in the Sudan and the Arabian Peninsula, and salinization in the Jordan Valley.

# Degraded?



# Constraints for Land Restoration in Dry Mediterranean conditions

## CLIMATE

- Predictable Summer Drought
- Less predictable out of season droughts

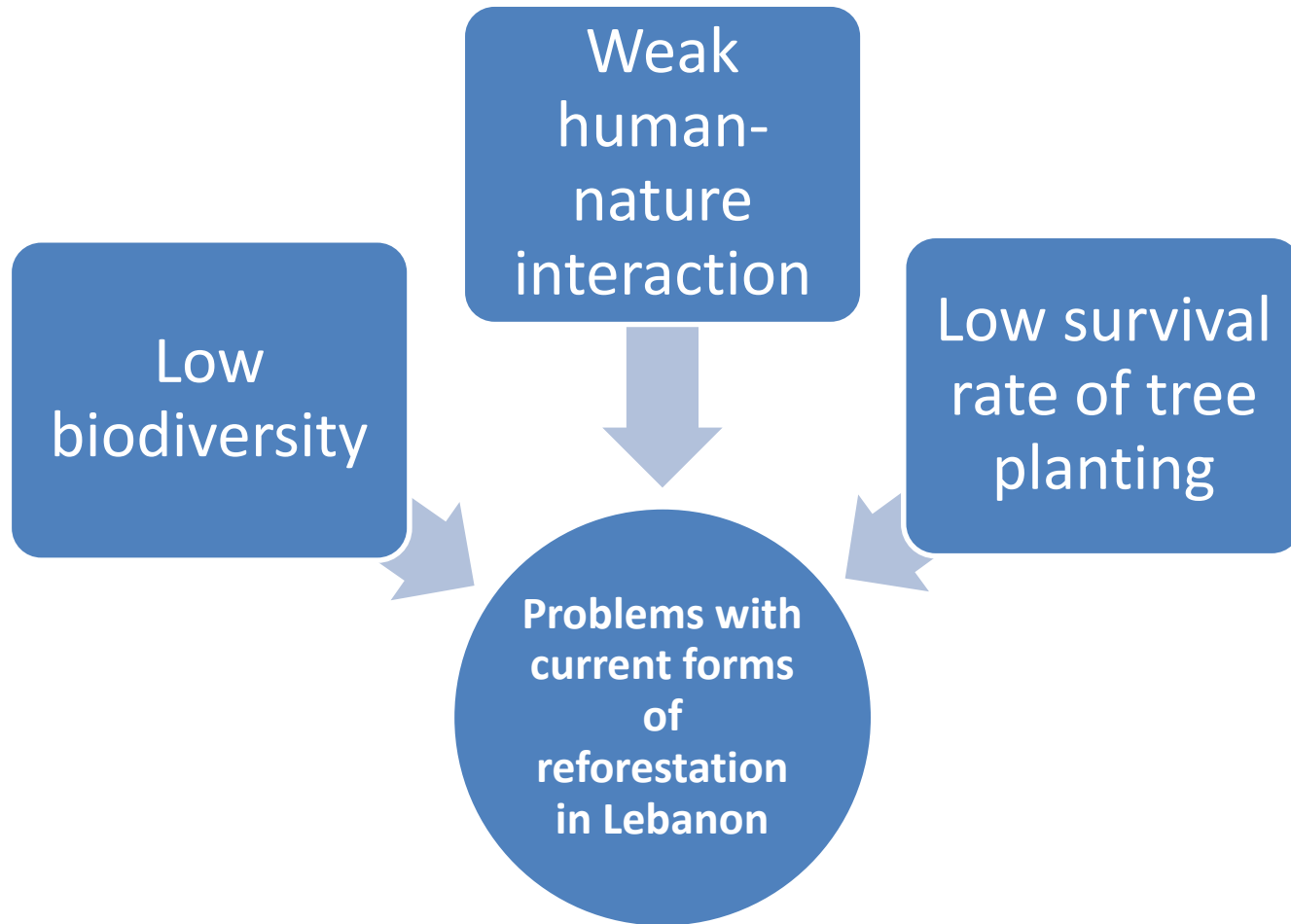
## SOIL

- Shallow/ Stony/discontinuous
- Poor structure, prone to surface crusting
- Poor Biological Fertility SOM
- Low Nutrient Content

## DISTURBANCE REGIME

- FIRE
- Grazing
- Extreme Climate

# The case of Lebanon



*According to the [Ministry of Environment](#), 74% of Lebanon was previously covered with forests, in 2010 this number changed to a mere 23% with 30% of forests made up of Oak and Pine trees.*

# Downfalls of tree planting

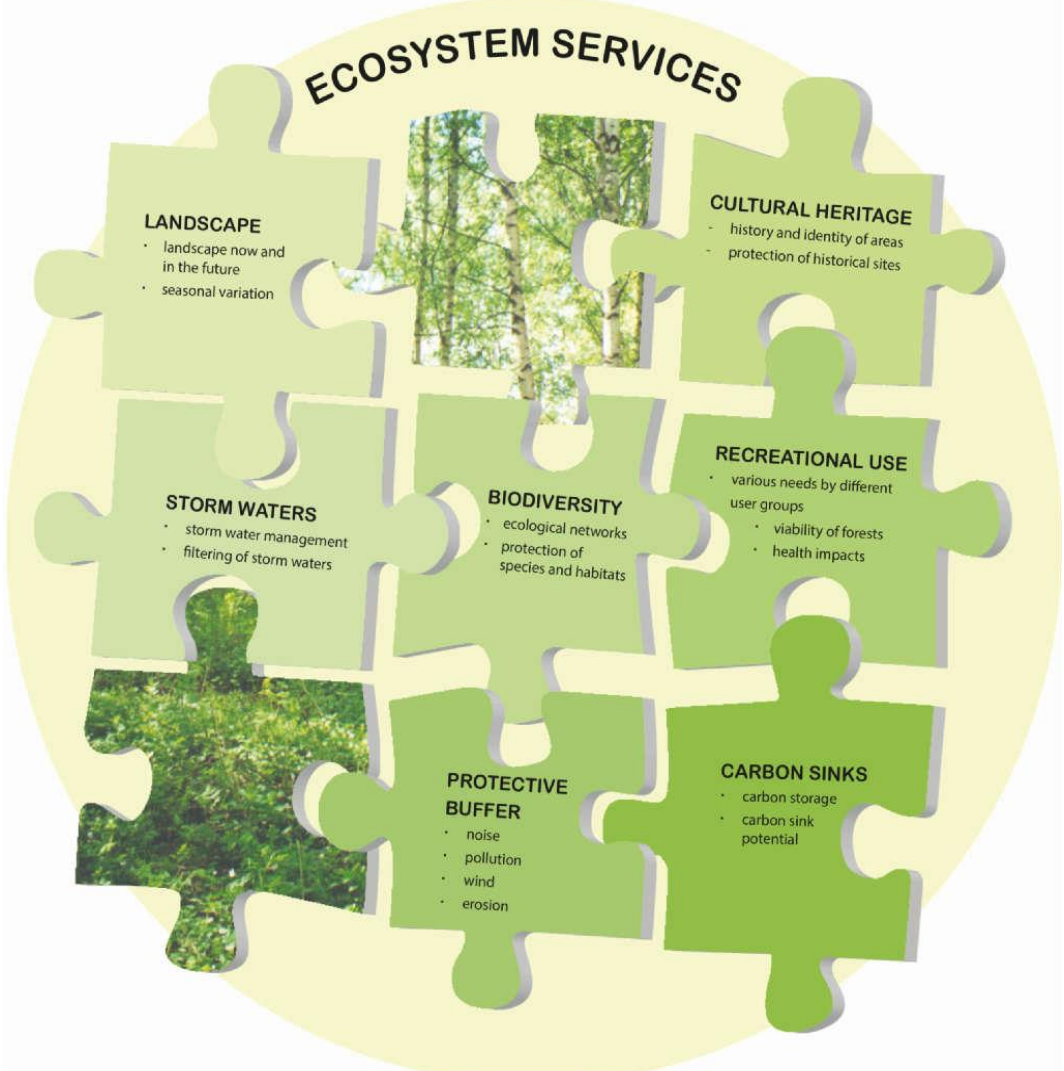
<p style="text-align: center;"><b>COSTLY</b></p> <ul style="list-style-type: none"><li>• Nurseries are expensive to build and maintain</li></ul>	<p style="text-align: center;"><b>HIGH MAINTENANCE</b></p> <ul style="list-style-type: none"><li>• Seedling need irrigation</li><li>• Tree planting requires technical know-how skills</li><li>• Land needs prior preparation</li></ul>
<p style="text-align: center;"><b>LABOR INTENSIVE</b></p> <ul style="list-style-type: none"><li>• Seedlings need to be transported to site</li></ul>	<p style="text-align: center;"><b>LOW SURVIVAL RATE</b></p> <ul style="list-style-type: none"><li>• Survival rate is low because roots of the tree do not penetrate deeply into the soil and land conditions in Lebanon are prominently rocky</li></ul>



# Advantages of a biodiversity rich forest

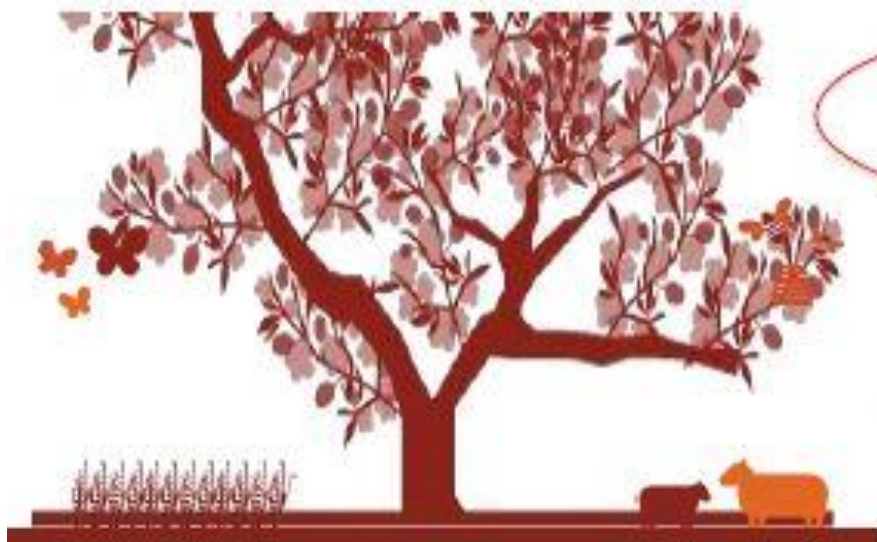
- Richer for ecology
- More resilient to climate change
- Less susceptible to fire hazards (vs. only a pine forest)
- Helps conserve natural heritage of native species

# environmental, economic and social **positive changes**



## Transforming the landscape

### The Almendrehesa, an integrated farming system



Together with local producers we have developed the *almendrehesa* concept: an innovative economic alternative to the current degrading agricultural practices.

The *almendrehesa* is an integrated production system: a combination of almond and local trees, with aromatic oil crops, active bee hiving and lamb farming, processed jointly and marketed locally.

The combination of **diversification** and increased productivity leads to improved farmer income as well as increased land value, while reducing the risks of the previous ranching practices. This productive ecosystem decreases erosion, restores the water balance, enhances biodiversity and beautifies the landscape. Altogether the system contributes to the growth of the local economy while promoting local pride and inspiration.

In 2016 we aim to help establish 5 *almendrehesa* projects on the demo farms.

# Poor/Rich Biodiversity

## Mediterranean hills



Homogeneous pinewood,  
high risk of fire



Resilient system with oaks,  
pines and sabinas

## Agroforestry systems



Almond groves under  
intensive cropping



Almond groves with vegetal  
cover

## PRIVATE FORESTS PUBLIC BENEFITS



## URBAN & COMMUNITY FORESTRY PROGRAM

This program helps almost 8,000 communities manage and benefit from community trees by delivering information, tools and financial resources.

**140** MILLION ACRES  
of urban and community forest lands in  
the United States.



**200** MILLION

Number of Americans living in rural and urban  
communities served by the UCF Program.



## URBAN TREES Improve:

- 1 HUMAN HEALTH**  
By reducing health issues and promoting an active lifestyle. Estimated dollar value of the health benefits of pollution removed by trees is \$8.8 billion.



- 2 ECONOMIC DEVELOPMENT**  
By creating jobs. Urban forestry professionals have an annual economic impact of \$147.8 billion.



- 3 WATER QUALITY + QUANTITY**  
By filtering pollutants and slowing storm water. The urban tree canopy can retain 20-90% of the annual rainfall under their canopy, depending on the climate.

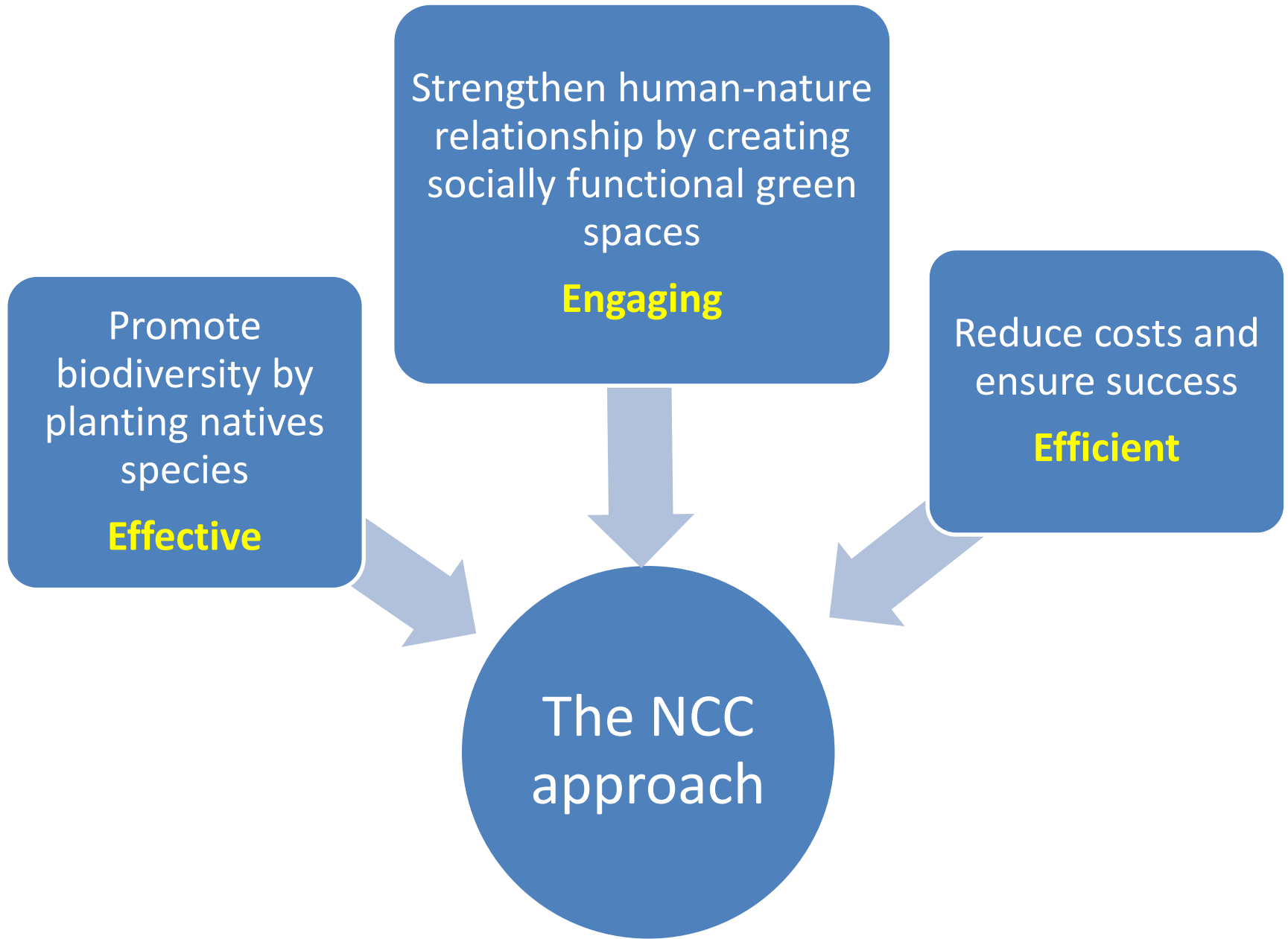


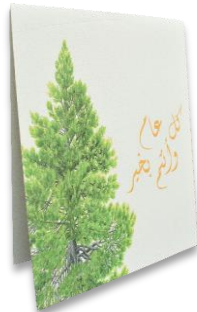
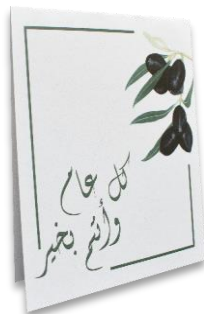
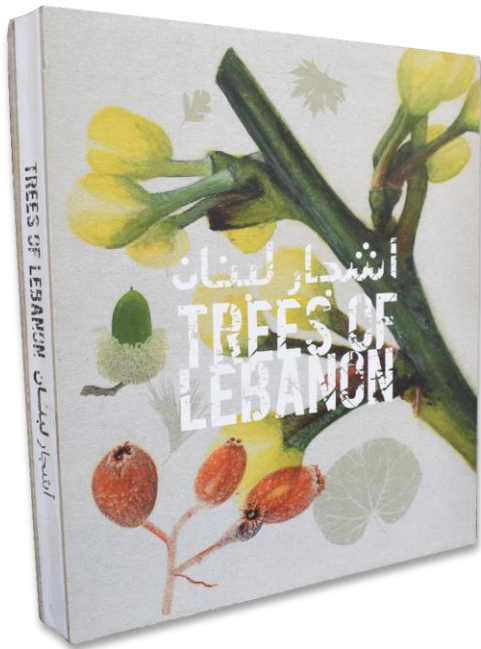
- 4 AIR QUALITY**  
By removing air pollutants and cooling air temperature. Urban trees remove an estimated 651,000 metric tons of pollution per year or the equivalent carbon dioxide emissions from 138,500 cars.



# Break down of Restoration

Categories	Ecological Impact
A/Reforestation	Accelerates natural regeneration
Nature care	Protects environment
Eco-citizen	Accelerates natural recovery
Cultural craftsmanship	Conserves nature-based cultural practices
Green activities	Promotes well-being through nature contact







# GRASS ROOTING



# ECOTECHNOLOGICAL TOOLS TO ENHANCE REVEGETATION OF DRYLANDS

- Reducing predation
  - Improving microsites and resource availability.
  - Improving the ability of planted seedlings to withstand stressful Environmental conditions.
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- ORGANIC AMENDEMENTS
  - TREE SHELTERS
  - MYCORRHIZAE
  - HYDROGEL
  - WATER HARVESTING
  - SEEDLING HARDENING
  - MULCHING



**Thank you**