CAPACITY-BUILDING WORKSHOP FOR NORTH AFRICA AND THE MIDDLE EAST ON THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY (TEEB)
Beirut, 21–23 February 2012

Valuation of forest ecosystems services in Tunisia

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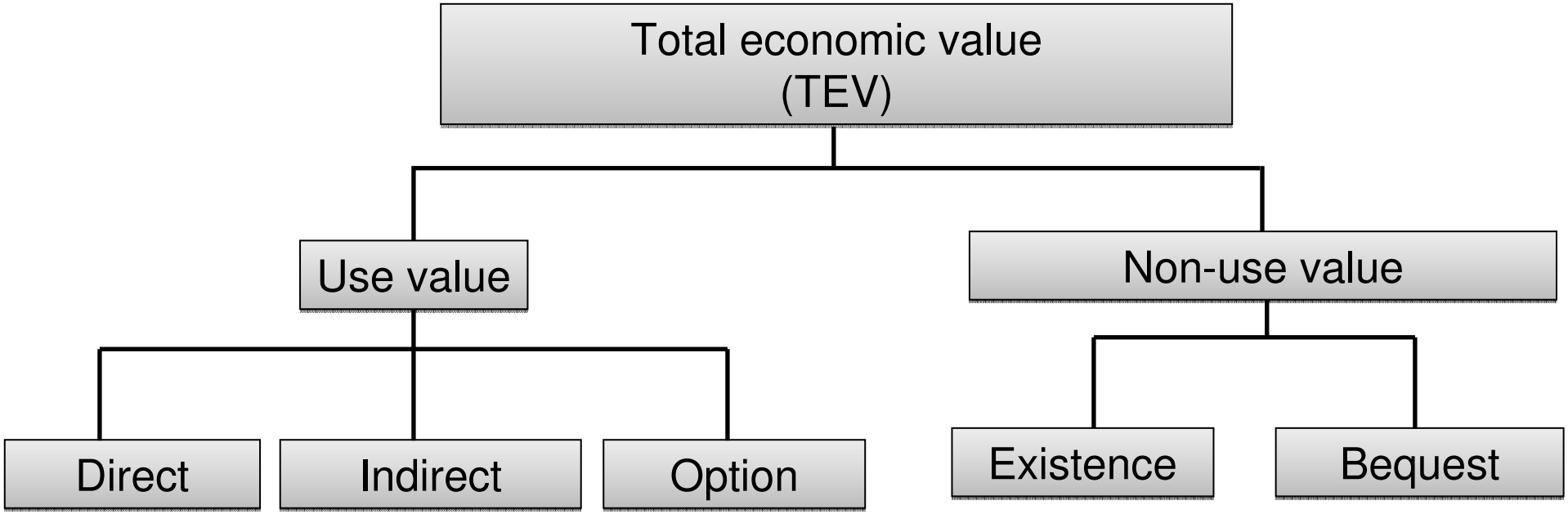
Contents

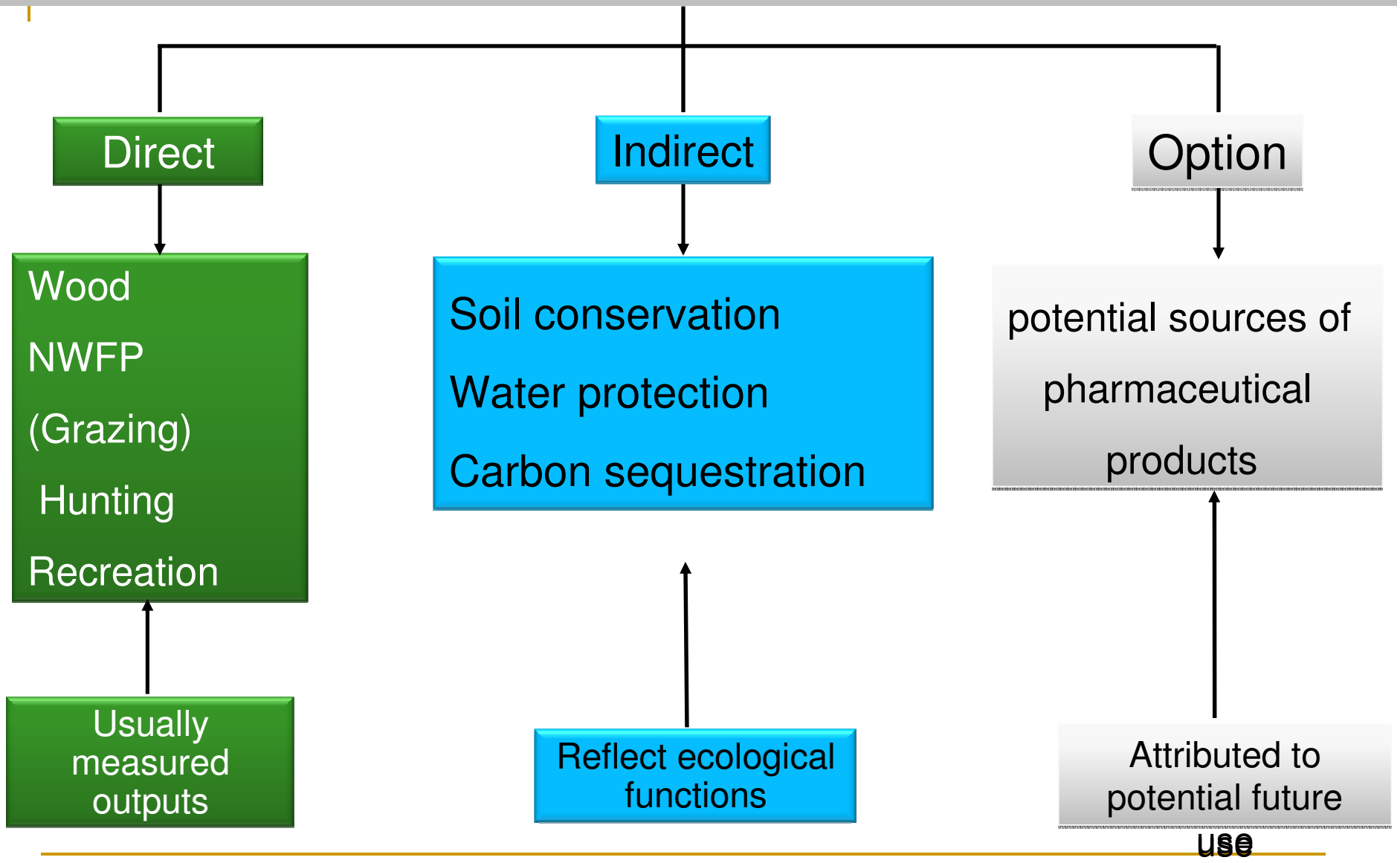
Objectives of monetary valuation

- Wide variety of products and services
- A need for compromises in order to maximize the social value
- Valuation of the economic performance from a point of view of sustainable development
- Economic analysis of investments
- Regulation of markets by the internalization of external costs and benefits.
- Evaluation of compensation, subsidy, etc… to assist the decision making process

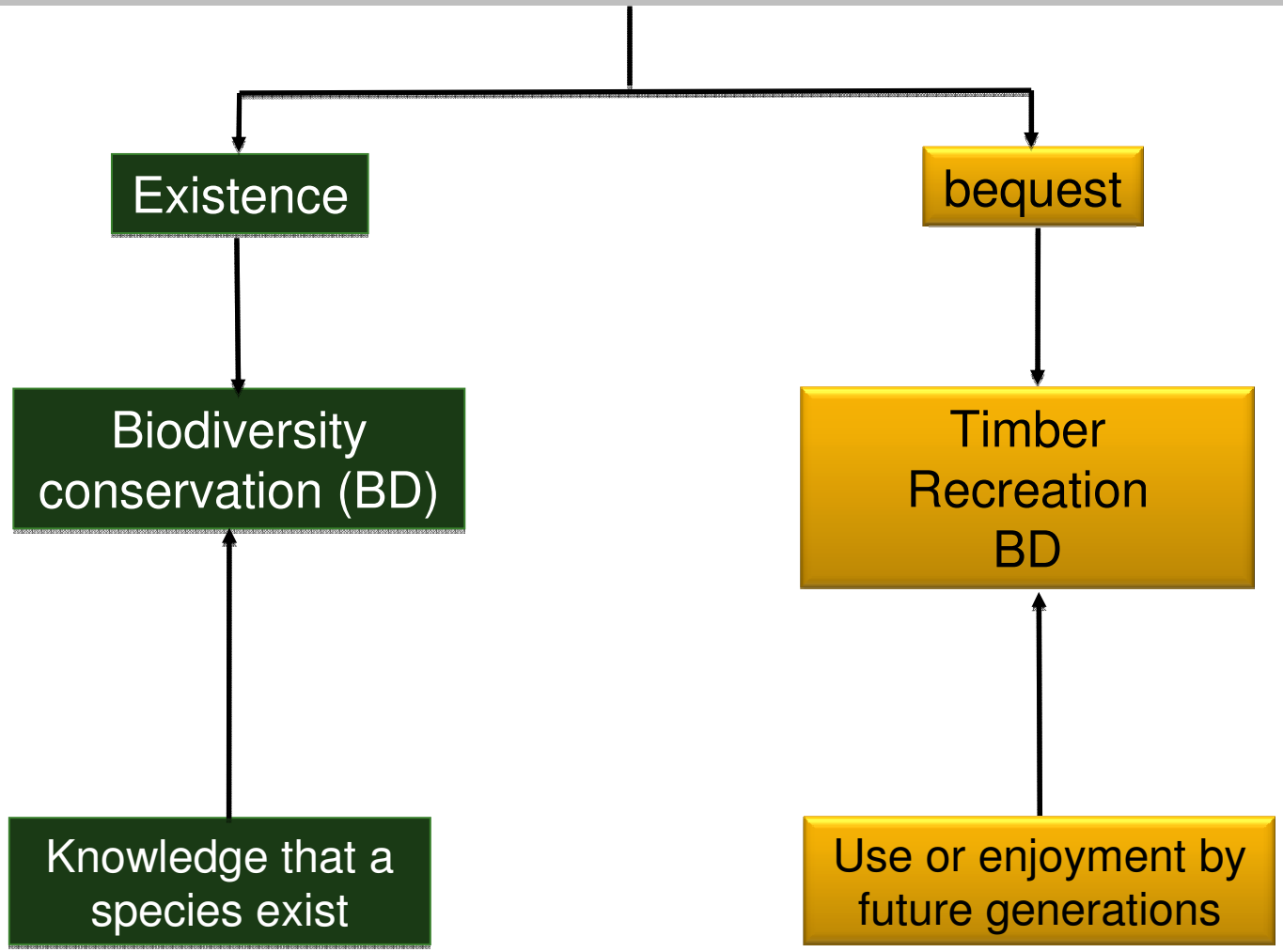
Categories of economic values



1. Use Values


Direct
Indirect
Option
Wood
NWFP
(Grazing)
Hunting
Recreation
Soil conservation
Water protection
Carbon sequestration
potential sources of pharmaceutical products
Usually measured outputs
Reflect ecological functions
Attributed to potential future use

2. Non-use values



+ Social costs

Damage due to forest fires	→	ALL TEV categories
Erosion due to mismanagement (overgrazing, overlogging, etc)	→	Indirect use value
Floods, landslides, etc due to poor or no forest management	→	Indirect use value
Loss of biodiversity caused by forest plantations	→	Non-use value

5772 ha cork oak (35.2%)

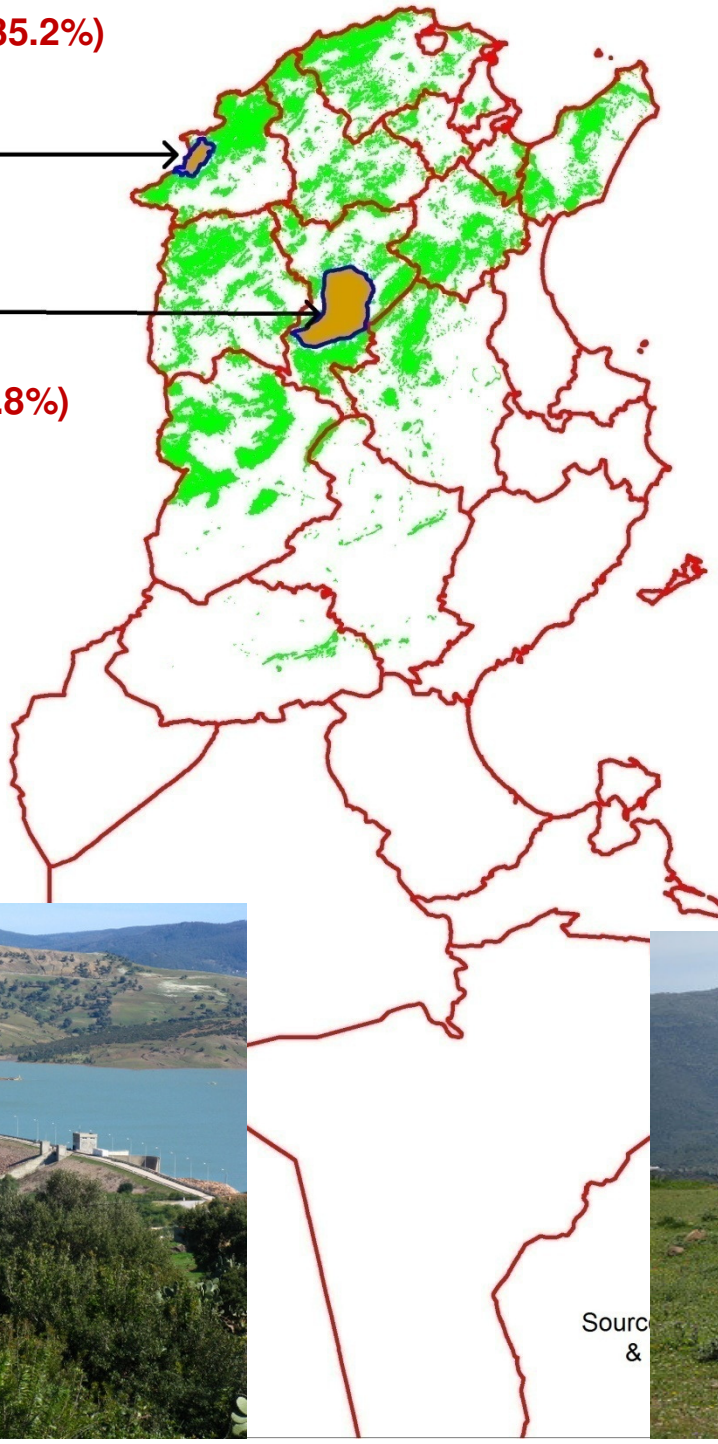
800 – 1000 mm

Bassin Versant de Barbra

Bassin Versant de Siliana

23490 ha Aleppo pine (25.8%)

400 mm



1.2 M ha of forests (7.2%)

2. Data collection

Identification of products, services and externalities of forests

- Exhaustive list of forest products and services

Forest valuation

- Physical and monetary terms among different valuation methods
- Annual flow of values at national level
- Use of most recent data available (2010)

Availability of data

- Official statistics
- Documented studies and research reports

3. Valuation methods

- **Market price** : commercial products.

- **Methods based on people's behavior** : reaction to environmental change.

  - **Revealed preference techniques :** consumers behavior measured by market : changes in production (productivity and damage cost avoided), travel cost method, hedonic price method.

  - **Stated preference techniques :** Contingent valuation method (CVM) through conduction of surveys

- **Cost-based methods : Replacement costs, defensive expenditures, opportunity cost of labor**

Direct use values

1. Wood products : timber, fuel wood

2. Non wood products : cork, honey, pine cones, acorns, carobs, AMP, mushrooms, snails

3. Grazing

4. Hunting

5. Recreation

Wood products

- Quantities sold in the market

➢ **Market price**

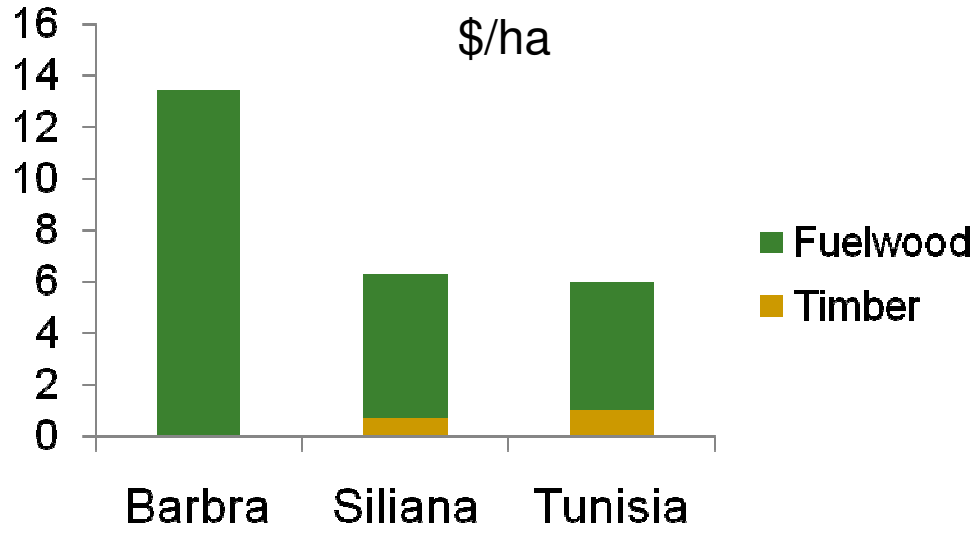
Quantity harvested * stumpage price

(Roadside price – harvesting cost)

➢ **Substitution price**

- **Local price of fuelwood**
- Quantities collected at no charge, legally (usage rights) or illegally

Quantity * price in similar goods markets



- Wood value is low in Tunisia ($ 6/ ha) and other Mediterranean countries
- Fuelwood production :

  - Value higher than timber: 83% of total
  - important volume of fuelwood Freely gathered : (90%)

Non-Wood products

1. Sold quantities in the market when the price is known
2. Sold quantities in the market when the price is unknown
3. Unsold quantities = self-consumed

1. Sold quantities with known price → ➢**Market price**

Quantity x Producer price (in the forest)

Ex. : Cork, aromatic plants

Cases 2 and 3: price unknown or inexistent

➢ Comparison of the associated benefits and costs

– Estimate the value of gathering NWFP

- Production
- Time needed for harvesting
- Wage of labor required

} **Labor costs (LC)**

➢ Cost of other raw material = Intermediate consumption (IC)

➢ Net benefit = Total output – LC- IC - Taxes

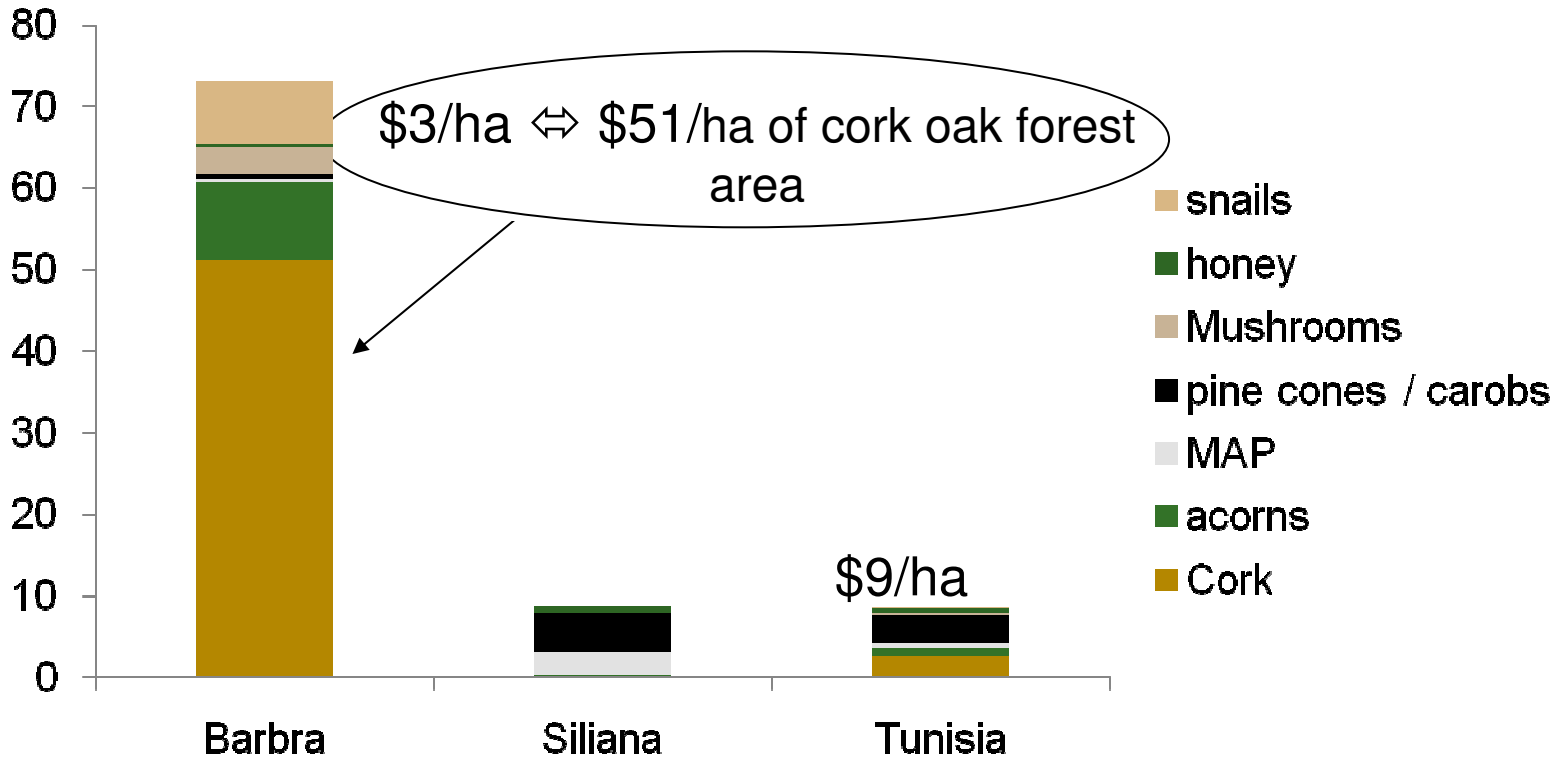
Ex. : Snails

= $(87636kg*4.2) - $(87636*2.1) = $184,037

Revenue — Labor costs (LC) — Net Benefit

➢ Pricing Substitute Goods

Exple : acorns



- NWFP are much important than wood products

- Cork is the most valuable and marketable NWFP.

- Data not always available, depending on research studies.

Grazing

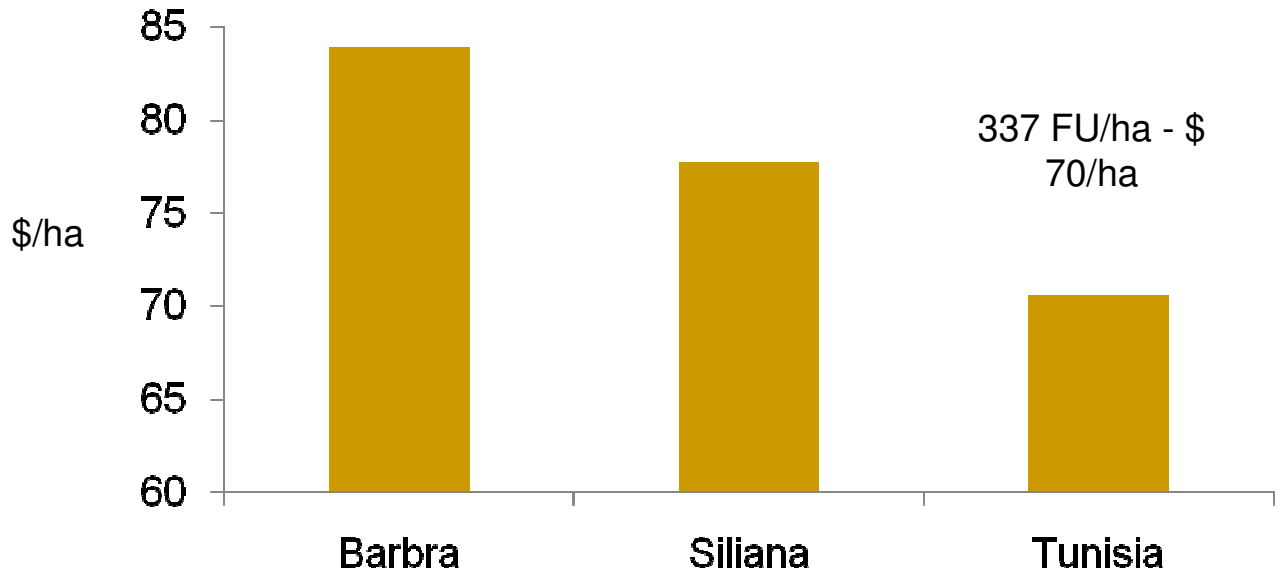
- Grazing is usually free or against symbolic price

➢ **Substitute goods pricing**

1. Quantity of grazing resources consumed is converted into forage units (FU)

2. Nutritive content : 1 FU ˜ 1 kg of barley grain

3. Shadow price : $ 0.2/kg of barley (2010)



Grazing value is high in North Africa ($28-76/ha in 2001)

Overgrazing = > declining forage productivity, soil erosion

Grazing in planted areas = > Damage costs

Trade-off between grazing use value and forest conservation

1. Contingent valuation

- Create an hypothetical market for an environmental service (recreation, hunting, biodiversity conservation …)

- Based on surveys

  - How much are you willing to pay for this service ?
  - How much are you willing to accept losing it ?

- WTP : $6/ visit for the Ichkeul park (the most visited with 58000 visits in 2010) - *source : Ferchiou, 2011*

2. Choice experiment method (CEM)

- Directly ask people about their preferences
- It values several changes at the same time (recreation, erosion, carbon sequestration, biodiversity, etc.)

- $ 4.5 /visit in 2009 to a new forest for recreational activities – source : Daly et al., 2010.
- 115000 visits to national parks in 2010

→ $554,000 or 7.8/ha of recreational area or $0.5/ha

- Low value compared to North Med. countries : 95 Euros /ha in 2001 for national parks in Spain

➢Price of game

- Permits and license fees are applied, but cannot indicate the real economic value
- Game value = $494,000 or $0.4/ha in Tunisia, a low value in average
- Higher value in the North : $2.3/ha in Barbra, $1.5/ha in Siliana
- This value can be very high in hunting reserves (numerous hunters in a small area)

Indirect use values

1. Watershed protection

2. Carbon sequestration

Watershed protection

- Changes in production
- Establish a cause-effect relationship
- Estimate the induced change in erosion and sedimentation
- Use opportunity cost of water to value the cost avoided

➢ Productivity approach

➢ Forest exists	:	A
➢ Forest doesn't exist	:	B
➢ Difference	:	A-B

Water loss avoided for Barbra watershed :

- 5 m^3 of sediments/ha and year (forest)
- 30 m^3 of sediments/ha (plantation of ravine banks)
- 1% of crop production (plantation of ravine banks)

$5.4/ha

$9.5/ha

- Plantation of river banks generates a very high social value : $117 /ha, especially due to crop conservation (71%)
- Watershed protection is the most important forest benefit ($ 16.5/ha for Siliana W. and $11/ha in general), after grazing !

Carbon sequestration

- Annual increment – annual felling - natural losses

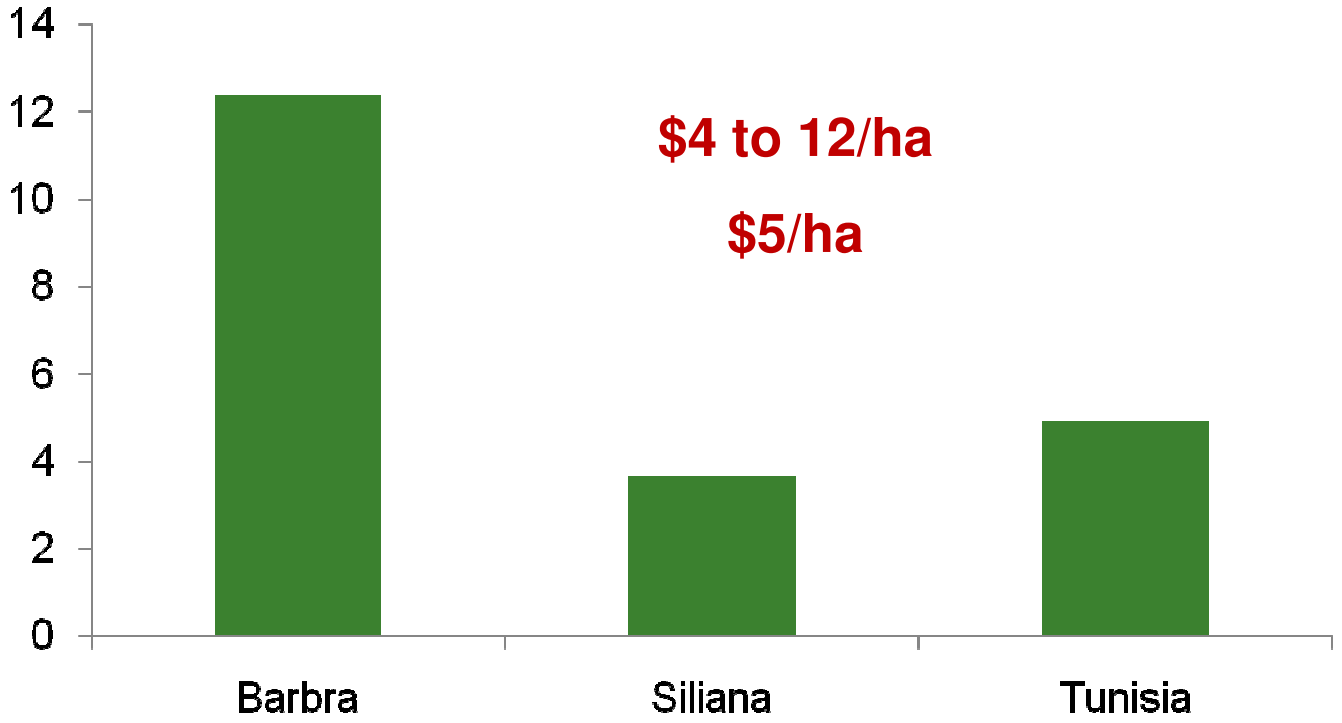
  Data about forest biomass (DGF)

- Conversion factors for transforming the volume into carbon **(FAO, IPCC, UNFCCC)**

- Because of fuelwood harvesting, we suppose that carbon sequestration is nil for shrubs

- **Value of carbon stored : estimate the benefits of reducing carbon emissions**

  - Carbon market : $15/tC (Carbon Finance)



Small value of carbon sequestration due to low increment and high volume of fuelwood collected

Biodiversity conservation

➢ Choice experiment modeling

-value : $6.8/person in 2010 for an increase of biodiversity by 1%. Difficult to extrapolate

➢ Cost-based methods

- Public expenses for conservation : $9/ha for forests, much higher in parks and reserves
- The average value ($9/ha) is higher than that for wood products ($6/ha)

Social costs

Forest fire

➢ **Cost-based methods** = > Effective cost

- Value of losses (VL) : Wood, NWFP, etc… for 30 years

VL = average value of losses x Surface of burnt area

- Barbra : $2626/ha x 2.6 ha = $ 6.826 ($1.2/ha)
- Siliana : $ 2029/ha x 14.7 ha = $ 29.832 ($1.3/ha)
- Tunisia : $ 2029/ha x 711 ha = $ 1.443 M ($1.2/ha)

Illegal acts

- Clearing (412 ha), ploughing, forest fires, cutting, grazing, poaching, products transport

➢ **Cost-based methods**

Damage cost related to clearing : $836.000 or $ 0.7/ha
Imprecision due to the lack of information about impacts

- Value of fees paid for illegal acts is much lower : $ 91.539
- Fixed fees are not well targeted : some illegal acts cause important damage, no damage for others
- Many illegal acts go unreported

Damage due to wildlife

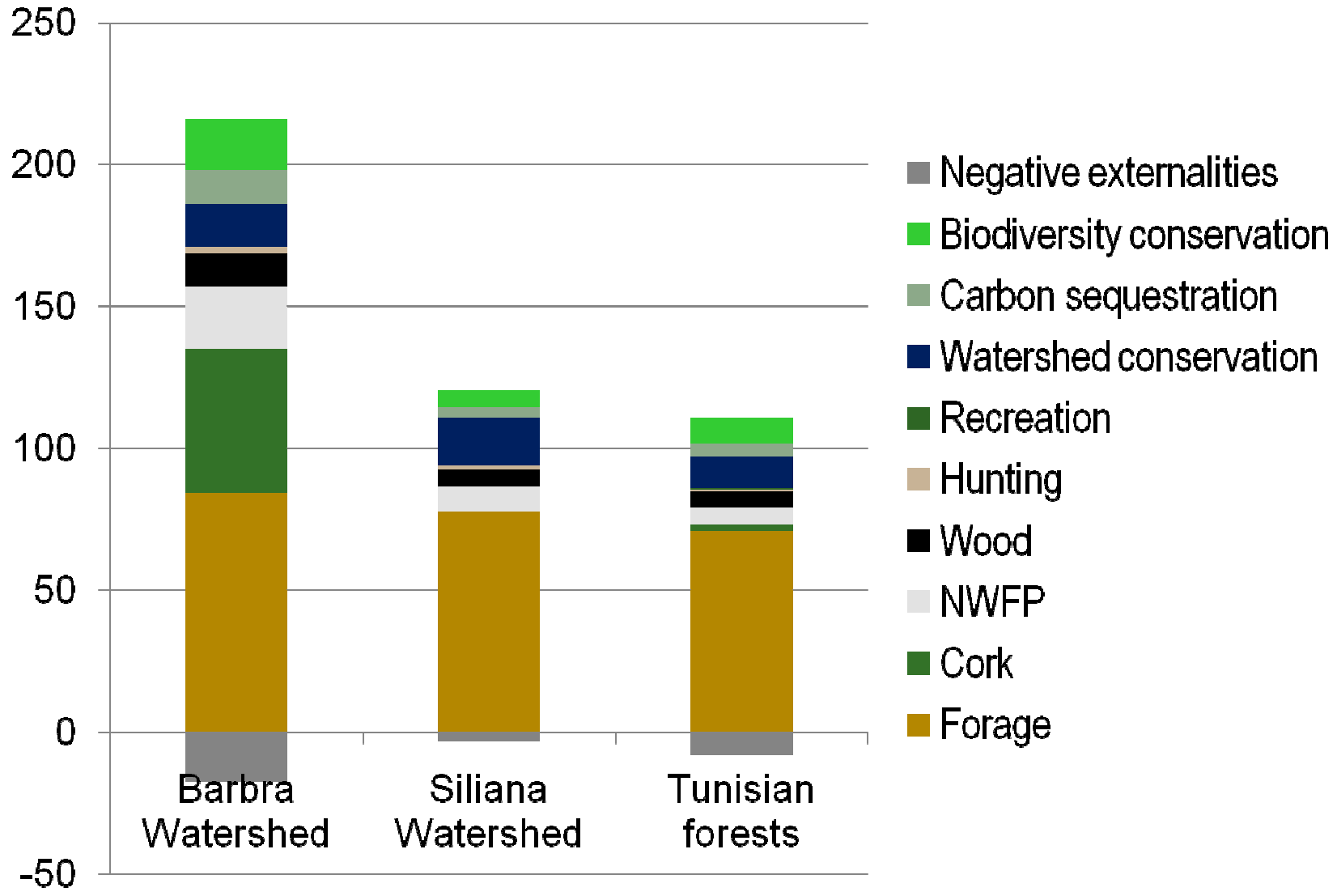
- Wild boar causes damages to neighboring croplands

➢ Replacement costs

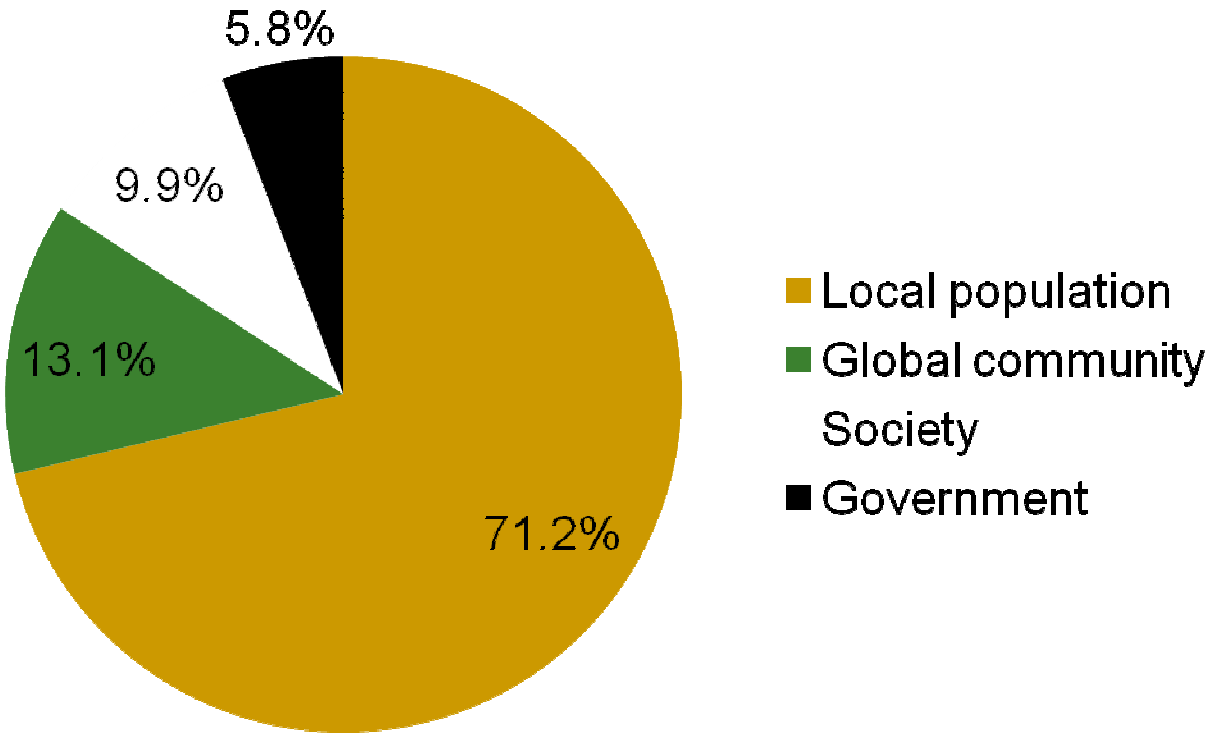
Cost of fencing of family properties :

- Barbra watershed : $ 16.1/ha
- Siliana watershed : $ 2.2/ha
- Tunisian forests : $ 6.1/ha

Total economic value estimates ($/ha - 2010)



Distribution - Total economic value (2010)



Conclusion

- **Need to integrate Non market benefits (90%) into management strategies and planning**

- **Mix of policy tools is needed :**
  - **Participation in forest management decisions of local populations / territorial management**
  - **Economic instruments to enhance the production and conservation of public goods (PES, international mechanisms, etc.)**

Discussion

- **The traditional accounting system is not adapted to forest ecosystem valuation.**

- **Necessity for cumulative experience & research work in order to improve the reliability of forest values.**

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Thank you for your attention

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