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**Towards the total sustainable social income of the Stone
pine forest of Andalusia under a refined System of
Environmental-Economic Accounting**

Campos P1, Oviedo JL2, Álvarez A3, Mesa B4

1-Spanish National Research Council (CSIC)-Institute for Public Goods and Policies (IPP), Madrid, Spain; 2,3,4-Spanish National Research Council (CSIC)-Institute of Marine Sciences of Andalusia (ICMAN), Cádiz, Spain.

Challenge, objective and case study

- The **United Nations Statistics Commission's working group** on the *System of National Accounts* (SNA) recommends the **challenge** of reforming its “central framework.”
- The **objective** of this research is to compare the **total sustainable social income** from our refinement of the *System of Environmental-Economic Accounting* (rSEEA) with the **standard gross value added** from the System of National Accounts (SNA).
- The SNA and the rSEEA are applied in the **Stone pine forest of Andalusia**, which covers an area of **243,559 hectares**.

Physical yields and stocks of the Stone pine forest of Andalusia (2010)

Class	Unit (u)	Area (ha)	Quantity (q)	Quantity/ha
1. Timber				
<i>Stock</i>	<i>m³</i>	243,559	10,648,202	43.7
<i>Natural growth</i>	<i>m³</i>	243,559	553,265	2.3
<i>Extraction</i>	<i>m³</i>	243,559	171,998	0.7
2. Cork				
<i>Stock</i>	<i>t</i>	16,695	4,119	24.7 ^(*)
<i>Natural growth</i>	<i>t</i>	16,695	702	4.2 ^(*)
<i>Extraction</i>	<i>t</i>	16,695	58	0.3 ^(*)
3. Firewood				
<i>Stock</i>	<i>m³</i>	60,059	618,239	10.3
<i>Natural growth</i>	<i>m³</i>	60,059	34,264	0.6
<i>Extraction</i>	<i>m³</i>	60,059	52	0.0
4. Pine cones	kg	243,559	24,980,459	102.6
<i>Landowner harvest</i>	<i>kg</i>	243,559	6,376,620	26.2
<i>Free</i>	<i>kg</i>	243,559	18,603,840	76.4
5. Grazing	UF	243,559	39,631,588	162.7
6. Residential	m ²	243,559	30,549	12.5 ^(*)
7. Carbon				
<i>Sequestration</i>	<i>tCO₂</i>	243,559	2,295,432	9.4
<i>Emissions</i>	<i>tCO₂</i>	243,559	980,663	4.0
<i>Net sequestration</i>	<i>tCO₂</i>	243,559	1,314,769	5.4
8. Recreation	v	243,559	674,909	2.8 ^a
9. Mushrooms	kg	243,559	1,063,027	4.4
10. Biodiversity	n ^o	243,559	104	0.1 ^(*)
11. Water runoff	m ³	46,535	88,022,941.6	1,891.5
<i>Economic</i>	<i>m³</i>	46,535	84,079,797	1,806.8
<i>Free</i>	<i>m³</i>	46,535	3,943,145	84.7

Abbreviations: UF is forage unit (metabolic energy of a kg of barley); tCO₂ is tons of carbon dioxide; v is visit; n^o is number of threatened species.

(*) These indicators are per 100 hectares.

^aNumber of visits from people who declare that they would pay an amount equal to or greater than the price given by the median stated by visitors.

Ecosystem service under the refined System of Environmental-Economic Accounting in the Stone pine forest of Andalusia (2010: €/ha)

- The ecosystem service is defined as the **positive contribution** of a *biotic nature production factor* to the **exchange value** of a **total product** that is generated in the **Stone pine forest of Andalusia** in the current period.

The **ecosystem service** (ES) is measured as the **residual exchange value** of the *total product* (TP) that results from having preferentially paid for the manufactured *intermediate consumption* (IC), the *labor cost* (LC), the *manufactured gross operating surplus* (GOSm) and the *ecosystem disservice* (ED):

$$\mathbf{ES\ (375) = TP\ (604) - IC\ (141) - LC\ (260) - GOSm\ (-172) - ED\ (0)}$$

- The components of the **ecosystem service** can be *depletion* (EA_{wu}) plus *environmental gross operating income* (GOI_e):

$$\mathbf{ES\ (375) = EA_{wu}\ (14) + GOI_e\ (361)}$$

Stone pine forest ecosystem services omitted by the System of National Accounts (2010: €/ha)

Embedded in consumed final products of SNA without market prices:

**amenity (79),
recreation (17),
landscape (112) and
biodiversity (8).**

Embedded in consumed final products consumed with market prices that only depend on environmental production factors:

**mushrooms (11),
water (42) and
carbon (74).**

Environmental income measured by the rSEEA in the SPF (2010: €/ha)

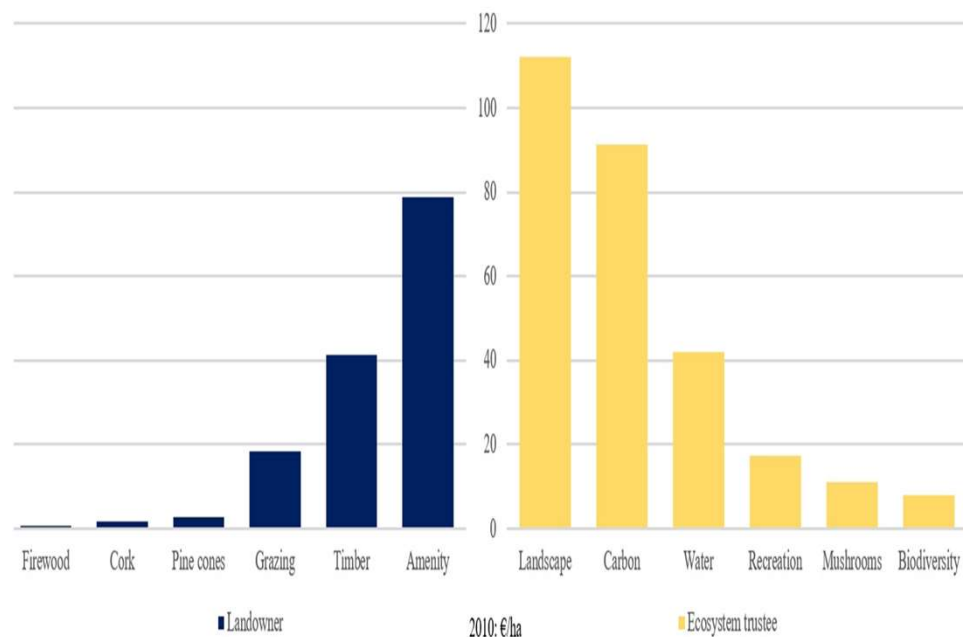
Environmental income
(EI = 425)

=

**Environmental gross
operating income**
(GOIe = 361)

+

**Revaluation of environmental
asset**
(EAr = 64)

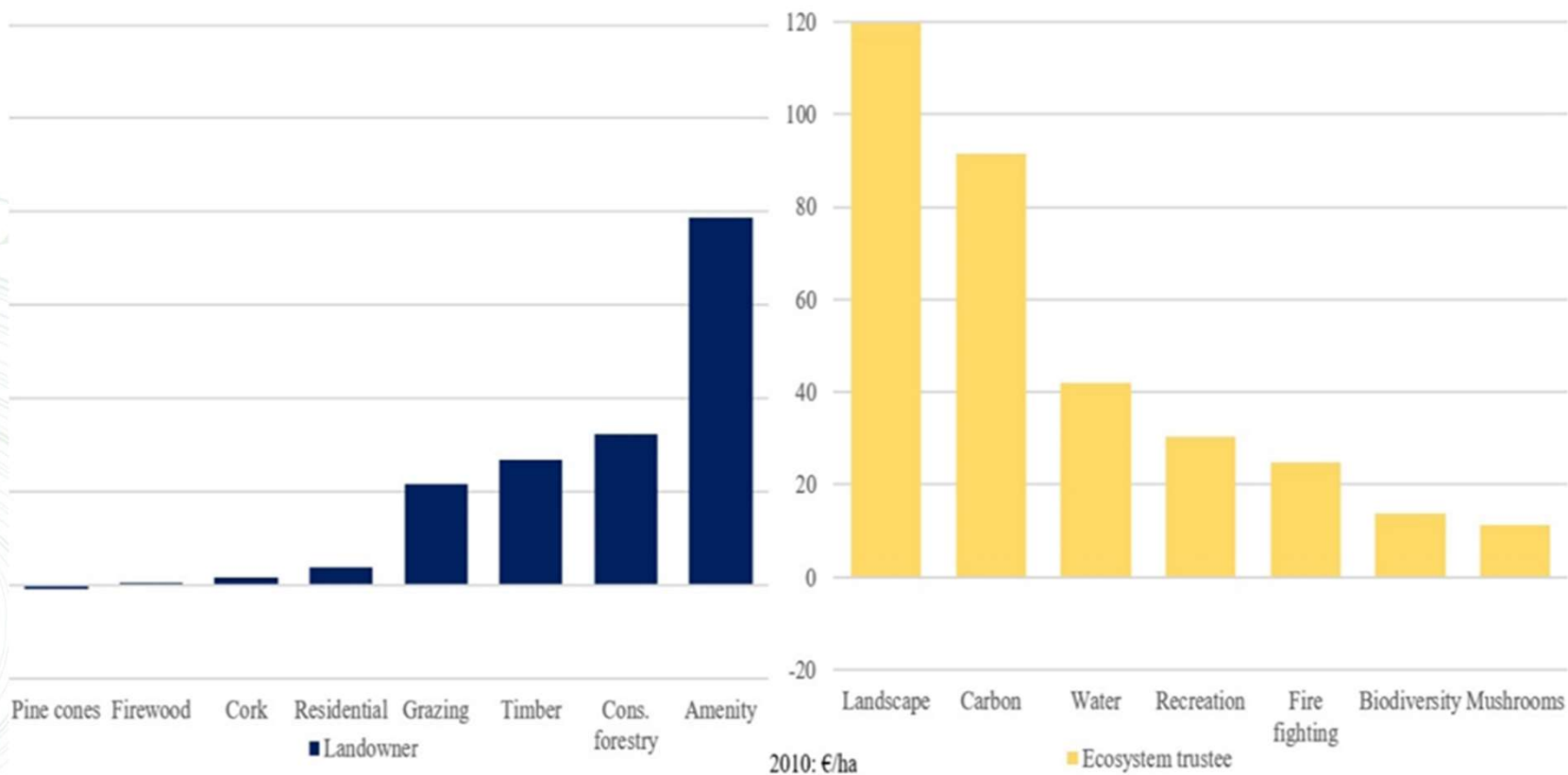


Total sustainable social income measured by the rSEEA in the SPF (2010: €/ha)

**Total sustainable social income ($TI_{rSEEA} = 498$) = Gross value added
of SNA ($GVA_{SNA} = 120$) + Ecosystem service omitted by SNA
($ES_{NON-SNA} = 343$) + Change in environmental asset ($CEA = 50$) +
Revaluation of manufactured fixed capital ($FC_{mr} = -15$)**

Total sustainable social income factorial distribution ($TI_{rSEEA} = 498$)
=
Labor cost ($LC = 260$) + Manufactured capital income ($CIm = -187$)
+ Environmental income ($EI = 425$)

Total sustainable social income of Stone pine forest of Andalusia measured by the rSEEA attributed to landowner and government ecosystem trustee



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