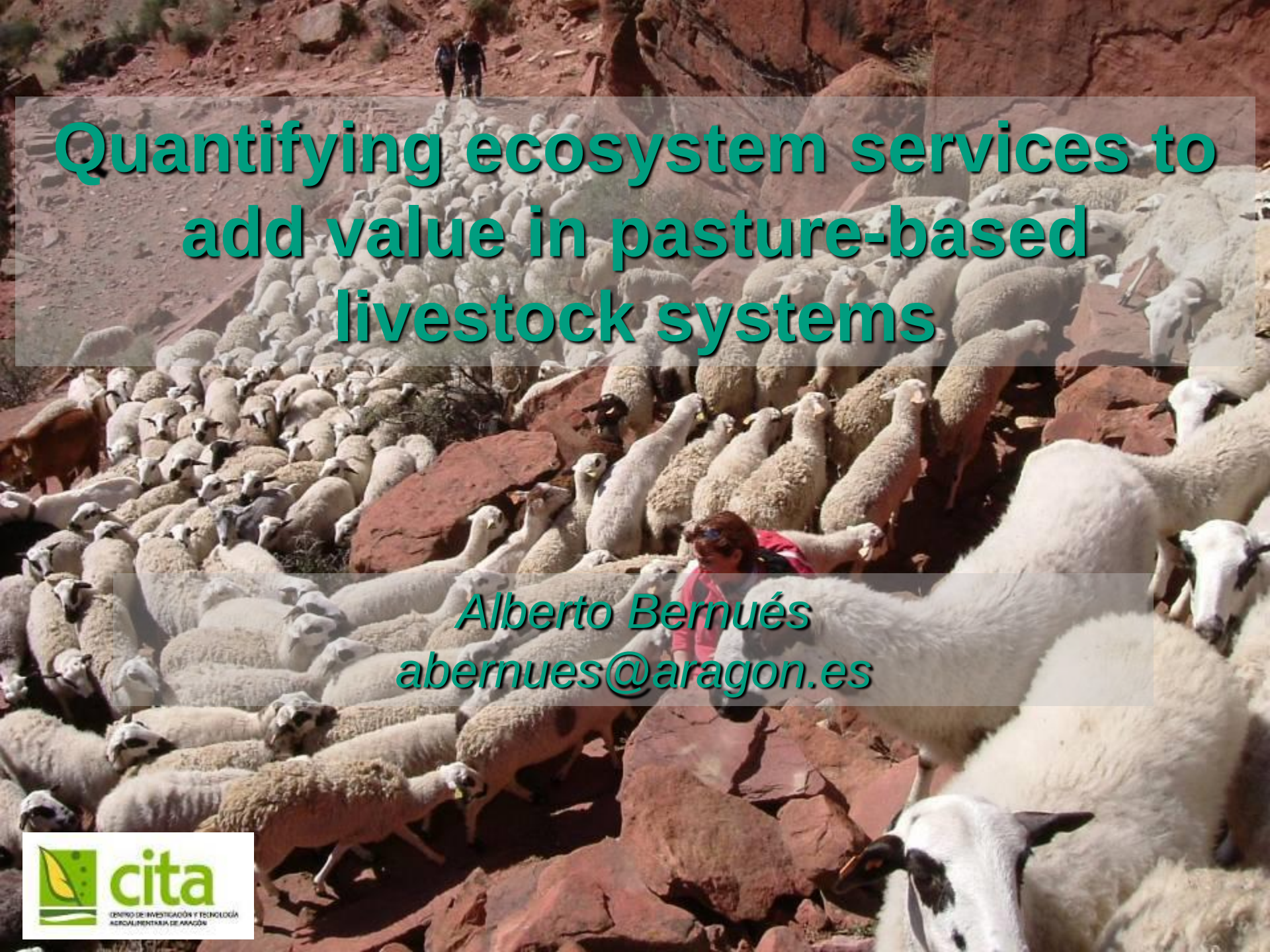

Quantifying ecosystem services to add value in pasture-based livestock systems

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Outline

1. Introduction: ES, farming systems and local breeds
2. How to value ES
3. Adding value to local breeds
4. Wrap-up

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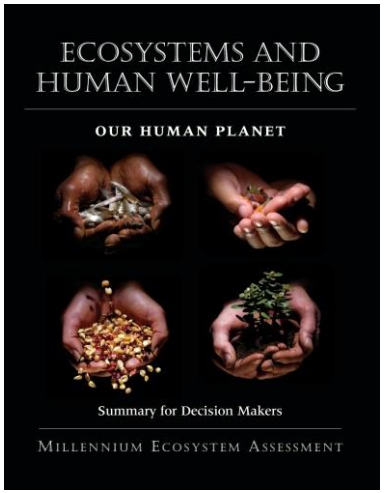
1. Introduction: ES, farming systems and local breeds

Ecosystem services



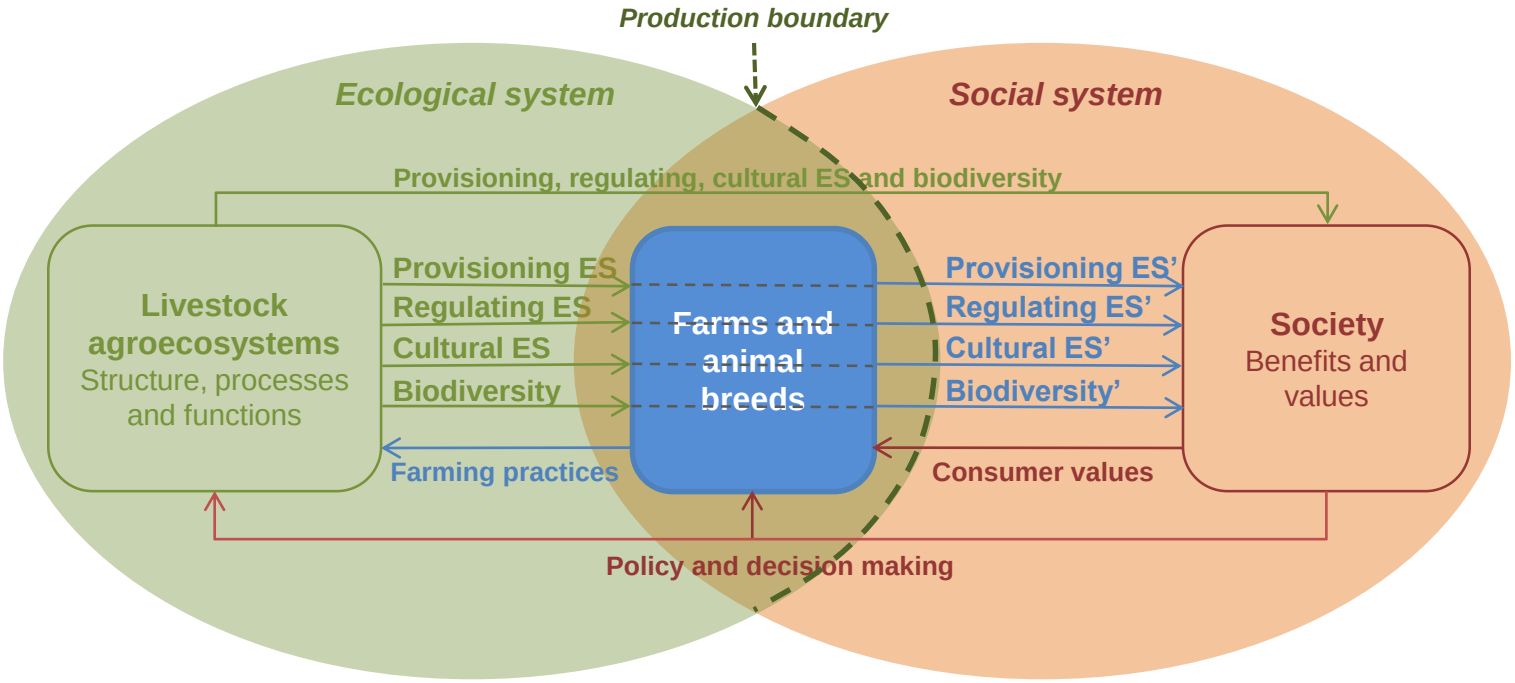
Ecosystem services are the direct and indirect benefits people obtain from ecosystems

1. Provisioning: products obtained from the ecosystem, i.e. food, timber, fiber, fresh water, etc.
2. Regulating: benefits obtained from the regulation of ecosystem processes, i.e. regulation of climate, erosion prevention, water regulation, etc.
3. Supporting: ecosystem services that are necessary for the maintenance of all other ecosystem services, i.e. primary production (photosynthesis), soil formation, nutrient cycling, water cycling, etc.
4. Cultural: nonmaterial benefits people obtain from ecosystems, i.e. spiritual enrichment, cognitive development, recreation, aesthetic experience, etc.

Main ES derived from livestock agroecosystems

1. Provisioning: quality products linked to the territory
2. Regulating: prevention of forest fires (Euro-mediterranean basin) soil fertility (Nordic regions), water quality (Alpine) etc.
3. Supporting: biodiversity conservation
4. Cultural: agricultural landscapes

Role of farms and breeds

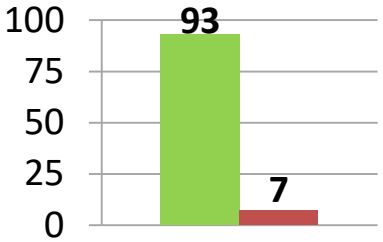


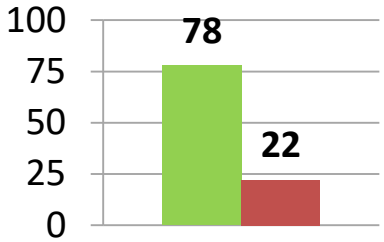
Diversity of farming systems

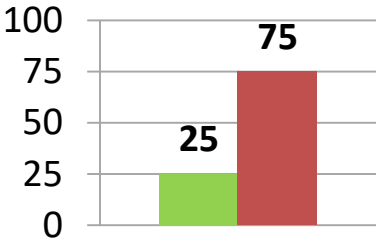
	Specialized sheep-mountain pastures	*Fully-integrated mixed sheep-permanent crops*	*Partially-integrated mixed sheep-arable crops*
Harvest (kg DM)	8.922	68.738	373.592
Self-consumption (%)	100	100	35
Sales (%)	0	0	65

Grazing/Indoor (%)

- Grazing
- Indoor

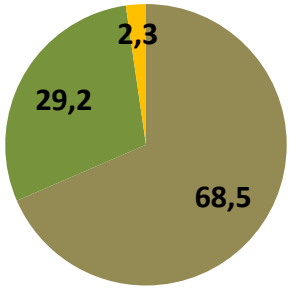


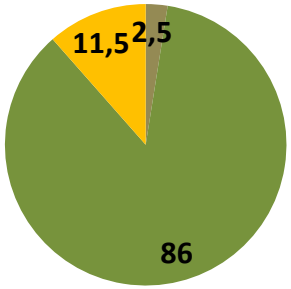


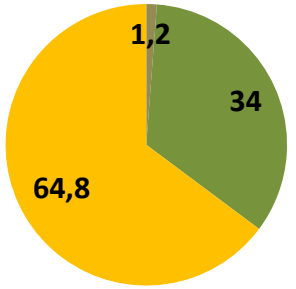


Annual grazing (%)

- Semi-natural vegetation
- Forages
- Stubbles







2. How to value ecosystem services?




Ecosystem Services valuation

- Different functional units
- Different temporal and spatial scales
- Different perceptions by society
- No market price

1. BIOPHYSICAL
2. SOCIO-CULTURAL
3. ECONOMIC

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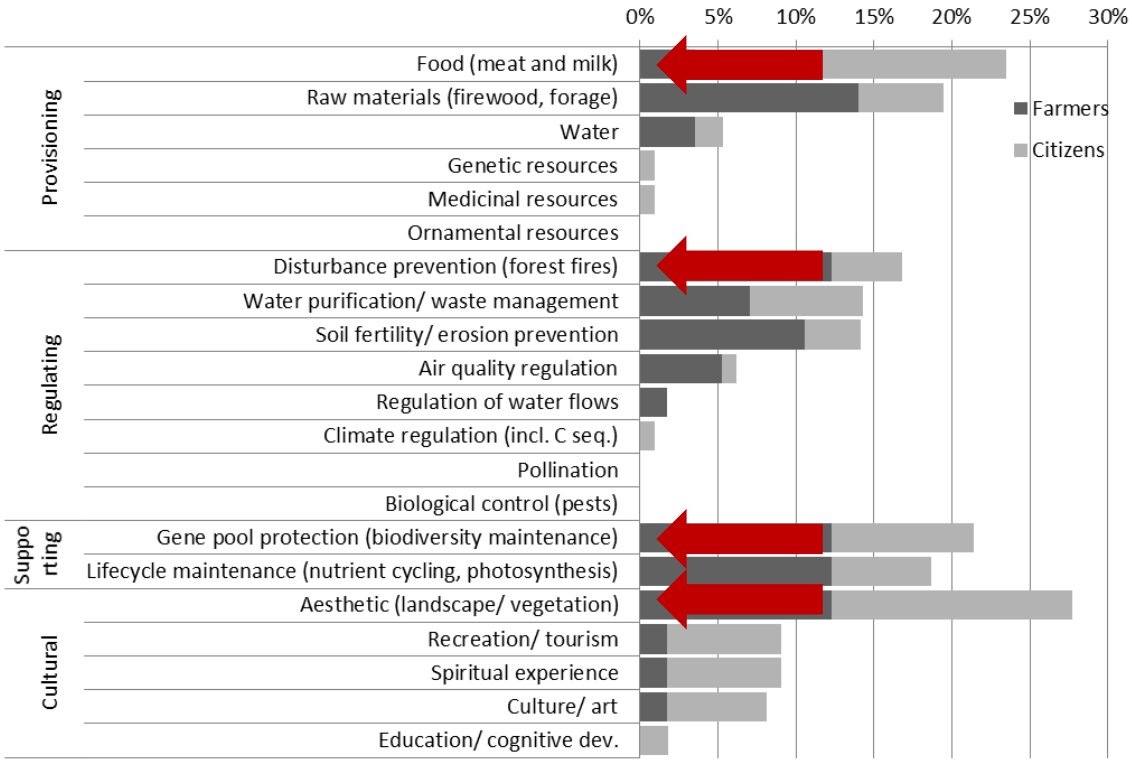
Socio-cultural valuation: views of farmers and other citizens



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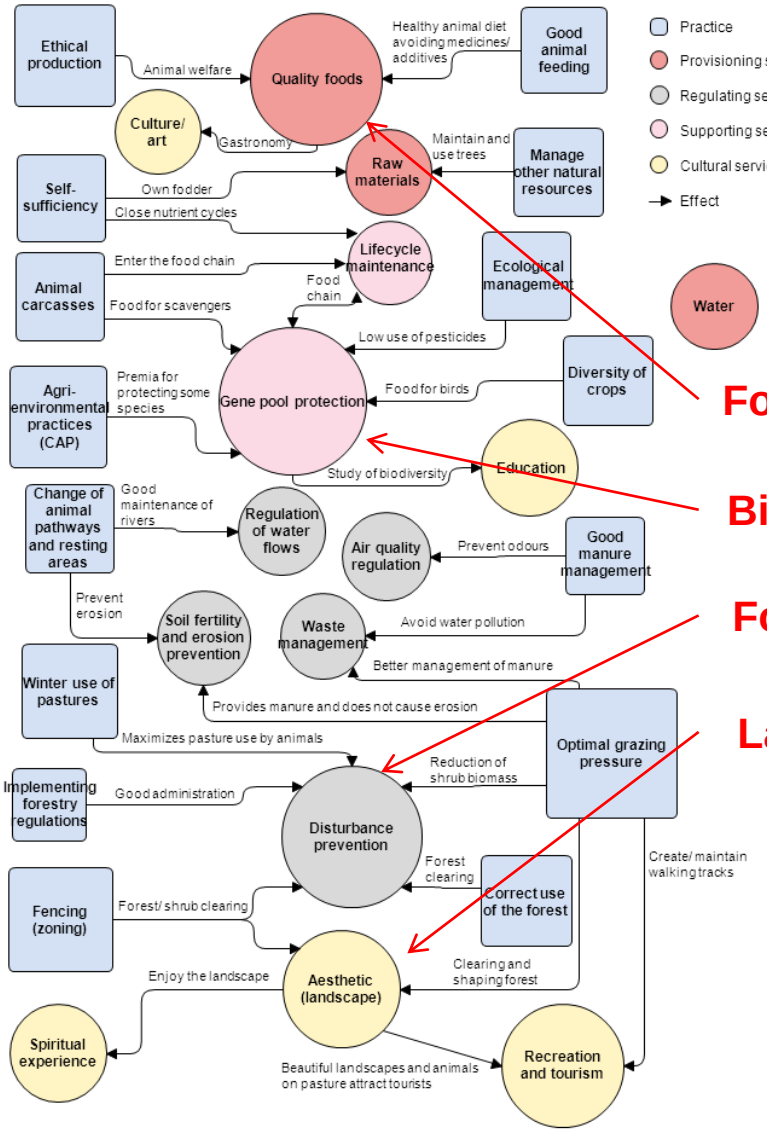
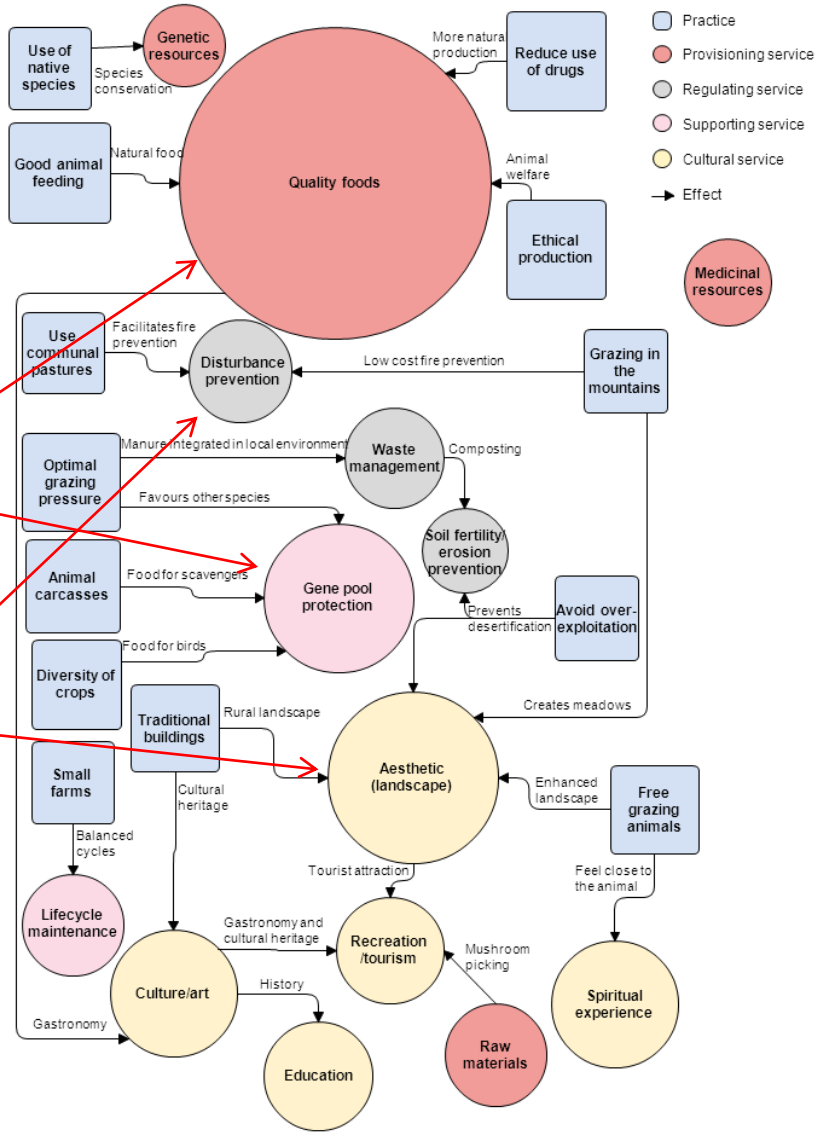
farmers



other citizens



Food quality

Biodiversity

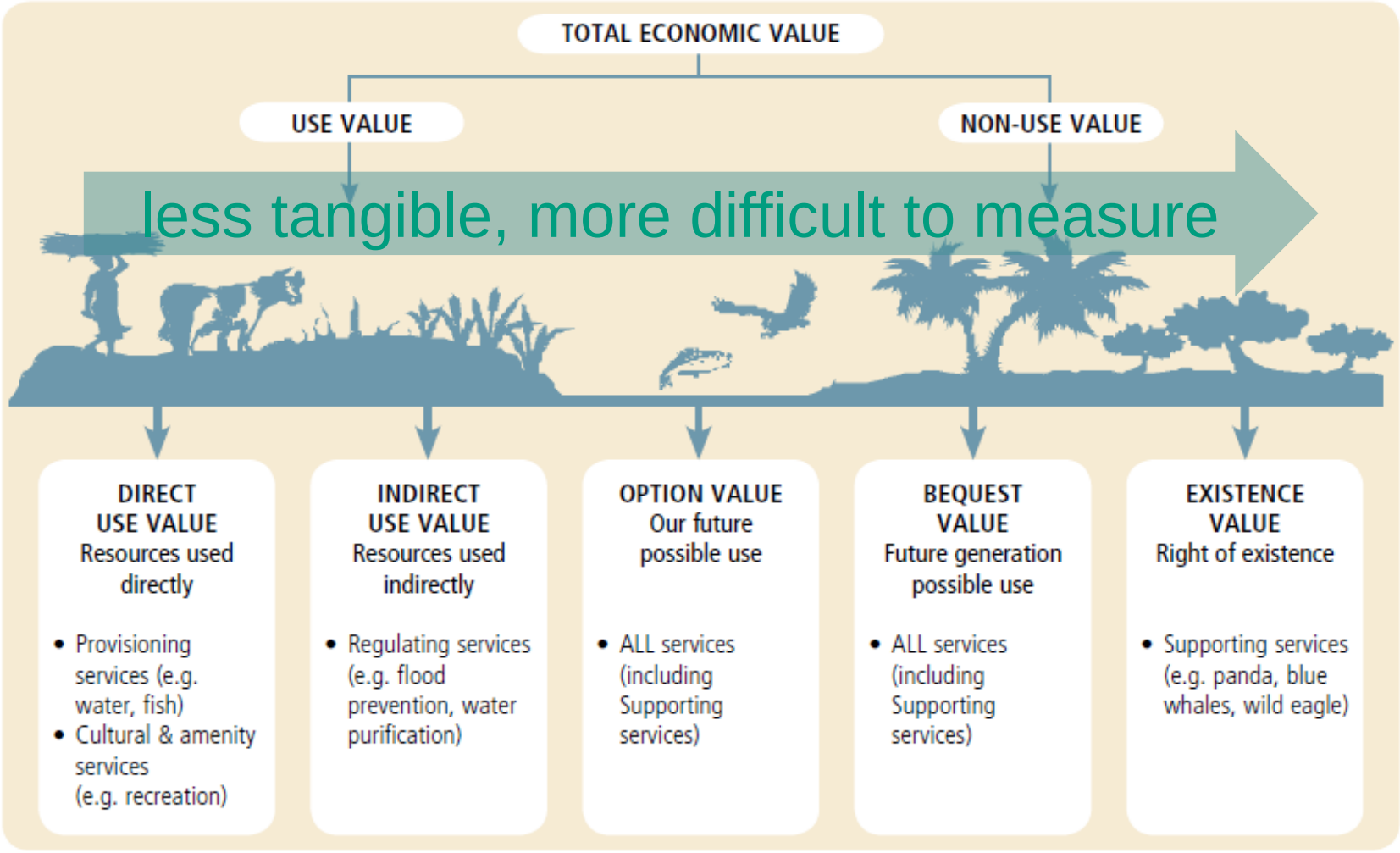
Forest fires

Landscape

Economic valuation: measuring public goods?

Total economic value (TEV): sum of output values (the values generated in the current state of the ecosystem, e.g., food production, climate regulation and recreational value) as well as insurance values, now and in the future.

Total Economic Value (TEV)



Non-use value

- do not involve direct or indirect use of the ecosystem service, but reflect the satisfaction that individuals derive from the knowledge they exist (e.g. enjoyment of a beautiful landscape, or breed)
- related to moral, religious of aesthetic properties of individuals
- **markets do not exist**

Stated preference methods

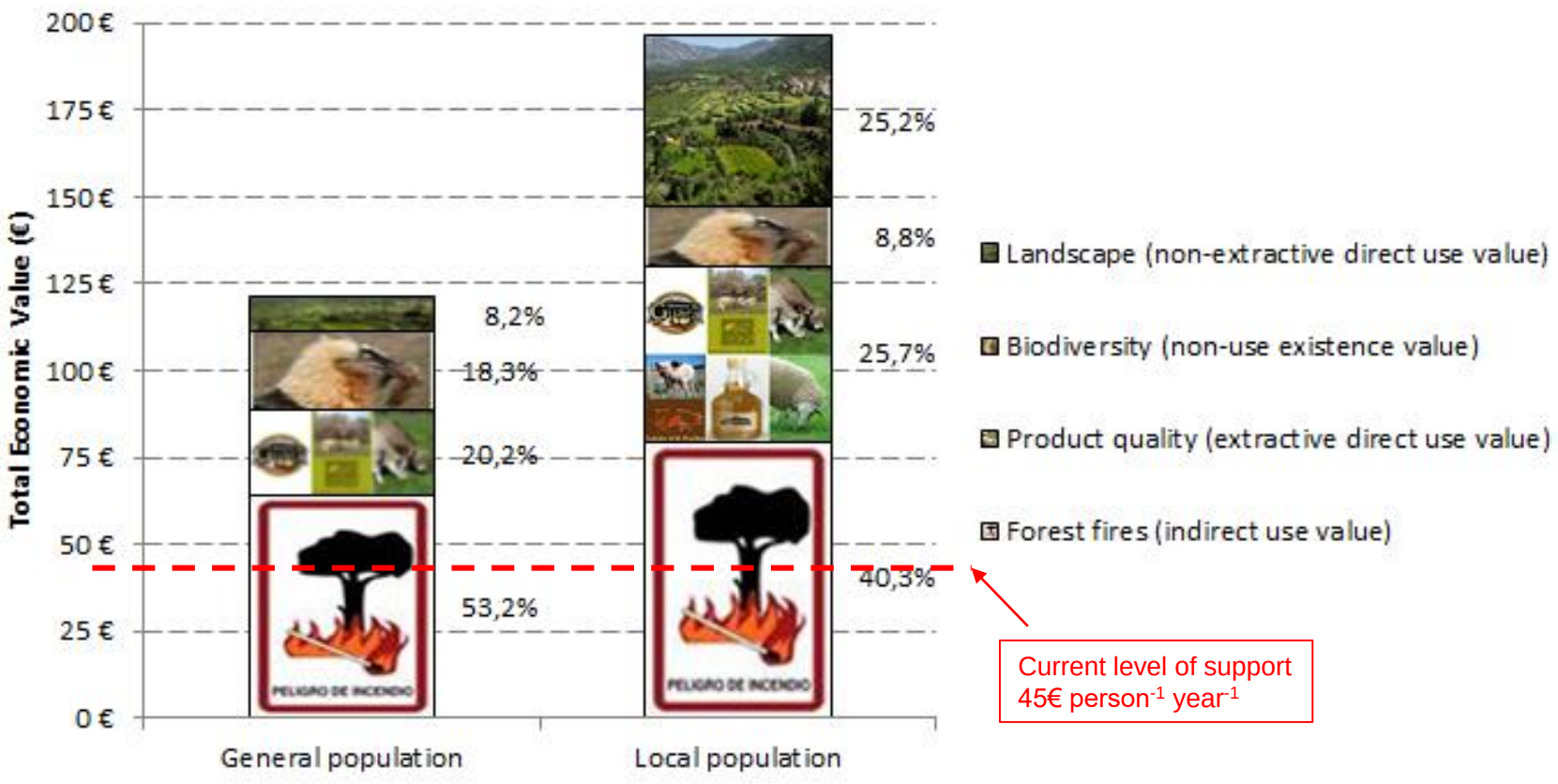
- **Choice modelling** Individuals are asked to choose their preferred alternative among several hypothetical land uses. Each **scenario** of land use is described by a number of attributes (e.g. vegetation cover, landscape fragmentation, biodiversity index, human activities, etc.). Individuals make trade-offs between the levels of the attributes describing the different alternatives in a choice set.
- **Underlying rational decision process**

Choice model for ES in Guara

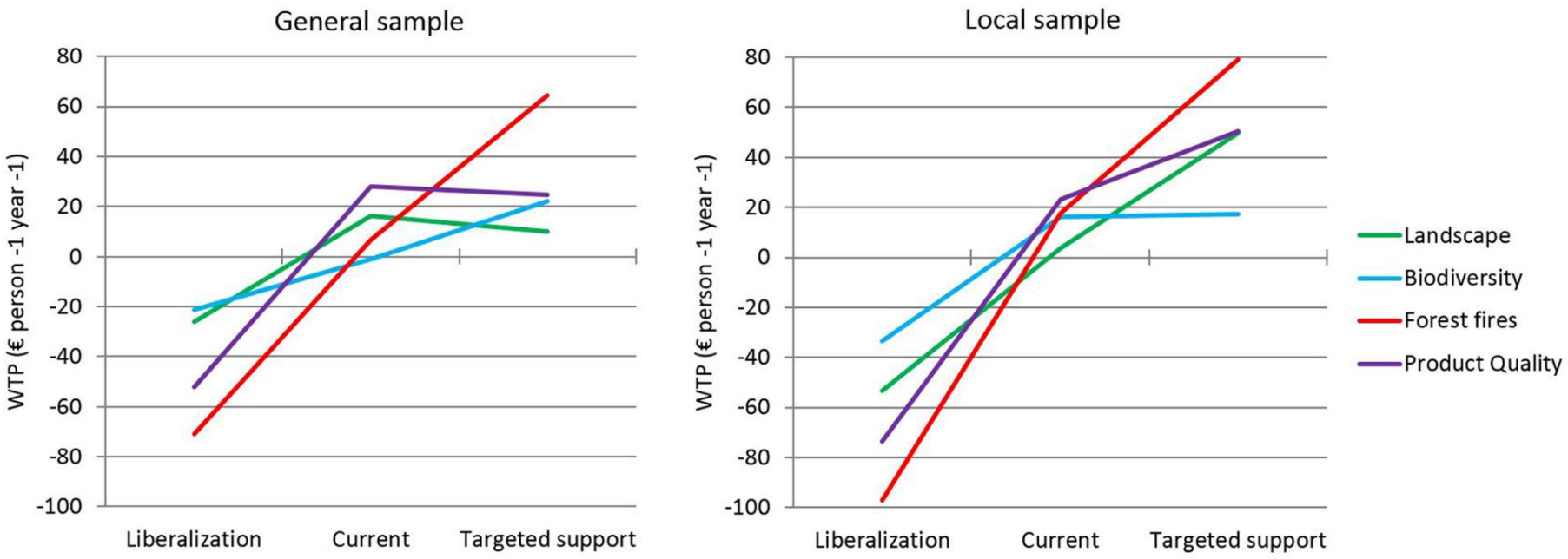
	Policy A	Policy B	CURRENT policy
Landscape	 strong increment of bushes reduction of meadows and crops	 light decrement of bushes light increment of meadows and crops	 light increment of bushes meadows and crops are maintained
Bearded vulture	 7 pairs	 15 pairs	 11 pairs
Forest fires	 **6** forest fires per year	 **2** forest fires per year	 **4** forest fires per year
Product quality linked to territory	 **2** quality products available sheep cheese and lamb meat	 **6** quality products available sheep cheese, lamb meat, pasture pork meat and olive oil, pasture beef and organic lamb	 **4** quality products available sheep cheese, lamb meat, pasture pork meat and olive oil
Annual cost	 15 €	 75 €	 45 €
CHOICE	◯ A	◯ B	◯ C

Economic value of agro-ecosystems in Guara

Willingness to Pay (WTP) (€ person-1 year-1) and composition of the Total Economic Value



Willingness to Pay (WTP) (€ person-1 year-1) for ecosystem services in different policy scenarios



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3. Adding value to local breeds

Two ways

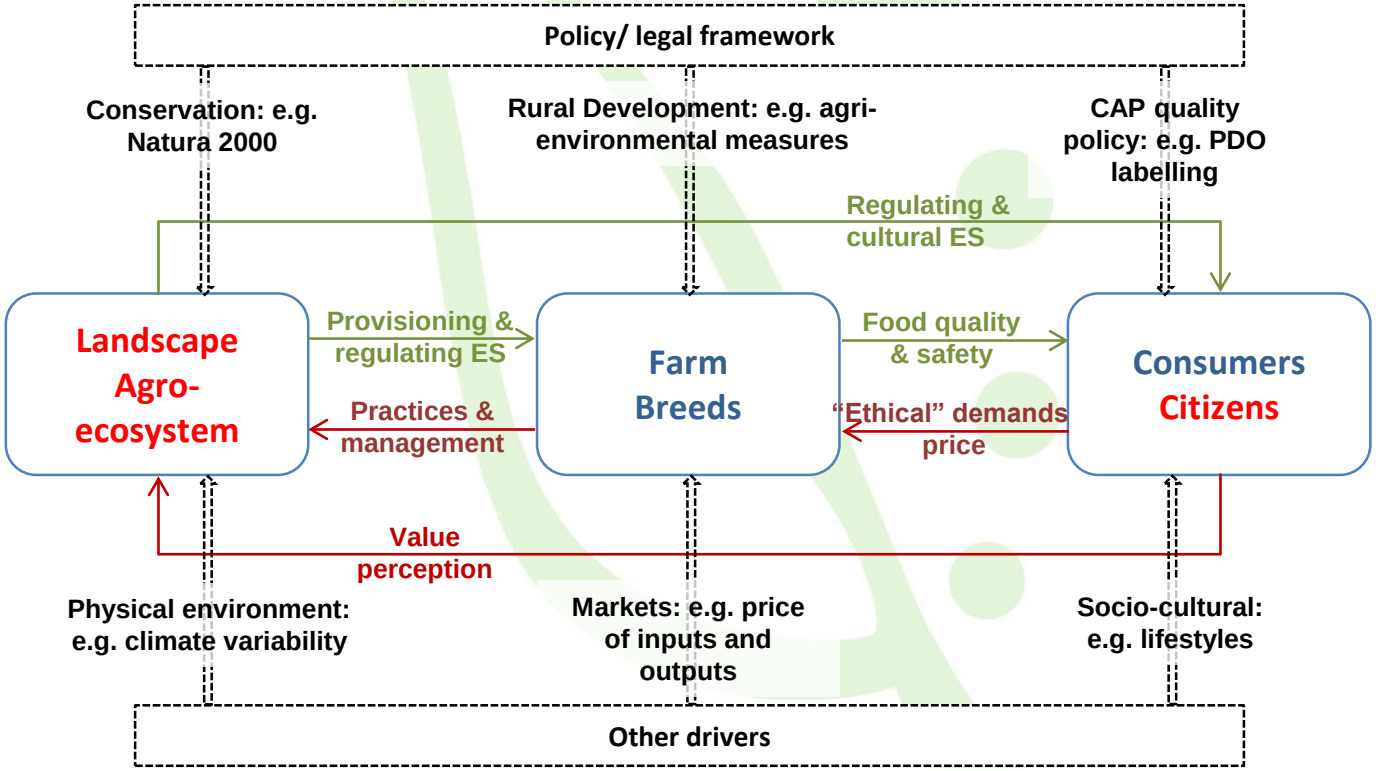
Payments for ecosystem services

- Public market: agricultural policies focus on non-provisioning ES for multifunctional farms and breeds (e.g. CAP subsidies become payments or rewards for the provision of public goods)

Quality products linked to the territory

- Private quality schemes: development of **consumer-led** animal products that incorporate “extrinsic” quality attributes (those based on the production systems, not on the product itself)

“Landscape-to-fork”: value chains based on (agro)ecosystem services



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4. Wrap-up

1. Animal agriculture can be multifunctional (delivery of public goods or ecosystem services), but not all farming systems are
2. The ES (EDS) linked to breeds are a function of how breeds are integrated in the agroecosystem
3. Need to objectively value “non-market” functions of breeds and integrate public goods into policy
4. Added value can be obtained trough public policy (e.g. PES schemes) or private initiatives (e.g. “landscape to fork” quality)

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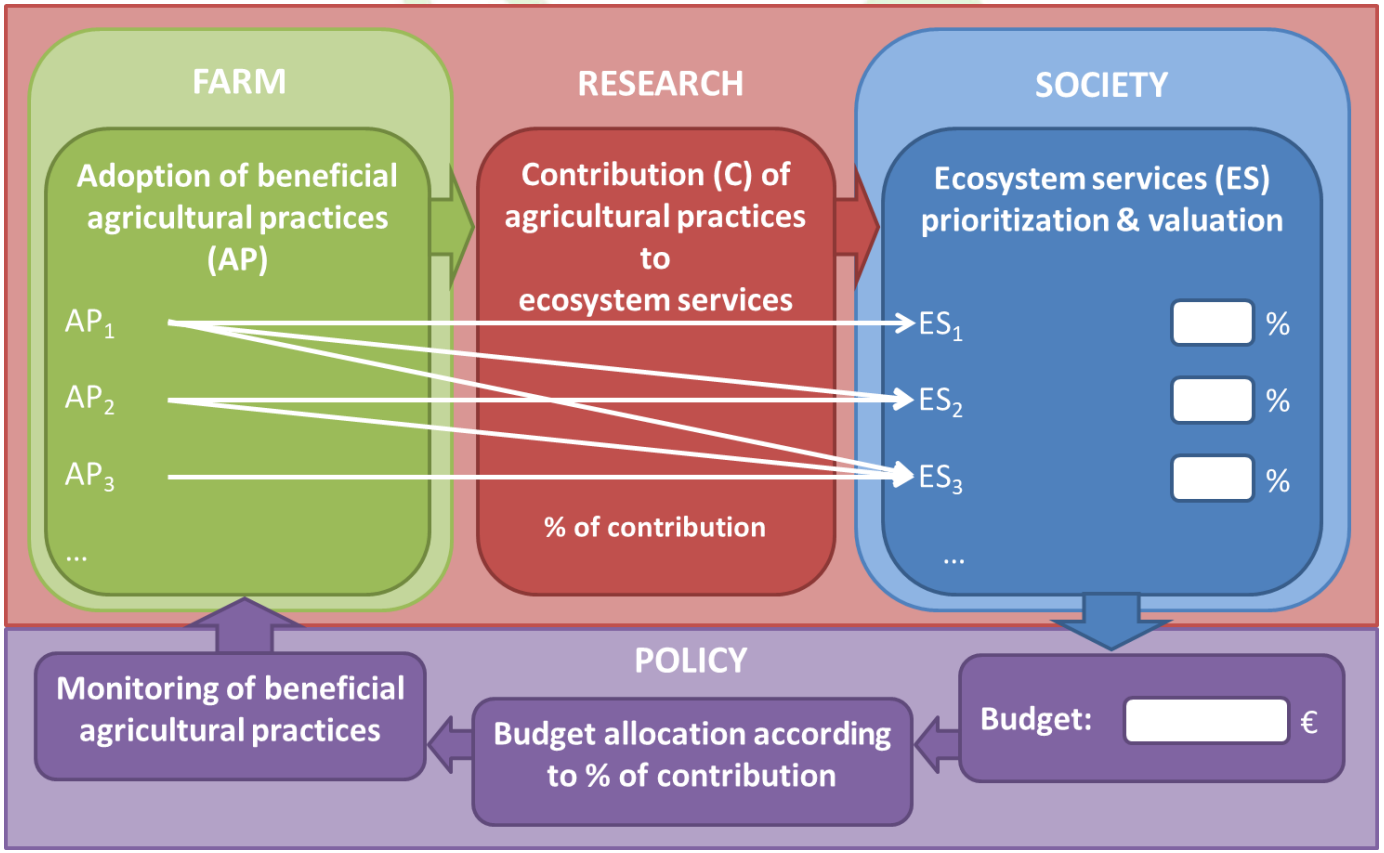
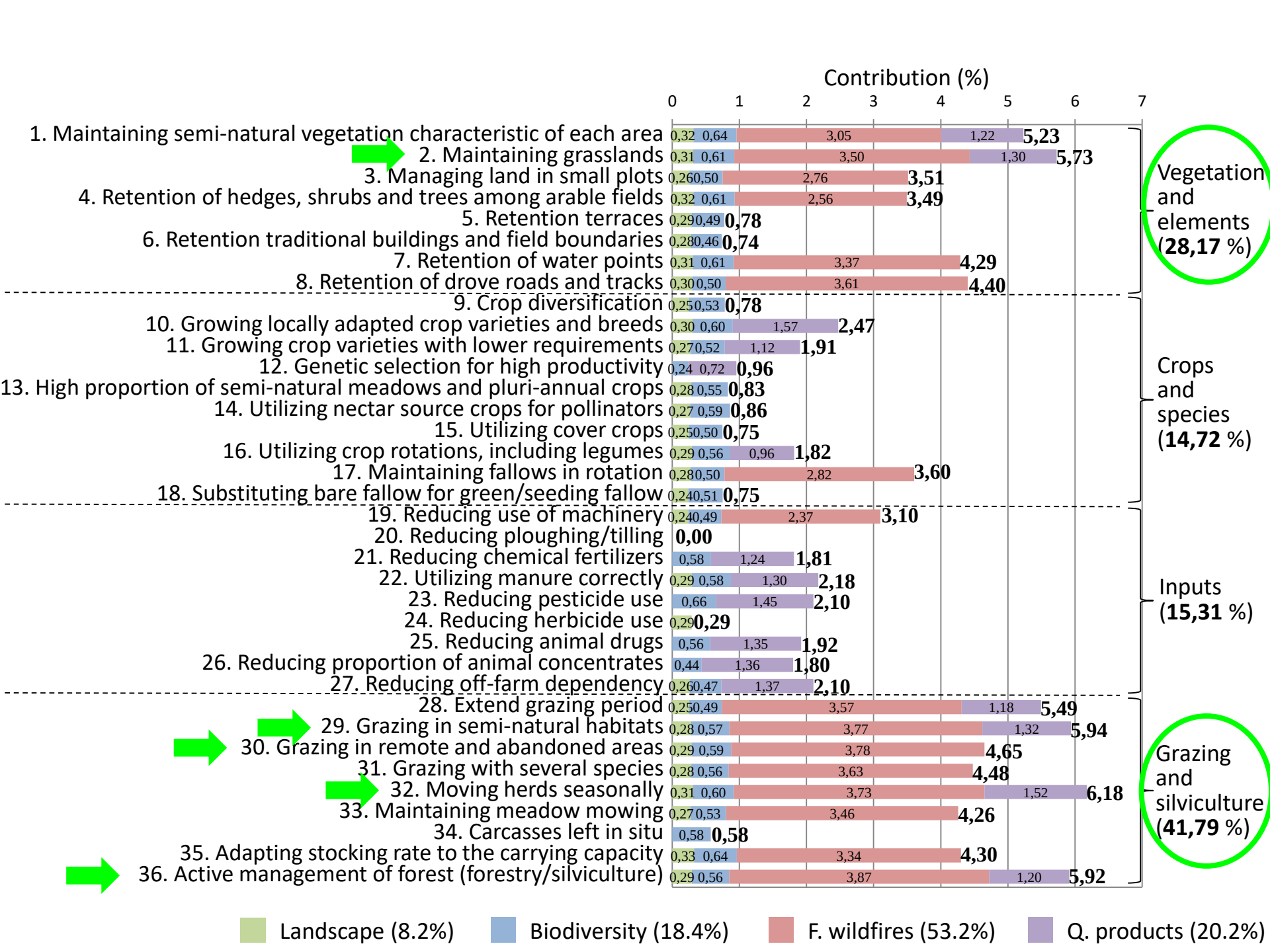
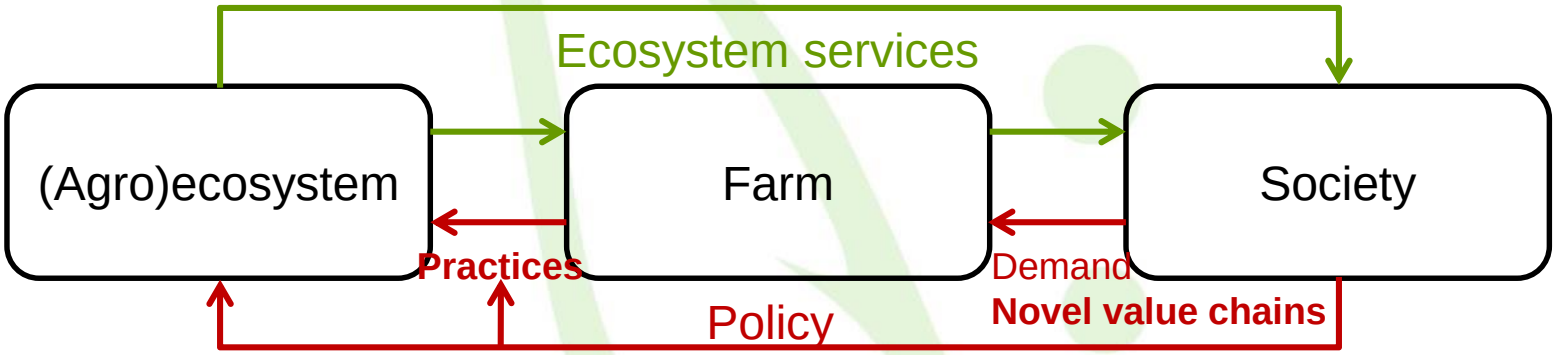
Thank you

E.g. Payments for ecosystem services




Contribution (%)
0
1
2
3
4
5
6
7
1. Maintaining semi-natural vegetation characteristic of each area
2. Maintaining grasslands
3. Managing land in small plots
4. Retention of hedges, shrubs and trees among arable fields
5. Retention terraces
6. Retention traditional buildings and field boundaries
7. Retention of water points
8. Retention of drove roads and tracks
9. Crop diversification
10. Growing locally adapted crop varieties and breeds
11. Growing crop varieties with lower requirements
12. Genetic selection for high productivity
13. High proportion of semi-natural meadows and pluri-annual crops
14. Utilizing nectar source crops for pollinators
15. Utilizing cover crops
16. Utilizing crop rotations, including legumes
17. Maintaining fallows in rotation
18. Substituting bare fallow for green/seeding fallow
19. Reducing use of machinery
20. Reducing ploughing/tilling
21. Reducing chemical fertilizers
22. Utilizing manure correctly
23. Reducing pesticide use
24. Reducing herbicide use
25. Reducing animal drugs
26. Reducing proportion of animal concentrates
27. Reducing off-farm dependency
28. Extend grazing period
29. Grazing in semi-natural habitats
30. Grazing in remote and abandoned areas
31. Grazing with several species
32. Moving herds seasonally
33. Maintaining meadow mowing
34. Carcasses left in situ
35. Adapting stocking rate to the carrying capacity
36. Active management of forest (forestry/silviculture)
Vegetation and elements (28,17 %)
Crops and species (14,72 %)
Inputs (15,31 %)
Grazing and silviculture (41,79 %)
Landscape (8.2%)
Biodiversity (18.4%)
F. wildfires (53.2%)
Q. products (20.2%)

Valuation: biophysical
economic
socio-cultural



Policy: agroenvironmental
PES