

The role of native and locally adapted breeds in the sustainable transformation of the livestock sector: examples from Italy

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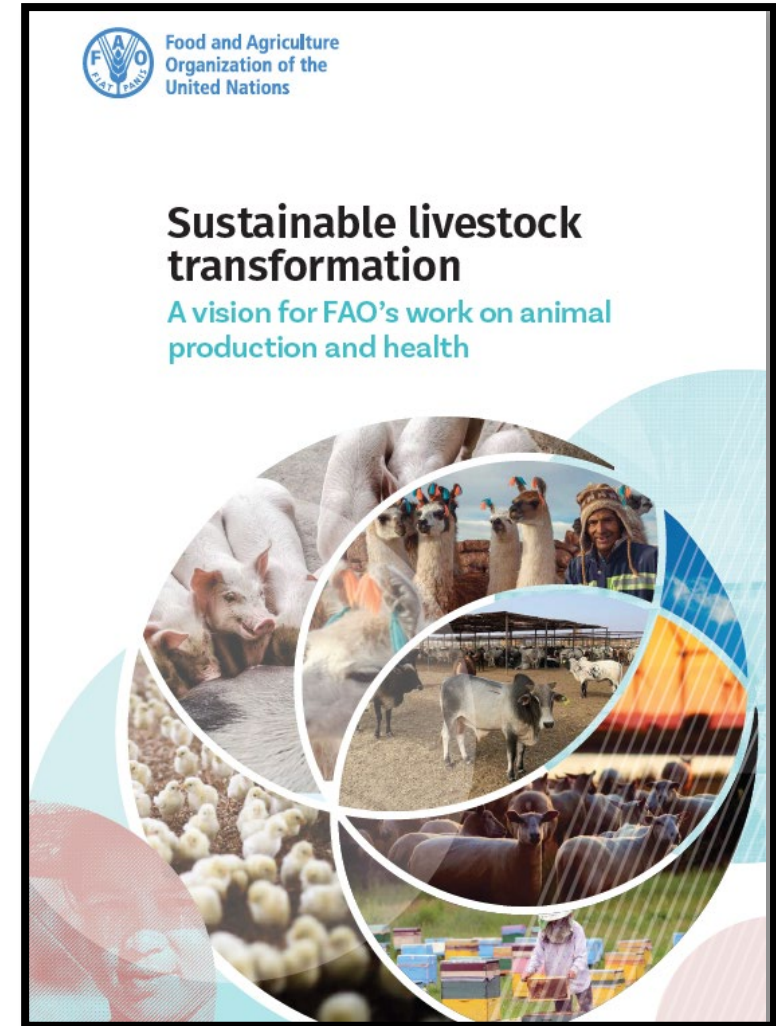
Structure of the presentation

- Definition and background
- Animal genetic resources and ecosystem services → focus on Italian National Focal Point
- Discussion of 2 case studies from Italy
- General conclusions



SUSTAINABLE LIVESTOCK TRANSFORMATION

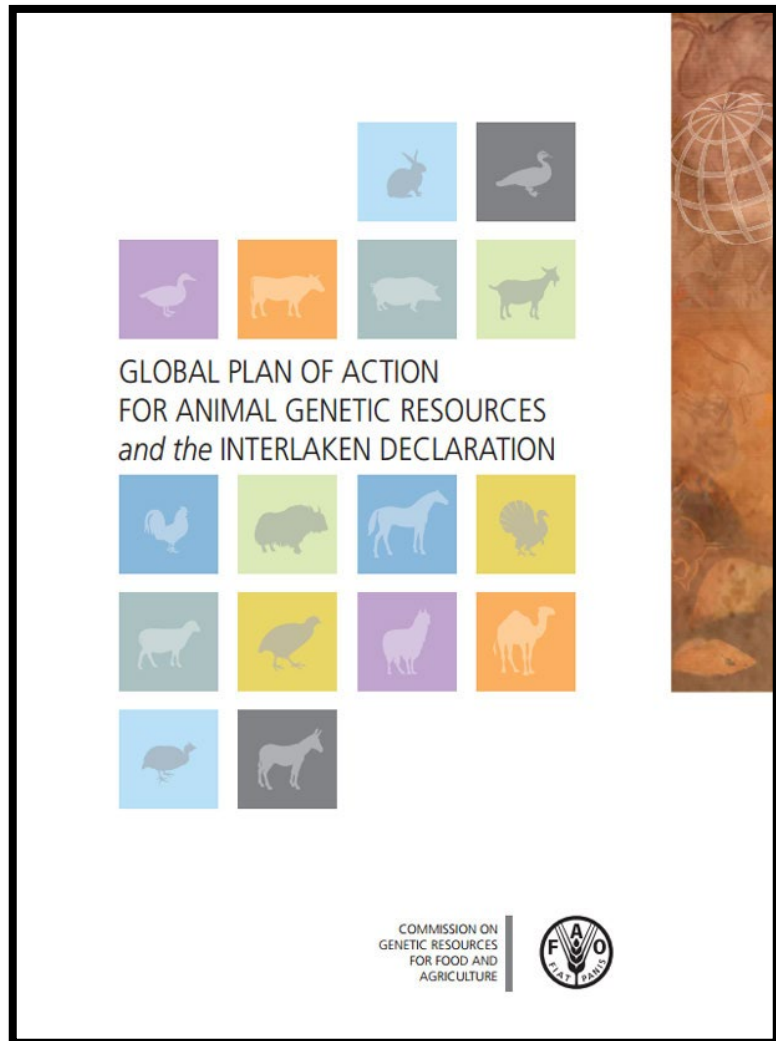
- Livestock sector makes a vital contribution to global food security and nutrition, livelihoods, and ecosystem services, contributing to all of the SDGs (FAO 2018).
- At the same time, the sector utilizes vast amounts of natural resources, faces continual threats (predators, epidemic, transboundary and zoonotic diseases) and both contributes to and is affected by climate change.
- Evolution and transformation of the sector are required to ensure it achieves its goals in a sustainable manner, while addressing all of the many trade-offs.



LIVESTOCK GENETIC DIVERSITY

- Wise management of animal genetic resources (AnGR) will be an essential part of sustainable livestock transformation process.
- The genetic diversity within and across breeds allows populations to adapt to changes in their production environment and breeders to improve the ability of their animals to achieve productivity objectives.
- The sustainable transformation will demand increased efficiency of resource utilization. This implies effective use of AnGR around the world and implementation of genetic improvement programmes.

FAO Global Plan of Action (GPA) for Animal Genetic Resources



The GPA is a policy document that includes 23 Strategic Priorities (SP), under four Strategic Priority Areas (SPA) and provides the framework for sustainable management of AnGR.

ERFP - Animal Genetic Resources Strategy for Europe



Key recommendations on sustainable use and genetic improvement of AnGR:

- Boost the development and implementation of sustainable breeding programs,...
- Promote innovations and new methods and technologies in breeding and AnGR management.
- Promote better use of AnGR diversity in the diversification of livestock production systems.
- Incorporate agro-ecological principles in livestock sector development and AnGR management.

Locally adapted breeds

Definition (EFABIS): Breeds which have been in the country for a sufficient time to be genetically adapted to one or more of traditional production systems or environments in the country.

According to the Animal Genetic Resources strategy for Europe (ERFP, 2021), a variety of local breeds have characteristics that make them potentially valuable in the provision of a range of ecosystem and cultural services.

On a total of 6370 breeds included in EFABIS database, 2098 are classified as "native" and 622 as "locally adapted".

This contribution aims to discuss the potential role of native and locally adapted breeds for the sustainable transition of livestock production systems.

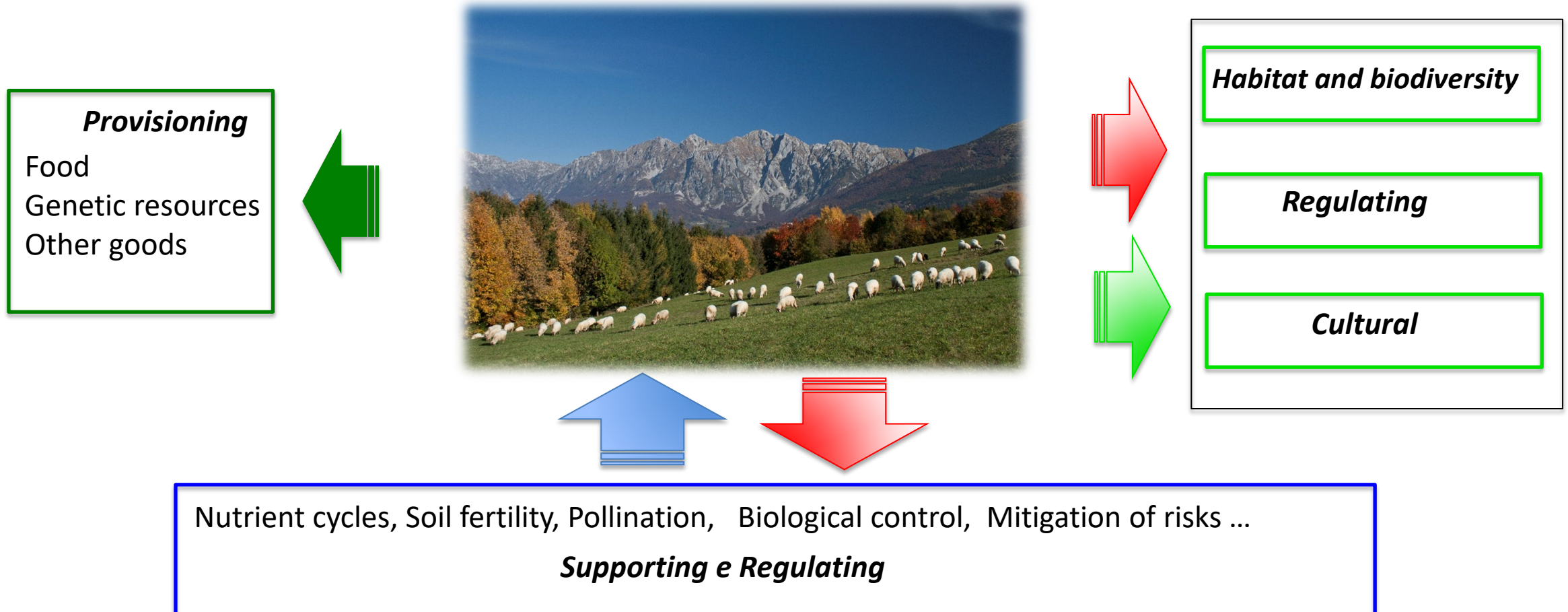
Ecosystem services and livestock farming systems

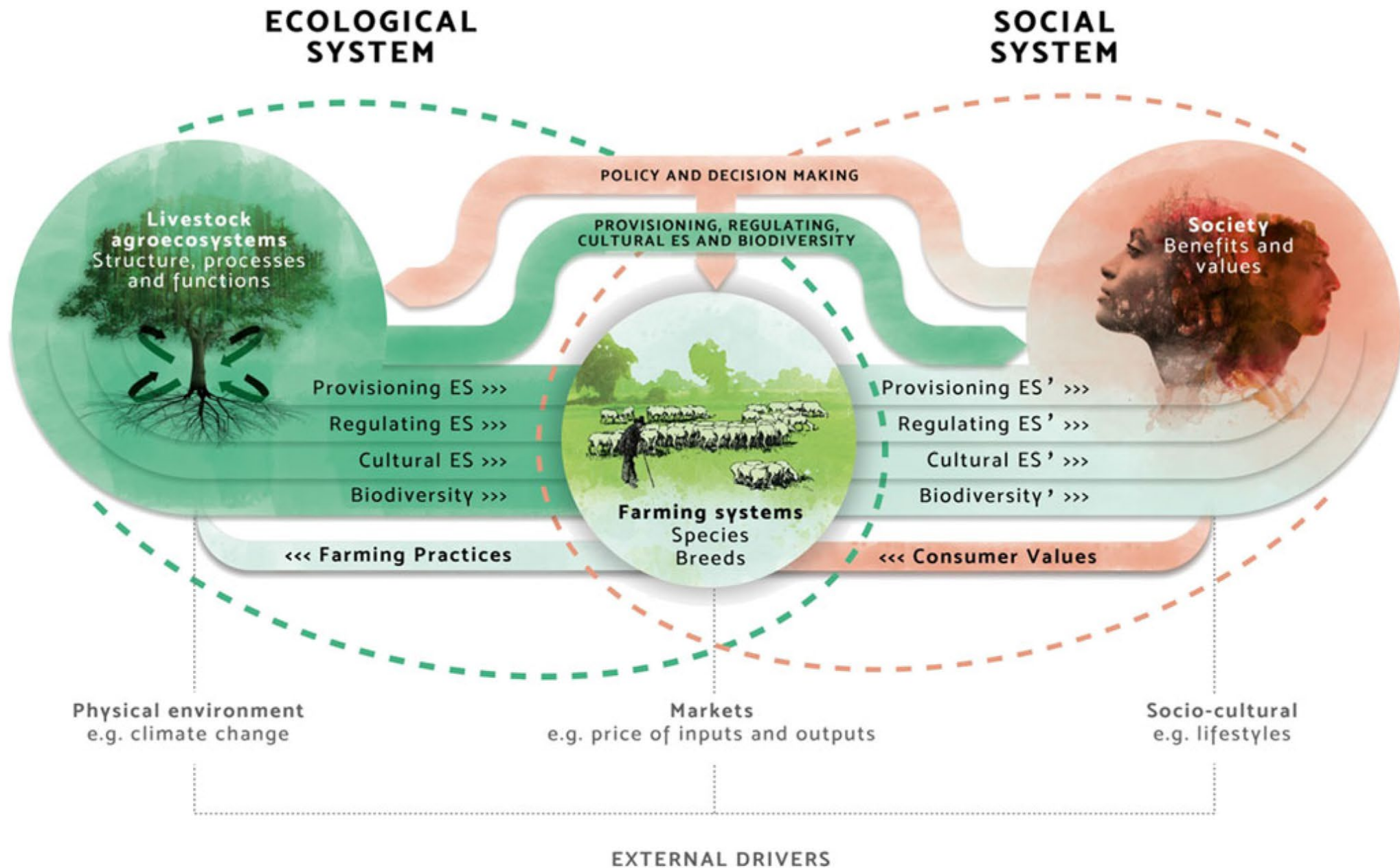
Ecosystem services: direct and indirect contributes of ecosystems to the human wellness, many of which does not have a market values

4 categories (TEEB):

- Provisioning: es livestock products
- Regulating: climate regulation, risks prevention (fire/avalanches), impollination, etc.
- Cultural: recreational, aesthetic, spiritual benefits provided by ecosystems, es landscape
- Supporting: habitat for species, biodiversity

Ecosystem services fluxes in livestock systems





AnGR and Ecosystem Services – DAD-Is Tool (Leroy et al., 2024)

Table 2

Cultural and regulating and maintenance ES reported for the 3 361 livestock national breed populations considered.

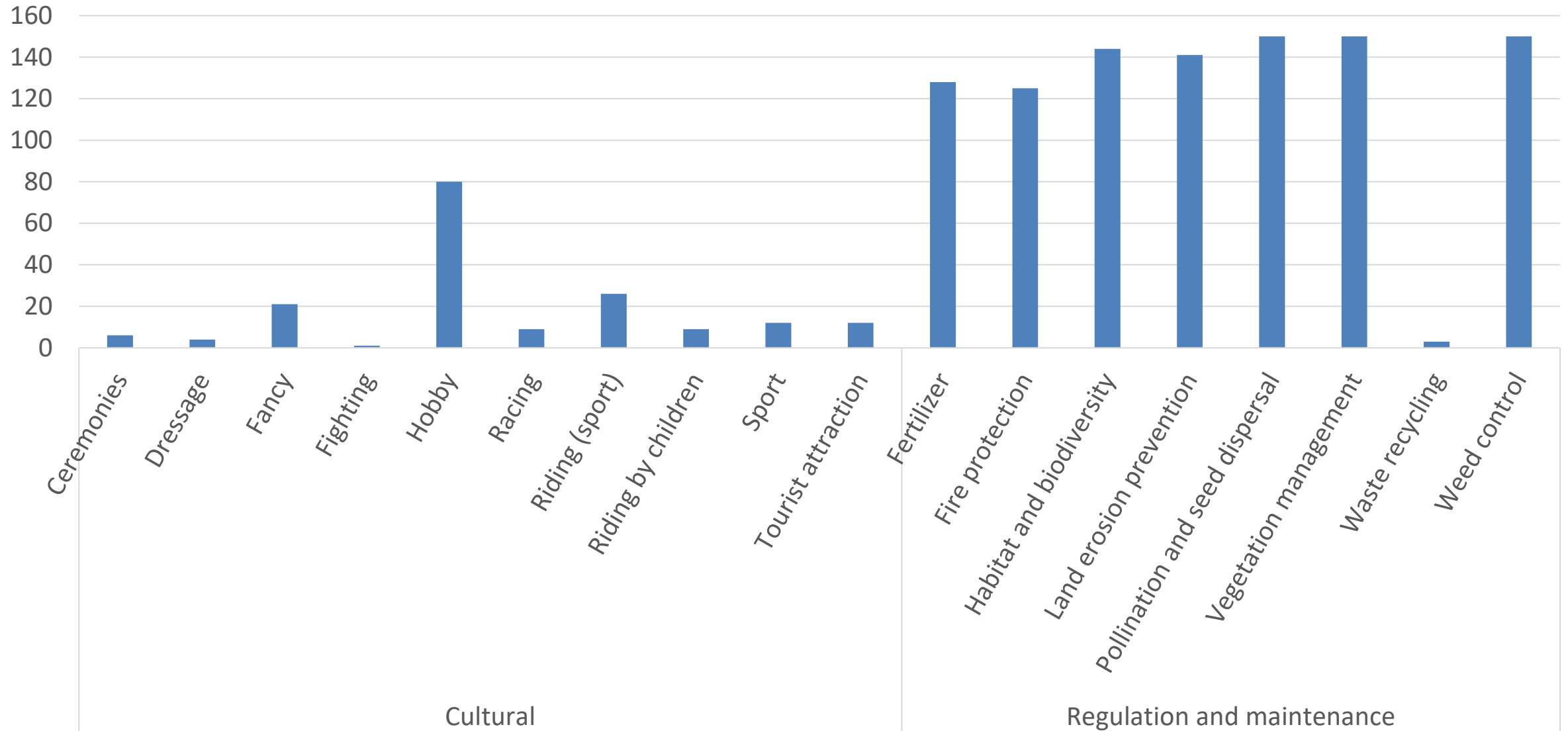
ES	Abbrev	N	%
Cultural			
Hobby	Hobb	590	17.6%
Research	Rese	427	12.7%
Fancy	Fanc	369	11.0%
Cultural and religious ceremonies	CuRC	248	7.4%
Tourist attraction	ToAt	186	5.5%
Riding sport	RiSp	174	5.2%
Sport	Spor	159	4.7%
Dressage	Dress	126	3.7%
Racing	Raci	115	3.4%
Riding by children	RiCh	102	3.0%
Fighting	Figh	14	0.4%
To handle fighting bulls	FiBu	14	0.4%
Regulating and maintenance			
Fertilizer	Fert	786	23.4%
Habitat provision and biodiversity	HaPB	770	22.9%
Vegetation management	VeMa	646	19.2%
Weed control and biomass residue management	WCBM	494	14.7%
Pollination and seed dispersal	PoSD	490	14.6%
Waste recycling of non-human edible feed	WaRe	459	13.7%
Fire protection	FiPr	373	11.1%
Land degradation and erosion prevention	LDEP	249	7.4%
Regulation and control of animal or human diseases	ReCD	141	4.2%
Water quality and flows regulation or purification	WQFR	14	0.4%

“... native and locally adapted breeds, which tend to be raised in less specialized production systems than exotic breeds, are reported to play multiple roles contributing to rural community livelihoods and environmental sustainability of food systems”

AnGR and Ecosystem Services – situation in Italy

Species	N of recorded breeds	Cultural ES (n of breeds)	Regulating and Maintenance ES (n of breeds)	Provisioning ES (n of breeds)
Cattle	35	7	35	35
Goat	45	3	45	45
Sheep	71	3	71	71
Ass	8	8	8	8
Horse	29	28	6	29
Pig	16	4	11	16
Chicken	18	18	0	18
Total	283	123	182	283

AnGR and non provisioning ES



Case Study 1: Valdostana Cattle breed (Efabis, 2022)

Breeding Males / Females
(n of heads)

610 / 8643 (Pezzata Nera Castana)

Herds (n)

843

Risk status

Not at risk

Uses

Meat and milk

Cultural ES

- **Fighting**
- Cultural and religious ceremonies
- Tourist attraction / touristic potential

Regulation and maintenance
ES

- Fertilizer
- Habitat provision and biodiversity
- Land degradation and erosion prevention
- Pollination and seed dispersal
- Vegetation management
- Weed control and biomass residue management



Productive ES



Only the milk by "Valdostana" breeds can be used to produce "Fontina" PDO cheese

Cultural ES - fighting



Animal (2020), 14:1, pp 13–21 © The Animal Consortium 2019
doi:10.1017/S175173111900168X



 frontiers | Frontiers in Ecology and Evolution

TYPE Original Research
PUBLISHED 30 September 2022
DOI 10.3389/fevo.2022.972093

Genetic correlations and causal effects of fighting ability on fitness traits in cattle reveal antagonistic trade-offs

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Genetic correlations of fighting ability with somatic cells and longevity in cattle

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Case Study 2: local sheep breeds in Veneto Region

This study is part of a project (Sheep Al.L. Chain) aiming to improve the competitiveness of local sheep breed farms (Lamon and Alpagota) through the valorisation of their link with mountain agroecosystems

Three specific aims:

- Sustainable use of animal genetic resources/in vivo conservation program
- Link between sheep products and landscape/agroecosystems → “territorial marketing” strategy
- Conversion to organic production: SWOT analysis

More info available at these links:

<https://www.mdpi.com/2071-1050/14/8/4698>

https://eu-cap-network.ec.europa.eu/campaign/eip-agri-innovation-awards-2024-nominees_en#paragraph-77199

Alpagota Sheep Breed (Efabis 2022)

Breeding Males / Females
(n of heads)

86 / 1253



Herds (n)

49

Risk status

Endangered

Uses

Meat (wool)

Regulation and maintenance
ES

- Fertilizer
- Fire protection
- **Habitat provision and biodiversity**
- Land degradation and erosion prevention
- Pollination and seed dispersal
- Vegetation management
- Weed control and biomass residue management



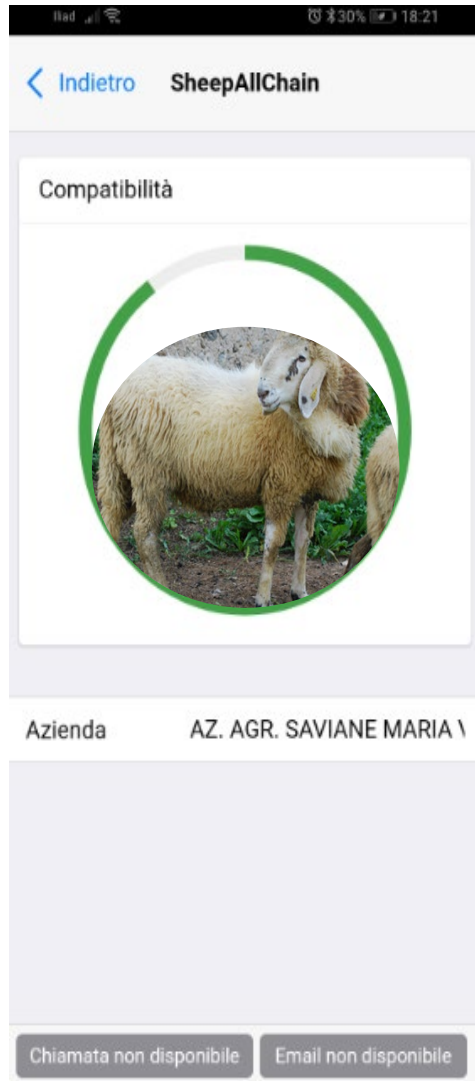
Alpagota Sheep Breed – Productive services

Slow food presidium
«agnello d'Alpago»



Use of genetic resources

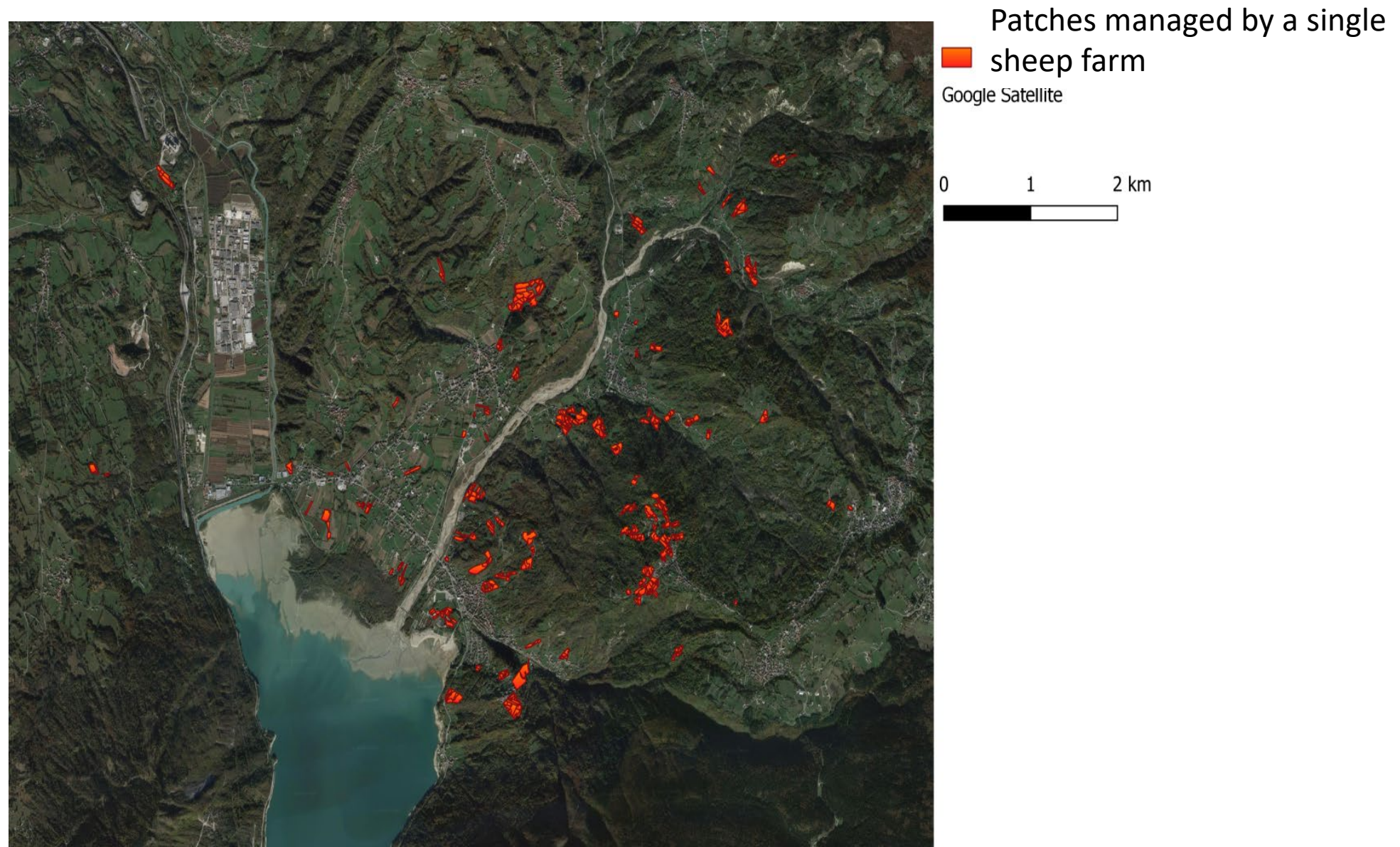
application for mobile phone to support mating plans, with the aim to limit the risk of inbreeding.



Results – link between sheep farms and landscape



Results – link between sheep farms and landscape



Conclusions

- Link between traditional livestock systems and agro-ecosystems → ecosystem services and added value for the livestock products :
 - Public payment/subsides for ecosystem services
 - Territorial marketing
- Implication for AnGR
 - Specific researches on link between AnGR, farming systems and agroecosystems are needed
 - Indicators on productive environment are needed
 - Needs of specific researches to increase the number of studied traits to strengthen the characterization of livestock breeds, particularly local breeds, in their production environment.

Take home message

From local to global: link between local genetic resources, farming systems, high quality products and agroecosystems as key factor to ensure resilience and sustainable transformation of the livestock sector

