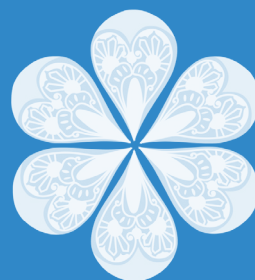




Mobile pastoralism in the Mediterranean: Arguments and evidence for policy reform and its role in combating climate change

December 2017



M E D I T E R R A N E A N
Consortium for Nature & Culture

AUTHORS:

Pablo Manzano-Baena

Concha Salguero-Herrera

EDITED BY:

Liza Zogib

DESIGNED BY:

Divya Venkatesh

WITH CONTRIBUTIONS FROM:

Alexis Katsaros, Sana Mzoughi, Shalimar Sinno,

Sandra Spissinger-Bang, Engin Yilmaz, Liza Zogib



 medconsortium.org

 info@medconsortium.org

 [/medconsortium](https://www.facebook.com/medconsortium)



ACCRONYMS

CAP – European Common Agriculture Policy

CLAs – Conjugated Linoleic Acids

EFNCP – European Forum for Nature Conservation
and Pastoralism

EU – European Union

FAO – Food and Agriculture Organisation of the
United Nations

GHG – Greenhouse Gas

IPCC – Intergovernmental Panel on Climate Change

IUCN – International Union for the Conservation
of Nature

OIE – World Organisation for Animal Health

PUFAs – Polyunsaturated Fatty Acids

UNEA – United Nations Environmental Assembly



Photo Credit: We belong
to different generations,
different lifestyles, but we are
and always will be, nomads.
© Younes Tazi, Morocco,
2014.

CONTENTS

<u>EXECUTIVE SUMMARY</u>	7
<u>INTRODUCTION</u>	11
<u>ENVIRONMENTAL AXIS</u>	13
Biodiversity	14
Combating Land Degradation.....	15
<u>CLIMATE CHANGE AXIS</u>	17
Mitigation	18
Adaptation	19
<u>ECONOMIC AXIS</u>	20
<u>SOCIAL AXIS</u>	24
Food security & food safety	25
Efficiency in food production	25
Improvement in food quality	25
Culture	26
Other social issues	27
<u>POLICY ACTION</u>	28
<u>SHORTCOMINGS AND KNOWLEDGE GAPS</u>	32
<u>REFERENCES</u>	34
<u>ANNEX: THE CULTURE OF PASTORALISM IN THE MEDITERRANEAN</u>	44
Spain	45
Greece	46
Turkey	48
Lebanon	50
Tunisia	52
Pastoralism, religion and spirituality	54
<u>ANNEX REFERENCES</u>	56



EXECUTIVE SUMMARY

Mobile pastoralism¹ is one of the **most efficient** livestock farming systems in terms of natural resource use and land management. It is also a **highly sustainable** and economically rational system that makes the most of the Earth's less productive areas, unsuitable for crop production.

The environmental benefits of mobile pastoralism are many and these have been tried and tested on the ground for millennia. In recent decades research on ecology, economics, nutrition and sociology has revealed many of these benefits, highlighting the role that this traditional practice can fulfil in the present day as a **tool for 'retroinnovation'** in the fight to **tackle climate change** mitigation and adaption, respond to social challenges and promote resilient livelihoods.

In a highly biodiverse region such as the Mediterranean, mobile pastoralism not only **provides ecosystem functions** associated with grazing that **maintain biodiversity**, but also contributes to ecosystem adaptation for climate change. The drover roads maintained by livestock mobility are ecological corridors that favour seed dispersal and connect valuable habitats, so avoiding isolation and fragmentation, which are amongst the most serious threats to areas of high biodiversity. They also increase botanical diversity and habitat heterogeneity without which other species could not survive.

Mobile pastoralism is also one of the most cost effective methods of **preventing wildfires** since grazing relies on natural rangelands, consuming the biomass, which if left untouched forms the fuel for fires. Livestock grazing it is also an effective tool for soil stability, restoration and resilience as it adds manure to the nutrient cycle and restores vegetation cover as mobile herds allow pastures to rest and **trees to regenerate**. Most importantly in the Mediterranean, livestock mobility has direct benefits for **water cycle regulation** as it helps reduce pressure on water resources, consuming water on the move where it is available.

Pastures are one of the largest carbon sinks on the planet, therefore mobile pastoralism must be used as a critical tool in the fight against climate change as it **maintains carbon-rich soils** and sustains ecosystems with high carbon fixation capacity.

It is also the livestock production system that requires the **least fossil fuel** energy, helping in turn to reduce the demand of industrial feed whose production and transport produce large GHG emissions. It additionally reduces the incidence of pollution, the **reliance on veterinary products** (among them antibiotics) and so produces **healthier food**, from livestock reared in the open air, which are fit and more resistant to disease.

The capacity to **adapt to climate change challenges** is probably the most distinctive feature of pastoralist communities who rely on local breeds, mobility

¹ Mobile pastoralism is a catch-all term that encompasses transhumance, semi-nomadic and nomadic pastoralism, and some practices of extensive grazing, where people and their livestock move on foot through the landscape in search of pasture and water.

and communal land tenure, making it resilient, ductile and adaptable to changing climatic conditions.

Based on all these reasons, new research shows that the policy recommendations to reduce extensive livestock to mitigate greenhouse gas emissions will be counterproductive.

Economic benefits are also increasingly recognized. To begin with, mobile pastoralism makes the most of available resources in areas considered “marginal” from a purely agricultural production point of view, but these areas can be rich for the provision of other **ecosystem services**. Additionally, pastoral products can easily meet the rising market demands for sustainable and healthy food that supports **social and cultural values** and is produced in natural environments and **diversified cultural landscapes**. This is crucial **to fight depopulation** in rural areas and build a strong and resilient rural economy, by creating sustainable direct and indirect jobs and **stimulating peripheral economies**, such as different types of rural tourism and other complementary activities.

These economic benefits also have **social implications**, as they can contribute to helping traditionally marginalized groups (e.g. women) to get a job or become entrepreneurs, and to alleviate the out-migration of young people to urban areas due to the lack of job opportunities. The advantages of 21st Century technology can make pastoralist businesses easier and rural areas can become an attractive option for new populations looking for healthier and happier ways of living.

The **cultural aspect** (see Annex) of mobile pastoralism is fundamental in understanding **resilience** strategies, **adaptation** capacities and the legacy that allows it to operate under modern conditions. Examples from Spain, Greece, Turkey, Lebanon or Tunisia show how pastoralist cultural traits are ancient yet useful and important for the adaptation of extensive livestock production, and also a very important part of Mediterranean culture.

In spite of the clear benefits provided, mobile pastoralism is sometimes perceived as an unsustainable farming system due to poor

understanding of its role in **human wellbeing**, resulting in **undermining policies** that have created hurdles to its sustainability. This, in turn, results in widespread environmental deterioration and the aggravation of wrong perceptions.

Decisive and **urgent policy action** is therefore needed in terms of understanding, recognizing and supporting mobile pastoralism. Policy should focus on producing specific regulations for these extensive farming systems (separated from industrial and intensive farming system regulations), and helping to improve key issues such as production of safe and high-quality foods, sanitary regulations, use of protection dogs, available data and statistics, and improving the state and status of traditional pastoral routes and existing drover roads.

To attain these objectives a change in the **current agricultural policy** approach is fundamental (e.g. in the new EU Common Agricultural Policy). The integration of environmental and social principles must be real in order to shift agriculture policy focus from supporting nature degrading, intensive production systems to those that provide a high level of public services and improve human wellbeing, as is the case for mobile pastoralism.

This document makes the case for mobile pastoralism – a beneficial practice that is seriously threatened today, not just in the Mediterranean, but all over the world.

Photo Credit: Spanish
pastoralist with Pramenka
flock in Eastern Herzegovina.
© Pablo Manzano





INTRODUCTION

Mobile pastoralism is the most efficient livestock farming system in terms of use of forage resources, water and energy, and one of the most sustainable food systems on the planet. The herds move to pastures according to seasonal availability and this has traditionally characterized grazing in the Mediterranean Basin – one of the main biodiversity hot spots on Earth, partly due to these ancestral mobile pastoralist practices. Although herbaceous pastures do exist in the Mediterranean region, shrub or wood pastures are predominant, having additional qualities in terms of both forage provision (particularly important in dry conditions) and high nature values². Mobile pastoralism's contribution to rural economy, society and biodiversity is also outstanding, integrating the three dimensions of sustainable development (economic, social and environmental). Mobile pastoralism is thus a crucial element in the achievement of the Sustainable Development Goals and it is a paradigmatic example of what FAO defines as “climate-smart agriculture”³.

Increased global environmental awareness, particularly in the framework of global climate change, has put a focus on livestock production. Greenhouse gas (GHG) emissions, land degradation or deforestation and biodiversity loss are impacts attributed to livestock⁴, where extensive practices carry much of the burden (cf. Climate Change Mitigation section of this document). However, sustainable extensive livestock production is linked to traditional practices⁵ and to cultural landscapes⁶, both elements being the backbone of Mediterranean mobile pastoralism. The understanding of sustainability has also been widened in past decades, comprising not only environmental but also economic and social aspects.

Pastoralism is an economic activity that can be defined as a livestock production system that maximizes flexibility in order to thrive upon unpredictable resources, through livestock mobility and communal land management. It is a very logical although complex production system that merges environmental, social and economic rules, and has therefore been subject to repeated misunderstandings by analysts and policymakers. It is easy to fall into the trap of using terminologies or understandings that undermine its value⁷.

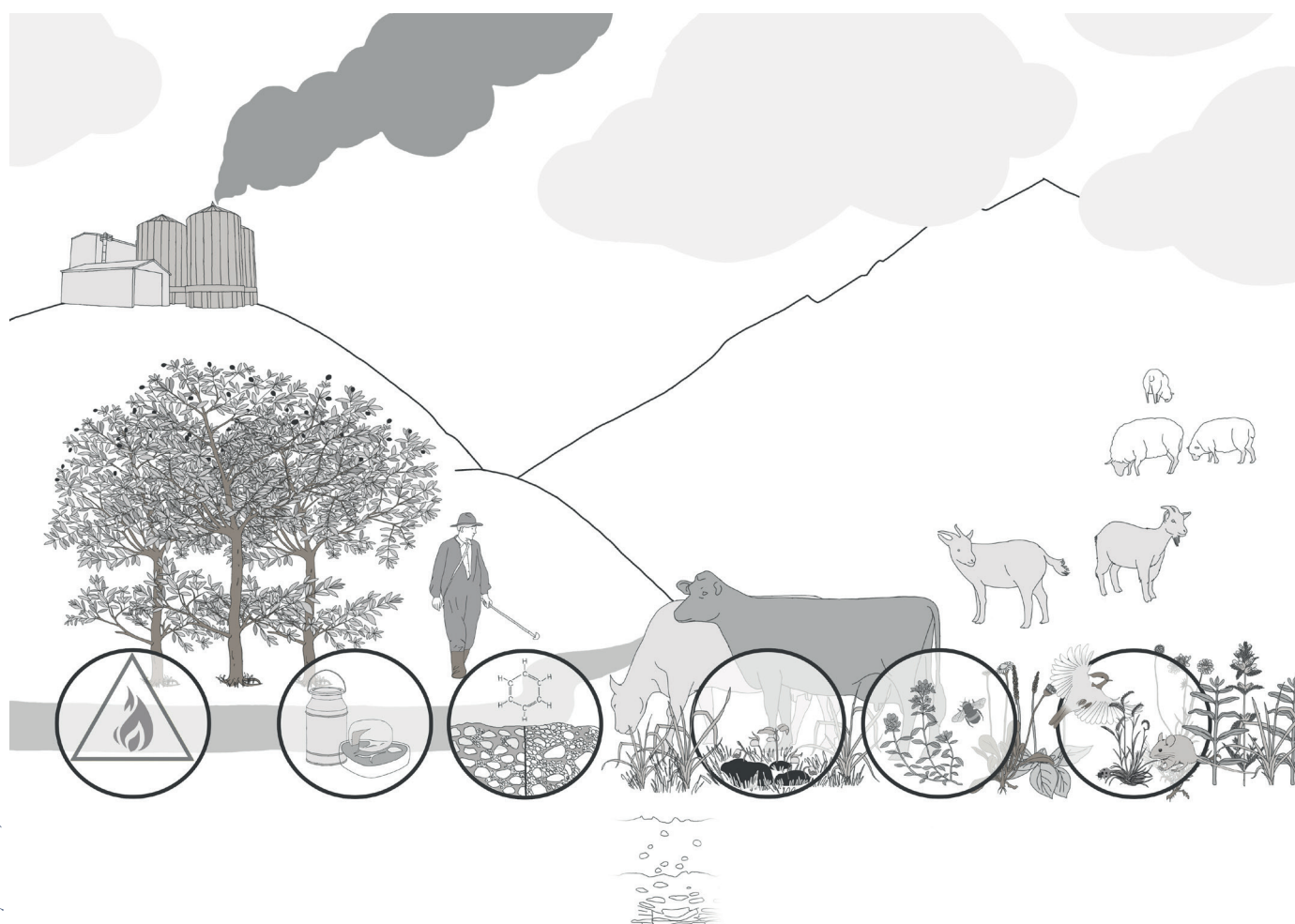
In the current climate change scenario, mobile pastoralism fulfills a crucial role as a tool for ‘retroinnovation’, or innovation through traditional practices, in both adaptation and mitigation and it can also contribute to tackle other major challenges which modern society currently confronts: the economic crisis, the need for participatory governance, and social stability.

The main objective of this document is thus to elaborate solid arguments as a basis for advocating and lobbying in favour of public policy support to mobile pastoralism both at Mediterranean and international level.

BOX 1: ECOSYSTEM SERVICES PROVISION⁸.

The Millenium Ecosystem Assessment⁹ categories provide a framework to summarize the public goods and ecosystem services stated in this document that are provided by mobile pastoralism:

- Provisioning: forage, fertilization, human and animal food, hunting, fiber, wood fuel, landscape, biodiversity, etc.
- Regulating: seed dissemination, species conservation, clean air, habitats, plant species control and regeneration, water cycle regulation, soil protection, wildfire prevention, floods and erosion prevention, microclimate regulation, carbon storage, etc.
- Cultural: tourism, hunting, cultural identity and values, spiritual values, recreational and health benefits, traditional and scientific knowledge, etc.
- Supporting: nutrient cycle maintenance, pollination, etc.



⁸ See also Hoffmann et al 2014

⁹ Millennium Ecosystem Assessment 2003, Ch. 2: Ecosystems and their services, Fig. 2.1.

A photograph of a brown skink resting on a forest floor. The ground is covered with a mix of small, light-colored stones and numerous fallen leaves in various shades of brown, tan, and green. The skink is positioned horizontally across the middle of the frame, its body slightly curved. A white rectangular box with blue text is overlaid on the upper portion of the image.

Environmental Axis

Photo Credit: Skink in an
Eastern Herzegovinian forest
© Pablo Manzano

BIODIVERSITY

According to IUCN *the Mediterranean Basin is one of the world's richest places in terms of **animal and plant diversity** and it is recognized as one of the first 25 Global Biodiversity Hotspots*¹⁰, largely due to traditional pastoral practices. Pastoralism creates habitats without which other species could not survive (such as certain invertebrate and bird species), sustaining their botanical diversity to a high degree – in therophyte-dominated pastures, 180 spp/0.1 ha and 30 spp/400 cm² can be found¹¹. Well-managed livestock can also prevent the spread of invasive species¹².

Regarding the maintenance of ecological functions, transhumant routes can be acknowledged as **ecological corridors** along which millions of seeds and insects are moved via the animals' coats and fleeces, hooves and droppings. A herd of 1000 transhumant sheep in Spain transports as many as 200 million ingested seeds along drove roads during their 1,500 km long migration with a mean dispersal distance of 40 km¹³ - other means of dispersal such as seeds attached to the fleece¹⁴, or seed spitting¹⁵ should be added to this figure. These animal movements interconnect valuable habitats and protected areas, avoiding their isolation and fragmentation, which are amongst the most serious threats these areas face today.

The role drove roads play in **habitat connectivity** is not restricted to the dispersal phenomena; they provide habitat heterogeneity that increases plant diversity¹⁶ and serve as a refuge habitat for birds¹⁷ or arthropods¹⁸, including pollinators that can yield key ecosystem services¹⁹, in otherwise hostile intensive land use landscapes. Their fractal nature²⁰ multiplies their connectivity, which is however linked to keeping them in use. Given the heavy fragmentation in, for example, European habitats, this feature is very relevant for the EU's *Green Infrastructure* strategy²¹ - to which the effect of homogenization derived from intensification is added²².

Mobile pastoralism is also relevant in the **maintenance of food webs**. Different scavengers along the Mediterranean basin are favoured through pastoralism²³, as are insects providing valuable ecosystem services associated with nutrient cycling, such as dung beetles²⁴, especially if adequate, moderate livestock numbers are applied²⁵, or ants²⁶.



¹⁰ https://cmsdata.iucn.org/downloads/the_mediterranean_a_biodiversity_hotspot_under_threat.pdf

¹¹ Peco et al 2006

¹² DiTomaso, 2000

¹³ Manzano 2015a:145

¹⁴ Manzano & Malo 2006

¹⁵ Delibes et al 2017

¹⁶ Azcárate et al 2013a

¹⁷ Lentini et al 2011

¹⁸ Azcárate et al 2013b

¹⁹ Hevia et al 2016

²⁰ Manzano Baena & Casas 2010

²¹ European Commission 2013

²² Gossner et al 2016

²³ Marinković & Karadžić 1999, Xirouchakis & Nikolakakis 2002, Mateo-Tomás 2013

²⁴ Barbero et al 1999

²⁵ Tonelli et al 2017

²⁶ Manzano et al 2010



Photo Credit: Iberian lynx.
© CBD-Habitat

Bats can also benefit from extensive livestock, in turn providing pest control services²⁷.

The latest available data for the EU show that one of the main **causes of biodiversity depletion** in Europe is the **abandonment of pastoral practices**²⁸. This is in spite of several pasture types being legally recognized as “priority natural habitat types of Community interest” by the Habitat Directive and the EU thus stating legal obligation to protect them. There is an increasing demand to include sustainable agricultural practices as a tool for conservation (EFNCP 2015b)²⁹. Grazed pastures have shown to be the only cultural landscape whose abandonment triggers a biodiversity loss, and their species composition bears the highest resemblance to ecosystems that are considered “natural”³⁰. Intermediate disturbance through grazing sustains species diversity³¹. The decline of species as threatened as the Iberian lynx, among others, dependent on grassland-scrubland mosaics maintained by livestock³², or amphibians whose populations are sustained by traditional water infrastructure for livestock³³, are linked with pastoralist abandonment.



COMBATING LAND DEGRADATION

Fire prevention. Wildfires devastate the Mediterranean year after year with huge losses of economic, social, environmental and cultural values. One of the root causes is the abandonment of pastoral practices, so the biomass previously consumed by animals is left untouched, forming fuel for wildfires. Lands under silvopastoralist use have proven to be less prone to wildfires because of understorey reduction³⁴. Additionally, livestock has proven to be very useful in maintaining firebreaks³⁵. This adds to the usefulness of controlled, traditionally prescribed fires by pastoralists – and where the involvement of the public sector is possible and positive³⁶.



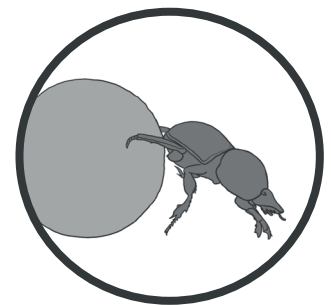
In spite of pastoralists being routinely accused of overgrazing and forest damage, extensive livestock has proven to sustain adequate **regeneration of tree cover** in parkland/savanna-like landscapes. Livestock that migrates seasonally leaves the pasture just at the time when the grass starts to become scarce and before the animals start browsing on young saplings, allowing for their survival³⁷. Adequate livestock management, often consisting in mobile pastoralism, preserves some shrubs in the landscape that provide shade to young trees and shelter them from grazing, improving their survival rate up to adult age³⁸ and ensuring the long-term durability of the ecosystem.

- 27 Ancillotto et al 2017
- 28 European Environment Agency 2015
- 29 EFNCP 2015b
- 30 Plieninger et al 2014
- 31 Dumont et al. 2012
- 32 Palomares et al. 2001
- 33 Canals et al. 2011
- 34 Rigueiro-Rodríguez et al 2005
- 35 Ruiz Mirazo 2011
- 36 Vélez 2010
- 37 Carmona et al 2013
- 38 Perea et al 2016

Livestock grazing can also be used as a tool for **soil restoration**. Vegetation cover can be restored, therefore preventing floods and erosion. In the process, plant³⁹ and arthropod⁴⁰ diversity can also be improved. Low grazing pressure has been observed to be a preferable restoration strategy than complete grazing cessation or afforestation⁴¹. The full restoration of previous diversity is challenging, however, so preventing abandonment is preferable⁴². Additionally, manure has the capacity to increase soil macroaggregates, compaction resistance and water content capacity⁴³, all of which have a direct positive effect on resistance to erosion. Livestock corralling (“bomas” or “kraals”) is routinely used as a technique to regenerate degraded vegetation and soils in Eastern Africa⁴⁴, equivalent to the practice of folding livestock in Europe (“redileo” in Spain). In a mutually beneficial relationship, livestock benefits from high-diversity pastures in terms of nutrition and health, even if feeding from hay⁴⁵.



Livestock plays an important role in soil **nutrient cycling**. In agropastoralist (crop-livestock) systems, mineralization of organic matter is to a large extent done by bacteria in the dung⁴⁶ that dung beetles as well as ants and termites further contribute to incorporate into the soil⁴⁷. These processes generate a net nutrient transfer from rangelands to croplands⁴⁸, thereby fertilizing crops and contributing to food security. They also steer a slow release of N and other nutrients, therefore preventing water pollution by leaching⁴⁹. While livestock remains fundamental for its role in nutrient cycling even in very densely populated humid areas⁵⁰, this sustainable fertilization strategy has however been superseded by the use of resources from fossil reserves⁵¹.



While water exhaustion and **water usage** are related to land degradation, a large water footprint is routinely attributed to livestock. A better understanding of green water vs. blue water demand is desirable⁵², however, particularly in the case of water usage by traditional pastoralists. As their use of blue water (i.e. water extracted from streams or reservoirs) is minimal if at all, and their use of green water (i.e. rainwater) has no impact on the general availability of water, given their reliance on natural vegetation, their water footprint can be considered nil⁵³. Most importantly, the benefits on soil structure mentioned above also have a **direct benefit** in the **water storage capacity** and in the **regulating water cycle**.



- 39 Pykälä, 2003
- 40 Pöyry et al., 2004
- 41 Papanastasis et al 2017
- 42 Muller et al. 1998
- 43 Blanco-Canqui et al 2015, Mikha et al 2015
- 44 Kimiti et al 2017, Huruba et al 2017
- 45 French 2017
- 46 Haynes & Williams 1993:149, Rufino et al 2006
- 47 Slade et al 2016a, Manzano et al in prep
- 48 Powell et al 1996, Schiere & Kater 2001, Rufino et al 2006
- 49 Rufino et al 2006
- 50 Thorne & Tanner 2002
- 51 Schiere et al 2002
- 52 Hoekstra 2016
- 53 Scholtz et al 2013, Pfister et al 2017

Climate Change Axis

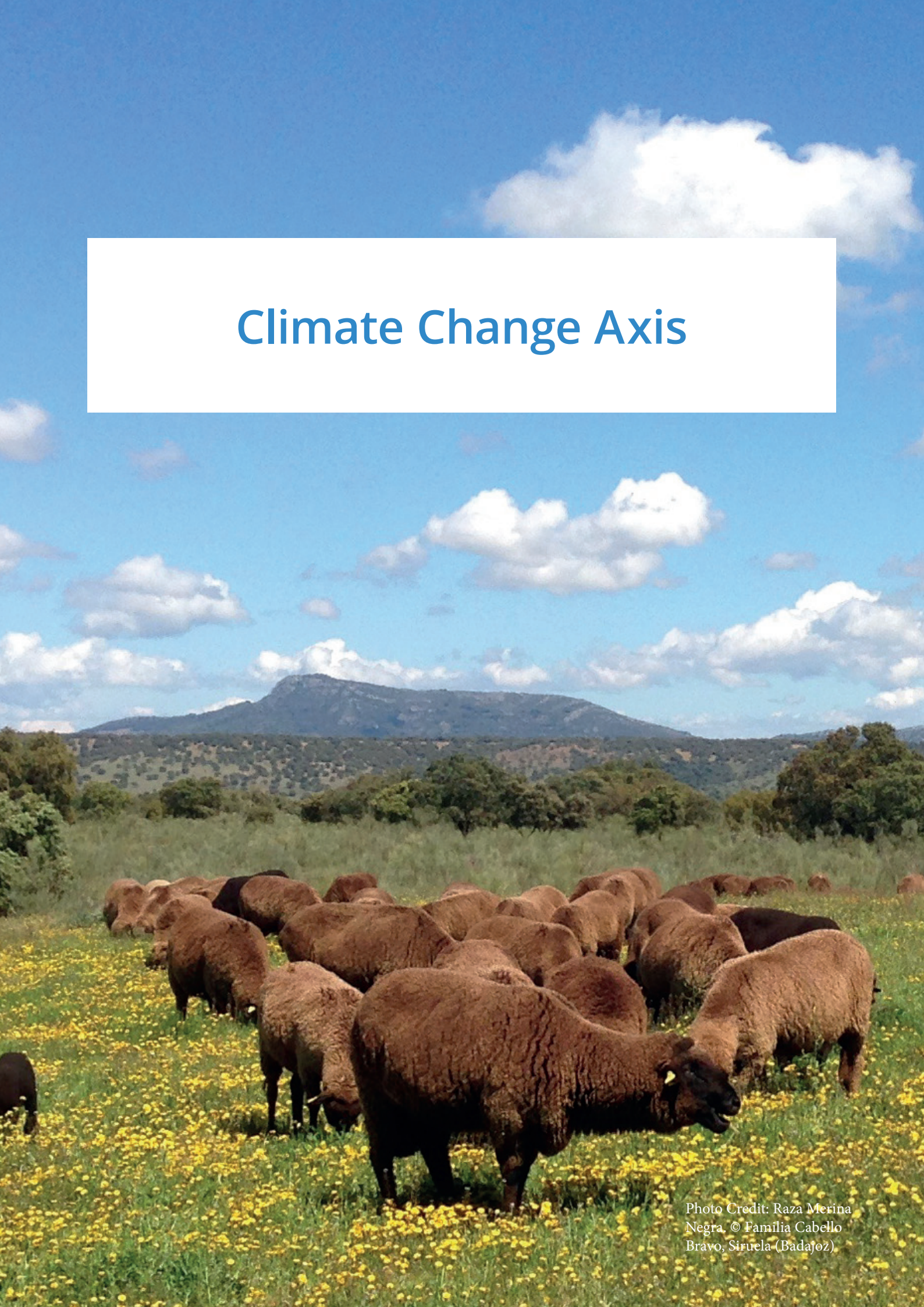


Photo Credit: Raza Merina
Negra, © Familia Cabello
Bravo, Siruela (Badajoz)

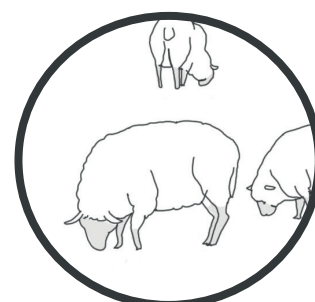
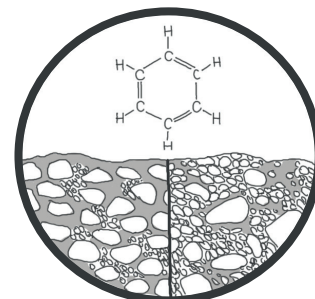
While mobile pastoralism has been rather more linked to climate change adaptation, here we list significant arguments to also take it into account as an important element of mitigation strategies.

MITIGATION

Regarding **carbon storage**, grazing has a crucial role in CO₂ offsets and grazing land is one of the largest sinks for long-term carbon sequestration. On the other hand, degraded or tilled pastures can release large amounts of carbon dioxide into the atmosphere. Keeping these areas managed under sustainable grazing practices is essential for climate change mitigation.

The potential of grazed ecosystems to store carbon in the soil is illustrated by the IPCC report on land use change⁵⁴. Savanna or grasslands store most of the carbon in the soil, highlighting the sequestration potential of good livestock practices. This has been the central argument to soften the mainstream message of extensive livestock as a big GHG source⁵⁵. Given the high dependence of carbon storage potential on seasonality and water availability⁵⁶, adequate soil conditions that retain water and allow for extended soil moisture (see above) will be essential for translating it into actual soil carbon fixation.

Mobile pastoralism can also have a very relevant role in **low-carbon livestock production**. Pastoralism, along with other livestock practices that vary in their degree of extensification, has been largely attributed with large carbon footprints, which end up offsetting potential benefits of e.g. sequestration in rangeland soils⁵⁷, to a great extent because of the intensity of methane and nitrous oxide emission in cellulose-rich diets and their very strong greenhouse effect in the short term. These attributions are nevertheless contentious, because they do not take into account baseline emissions in ecosystems⁵⁸ and the very low fossil fuel use footprint by pastoral practices (because of less reliance on industrial animal feed⁵⁹). Fuel-derived carbon dioxide is a much more dangerous greenhouse gas in the long term, i.e. a scale of thousands of years⁶⁰. This effect is also measurable in terms of energy, which illustrates the trade-off between efficiency as currently measured and sustainability⁶¹. This basically translates into **mobile pastoralism being the most climate-friendly livestock production system**. If this argument is taken into account, the lower demand of extensive systems for croplands and fodder, being able to feed on grass from marginal lands or by-products from crop production and food processing⁶² would make sustainable diets achievable. Dung-burying insects such as dung beetles⁶³ or ants⁶⁴ seem also to have a



54 Table 4 at IPCC 2000

55 Garnett 2009

56 Hovenden et al 2014

57 Gerber et al 2013

58 Manzano & White submitted

59 Casas & Manzano 2011, Global Justice Now 2015, Vigan et al 2017

60 Manzano & White submitted

61 Rodríguez-Ortega et al 2017

62 Schader et al 2015, Röös et al 2016

63 Slade et al 2016b

64 Manzano et al in prep



relevant role in reducing current estimates of GHG emissions from manure excreted by pastoralist livestock.

ADAPTATION

In the discussions around climate change, pastoralism has been mainly mentioned because of its undeniable advantages for climate change adaptation, as they are intimately linked with their **resilience** strategies. Publications on the issue are abundant for sub-saharan Africa⁶⁵, but there are also examples of global scope⁶⁶. This is not surprising, mobile pastoralism being a livelihood that has developed not to cope with but to profit from unpredictable resources⁶⁷, even if this concept is difficult to understand both by scientists and practitioners⁶⁸.

Among the factors that contribute to the adaptation capacity of mobile pastoralists, perhaps the most important ones are **mobility** and **communal land management**. Both elements allow pastoralists to have a large pool of natural resources, not restricted to private lands. Grazing resources can therefore be optimized both in terms of quality (accessing the best available fodder) and quantity (no grass will be left ungrazed because of insufficient animals e.g. in an extraordinarily productive year). In the context of climate change, the ability to cope with changes is easily derived from these strategies. Any attempt to disrupt mobility will easily translate into a dramatic and often fatal loss of resilience⁶⁹.

Indigenous breeds are also an essential element, as they are adapted not only to local environments but also to the practices of the community. Repeated attempts to introduce “improved” breeds that cannot cope with the local production regime are therefore totally counterproductive for intended development aims⁷⁰.

Photo Credit (from top to bottom): Water provision to livestock through water troughs; Transhumant flock migrating through dry pastures; Transhumant flock migrating through snow covered pastures.
© Trashumancia y Naturaleza

65 e.g. Nassef et al 2009, WISP 2010, Kisangani & Abdel Aziz 2011, Manzano 2014

66 Nori & Davies 2007, Neely et al 2009

67 Krätli 2015

68 Krätli et al 2015

69 Nori et al 2008

70 Manzano 2015b, Manzano 2017

Economic Axis



Photo Credit: Locally
adapted Pramenka sheep in
Eastern Herzegovina.
© Pablo Manzano

Given the uniqueness of many pastoralist products, markets offer great opportunities for pastoralist development⁷¹, but mobile pastoralism also has a particular advantage at **fixing human population**, creating **sustainable economic networks** in rural areas. This is especially important in those areas considered marginal for the current economic model, which make them vulnerable to a lack of investment and depopulation, feeding the vicious circle of socio-economic decline of these areas.

However, regarding low population density and marginal lands for crop production, pastoralism might be the best cost-efficient option⁷² as few other economic activities are possible. Pastoralism can also play a unique role to structure a sustainable economic network in areas where diversity and product specificity are central market values⁷³, and that rely on diversified and complementary networks of small enterprises and family businesses which will bring more resilience to rural economies (responding to the logic that it is “better to have 1000 businesses with 4 workers than only 1 enterprise of 4000 workers”). This can be the foundation for a **strong and resilient rural economy**, by creating sustainable direct and indirect jobs and stimulating *peripheral economies* (linked with different types of tourism, handicrafts, wine and gastronomy, etc.). This would also contribute to facilitate traditionally marginalized groups (e.g. women) to access jobs or become entrepreneurs, and to alleviate the out-migration of young people to urban areas due to the lack of job opportunities.

Pastoralism can also benefit from the steadily increasing demand for sustainable food and other products containing “different” values (social, cultural or health related):

- **Organic:** Substantial growth is envisaged in North America and Northern Europe (with Germany at the top), but also in the Mediterranean – Spain being the first producer, and fifth worldwide (where 53.2 % consists of permanent grassland and grazing areas⁷⁴), and France and Italy are second and fourth consumer countries respectively. The three strongest per capita consumer countries in the world are also European (Switzerland, Denmark and Sweden)⁷⁵. To make the most of these opportunities, the Mediterranean organic sector should develop a strategic vision focused on cooperation among different actors in various areas (legislation, policies, information, research and extension, market etc.), with a view to achieving a more harmonious and sound development of the sector at both national and international contexts⁷⁶.
- Other **sustainable food** categories, like eco-labeled foods, sustainable sourcing, traceability, nature protection, etc. are envisaged to rise. As some market research has shown, up to 85% of consumers would choose a Natura 2000 labeled product, confirming the willingness of consumers to support biodiversity and

71 McGahey et al 2014

72 Western 1982, Krätli 2015

73 Mathias et al 2010

74 EcoLogical 2016

75 Willer & Lernoud 2017

76 Pugliese et al. 2014

local economic activity in rural areas⁷⁷.

- **Sustainability metrics** are likely to be prominent, (particularly significant for mobile pastoralism regarding carbon neutral pledges) and also food authenticity and traceability – greater investment is envisaged in ingredient supply chains to allow transparency and reduce the risk of food fraud and adulteration⁷⁸.
- The future consumer profile seems to show a tendency of reducing meat consumption (particularly red meat, considered more unhealthy) while looking for **food that benefits both health and the environment**, and from **local and trustworthy producers**. There is big potential here for pastoral products, although some efforts on innovation, new products and better communication to targeted consumers must be developed⁷⁹.

However, out of these specific market niches, mobile pastoralism is threatened by the current structure of the economic environment. Even if the environmental values it provides are recognized, the current market is not yet able to pay for them, and the organic market is still insufficient to promote their best practices⁸⁰. The costs are higher for these labour-intensive systems, so price competition with products from industrial farming (which also control part of the market supply chain) is difficult.

Regarding import/export markets, pastoralist products from developing countries could also benefit from accessing wealthier country markets, through **adding value in origin** and promoting local skills and resources for local food production, processing and trade. The recognition of this fact is nevertheless still challenging⁸¹ and will depend on trade agreements being favourable to pastoral products from small farming systems. This point can also be controversial as export/import markets will always involve transport and therefore more carbon emissions.

Access to the wider public is also challenging for pastoral products, as the majority of consumers



Photo Credit (from top to bottom): QueRed (the Spanish association for artisanal cheese making) at the Slow Food Cheese Fair in Bra, Italy. © Concha Salguero

Cheese making.
© Trashumancia y Naturaleza

Eco-lodge Kamena Gora.
© Pablo Manzano

77 SEO/BirdLife 2017
78 Ecovia Intelligence 2017
79 Interovic 2017
80 Escribano et al 2015a
81 Manzano 2016

innately tend to select oligopolies that control the mid-quality markets⁸². Joint marketing action in pastoralist collectives, however, could help tackle these issues⁸³, not only by classifying products and marketing them efficiently according to their quality⁸⁴, but also by promoting a more stable food market, based on a closer interaction between producer and consumer that avoids unnecessary intermediary market chain actors.

So **product diversification** and innovation are key to success. For example new market niches, such as demand for “grass meat” (meat from animals that feed only on grass, without industrial feed) that seem to be growing, present a big potential for extensive grazing meat. “Fifth range products”⁸⁵ also offer great potential as a new market niche for pastoralists, as they can shorten the market chain and facilitate wider access to urban consumers, including restaurants, increasing the demand for this type of product. Some experiences are already in place⁸⁶.

The potential of grazed lands for **carbon fixation** has already been discussed in this document, but access of pastoralists to carbon markets has remained challenging to date, e.g. due to ownership issues and the attribution of potential carbon payments⁸⁷, issues in determining correct management schemes⁸⁸, or high transaction costs⁸⁹. However, econometric analyses show the higher potential of more diverse grasslands in fixing more carbon, which combined with other ecosystem services provided by biodiversity may reinforce the economic arguments for conservation and for **payments for ecosystem services** even further⁹⁰.

Complementary activities and *peripheral economies* can also increase the profitability of pastoralism. For example, opportunities for **tourism** around drover roads have been extensively studied in Spain,

where they are even mentioned in the White Book on Transhumance⁹¹. These ancient routes have been mapped and protected in some Mediterranean countries and they constitute an excellent heritage for outdoor activities, compatible with transhumance uses, as recognised in the Spanish Act on Drove Roads, 1995⁹². Transhumance as a tourism activity⁹³ is increasingly being developed as a side income for many mobile pastoralists in Spain, and as a tourist attraction in Italy⁹⁴, highlighting the potential to other countries in the region.

Traditionally, rural economies have been based on “**multifunctionality**” (not on monoculture or specialization) so income and efficiency came from the combination of different activities and community deals. This might be one of the reasons why pastoralism and other traditional practices do not accommodate for mass production, standardised and specialised markets. The economies of scale, low price competition and other key concepts of industrial production are alien (and often contradictory) to practitioners of such traditional practices.

This is why, in the current market context the strong competitive point of rural areas is “**diversity**” as **opposed to standardization and mass production**. Traditional products must be linked to the territory and culture and therefore to the sustainability of their natural resources, involving the human resources of the local community.

New trends in economy, such as the so called “collaborative” or “sharing economy”, can also have a positive influence in catalysing changes in favour of traditional products and practices. However, for this to happen, establishing a reliable internet access in rural areas and other enabling conditions, will be essential⁹⁵.

82 Fernández-Márquez et al 2016

83 Manzano & Agarwal 2015

84 cf. section “Improvement of food quality” in this document

85 <http://www.gastronomes.es/en/index.php?controller=default&module=prestablog&id=24&fc=module>

86 <http://www.bbbfarming.net/portada/633-pierna-asada-a-baja-temperatura.html>

87 Tennigkeit & Wilkes 2008, Dougill et al 2012

88 Orgill et al 2017

89 Lipper et al 2010

90 Hungate et al 2017

91 AAVV 2012

92 Boletín Oficial del Estado 1995

93 Antón Burgos 2007

94 Kington 2010

95 Wagner et al 2015



Social Axis

Photo Credit: Cowboys:
Black Avileña. Cattle farmers:
García-Santana Brothers,
Navadijos (Avila, Spain).
Summer transhumance from
the lowlands of Extremadura
to the high summer pastures
in the Gredos Mountains.
© Gema Arrugaeta,
Spain, 2014.

FOOD SECURITY & FOOD SAFETY

EFFICIENCY IN FOOD PRODUCTION

One of the main, flawed political arguments to implement policies destructive to mobile pastoralism is a humanitarian one: the repeated occurrence of famines in pastoralist areas. This ignores the fact that **pastoralist livelihoods** are the **best at yielding agricultural production in the areas they live in**⁹⁶, and that crises are usually the consequence of a poor understanding of pastoralist livelihoods⁹⁷. Sufficient, well-tailored investment in pastoralist areas has the capacity to reduce conflict⁹⁸.

The same mechanisms that underlie pastoralist livelihood resilience are the ones that explain why mobile pastoralism achieves food security in otherwise harsh environments. Additionally, they achieve **optimization of resources in marginal lands** for crop production, as already described in the early 80s in the Sahel⁹⁹. This, however, is not an exclusive feature of mobile pastoralism in drylands, but also in other ecosystems such as cold¹⁰⁰ and mountainous¹⁰¹ areas.

Mobile pastoralism also yields important services for crop production by **facilitating pollination**: increases in grassland biodiversity, even if modest, improve pollinator availability and efficiency¹⁰² and therefore benefit crop yields.

IMPROVEMENT IN FOOD QUALITY

Mobile livestock is **less affected** by animal diseases, because of the trouble parasites have in establishing refugia¹⁰³. This is contradictory to the widespread veterinary strategy to immobilize livestock in order to treat diseases through drenching. Livestock reared in the open air and fed on natural pastures is more likely to be fit and **resistant to disease**, especially **local/native breeds**, which are usually hardier and more adapted to local conditions. This reduces the incidence of water and soil pollution and the reliance on veterinary products¹⁰⁴. These benefits are transmitted to the meat, milk and other derived products resulting in high quality, more secure, and healthier food. Special attention should be given to the emergence of antimicrobial resistance, which has attracted attention from the World Health Organization¹⁰⁵ and from European institutions¹⁰⁶. This has triggered the involvement of international organizations that lead on veterinary health issues such as FAO¹⁰⁷ or OIE¹⁰⁸.

96 Krätli 2015

97 Krätli et al 2015, Manzano 2017

98 de Haan et al 2016

99 Breman & de Wit 1983

100 Dwyer & Istomin 2009

101 Manzano Baena & Casas 2010, EFNCP 2015a

102 Orford et al 2016

103 Kenyon et al 2009

104 Eisner et al 2014

105 WHO 2015

106 European Parliament News 2016

107 <http://www.fao.org/antimicrobial-resistance/en/>

108 <http://www.oie.int/our-scientific-expertise/veterinary-products/antimicrobials/>

There is solid evidence that **pasture-fed animal products consistently yield a better nutritional profile**, with direct obvious implications for pastoral products. Benefits are linked with a lipidic composition that is better for human health, essentially consisting in higher content of polyunsaturated fatty acids (PUFAs) or conjugated linoleic acids (CLAs), or higher Omega 3 content (better Omega 6/Omega 3 balance). This is the case for pork meat, of which the Iberian pig is the best example of pastoralist production¹⁰⁹, for beef¹¹⁰ as well as for lamb¹¹¹ and cow milk¹¹². In the latter case, it is considered healthier even if the iodine content is lower in pasture-fed animals.

Sustainable livestock production is able to provide **enough animal products for healthy human diets** (enough high-quality protein)¹¹³. This is an important issue considering the increased alerts about health risks caused by excessive red meat consumption and its impact in the public debate¹¹⁴, including effects on obesity¹¹⁵. It is also important considering that intensive livestock production impacts are regarded as inevitable because of the rising demand in animal products that is supposedly to be satisfied¹¹⁶; this rising and unhealthy demand trend has very negative projections regarding sustainability¹¹⁷. Importantly, the perception that a vegan diet is most sustainable, because of the lost efficiency in the conversion of plant food into animal food, is proved as flawed in this case by the use grazers make of uncultivable land: healthy diets with moderate amounts of animal products have indeed higher carrying capacity¹¹⁸. Based on the evidence presented in the previous paragraph, it is clear that such a scenario where animal foods are obtained from mobile pastoralism would not only be sustainable but would also provide the highest quality of animal products.

CULTURE

The practice of mobile pastoralism is deeply rooted in the landscape and is imbued with cultural significance. As such it is an important cultural practice that contributes to the preservation of **cultural diversity**¹¹⁹ and immaterial heritage¹²⁰ in all countries where it persists.

Mobile pastoralism, as a major traditional cultural practice in the Mediterranean, dating as far back as 10,000 years, is a unique example of how biological and cultural components have been constantly interacting through millennia. This interaction has shaped traditional Mediterranean landscapes and produced innumerable cultural manifestations. Traditional farmhouses, huts, watering points, cultivated terraces, bridges, stone walls, hermitages and monasteries, and a long list of other rural architectural features form part of a material heritage that is the physical expression of a long and wise relationship between nature and humankind. The maintenance of **local breeds**, themselves of cultural importance, is another way in which this practice contributes to maintaining cultural heritage¹²¹.

Consequently, pastoral landscapes harbour a rich cultural heritage, both material and immaterial, which is crucial not only for our physical survival but also for our spiritual sense of identity and belonging.

The immaterial heritage of pastoralism in the Mediterranean is outstanding and can be found in countless manifestations of folklore, local agroecosystems, traditional ecological knowledge, cultural practices, art, traditional celebrations, gastronomy, poetry, and so forth. Some selected examples are provided in the Annex by way of illustration.

109 Jiménez-Colmenero et al 2010
110 Średnicka-Tober et al 2016a
111 Howes et al 2014
112 Średnicka-Tober et al 2016b
113 Schader et al 2015
114 Rutsaert et al 2015
115 Wang & Beydoun 2009
116 FAO 2004
117 Tilman & Clark 2014
118 Peters et al 2016

119 Casas & Hernández Yustos 2012
120 Boletín Oficial del Estado 2017
121 Köhler-Rollefson 1997, 2001

OTHER SOCIAL ISSUES

Mobile pastoralism is able to **improve territorial balance**. The high labour intensity of the livelihood and the high added value of its products, as mentioned above, are able to support more people in rural areas¹²², sustaining strong, vibrant and resilient communities. Rural areas need to be provided with basic services in order to attract young people and a variety of professionals to reduce out-migration to urban areas and tackle the depopulation that is becoming critical in some Mediterranean areas¹²³. Simultaneously, record numbers of migrants and asylum-seekers arrive from other parts of the Mediterranean, most of them living in overcrowded conditions in temporary camps. This challenging paradox should be a central point of reflection in social and economic decision making processes and crucial for the future of rural life.

However, at policy level the contrary has happened, with **small scale farming** in rural areas **largely ignored**. Official figures show that for example in the EU, between 2003-2010, three million farms disappeared, of which nearly 80% were smaller than 5 ha. In contrast, the number of farms larger than 50 ha increased by nearly 30,000 in the same period¹²⁴. This can be attributed to a European Common Agricultural Policy (CAP) that for decades has favoured industrial farms with a productivity focus, while displacing those that generate the highest quality products with the least negative impact. Latest CAP reforms seem to deepen the disadvantage of farms in low-performing areas¹²⁵.

High value products protect smaller farms from being outcompeted, and this has proved critical for Mediterranean livestock owners, particularly due to quality certification initiatives¹²⁶. This is very important to guarantee some stability of rural populations in areas of low agricultural potential.

Gender is a major factor explaining rural depopulation and the collapse of pastoral systems.

The fundamental role of women in pastoralist societies has been well described, but also the labour division around gender lines and their low empowerment in traditional settings¹²⁷. While women's mobility can be constrained in less developed settings¹²⁸, their abandonment of the rural landscape in more developed countries poses a real problem of social sustainability¹²⁹ as well as of cultural erosion that can compromise future innovation and diversification opportunities, with industries such as cheese-making tied to the traditional knowledge of women. **Women's empowerment**¹³⁰ is therefore a **fundamental** strategy for the long-term sustainability of pastoral societies. Empowerment of pastoralist women to make them part of the decision making process would be a decisive change for keeping rural areas alive and in turn traditional practices such as mobile pastoralism. In some countries women are starting to react and creating their own groups¹³¹.

Mobile pastoralism has the ability to provide the **highest** levels of **animal welfare** among livestock husbandry. Whereas intensive systems have been heavily criticised for ethical concerns, pastoralist systems cannot be viewed in the same light. Animals in extensive husbandry techniques enjoy the open pasture, exercise and natural food, and this make them much less prone to disease. Additionally in terms of productivity, they benefit from lower veterinary treatments, availability of shadowed shelters and variety in food choice¹³². Livestock intensification implies an increase in animal densities that also has a direct impact in animal welfare loss¹³³.

122 Escribano et al 2015b

123 Pinilla et al 2006

124 DGARD 2013:162

125 Giannakis & Bruggeman 2015

126 Ligios et al 2005, Pflimlin et al 2006

127 Flintan 2008

128 Ilcan 1994

129 Ní Laoire 2001, Hoggart & Paniagua 2001

130 IUCN 2013

131 For example, Ganaderas en Red in Spain: <https://www.facebook.com/GanaderasenRed/>

132 Broom et al 2013, Broom 2016

133 Llonch et al 2016

Policy Action



Photo Credit: Watch out,
sheep crossing!
© Wassim Ghozani,
Tataouine-Tunisia, 2014.

Mobile pastoralism has been the **victim of poor policies** worldwide¹³⁴, mainly due to poor understanding at political decision-making levels. The Mediterranean is no exception with, for example, an EU Common Agriculture Policy that fails to support pastoralism¹³⁵ and that is unable to understand the functioning of woodland pastures¹³⁶ or traditional governance systems such as common grazing lands¹³⁷.

The **public policy steps needed** in support of mobile pastoralism should build upon evidence presented here in order to help comply with other national and international legislation. Arguments and supportive data have been put forth so that the commitments within the UN Conventions (Biological Diversity, Desertification and Land Degradation, and Climate Change) can be honoured. Other relevant legislation includes nature conservation regulations, animal husbandry and animal welfare regulations, Rural Development Strategies, EU 2020 Strategy, etc. Further legislation could be built upon the 2016 UNEA resolution (UN Environmental Assembly) in favour of pastoralism¹³⁸.

A traditional element to avoid conflict of livestock keepers with predators in the Mediterranean while allowing for their co-existence has been the use of **livestock protection dogs**¹³⁹, with local breeds in nearly every corner of the Mediterranean basin. However, use of such dogs is increasingly being limited by Breed-Specific Laws created to protect the general public against potentially dangerous dogs. Specific provisions are required to protect the use of working dogs with pastoralists in order to minimize human-wildlife conflict. On the contrary, wise use of these dogs should be encouraged or even subsidized in light of the increasing conflicts with expanding bear and wolf populations. Further research is also needed to establish best practices in pastoral dog management¹⁴⁰.

Another difficult issue is in relation to sanitary and **food hygiene regulations**, such as those for animal disease control, animal husbandry and food processing. These are usually tailored to meet larger-scale industrial needs, making compliance very difficult for small producers. Good examples are the cheese processing regulations: in some countries, the same hygiene and sanitary requirements are applied irrespective of whether the producer is a large factory or a small artisanal holding. This often leads to the **prohibition of on-site cheese-making** for livestock farmers, or makes investment in cheese-making unaffordable for small producers. The **adaptation** of the current cheese production regulations **to artisanal production** is therefore crucial to their competitiveness: the European Commission has recently approved a guide for Good Hygiene Practices in the production of artisanal cheese and dairy products¹⁴¹, which is an important step forward.

134 de Jode 2010, Khazanov, 2013

135 Giannakis & Bruggeman 2015

136 EFNCP 2015a

137 EFNCP 2015b

138 UNEP 2016

139 Cummins 2008

140 Eklund et al 2017

141 Eklund et al 2017

The progressive **closure of small rural slaughterhouses** is another handicap for small livestock farmers. It is not only that the animals have to be taken further to be slaughtered (with more distress for the animals), but also that slaughterhouses are often large and privately owned and they are in a strong position to impose prices and other conditions. One potential solution could be using **small scale mobile processing units**. This would reduce costs, improve animal welfare and ease market access for small producers. However, in general, current legislation does not facilitate the use of this alternative, despite its strong potential for rebuilding local and sustainable food systems. However some experiences have been already implemented in for instance the USA and Sweden, and new voices are rising for the approval of such systems in countries such as France and Spain¹⁴².

Specific strategies should also be designed to support **high-value** products associated with high quality. Specific marketing of the **pastoral products' superior quality** is well proven to be the best opportunity for the survival and livelihood of pastoral communities, but it still **needs support**. The bottleneck for organic meat farms in Western Spain, for example, has been the conservative middlemen, who still do not demand enough high-quality products to sustain organic farms – even if the interest of individual consumers is keeping pace with the change of producer mentalities¹⁴³.

National **agricultural policies**, or the CAP in the case of European Union members, should be **redesigned** with several aspects in mind. Public payments to agriculture should be structured in a way to differentiate extensive from intensive livestock production (Box 2), while **territories** should get **differential** treatment according to their **conservation value**¹⁴⁴. Public funds and policies should support and promote agricultural systems that provide public and ecosystem services, and plan to put an end to production systems that degrade and deplete natural resources and social wellbeing.



Photo Credit (from top to bottom): Drove roads demarcated by a milestone; Drove roads are also used for ecotourism activities such as cycling.
© Trashumancia y Naturaleza

¹⁴² Gomar 2016

¹⁴³ Escribano et al 2015a

¹⁴⁴ EFNCP 2015b

BOX 2: DISTINGUISHING MOBILE PASTORALISM AND *EXTENSIVE* FARMING FROM *INTENSIVE* LIVESTOCK REARING.

We often talk about “extensive farming systems” in contrast with “intensive farming systems”. The former means low input farming systems where the livestock lives outdoors, ranging the territory and grazing the local natural resources, managed mainly through pastoralism and without any - or very little - use of external inputs. The latter means an industrial way to maximize animal food production, by applying industry methods through the concentration of a high number of livestock indoors, fed and kept by the intense use of external inputs. The extensive systems are highly sustainable and produce environmental benefits, while the intensive systems produce a number of negative environmental impacts.

However, the sustainability of livestock production shows different degrees of impact according to the degree of intensification. Three major levels can be established: extensive, mixed and industrial. The first one roughly corresponds to mobile pastoralism; the second corresponds to animals kept in open fields but fed to a large extent with fodder; while the third one corresponds to feedlots. Mixed and industrial systems show distinct environmental impacts, yet they are continually considered together in national statistics and decisions, which hinders the development of appropriate policies.

Mixed systems are very common on both shores of the Mediterranean due to fodder subsidies, in principle provided to help poor livestock keepers. They are often identified with pastoralism but cause specific environmental problems such as land degradation. This happens because of nutrient depletion if livestock densities¹⁴³ are too high; demand for fibrous food above the available carrying capacity because of high protein input in fodder that needs to be compensated by fibre, as is the case in Algeria and Syria¹⁴⁶, or general increased trampling. Fodder subsidies have proven to trigger overstocking and land degradation¹⁴⁷.

Differentiating pastoralist systems from less extensive systems is also necessary when designing Greenhouse Gas (GHG) mitigation policies¹⁴⁸; current proposals that do not differentiate among them¹⁴⁹ can have a big impact in undermining pastoralist systems while at the same time not fulfilling the aimed objectives¹⁵⁰, as pastoralist systems are negligible GHG emitters if adequate baseline emission levels are accounted for. Conversely mixed systems, promoted by current subsidy schemes, increase GHG emissions due to higher demand for industrial fodder, with its associated footprint, and to a number of inefficiencies in feed digestion and management¹⁵¹.

Pastoralism on the other hand is an environmentally friendly production system that should therefore be promoted with an environmental perspective, while more intensive systems should be gradually led and encouraged to increasingly comply with more sustainable production standards. It would therefore be advisable to make a clear statistical distinction between intensive and pastoralist systems, so that distinct and appropriate environmental policies can be designed for both.

143 Powell et al 1996

144 Hazell et al 2001:19-23

145 Hazell et al op, cit., Fundación Entretantos forthcoming

146 Fundación Entretantos forthcoming

147 Key & Tallard 2012

148 Vigan et al 2017, Manzano & White submitted

149 Herrero et al 2016

Shortcomings / Knowledge Gaps

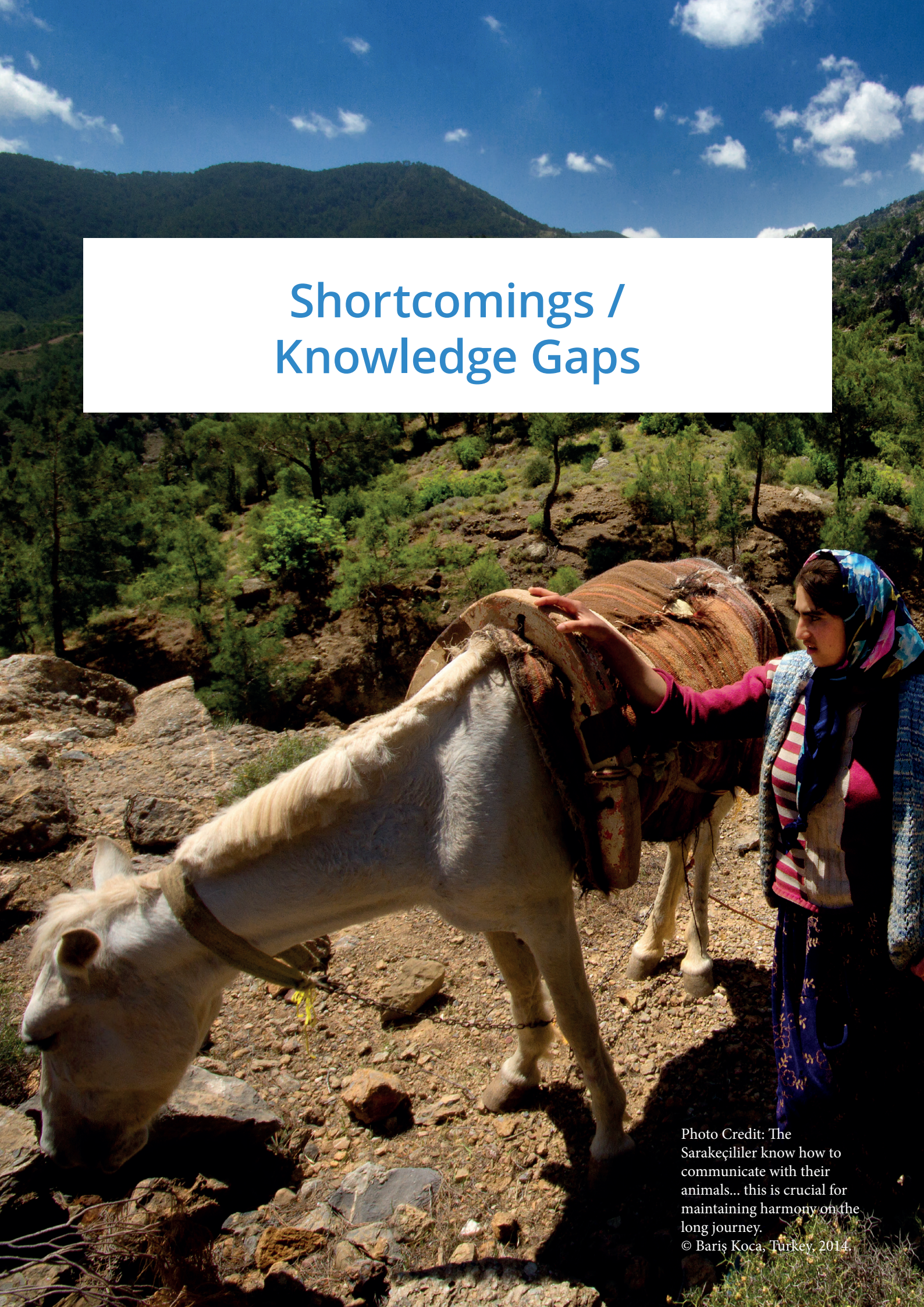


Photo Credit: The Sarakeçililer know how to communicate with their animals... this is crucial for maintaining harmony on the long journey.

© Barış Koca, Turkey, 2014.

Beyond the promotion of adequate policies, some **knowledge gaps** persist around Mediterranean pastoralism that require future efforts to ensure **accurate decision-making**.

A major shortcoming is the **lack of documentation about drovers' roads**. We have revised above how determinant these structures are for the provision of ecosystem services. However, only France and Spain seem to have a more or less complete catalogue of their drove roads that allows for protective measures. Efforts are currently underway to map drove roads throughout the Mediterranean.

National **statistics do not** discriminate between the different types of livestock production systems and are not therefore able to **determine how many people** are working **in mobile pastoralism** or **how many animals** they have, and other basic information. In the case of the European Union this is particularly deplorable, for there have been specific payments for "livestock extensification". This means that the information is managed by local administrations but there is no demand for it to be incorporated into national statistics. Without that information it is hard to design efficient interventions and, when researchers try to come up with a number, they have to use indirect estimates¹⁵² that may not be accurate enough. In North Africa and other Mediterranean areas the uncertainty is even more acute making it challenging to design accurate and adequate policies¹⁵³.



Photo Credit: A map showing transhumance routes in the region between Fethiye-Kaş-Demre in Turkey. © Engin Yılmaz

152 Casas Nogales & Manzano Baena 2007, Fundación Entretantos, Ruiz et al 2017
 153 Dutilly-Diane 2007

REFERENCES:

- AA.VV. (2012) *La Trashumancia en España. Libro Blanco*. Ministerio de Agricultura, Alimentación y Medio Ambiente. https://www.iucn.org/sites/dev/files/import/downloads/libro_blanco_de_la_trashumancia_en_espana.pdf
- Ancillotto, L., Ariano, A., Nardone, V., Budinski, I., Rydell, J., Russo, D. (2017). *Effects of free-ranging cattle and landscape complexity on bat foraging: Implications for bat conservation and livestock management*. Agriculture, Ecosystems & Environment 241, 54-61. <https://doi.org/10.1016/j.agee.2017.03.001>
- Antón Burgos, F.J. (2007). *Trashumancia y turismo en España*. Cuadernos de Turismo 20, 27-54. <http://www.redalyc.org/articulo.oa?id=39802002>
- Azcárate F.M., Robleño I., Seoane J., Manzano P., Peco B. (2013a) *Drove roads as local biodiversity reservoirs: effects on landscape pattern and plant communities in a Mediterranean region*. Applied Vegetation Science 16, 480-490. <http://dx.doi.org/10.1111/avsc.12003>
- Azcárate F.M., Seoane J., Castro, S., Peco B. (2013b) *Drove roads: Keystone structures that promote ant diversity in Mediterranean forest landscapes*. Acta Oecologica 40, 107-115. <http://doi.org/10.1016/j.actao.2013.03.011>
- Barbero, E.; Palestini, C. & Rolando, A. (1999). *Dung Beetle Conservation: Effects of Habitat and Resource Selection (Coleoptera: Scarabaeoidea)*. Journal of Insect Conservation 3, 75-84. <http://dx.doi.org/10.1023/A:1009609826831>
- Blanco-Canqui H, Hergert, G. W., Nielsen, R. A. (2015). *Cattle Manure Application Reduces Soil Compactibility and Increases Water Retention after 71 Years*. Soil Science Society of America Journal 79, 212-223. <http://dx.doi.org/10.2136/sssaj2014.06.0252>
- Boletín Oficial del Estado (1995). *Ley 3/1995, de 23 de marzo, de Vías Pecuarias*. BOE 71, 9206-9211. https://www.boe.es/diario_boe/txt.php?id=BOE-A-1995-7241
- Boletín Oficial del Estado (2017). *Real Decreto 385/2017, de 8 de abril, por el que se declara la Trashumancia como Manifestación Representativa del Patrimonio Cultural Inmaterial*. BOE 86, 28901-28902. https://www.boe.es/diario_boe/txt.php?id=BOE-A-2017-4009
- Breman, H. & de Wit, C.T. (1983). *Rangeland Productivity and Exploitation in the Sahel*. Science 221 (4618), 1341-1347. http://pdf.usaid.gov/pdf_docs/pnaap851.pdf
- Broom, D.M., Galindo, F.A., Murgueitio, E., 2013. *Sustainable, efficient livestock production with high biodiversity and good welfare for animals*. Proceedings of the Royal Society B: Biological Sciences 280, 20132025 <http://dx.doi.org/10.1098/rspb.2013.2025>
- Broom, D.M. 2016. *Sentience, animal welfare and sustainable livestock production*. In Indigenous, eds K.S R eddy, R.M.V. Prasad and K.A. Rao , 61 - 68. Excel India Publishers: New Delhi.
- Canals, R. M., Ferrer, V., Iriarte, A., Cárcamo, S., San Emeterio, L., Villanueva, E. (2011). *Emerging conflicts for the environmental use of water in high-valuable rangelands. Can livestock water ponds be managed as artificial wetlands for amphibians?* Ecological Engineering 37, 1443-1452. <http://doi.org/10.1016/j.ecoleng.2011.01.017>
- Carmona, C. P.; Azcárate, F. M.; Oteros-Rozas, E.; González, J. A.; Peco, B. (2013) *Assessing the effects of seasonal grazing on holm oak regeneration: Implications for the conservation of Mediterranean dehesas*. Biological Conservation 159, 240-247 <http://dx.doi.org/10.1016/j.biocon.2012.11.015>
- Casas Nogales, R. & Manzano Baena, P. (2007) *Valoración económica del pastoralismo en España*. WISP-IUCN document. 40 p. https://cmsdata.iucn.org/downloads/spain_tev_es_2.pdf

- Casas Nogales, R.; Manzano Baena, P. (2010) *Hagamos bien las cuentas. Eficiencia y servicios de la trashumancia en la Cañada Real Conquense (Let's do proper accounting. Efficiency and services from transhumance at the Conquense Drove Road)*. II Congreso Nacional de Vías Pecuarias. Cáceres, Spain. Pp: 302-315. <http://www.pastos.es/pdf/otrocasasmanzano.pdf>
- Casas, R., Hernández Yustos, R. (2012). *Conocimientos tradicionales en Segovia: conservación del patrimonio natural a través de una actividad tradicional: la trashumancia*. Caja Segovia, Obra Social y Cultural. 160 pp.
- Cummins, B. D. (2008). *Bear Country. Predation, Politics, and the Changing Face of Pyrenean Pastoralism*. Carolina Academic Press. 378 pp.
- Cuttelod, A., García, N., Abdul Malak, D., Temple, H. and Katariya, V. 2008. *The Mediterranean: a biodiversity hotspot under threat*. In: J.-C. Vié, C. Hilton-Taylor and S.N. Stuart (eds). *The 2008 Review of The IUCN Red List of Threatened*
- De Haan, C., Dubern, E., Garancher, B., Quintero, C. (2016). *Pastoralism Development in the Sahel. A Road to Stability?* World Bank Group, Washington DC. <http://documents.worldbank.org/curated/en/586291468193771160/Pastoralism-development-in-the-Sahel-a-road-to-stability>
- de Jode, H. (2010). *Modern and mobile. The future of livestock production in Africa's drylands*. IIED & SOS Sahel, London. <http://pubs.iied.org/12565IIED.html>
- Delibes M., Castañeda I., Fedriani J.M. (2017). *Tree-climbing goats disperse seeds during rumination*. *Frontiers in Ecology and the Environment* 15, 222–223. <http://dx.doi.org/10.1002/fee.1488>
- DGARD (2013). *Agriculture in the European Union. Statistical and economic information*. European Union, Brussels. http://ec.europa.eu/agriculture/statistics/agricultural/2013/pdf/full-report_en.pdf
- DiTomaso, J.M. (2000). *Invasive weeds in rangelands: species, impacts, and management*. *Weed Science* 48, 255–265. [http://dx.doi.org/10.1614/0043-1745\(2000\)048\[0255:IWIRSI\]2.0.CO;2](http://dx.doi.org/10.1614/0043-1745(2000)048[0255:IWIRSI]2.0.CO;2)
- Dougill, A.J., Stringer, L.C., Leventon, J., Riddell, M., Rueff, H., Spracklen, D.V., Butt, E. (2012). *Lessons from community-based payment for ecosystem service schemes: from forests to rangelands*. *Phil. Trans. R. Soc. B* 367, 3178–3190. <http://dx.doi.org/10.1098/rstb.2011.0418>
- Dumont, B., Rossignol, N., Loucougaray, G., Carrère, P., Chadoeuf, J., Fleurance, G., Bonis, A., Farruggia, A., Gaucherand S., Ginane, C., Louault, F., Marion, B., Mesléard, F. & Yavercovski, N. (2012). *When does grazing generate stable vegetation patterns in temperate pastures?* *Agriculture, Ecosystems and Environment*, 153, 50–56.
- Dutilly-Diane, C. (2007). *Pastoral economics and marketing in North Africa: a literature review*. *Nomadic Peoples* 11, 69–90. <http://dx.doi.org/10.3167/np.2007.110105>
- Dwyer, M.J. & Istomin, K.V. (2009). *Theories of Nomadic Movement: A New Theoretical Approach for Understanding the Movement Decisions of Nenets and Komi Reindeer Herders*. *Human Ecology* 36: 521–533. <http://dx.doi.org/10.1007/s10745-008-9169-2>
- EcoLogical (2016) *El sector Ecológico en España*. 12 pp. http://pae.gencat.cat/web/.content/al_alimentacio/al01_pae/05_publicacions_material_referencia/arxiu/2016_Informe_EcoLogical.pdf
- Ecovia Intelligence (2017) *Predictions for Sustainable Food in 2017*. <http://www.ecovaint.com/r0401/> Retrieved on 1st May 2017.
- EFNCP (2015a). *Europe's wood pastures: condemned to a slow death by the CAP? A test case for EU agriculture and biodiversity policy*. <http://www.efncp.org/download/brussels2011b/Wood-pastures-EP-booklet.pdf>
- EFNCP (2015b). *Exploring our Common Ground. A Networking Event on Common Grazing in Europe*. <http://www.efncp.org/events/seminars-others/exploring-common-ground2015/>

- Eisler, M.C., Lee, M. R. F., Tarlton, J. F., Martin, G. B., Beddington, J., Dungait, J. A. J., Greathead, H., Liu, J., Mathew, S., Miller, H., Misselbrook, T., Murray, P., Vinod, V. K., Van Saun, R., & Winter, M., (2014). *Agriculture: Steps to sustainable livestock*. Nature 507, 32–34. <http://dx.doi.org/10.1038/507032a>
- Eklund, A., López-Bao, J.V., Tourani, M., Chapron, G., Frank, J. (2017). *Limited evidence on the effectiveness of interventions to reduce livestock predation by large carnivores*. Scientific Reports 7, 2097. <http://dx.doi.org/10.1038/s41598-017-02323-w>
- Escribano, AJ; Gaspar , P; Mesias, FJ; Escribano, M., Pulido, F (2015a) *Comparative Sustainability Assessment of Extensive Beef Cattle Farms in a High Nature Value Agroforestry System*. In: Squires, Victor R. (Ed.) *Rangeland Ecology, Management and Conservation Benefits*. Nova Science Publishers, Inc., New York, pp. 65-85. <http://orgprints.org/29485/>
- Escribano, A.J., Gaspar, P., Mesias, F.J., Escribano, M. (2015b). *The contribution of organic livestock to sustainable rural development in sensitive areas*. International Journal of Research Studies in Agricultural Sciences (IJRSAS) 1, 21-34. <http://orgprints.org/29518/1/Sustainable%20rural%20development.%20Escribano%20et%20al.%202015.pdf>
- European Commission (2013). *Green Infrastructure (GI) – Enhancing Europe’s Natural Capital*. COM (2013) 249 Final. http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructures/1_EN_ACT_part1_v5.pdf
- European Environment Agency (2015). *State of the Environment of Europe Report 2015*. Executive summary. EEA, Copenhagen. <http://www.eea.europa.eu/soer>
- European Parliament News (2016). *Superbugs: MEPs want to curb use of antibiotics in farming*. Press release, March 10th 2016. <http://www.europarl.europa.eu/news/en/news-room/20160303IPR16930/Superbugs-MEPs-want-to-curb-use-of-antibiotics-in-farming>
- FACEnetwork (2016). *European Guide for Good Hygiene Practices in the production of artisanal cheese and dairy products*. https://ec.europa.eu/food/sites/food/files/safety/docs/biosafety_fh_guidance_artisanal-cheese-and-dairy-products_en.pdf
- FAO (2004). *Protein sources for the animal feed industry*. Executive Summary. <http://www.fao.org/docrep/007/y5019e/y5019e03.htm>
- Fernández-Márquez, C. M., Fatás-Villafranca, F., Vázquez, F. J. (2016). *Endogenous Demand and Demanding Consumers: A Computational Approach*. Computational Economics. <http://dx.doi.org/10.1007/s10614-015-9557-9>
- Flintan, F., 2008. *Women’s Empowerment in Pastoral Societies*. IUCN-World Initiative for Sustainable Pastoralism 2008. http://cmsdata.iucn.org/downloads/gender_format.pdf
- French, K.E. (2017). *Species composition determines forage quality and medicinal value of high diversity grasslands in lowland England*. Agriculture, Ecosystems & Environment 241, 193-204. <https://doi.org/10.1016/j.agee.2017.03.012>
- Gerber, P.J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A. & Tempio, G. (2013). *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities*. FAO, Rome. <http://www.fao.org/3/i3437e.pdf>
- Giannakis, E., Bruggeman, A. (2015). *The highly variable economic performance of European agriculture*. Land Use Policy 45, 26-35. <http://dx.doi.org/10.1016/j.landusepol.2014.12.009>
- Global Justice Now. (2015). *Silence but deadly. Estimating the real climate change impact of agribusiness corporations*. <http://www.globaljustice.org.uk/sites/default/files/files/resources/cop-paris-briefing-online.pdf>
- Gomar, A. (2016) *Tendiendo puentes. Como acortar la cadena de productos cárnicos*. Soberanía Alimentaria 26. <http://www.soberaniaalimentaria.info/numeros-publicados/57-numero-26/383-tendiendo-puentes>

- Gossner, M.M., Lewinsohn, M.T., Kahl, T., Grassein, F., Boch, S., Prati, D., Birkhofer, K., Renner, S.C., Sikorski, J., Wubet, T., Arndt, H., Baumgartner, V., Blaser, S., Blüthgen, N., Börschig, C., Buscot, F., Diekötter, T., Ré Jorge, L., Jung, K., Keyel, A.C., Klein, A.M., Klemmer, S., Krauss, J., Lange, M., Müller, J. (2016). *Land-use intensification causes multitrophic homogenization of grassland communities*. *Nature* 540, 266–269. <http://dx.doi.org/10.1038/nature20575>
- Haynes, R.J., Williams, P.H. (1993). *Nutrient Cycling and Soil Fertility in the Grazed Pasture Ecosystem*. *Advances in Agronomy* 49, 119–199. [http://dx.doi.org/10.1016/S0065-2113\(08\)60794-4](http://dx.doi.org/10.1016/S0065-2113(08)60794-4)
- Hazell, P.B.R., Oram, P., Chaherli, N. (2001). *Managing droughts in the low-rainfall areas of the Middle East and North Africa*. Environment and Production Technology Division Discussion Paper No 78. Washington: International Food Policy Research Institute <http://ebrary.ifpri.org/utills/getfile/collection/p15738coll2/id/67074/filename/67075.pdf>
- Herrero, M., Thornton, P.K., Gerber, P., Reid, R.S. (2012). *Livestock, livelihoods and the environment: understanding the trade-offs*. *Current Opinion in Environmental Sustainability* 1:111–120. <http://dx.doi.org/10.1016/j.cosust.2009.10.003>
- Herrero, M., Henderson, B., Havlík, P., Thornton, P.K., Conant, R.T., Smith, P., Wiersenius, S., Hristov, A.N., Gerber, P., Gill, M., Butterbach-Bahl, K., Valin, H., Garnett, T., Stehfest, E. (2016). *Greenhouse gas mitigation potentials in the livestock sector*. *Nature Climate Change* 6, 452–461. <http://dx.doi.org/10.1038/nclimate2925>
- Hevia, V., Bosch, J., Azcárate, F.M., Fernández, E., Rodrigo, A., Barril-Graells, H., González, J.A. 2016. *Bee diversity and abundance in a livestock drove road and its impact on pollination and seed set in adjacent sunflower fields*. *Agriculture, Ecosystems and Environment* 232, 336–344. <http://dx.doi.org/10.1016/j.agee.2016.08.021>
- Hoekstra, A.Y. (2016). *A critique on the water-scarcity weighted water footprint in LCA*. *Ecological Indicators* 66, 564–573. <http://dx.doi.org/10.1016/j.ecolind.2016.02.026>
- Hoffmann I., From T., Boerma D. (2014). *Ecosystem services provided by livestock species and breeds, with special consideration to the contributions of small-scale livestock keepers and pastoralists*. FAO Commission on Genetic Resources for Food and Agriculture. Background study paper no. 66. <http://www.fao.org/3/a-at598e.pdf>
- Hoggart, K., Paniagua, A. (2001). *The restructuring of rural Spain?* *Journal of Rural Studies* 17, 63–80. [https://doi.org/10.1016/S0743-0167\(00\)00037-1](https://doi.org/10.1016/S0743-0167(00)00037-1)
- Hovenden, M.J., Newton, P.C., Wills K.E. (2014). *Seasonal not annual rainfall determines grassland biomass response to carbon dioxide*. *Nature* 511, 583–586. <http://dx.doi.org/10.1038/nature13281>
- Howes, N.L., El-Din Ahmed Bekhit, A., Burritt, D.J., Campbell, A.W. (2014). *Opportunities and Implications of Pasture-Based Lamb Fattening to Enhance the Long-Chain Fatty Acid Composition in Meat*. *Comprehensive Reviews in Food Science and Food Safety* 14, 22–36. <http://dx.doi.org/10.1111/1541-4337.12118>
- Hungate, B.A., Barbier, E.B., Ando, A.W., Marks, S.P., Reich, P.B., van Gestel, N., Tilman, D., Knops, J.M.H., Hooper, D.U., Butterfield, B.J., Cardinale, B.J. (2017). *The economic value of grassland species for carbon storage*. *Science Advances* 3, e1601880. <http://dx.doi.org/10.1126/sciadv.1601880>
- Huruba, R., Mundy, P.J., Sebata, A., Purchase, G.K., MacFayden, D.N. (2017). *Impala, Aepyceros melampus: does browse quality influence their use of sites originally utilised as short-duration kraals in a southern African savanna?* *The Rangeland Journal* 39, 113–121. <http://dx.doi.org/10.1071/RJ16016>
- Ilcan, S.M. (1994). *Peasant Struggles and Social Change: Migration, Households and Gender in a Rural Turkish Society*. *International Migration Review* 28, 554–579. <http://dx.doi.org/10.2307/2546821>
- Interovic (2017). *European promotion campaign “Carne de lechal y cordero: vuelve a disfrutar de la carne de cordero”*. <http://www.interovic.es/medicion-de-resultados> Retrieved on 1st May 2017.

- IPCC (2000). IPCC Special Report. *Climate Land Use, Land-Use Change, and Forestry*. Summary for Policymakers. WMO, UNEP. ISBN: 92-9169-114-3. <https://www.ipcc.ch/pdf/special-reports/spm/srl-en.pdf>
- IUCN (2013). *Women pastoralists' empowerment: Supporting positive change*. Briefing note. WISP-IUCN, Nairobi. http://cmsdata.iucn.org/downloads/policy_note_women_pastoralists_empowerment__supporting_positive_change_eng.pdf
- Jiménez-Colmenero, F., Ventanas, J., Toldrá, F. (2010) 'Nutritional composition of dry-cured ham and its role in a healthy diet', *Meat Science* 84(4): 585–593. <http://dx.doi.org/10.1016/j.meatsci.2009.10.029>
- Kenyon, F., Greer, A.W., Coles, G.C., Cringoli, G., Papadopoulos, E., Cabaret, J., Berrag, B., Varady, M., Van Wyk, J.A., Thomas, E., Vercruysse, J., Jackson, F. (2009). *The role of targeted selective treatments in the development of refugia-based approaches to the control of gastrointestinal nematodes of small ruminants*. *Veterinary Parasitology* 164, 3–11. <https://doi.org/10.1016/j.vetpar.2009.04.015>
- Key, N. & Tallard, G. *Mitigating methane emissions from livestock: a global analysis of sectoral policies*. *Climatic Change*, 12, 387–414 (2012) <http://naldc.nal.usda.gov/download/54463/PDF>
- Khazanov, A. M. (2013) *Contemporary pastoralism: old problems, new challenges*. In: Sternberg, T. & Chatty, D. (eds), *Modern pastoralism and conservation. Old problems, new challenges*. White Horse Press, Cambridge, pp 5-23.
- Kimiti, D.W., Hodge, A-M.C., Herrick, J.E., Beh, A.W., Abbott, L.E. (2017). *Rehabilitation of community-owned, mixed-use rangelands: lessons from the Ewaso ecosystem in Kenya*. *Plant Ecology* 218, 23-37. <http://dx.doi.org/10.1007/s11258-016-0691-9>
- Kington, T. (2010). *For a real Italian getaway, follow the herd*. *The Guardian* 7 February 2010. <https://www.theguardian.com/travel/2010/feb/07/walkingholidays-italy>
- Kisiangani, E., Abdel Aziz, M. (2011) *The future of pastoralism in a changing climate*. JotoAfrika 11, August 2011. http://www.alin.or.ke/download_file.php?f=53299300JA%207.pdf
- Köhler-Rollefson, I. (1997). *Indigenous practices of animal genetic resource management and their relevance for the conservation of domestic animal diversity in developing countries*. *Journal of Animal Breeding and Genetics* 114, 231–238. <http://dx.doi.org/10.1111/j.1439-0388.1997.tb00509.x>
- Köhler-Rollefson, I. (2001). *Community based management of animal genetic resources with special reference to pastoralists*. Proc. Workshop on Community Based Management of Animal Genetic Resources. FAO corporate depository, Mbambane, Swaziland. May 7–11, 2001, pp. 13-25.
- Krätli, S. (2015) *Valuing variability: New Perspectives on climate resilient drylands development*. IIED. Edited by de Jode, H. <http://pubs.iied.org/10128IIED.html>
- Krätli S., Kaufmann B., Roba H., Hiernaux P., Li W., Easdale M., Hülsebusch C. (2015). *A House Full of Trap Doors: Identifying barriers to resilient drylands in the toolbox of pastoral development*. IIED discussion paper, IIED, London and Edinburgh. <http://pubs.iied.org/10112IIED>
- Lentini, P.E., Fischer, J., Gibbons, P., Lindenmayer, D.B. & Martin, T.G. (2011). *Australia's Stock Route Network: 1. A review of its values and implications for future management*. *Ecological Management & Restoration* 12, 119–127. <http://dx.doi.org/10.1111/j.1442-8903.2011.00591.x>
- Ligos, S., Revilla, R., Nardone, A., Casu, S. (2005). *Cattle husbandry systems in Mediterranean mountains: situation and prospects*. In: Georgoudis, A. Rosati, A., Mosconi, C. (eds.). *Animal production and natural resources utilisation in the Mediterranean mountain areas*. EAAP Scientific Series 115, pp. 375-386.

- Lipper, L., Dutilly-Diane, C., McCarthy, N. (2010). *Supplying Carbon Sequestration From West African Rangelands: Opportunities and Barriers*. *Rangeland Ecology & Management* 63, 155-166. <http://dx.doi.org/10.2111/REM-D-09-00009.1>
- Llonch, P., Haskell, M .J., Dewhurst, R .J., Turner, S.P. (2016) *Current available strategies to mitigate greenhouse gas emissions in livestock systems: an animal welfare perspective*. *Animal* 11, 274 -284. <https://doi.org/10.1017/S1751731116001440>
- Manzano, P. (ed.) (2014) *Community Based Adaptation to climate change strengthens pastoralists' resilience*. Special Issue. *JotoAfrika* 14, July 2014. http://www.alin.or.ke/download_file.php?f=73399627JotoAfrika14.pdf
- Manzano, P. (2015a). *Transporte de semillas por las ovejas trashumantes, y sus potenciales implicaciones en la vegetación*. PhD Thesis, Universidad Autónoma de Madrid. <http://hdl.handle.net/10486/670899>
- Manzano, P. (2015b) *Pastoralist Ownership of Rural Transformation: The adequate path to change*. *Development* 58 (2/3), 000326-000332. <http://rdcu.be/pAqc>
- Manzano, P. (2016). *Case study #12: Improvements of livestock disease management through enhanced beef supply chain hazard analysis procedures around Transfrontier Conservation Areas in Southern Africa*. In: LEAP. Principles for the assessment of livestock impacts on biodiversity. Livestock Environmental Assessment and Performance Partnership. FAO, Rome, Italy, pp. 134-139. <http://www.fao.org/3/a-i6492e.pdf#page=166>
- Manzano, P. (2017) *Development interventions on pastoralist areas: a new decision matrix to identify win-win situations and no-go zones*. *The Solutions Journal* 9 (3). <https://www.thesolutionsjournal.com/article/development-interventions-pastoralist-areas-new-decision-matrix-identify-win-win-situations-no-go-zones/>
- Manzano Baena, P. and Casas, R. (2010) *Past, present and future of trashumancia in Spain: nomadism in a developed country*. *Pastoralism: Research, Policy and Practice (Practical Action)* 1 (1), 72-90. <https://sites.google.com/site/pablomanzanobaena/Home/bienvenida/Manzano%26Casas2010.pdf>
- Manzano, P., Azcárate, F.M., Peco, B. & Malo, J.E. (2010) *Are ecologists blind to small things? The missed stories on non-tropical seed predation on feces*. *Oikos* 119, 1537-1545. <http://dx.doi.org/10.1111/j.1600-0706.2010.18602.x>
- Manzano, P.; Agarwal, M. (2015) *Pastoralist Participation and Networking in Policy dialogue: Dimensions and Challenges*. *Perspectives* 18, 1-16. https://wedocs.unep.org/bitstream/handle/20.500.11822/10003/ENVIRONMENT%20PAPERS%20DISCUSSION_PASTROLISTS002.pdf
- Manzano, P. & White, S.R. (submitted). *Livestock emissions: Consider correct accounting of alternative scenarios*. *Nature Sustainability*.
- Manzano, P., Malo, J.E., Azcárate, F.M. (in prep). *Can granivorous ants be better dung removers than beetles? An insight from Mediterranean sheep-grazed pastures*.
- Marinković S. & Karadžić B. (1999) *The role of nomadic farming in the distribution of the griffon vulture (Gyps fulvus) on the Balkan peninsula*. *Contributions to the Zoogeography and Ecology of the Eastern Mediterranean Region* 1, 141-152.
- Mateo-Tomás P.(2013) *The role of extensive pastoralism in vulture conservation*. *Proceedings of the Griffon Vulture Conference*, 6-8 March 2013, Limassol, pp. 104-114.
- Mathias, E., Mundy, P., Köhler-Rollefson, I. (2010). *Marketing products from local livestock breeds: an analysis of eight cases*. *Animal Genetic Resources* 47, 59-71. <http://www.fao.org/3/contents/97538470-9af5-59ba-ab26-f53828ac712a/i1823t07.pdf>

- McGahey, D., Davies, J., Hagelberg, N., and Ouedraogo, R. (2014). *Pastoralism and the Green Economy – a natural nexus?* Nairobi: IUCN and UNEP. x + 58p. <https://portals.iucn.org/library/sites/library/files/documents/2014-034.pdf>
- Mikha, M. M., Hergert, G. W., Benjamin, J. G., Jabro, J. D., Nielsen, R. A. (2015). *Long-Term Manure Impacts on Soil Aggregates and Aggregate-Associated Carbon and Nitrogen*. Soil Science Society of America Journal 79, 626-636. <http://dx.doi.org/10.2136/sssaj2014.09.0348>
- Millennium Ecosystem Assessment (2003). *Ecosystems and Human Well-being. A Framework for Assessment*. Island Press. <http://www.unep.org/maweb/documents/document.300.aspx.pdf>
- Muller, S., Dutoit, T., Alard, D., & Grevilliot, F. (1998). *Restoration and Rehabilitation of Species-Rich Grassland Ecosystems in France: a Review*. Restoration Ecology, 6(1), 94-101. <http://dx.doi.org/10.1046/j.1526-100x.1998.06112.x>
- Nassef, M., Anderson, S., Hesse, C. (2009). *Pastoralism and climate change. Enabling adaptive capacity*. HPG Commissioned Report, April 2009. London: ODI. http://www.fao.org/fileadmin/user_upload/drought/docs/Climate%20Change.pdf
- Neely, C., Bunning, S., Wilkes, A., (2009). *Review of evidence on dryland pastoral systems and climate change. Implications and opportunities for mitigation and adaptation*. FAO Land and Water Discussion Paper 8. <http://www.fao.org/3/a-i1135e.pdf>
- Ní Laoire, C. (2001). *A Matter of Life and Death? Men, Masculinities and Staying 'Behind' in Rural Ireland*. Sociologia Ruralis 41, 220-236. <http://dx.doi.org/10.1111/1467-9523.00179>
- Nori, M., Davies, J. (2007). *Change of wind or wind of change? Climate change, adaptation and pastoralism*. The World Initiative for Sustainable Pastoralism. Nairobi: IUCN. http://cmsdata.iucn.org/downloads/c__documents_and_settings_hps_local_settings_application_data_mozilla_firefox_profile.pdf
- Nori M., Taylor, M., Sensi, A. (2008). *Browsing on fences: pastoral land rights, livelihoods and adaptation to climate change*. IIED Drylands Series #148, IIED & ILC, London & Rome. <http://pubs.iied.org/12543IIED.html>
- Orford, K.A., Murray, P.J., Vaughan, I.P. & Memmott, J. (2016). *Modest enhancements to conventional grassland diversity improve the provision of pollination services*. Journal of Applied Ecology. <http://dx.doi.org/10.1111/1365-2664.12608>
- Orgill, S.E., Waters, C.M., Melville, G., Toole, I., Alemseged, Y., Smith, W. (2017). *Sensitivity of soil organic carbon to grazing management in the semi-arid rangelands of south-eastern Australia*. The Rangeland Journal 39, 153-167 <http://dx.doi.org/10.1071/RJ16020>
- Palomares, F., Delibes, M., Revilla, E., Calzada, J. & Fedriani, J.M. (2001). *Spatial ecology of Iberian lynx and abundance of European rabbits in southwestern Spain*. Wildlife Monographs, pp. 1–36.
- Papanastasis, V.P., Bautista, B., Chouvardas, D., Mantzanas, K., Papadimitriou, M., Mayor, A.G., Koukioumi, P., Papaioannou, A., Vallejo, R.V. (2017). *Comparative assessment of goods and services provided by grazing regulation and reforestation in degraded Mediterranean rangelands*. Land Degradation & Development 28, 1178–1187. <http://dx.doi.org/10.1002/ldr.2368>
- Peco, B., Sánchez, A.M., Azcárate, F. (2006). *Abandonment in grazing systems: consequences for vegetation and soil*. Agriculture, Ecosystems & Environment 113, 284–294. <https://doi.org/10.1016/j.agee.2005.09.017>
- Perea, R.; López-Sánchez, A.; Roig, S. (2016) *The use of shrub cover to preserve Mediterranean oak dehesas: a comparison between sheep, cattle and wild ungulate management*. Applied Vegetation Science 19, 244–253 <http://dx.doi.org/10.1111/avsc.12208>
- Peters CJ, Picardy J, Darrouzet-Nardi AF, Wilkins JL, Griffin TS, Fick GW. (2016) *Carrying capacity of U.S. agricultural land: Ten diet scenarios*. Elementa. 4:116. <http://doi.org/10.12952/journal.elementa.000116>

- Pfister, S., Boulay, A.-M., Berger, M., Hadjikakou, M., Motoshita, M., Hess, T., Ridoutt, B., Weinzettel, J., Scherer, L., Döll, P., Manzardo, A., Núñez, M., Verones, F., Humbert, S., Buxmann, K., Harding, K., Benini, L., Oki, T., Finkbeiner, M., Henderson, A. (2017). *Understanding the LCA and ISO water footprint: A response to Hoekstra (2016) "A critique on the water-scarcity weighted water footprint in LCA"*. Ecological Indicators 72, 352-359. <http://dx.doi.org/10.1016/j.ecolind.2016.07.051>
- Pflimlin, A., Perrot, C., Parguel, P. (2006). *Diversity of dairy systems and products in France and in Europe: the assets of less favoured areas*. In: R. Rubino, R., Sepe, L., Dimitriadou, A., Gibon, A. (eds.). Product quality based on local resources leading to improved sustainability. EAAP Scientific Series 118, pp. 293-308.
- Pinilla, V. Ayuda, M.I., Sáez, L.A. (2006). *Rural depopulation in Mediterranean Western Europe: a case of Aragon*. ISBN: 978-84-92582-43-3 http://www.ceddar.org/content/files/articulof_282_01_DT-2006-1.pdf
- Plieninger, T., Hui, C., Gaertner, M. & Huntsinger L. (2014) *The Impact of Land Abandonment on Species Richness and Abundance in the Mediterranean Basin: A Meta-Analysis*. PLoS One 9(5): e98355. <http://dx.doi.org/10.1371/journal.pone.0098355>
- Powell, J.M., Fernández-Rivera, S., Hiernaux, P., Turner, M.D. (1996). *Nutrient cycling in integrated rangeland/cropland systems of the Sahel*. Agric. Syst. 52, 143-170. [https://doi.org/10.1016/0308-521X\(96\)00009-1](https://doi.org/10.1016/0308-521X(96)00009-1)
- Pöyry, J., Luoto, M., Paukkunen, J., Pykälä, J., Raatikainen, K. & Kuussaari, M. (2006). *Different responses of plants and herbivore insects to a gradient of vegetation height: An indicator of the vertebrate grazing intensity and successional age*. Oikos, 115, 401-412. <http://dx.doi.org/10.1111/j.2006.0030-1299.15126.x>
- Pugliese, P., Marie Reine Bteich, M.R., and Lina Al-Bitar, L. (eds.) (2014), *Mediterranean Organic Agriculture Key features, recent facts, latest figures*. MOAN report 2014 CIHEAM Bari. http://moan.iamb.it/index.php?option=com_phocadownload&view=category&download=81:mediterranean-organic-agriculture-key-features-recent-facts-latest-figures-report-2014&id=8:publications&Itemid=94
- Pykälä, J. (2003). *Effects of restoration with cattle grazing on plant species composition and richness of semi-natural grasslands*. Biodiversity & Conservation, 12(11), 2211-2226. <http://dx.doi.org/10.1023/A:1024558617080>
- Rigueiro-Rodríguez, A., Mosquera-Losada, M., Romero-Franco, R., González-Hernández, M.P., Villarino-Urtiaga, J.J., 2005. *Silvopastoral systems as a forest fire prevention technique*. In: Mosquera-Losada, M.R., McAdam, J., Rigueiro-Rodríguez, A. (Eds.), *Silvopastoralism and Sustainable Land Management*. CAB International, Wallingford, pp. 380-387. <http://dx.doi.org/http://dx.doi.org/10.1079/9781845930011.0380>
- Rodríguez-Ortega, T. Bernués, A., Olaizola, A.M., Brown, M.T. (2017). *Does intensification result in higher efficiency and sustainability? An emergy analysis of Mediterranean sheep-crop farming systems*. Journal of Cleaner Production 144, 171-179. <http://dx.doi.org/10.1016/j.jclepro.2016.12.089>
- Röös, E., Patel, M., Spångberg, J., Carlsson, G. & Rydhmer, L. (2016). *Limiting livestock production to pasture and by-products in a search for sustainable diets*. Food Policy 58, 1-13. <http://dx.doi.org/10.1016/j.foodpol.2015.10.008>
- Rufino M, Rowe E, Delve RJ, Giller KE (2006) *Nitrogen cycling efficiencies through resource-poor African crop-livestock systems*. Agr Ecosyst Env 112:261-282. <https://doi.org/10.1016/j.agee.2005.08.028>
- Ruiz Mirazo, J. (2011). *Las áreas pastocortafuegos: un sistema silvopastoral para la prevención de incendios forestales*. PhD thesis, Universidad de Granada. http://digital.csic.es/bitstream/10261/35848/1/Tesis_JRM_FINAL.pdf

- Ruiz, J., Herrera, P.M., Barba, R., Busqué, J. (2017). *Definición y caracterización de la extensividad en las explotaciones ganaderas en España*. Ministerio de Agricultura, Pesca, Alimentación y Medio Ambiente, Madrid. http://www.mapama.gob.es/es/ganaderia/temas/produccion-y-mercados-ganaderos/informesobreganaderiaextensivaenespana/octubre2017nipo_tcm7-468281.pdf
- Rutsaert, P., Barnett, J., Gaspar, R., Marcu, A., Pieniak, Z., Seibt, B., Lima, M.L., Fletcher, D., Verbeke, W. (2015). *Beyond Information Seeking: Consumers' Online Deliberation About the Risks and Benefits of Red Meat*. Food Quality and Preference 39: 191–201. <http://dx.doi.org/10.1016/j.foodqual.2014.07.011>
- Schader, C., Muller, A., Scialabba, N.E.-H., Hecht, J., Isensee, A., Erb, K.-H., Smith, P., Makkar, H.P.S., Klocke, P., Leiber, F., Schwegler, P., Stolze, M., Niggli, U. (2015). *Impacts of feeding less food-competing feedstuffs to livestock on global food system sustainability*. Journal of The Royal Society Interface 12, 20150891. <http://dx.doi.org/10.1098/rsif.2015.0891>
- Schiere J.B., Kater L. (2001). *Mixed crop-livestock farming. A review of traditional technologies based on literature and field experiences*. FAO Animal Production & Health paper 152. <http://www.fao.org/docrep/004/Y0501E/y0501e00.htm>
- Schiere, J.B., Ibrahim, M.N.M., van Keulen. H. (2002). *The role of livestock for sustainability in mixed farming: Criteria and scenario studies under varying resource allocation*. Agric. Ecosyst. Environ. 90, 139–153. [http://doi.org/10.1016/S0167-8809\(01\)00176-1](http://doi.org/10.1016/S0167-8809(01)00176-1)
- Scholtz, M.M., van Ryssen, J.B.J., Meissner, H.H., Laker, M.C. (2013). *A South African perspective on livestock production in relation to greenhouse gases and water usage*. South African Journal of Animal Science 43 (3), 247–245. <http://dx.doi.org/10.4314/sajas.v43i3.2>
- SEO/BirdLife (2017), *Prueba de Comercialización. Productos Natura 2000*. <http://www.natura2000products.eu/productores/prueba-de-comercializacion/> Retrieved on 1st May 2017.
- Slade, E.M., Roslin, T., Santalahti, M., Bell, T. (2016a). *Disentangling the 'brown world' faecal–detritus interaction web: dung beetle effects on soil microbial properties*. Oikos 125, 629–635. <http://dx.doi.org/10.1111/oik.02640>
- Slade, E.M., Riutta, T., Roslin, T., Tuomisto, H.L. (2016b). *The role of dung beetles in reducing greenhouse gas emissions from cattle farming*. Scientific Reports. 6, 18140. <http://dx.doi.org/10.1038/srep18140>
- Średnicka-Tober, D., Barański, M., Seal, C. J., Sanderson, R., Benbrook, C., Steinshamn, H., Gromadzka-Ostrowska, J., Ewa Rembiałkowska, E., Skwarło-Sońta, K., Eyre, M., Cozzi, G., Larsen, M.K., Jordon, T., Niggli, U., Sakowski, T., Calder, P.C., Burdge, G.C., Sotiraki, S., Stefanakis, A., Yolcu, H., Stergiadis, S., Eleni Chatzidimitriou, E., Butler, G., Stewart, G., Leifert, C. (2016a). *Composition differences between organic and conventional meat: a systematic literature review and meta-analysis*. British Journal of Nutrition 115, 994–1011. <http://dx.doi.org/10.1017/S0007114515005073>
- Średnicka-Tober, D., Barański, M., Seal, C. J., Sanderson, R., Benbrook, C., Steinshamn, H., Gromadzka-Ostrowska, J., Ewa Rembiałkowska, E., Skwarło-Sońta, K., Eyre, M., Cozzi, G., Larsen, M.K., Jordon, T., Niggli, U., Sakowski, T., Calder, P.C., Burdge, G.C., Sotiraki, S., Stefanakis, A., Stergiadis, S., Yolcu, H., Eleni Chatzidimitriou, E., Butler, G., Stewart, G., Leifert, C. (2016b). *Higher PUFA and n-3 PUFA, conjugated linoleic acid, α -tocopherol and iron, but lower iodine and selenium concentrations in organic milk: a systematic literature review and meta- and redundancy analyses*. British Journal of Nutrition 115, 1043–1060. <http://dx.doi.org/10.1017/S0007114516000349>
- Tennigkeit, T., Wilkes, A. (2008). *An assessment of the potential for carbon finance in rangelands*. ICRAF Working Paper 68, ICRAF, Nairobi. <http://www.worldagroforestry.org/downloads/Publications/PDFS/WP15892.pdf>
- Thorne PJ, Tanner JC. (2002). *Livestock and nutrient cycling in crop-animal systems in Asia*. Agricultural Systems 71, 111–126. [https://doi.org/10.1016/S0308-521X\(01\)00039-7](https://doi.org/10.1016/S0308-521X(01)00039-7)

- Tilman, D., Clark, M. (2014). *Global diets link environmental sustainability and human health*. Nature 515, 518-522. <http://dx.doi.org/10.1038/nature13959>
- Tonelli, M., Verdú, J.R., Zunino, M.E. (2017). *Effects of grazing intensity and the use of veterinary medical products on dung beetle biodiversity in the sub-mountainous landscape of Central Italy*. PeerJ 5:e2780 <https://doi.org/10.7717/peerj.2780>
- UNEP (2016). UNEP/EA.2/Res.24 : *Combating desertification, land degradation and drought and promoting sustainable pastoralism and rangelands*. United Nations Environment Assembly of the United Nations Environment Programme. Second session. Nairobi, 23–27 May 2016. http://wedocs.unep.org/bitstream/handle/20.500.11822/11197/K1607149_UNEPEA2_RES24E.pdf
- Vélez, R. (2010). *Prescribed Burning for Improved Grazing and Social Fire Prevention: the Spanish EPRIF Programme*. In 'Best Practices of Fire-Use – Prescribed Burning and Suppression Fire Programmes in Selected Case-Study Regions in Europe'. (Eds C Montiel, D Kraus) European Forest Institute, Research Report 24, pp. 107–122. (Joensuu, Finland)
- Vigan, A., Lasseur, J., Benoit, M., Mouillot, F., Eugène, M., Mansard, L., Vigne, M., Lecomte, P., Dutilly, C. (2017). *Evaluating livestock mobility as a strategy for climate change mitigation: Combining models to address the specificities of pastoral systems*. Agriculture, Ecosystems & Environment 242, 89–101. <http://dx.doi.org/10.1016/j.agee.2017.03.020>
- Wagner, T., Kuhndt, M., Lagomarsino, J., Mattar, H., (2015) *Listening to sharing economy initiatives*. http://www.scp-centre.org/wp-content/uploads/2016/05/Listening_to_Sharing_Economy_Initiatives.pdf
- Wang, Y, Beydoun, M.A. (2009) *Meat consumption is associated with obesity and central obesity among US adults*. International Journal of Obesity 33, 621–628. <http://dx.doi.org/10.1038/ijo.2009.45>
- Western, D. (1982) *The Environment and Ecology of Pastoralists in Arid Savannas*. Development and Change 13, 183–211. <http://dx.doi.org/10.1111/j.1467-7660.1982.tb00117.x>
- WHO (2015). *Global action plan on antimicrobial resistance*. WHO, Geneva. http://apps.who.int/iris/bitstream/10665/193736/1/9789241509763_eng.pdf
- Willer, H., Lernoud, J. (Eds.) (2017). *The World of Organic Agriculture. Statistics and Emerging Trends* (2017.) Research Institute of Organic Agriculture (FiBL), Frick, and IFOAM – Organics International, Bonn. Version 1.3 of February 20, 2017. <http://www.organic-world.net/yearbook/yearbook-2017/pdf.html>
- WISP (2010). *Building climate change resilience for African livestock in sub-Saharan Africa*. IUCN ESARO, Nairobi, viii + 48pp. www.iucn.org/wisp/?7943/
- Xirouchakis, S. & Nikolakakis, M. (2002). *Conservation implications of the temporal and spatial distribution of Bearded Vulture Gypaetus barbatus in Crete*. Bird Conservation International 12, 269–280.



Annex: The Culture of Pastoralism in the Mediterranean

Photo Credit: Transhumance
of Laitxa sheep slicing through
the mountain at Arrizaga
gorge, in the Añalar Range
(Basque Country). © Gema
Arrugaeta, Spain, 2014.

SPAIN

Transhumance in Spain is the living legacy of human ingenuity in taking on the role of the great herbivores before them. Spain's natural richness is enhanced by the livestock activity initiated by Iberian drovers in Neolithic times, who began to create specific landscapes (such as the *dehesas*) and also native breeds such as the Merino sheep. Transhumance has left as its legacy the Drovers' Roads, the routes followed by the herds which were first given legal recognition in the 13th Century and whose status was re-confirmed in 1995 with the creation of the National Network of Drovers' Roads. Unique in the world, in total it stretches to more than 12,000 km in length and comprises over 400,000 ha of land; in comparative terms this equates to 161 times the length of the 'Camino de Santiago', with equal potential to attract visitors.

Spain is a good example of a western nation whose history, landscape and culture have been deeply influenced by pastoral and transhumant heritage, therefore the material and immaterial cultural legacy is immense¹⁵⁴. As such transhumance has been officially declared immaterial cultural heritage by the Spanish Parliament¹⁵⁵.

In the same way, the *dehesa* silvopastoral system, unique to Spain and Portugal, will in the near future be proposed for World Heritage status within the category of "cultural landscapes" of UNESCO. It meets five of the six criteria for cultural landscapes and all four of the total natural heritage criteria¹⁵⁶.

Perhaps one of the most important aspects to address in the Spanish context is to promote new uses for this heritage, in order to support its protection and build new economic activities related to it in rural areas. Public participation of the community and users in these processes will be a way to guarantee the future of this outstanding and unique cultural legacy.

154 Cruz Sánchez & Escribano Velasco 2013

155 Boletín Oficial del Estado 2017

156 ICOMOS, unpublished.

GREECE

Evidence of domesticated animals in the Greek territory goes back to the seventh millennium BC; however the appearance of transhumance is still disputed among scholars¹⁵⁷. Certainly though, under Ottoman rule (15th-19th century), a system of nomadic stock farming was gradually developed, known as the great *tseligata* which continued until the 20th century. One factor contributing to the flourishing of nomadism in that period was the ease of movement for herdsmen and their flocks as a result of a unified administration under the Ottomans. The basis of the *tseligata* system was a highly organised system of collaboration between the herdsmen, which incorporated many of the basic principles of the rural cooperative¹⁵⁸.

In Greece, transhumance is linked with two separate cultural groups of people: the Sarakatsani, who had no settled dwellings in either summer or lowland pastures, and the Vlachs, who created proper villages close to their summering sites but scattered over the plains in the winter according to availability of pastures; both groups are largely settled now. It is important to note however, that before the creation of ethnic states in the 20th century, the herdsmen along with their flocks, families and belongings were moving freely from place to place across Greece and the Balkans. This practice has played a particularly significant role in the origin and maintenance of lowland – upland interactions, influencing the actual character of the landscapes, as we know them today. At the same time, the realities of pastoral life have given rise to rich cultural traditions reflected in different music, customs, clothing, shepherding management, architecture and cuisine.

Recent decades have seen major changes. Socio-economic reasons such as technological innovations, EU subsidies and the availability of cheap labour from newly arrived immigrants have significantly affected the practice and its cultural aspects. Notably, the use of four-wheel drive vehicles has allowed transhumant shepherds to get to their pastures faster, while in many cases the flocks are moved between the highlands and lowland in large trucks. At the same time, the lack of nationally designated drover roads presents serious obstacles to the shepherds that still want to move their flocks on foot. Nevertheless, some aspects of the hard work involved still remain the same as the sheep still have to be tended night and day, the shearing, milking, slaughtering and skinning are still done by hand and in most cases there is no electricity or running water in their corrals.

Photo Credit: Women play an important part in transhumant life working equally hard with men. This is Kiki Siafarika, Avdella. © Stamos Abatis, North Pindos - Greece, 2014.

157 Hadjigeorgiou 2011

158 Papageorgiou 1986



TURKEY

In Turkey mobile pastoralism is a major traditional practice shaping the country's outstanding landscapes where three of the world's biodiversity hotspots meet: Mediterranean, Irano-Anatolian and Caucasus¹⁵⁹.

The rich ecosystem and habitat diversity has not only produced a considerable diversity of species but has also shaped the culture of the peoples living there and vice versa. With its adaptive capacity to spatial and temporal variabilities it is a unique example of people and nature interaction in Turkey that can be traced through its great impact on the country's cultural diversity with the values, institutions, artifacts/techniques, food, songs, arts and oral literature these communities have developed.

Despite the fact that mobile pastoralism in Turkey has suffered, some communities still maintain a wisdom, a keen knowledge of the landscapes in which they move, emerging from thousands of years of accumulated experiences. The practice in its many different forms in Turkey has therefore much to offer not only for conserving nature but also the cultural diversity and heritage of the country.



Photo Credit (from left to right): Two brothers rest before afternoon of grazing, Kızılağaç, Turkey.
© Engin Yılmaz

In the evening the women prepare food around the open fire. © Barış Koca, Turkey, 2014



LEBANON

In Lebanon pastoralism plays an important role in rural community heritage by sustaining close social and intergenerational relationships and livelihoods. To ensure the availability of feed between seasons, the herds move in transhumance between the highlands and the coastal areas. Places like the Bekaa Valley are important areas for different pastoral practices and associated lifestyles and livelihoods.

Pastoralism is also related to the *hima*, a traditional system of land governance and natural resource management that can be traced back to the Arabian Peninsula and early Islamic states. Derived from the 'Arabic word for "protection," the *hima* originated as a community-based method of safeguarding water resources and vegetation during times of drought and environmental hardship.

One aspect of the *hima* was that it was similar to an enclosure, thus preventing grazing during times of ecological stress. Today the *hima* system has undergone a revival and now protects wildlife, biodiversity, and natural resources, as well as facilitating conservation, education, scientific research, recreation, ecotourism, and land-use management. Transhumant grazing in the area has also increased the number of habitats that are suitable for plants, reptiles, and insects. In 2013, the Society for Protection of Nature in Lebanon (SPNL) conducted a quadrant-based floristic study in *Hima Fakiha*¹⁶⁰, which is situated in the semi-arid region of the northern Bekaa Valley. The *hima* was found to have a significantly higher number of endemic plants, approximately 1680 plant species, in a region consisting largely of rangelands stressed by overgrazing. In addition, in the same *hima*, a butterfly study was undertaken, being a good biological indicator of ecosystem health. They are relatively well-researched, easy to identify and monitor, and popular amongst the local populace. Butterflies respond quickly to changes in land use, including intensification and abandonment, and because they occur in one or more generations per year, butterfly populations can change rapidly and trends can be detected in a relatively short period of time. In *Hima Fakiha*, where grazing persists, about 495 species of butterflies have been detected to feed on a wide variety of the native host plants.

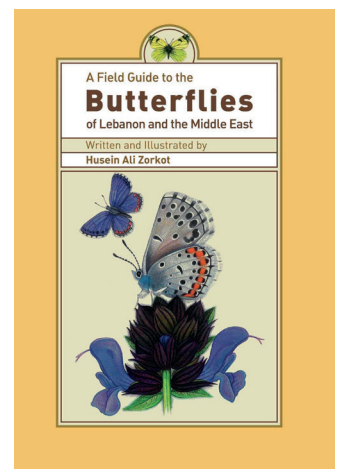
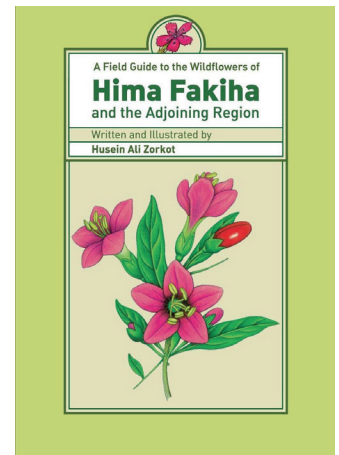


Photo Credit (from top to bottom): Hima Fekha Plant Guide and Butterfly Guide. © Society for the Protection of Nature, Lebanon.

Face of the future.
© Asaad Saleh,
Lebanon, 2014.

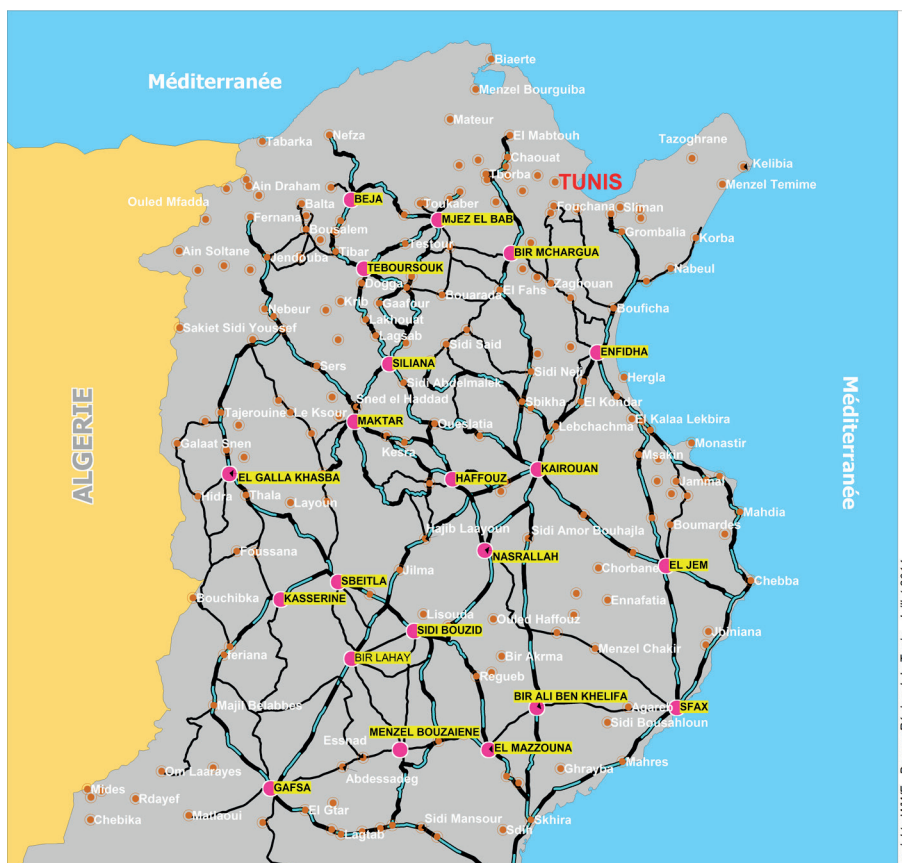


TUNISIA

The main characteristic of the organization of nomadic societies in Tunisia is their tribal reference. Strong socio-cultural and economic elements link individuals to the family, families to the fraction, and fractions to the tribe.

The first requirement of belonging to any tribe is respect for the notion that the honor of the tribe surpasses all individual interests. The second is the existence of a powerful system of mutual social and economic support among the members of the tribe. The absence of a strong agricultural, hydraulic and economic organization would prove disastrous in a difficult climatic and ecological context (steppe and desert of semi-arid and arid climates). Tribal customs and adaptive practices of nomadic pastoralism have ensured survival in the toughest of conditions.

Community spirit is therefore the key notion to understanding the functioning of the tribe. Councils of elders take decisions, arbitrate conflicts and ensure the proper functioning of collective life.



MAP SHOWING TRANSHUMANCE ROUTES IN TUNISIA

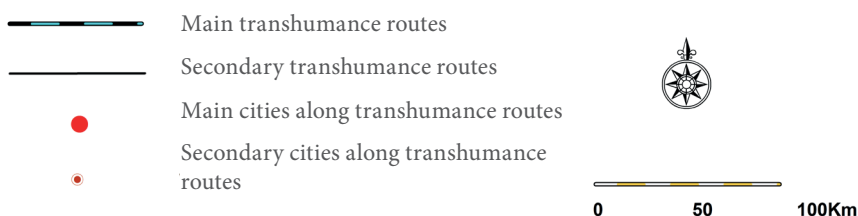


Photo Credit: A child playing cowboy with a sheep that has just been shorn.
© Wassim Ghozlani, Tataouine-Tunisia, 2014.



PASTORALISM, RELIGION AND SPIRITUALITY

The diverse practices of mobile pastoralism across the Mediterranean, indeed across the globe, have strong links with spirituality and religious tradition. While much more research is required to explore this field of enquiry, direct observations confirm that this is the case.

In the most general sense, the practice in itself is a spiritual one. It inspires a way of life that lends itself to spiritual enquiry. Mostly this is not articulated, nor acknowledged, nor understood. When pastoralists are asked why they maintain such a challenging way of life, the answer is often simply because they love it. It makes them feel 'free'. They have a full connection with the landscape, with the seasons, with their animals. Freedom, love and connection are all spiritual in nature, surpassing any particular religious tradition.

In Pablo Domínguez's¹⁶¹ comparative study of transhumant communities in the Central Spanish Pyrenees and the High Atlas of Marrakech, an interesting focus on religious and ritual linkages is presented:

"The spiritual and the immaterial world have always had a fundamental place in Mediterranean mountain transhumant systems. To portray this, the place of local saints referring to transhumance and highland pastures is a particularly sharp example of this. In fact, we generally find these spaces under the patronage of mythical figures and sanctities that centre the performance of pastoralist and transhumant rituals, in order to ensure a complete and balanced management of the villagers' common lands."¹⁶²

Further, there are many cases where the overlap between mobile pastoral practices and the related routes or landscapes can be seen. For instance in Dehesa de la Luz, Extremadura, there is an important religious site within the Dehesa landscape. Every year it becomes the site of huge celebration when the Virgin of Light (Luz) comes back to the Dehesa after nine days in the village of Arroyo de la Luz – a real crossroads for many of the Spanish canada (drovers' roads).

The maintenance of mobile pastoralism therefore has great importance not only for the culture of the regions in which it persists but also for a spirituality that is arguably the lost key to a more sustainable future.

¹⁶¹ Domínguez 2016
¹⁶² *ibid.*



ANNEX REFERENCES

Boletín Oficial del Estado (2017). *Real Decreto 385/2017, de 8 de abril, por el que se declara la Trashumancia como Manifestación Representativa del Patrimonio Cultural Inmaterial*. BOE 86, 28901-28902. https://www.boe.es/diario_boe/txt.php?id=BOE-A-2017-4009

Cruz Sánchez, P.J., Escribano Velasco, C., (2013) *Patrimonio material e inmaterial de las vías pecuarias en el entorno de la Cañada de la Plata. Una Mirada a las manifestaciones culturales de la trashumancia tradicional*. Junta de Castilla y León. Valladolid. http://bibliotecadigital.jcyl.es/jcyl/i18n/catalogo_imagenes/grupo.cmd?path=10111719

Domínguez, P. (2016). *A Comparative Study of Two Mediterranean Transhumant Systems and the Biocultural Diversity Associated with them*. In M. Agnoletti and F. Emanuelli (eds.), *Biocultural Diversity in Europe*, Environmental History 5, pp. 105-122. Environmental History series, Vol. 5, Springer. http://dx.doi.org/10.1007/978-3-319-26315-1_5

ICOMOS (unpublished). *Fundamentos para una posible inscripción de la dehesa en la lista del patrimonio mundial de UNESCO*. Informe de ICOMOS España.

Hadjigeorgiou, I. (2011), *Past, present and future of pastoralism in Greece. Pastoralism: Research, Policy and Practice* 1:24. <http://dx.doi.org/10.1186/2041-7136-1-24>

Papageorgiou, K (1986). *Agricultural cooperatives*. Evgenidio Foundation, Athens. (in Greek)

Zorkot, H. A. (2015). *A Field Guide to Wildflowers of Hima Fakiha and the Adjoining Region* (1st ed.). Beirut: Society for the Protection of Nature in Lebanon. Printing Sponsored by the Critical Ecosystem Partnership Fund (CEPF)



M E D I T E R R A N E A N
Consortium for Nature & Culture

The Mediterranean Consortium for Nature And Culture is a collective movement to support and raise awareness for cultural practices that have a positive impact on biodiversity.

Currently made up of 6 partners, we explore innovative and alternate ways of approaching nature conservation, helping to secure a more sustainable future in the Mediterranean.



Supported By



