

BOOK OF ABSTRACTS

International Workshop

Pastoralism and Sustainable Development



PACTORES project

Pastoral ACTORs, Ecosystem services and Society as key elements of agro-pastoral systems in the Mediterranean

14 – 15 July 2021

Impressum

International Workshop: Pastoralism and Sustainable Development

Book of Abstracts Published by:

Center for Agro-food economics and development - CREDA (Spain)
Mediterranean Agronomic Institute of Bari - CIHEAM Bari (Italy)
University of Vic UVIC (Spain)
Aristotle University of Thessaloniki - AUTH (Greece)
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Publisher

CIHEAM Bari

Website

<http://www.pactores.eu>

ISBN: 978-2-85352-610-4

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Preface

Dear colleagues,

I am very pleased to introduce the Book of Abstracts of the International Workshop “Pastoralism and Sustainable Development”.

This two-day e-workshop takes place online (via the Zoom platform) on July 14-15, 2021. The international e-workshop is organized in the framework of PACTORES project (Pastoral ACTORs, Ecosystem services and Society as key elements of agro-pastoral systems in the Mediterranean) (<http://www.pactores.eu>), funded within ERANET-MED program (project code: ERANETMED2-72-303). The workshop is organized with the financial support of the Italian Ministry of Education University and Research (MIUR).

The e-workshop serves as a forum for the exchange of insights, ideas and good practices regarding the multifaceted nexus between pastoralism (including agro-pastoralism, silvo-pastoralism, and agro-silvo-pastoralism) and sustainable development (including the Sustainable Development Goals - SDGs) in the Mediterranean and beyond.

The workshop is organised by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM Bari) in collaboration with the following institutions: Center for Agro-food Economics and Development (CREDA), Spain; University of Vic (UVIC), Spain; Aristotle University of Thessaloniki (AUTH), Greece; Polytechnic University Marche (UNIVPM), Italy; National Research Council (ISPAAM), Italy; Institut des Regions Arides (IRA), Tunisia; Algerian National Agronomic Research Institute (INRAA), Algeria; Sétif University (UFA), Algeria; and Suleyman Demirel University (SDU), Turkey.

The e-workshop consists of a keynote plenary session and four thematic sessions that address the connections between pastoralism and sustainable development: (1) environment, ecology and ecosystem services; (2) society and culture; (3) economy and finance; and (4) policy, institutions and governance. The keynote speeches addressed trends and challenges for sustainable development of sheep and goat systems as well as agro-ecology and agro-pastoral systems in Corsica and in the argane tree area in Morocco.

Almost 50 contributions were submitted by practitioners and scholars from 10 countries (Algeria, Burkina-Faso, France, Greece, India, Italy, Niger, Spain, Tunisia, Turkey). Of the received contributions, 32 were accepted for oral or poster presentations.

The results of the e-workshop should inform evidence-based actions and policies for the sustainable development of pastoralism in the Mediterranean and beyond. Such a sustainable development model considers and valorises the environmental, social, cultural and economic benefits of pastoralism and takes into account the political and governance determinants that shape and affect not only the activities of pastoralists but also their outcomes in terms, among others, of livelihoods and food security. The ultimate aim is to ensure the sustainability and perpetuity of pastoralism and the improvement of the living conditions and livelihoods of pastoral communities in line with the ambition of the SDGs.

The present book of abstracts includes all successfully positively reviewed abstracts. Full papers will be included in special issue of *Options Méditerranéennes*.

I take this opportunity to thank all people that contributed to the success of this event. These include the members of the organizing committee and the scientific committee as well as the authors. Special thanks to the project partners who enriched the event with their insights and provided valuable support.

Valenzano (Bari), 14th July 2021

Roberto Capone

Principal Administrator - CIHEAM Bari

Keynote Papers

Agro-ecology and agro-pastoral systems: A cross-analysis of two situations in Corsica and in the argane tree area in Morocco

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Abstract

Agro-ecology is the way of designing agricultural production systems by relying on the functionalities offered by ecosystems. Today, it stands out as the direction to take to meet the challenges of preserving natural resources and combating or adapting to climate changes. Our objective is to explore to what extent agro-pastoral systems in the Mediterranean could be involved into this agro-ecological approach. After presenting the general principles of agro - ecology in its different environmental as well as social, economic and societal dimensions, we analyze and compare two examples of Mediterranean agro-pastoralism. The first case is Corsica, a French island located in the North-Western part of the Mediterranean, the second one is in the South-West of Morocco in the argane tree biosphere reserve. From this comparative analysis, a holistic diagnosis of the strengths of pastoral systems but also of their challenges is proposed. Some prospective scenarios are then discussed on the possible futures of these systems and the dynamics to impulse.

Keywords: agro ecology, sustainable development, agro pastoralism, Corsica, Morocco, argane tree area

Trends and challenges for sustainable development of sheep and Goat Systems

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Abstract

Sheep and goat farming systems in Europe are an essential part of the agricultural industry and contribute to the provision of ecosystem services to society, in both Less Favoured Areas (LFA), and within cropping/arable areas where the role of grassland and livestock in rotations to build soil quality and farmland wildlife opportunities has significant potential. However, the sector faces many and diverse challenges which should be properly addressed for a sustainable and competitive future. The main problem is low income in the sector despite heavy reliance on subsidies from the Common Agricultural Policy (CAP) combined with poor uptake of innovations mainly as result of the age structure of the industry and lack of new entrants. Increasingly, the subsidies under CAP will be directed at public goods (GHG, Biodiversity, animal welfare and rural livelihoods). Our objective here is to give an overview of the status of the sector, present the main challenges and the current trends and opportunities, and set a new paradigm for the future of the sheep and goat industry by providing recommendations based on the key findings of the iSAGE project. iSAGE, Innovation for Sustainable Sheep and Goat Production in Europe, assessed the sustainability of sheep and goat sectors in Europe to future challenge such as climate change, food security, resource use efficiency and rural deprivation in marginal regions. Among others the results showed that special emphasis should be given to (i) supporting supply chains and increasing consumption of sheep and goat products through novel labelling, packaging and cuts, (ii) coping with climate change and greenhouse gas emissions using novel methodologies and technologies, and informing relevant policies particularly in pastoral systems, (iii) breeding for enhanced animal resilience, efficiency and adaptability, and promoting region-specific use of local breeds, and (iv) increasing the adoption of relevant innovations. The efficient adoption of innovations is expected to increase the sector's overall resilience and sustainability and decrease reliance on public support.

Keywords: sheep, goats, innovation, sustainability

Session 1. Environment, ecology and ecosystem services

Linear body measurements as a management tool for Tunisian local goats population raised in arid conditions

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Abstract

The study aims to describe the linear body measurements and their factors of variation and to establish their possible relationship with the live weight. The morphostructural parameters for 92 local kids included the body length, the wither height, the paunch girth and the heart girth collected from birth to 150 days of age. Weights were taken at standard ages (30, 90 and 150 days) at a weekly pace. The mean body length at 150 days of male was 46.29 cm, while that of the female was 44.23 cm. Similarly, the heart girth as well as wither height was also higher ($p < 0.05$) in male than those of the female. This trend confirms sexual dimorphism in local kids. The mode of birth had non-significant effect on paunch girth after 90 days of age. The month of birth significantly ($p < 0.01$) affected all morphostructural parameters, especially at early age. A high significant correlation was recorded between the paunch girth and the heart girth ($r=0.98$). Both, the body length ($r=0.97$) and the wither height ($r=0.95$) presented the highest correlations with birth weight and weight at 150 days of age. It could be concluded that the weight at different ages can be predicted with accuracy from some body measurements which can be exploited by goat producers for management, selection and genetic improvement programs in local goat population.

Keywords: morphostructural parameters, weights, arid conditions, correlation, selection.

Factors influencing growth traits of local kids population under arid conditions

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Abstract

Goat meat production, a widely extended activity in the more arid areas of Tunisia, relies on local breeds. These breeds are well adapted to produce under harsh conditions but have a very small size and low productivity. The aim of this study was to establish the factors of variation of kids' growth as well as the relations between weights at typical ages from birth up to 150 days of age. A total of 92 kids in the caprine herd at the ELGORDHAB-TATAOUINE experimental station, were used. The average weights of local kids were 2.55; 3.40; 4.91; 7.41; 9.82; 12.31 and 12.93 kg respectively at birth, 10, 30, 60, 90, 120 and 150 days. The average daily gain decreases with age. Results indicate that Tunisian local kids were characterised by a reduced weight at birth, which varies with sex, pigment type, mode of birth and especially the month of birth. Such performances confirm the moderate growth potential of local kids and also the importance of the impacts of environmental factors on the productive phenotypes. Besides their imperative inclusion in mixed models, the sources of variation of arid environment, as well as their interactions, need to be considered at the level of their random nature. The correlations between the different growth traits are between 0.15 and 0.94. The correlations were higher between adjacent weights and between the corresponding weights and gains. The establishment of the kid's weight parameters under arid regions helps to develop accurate selection indices and to optimally a breeding programs and performance recording systems for maximum economic gain or profit from growth traits.

Keywords: local kid, arid environment, growth performance, correlation, average daily gain, selection.

Long-term grazing enclosure impact on vegetation structure and carbon sequestration in arid areas: case study of Sidi Toui National Park, southern Tunisia

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Abstract

The degradation of arid rangelands is mainly caused by overgrazing. Grazing exclusion is considered as a key management aspect to restore these ecosystems leading to changes in vegetation and soil structure. However, it depends on intensity and duration of exclusion. The aim of this study was to evaluate the impact of long-term grazing enclosure (more than 25 years) on the soil surface state and vegetation structure. Aboveground biomass and correspondent carbon contents were also assessed. Measurements were made using the quadrat point method and phytomass sampling in two defined plant groups: (i) G1 dominated by *Anthyllis henoniana* and *Gymnocarpos decander* and (ii) G2 dominated by *Rantherium suaveolens* and *Stipa lagascae*, inside and outside Sidi Toui National park, during spring 2019. The main results indicated that under long-term grazing enclosure the perennials density, total vegetation cover and litter increased significantly in G1 and G2. Likewise, a significant increase in total aerial phytomass and aerial carbon content was observed inside the fenced area for both studied groups. However, a negative effect was stated on the annual's densities. These results suggest that long-term grazing enclosure appears to be beneficial in aboveground phytomass expansion of arid rangelands and enhancing their contribution to carbon sequestration.

Keywords: arid rangelands, grazing enclosure, protected areas, phytomass, carbon content.

Forage quality of dominant plant species of mountainous grasslands in northern Greece

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Abstract

The objective of this study was to detect differences in floristic composition and diversity indexes between four grasslands grazed by small ruminants in mountainous areas of Northern Greece. Moreover, the study was focused on chemical composition of the dominant desirable plant species. In each grassland, vegetation cover was measured, while floristic composition, and plant species diversity indexes were estimated. Moreover, plant material of dominant species was analyzed for crude protein (CP), Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF) and Acid Detergent Lignin (ADL). Dry matter digestibility (DMD) was calculated too. The results revealed no significant differences between the vegetation cover of the grasslands, which is relatively high (83% to 93%). According to the results, forbs were the dominant functional group in most of the grasslands, following by legumes. There was a high differentiation among species richness, Shannon index and Morisita similarity index among the studied grasslands. Concerning the chemical composition, forb and legume species had significant lower NDF and ADF compared to grasses, while there was no significant difference on CP content of the tested species, except *Anthoxantum odoratum* and *Thymus sibthorbii*. High species diversity and high forage quality was recorded to the studied grasslands.

Keywords: floristic composition, nutritive value, diversity index, grazing, mountainous grasslands, northern Greece.

Adequacy of stocking rates applied on protected pastures of Monti Sibillini (Central Apennines)

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Abstract

The management of permanent grasslands aims at achieving a balance between stocking rate and their potential carrying capacity to prevent undesired vegetation dynamics and to maximize the provision of ecosystem services. Among all, pastoral value (PV) is considered a valuable method that provides preliminary evaluation of pastures productive potential exploiting data already available (i.e., phytosociological surveys and maps). The paper aims to compare the actual stocking rate and the potential carrying capacity calculated by applying the PV method in several Natura 2000 sites (1000-2448 m a.s.l.) of Monti Sibillini (Marche region, Italy). Available vegetation data and maps were used to calculate PV of the pastures located in the grazing areas used by the monitored livestock farms. Geographic Information System (GIS) technologies were used to measure the grasslands surface and the site characteristics of the study areas to be used in the integrated measurements. PV of the grasslands varying between 1.56 and 27.48 was assessed and used to calculate carrying capacity ranging from 0.09 to 1.67 LU ha⁻¹ per 120 grazing days. The PV method and the applied GIS technologies played a significant role in identifying uneven stocking distribution.

Keywords: protected grasslands, Natura 2000, pastoral value, GIS, carrying capacity.

The role of pastoral systems in the creation and maintenance of Nature's Contribution to People in a European biodiversity hotspot

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Abstract

A comprehensive analysis of the relationship between pastoralism and Nature's Contribution to People (NCP) in Spain is missing in the literature. To address this gap in the literature, a systematic review exploring the interactions between pastoral systems and NCP was performed. An operator string was created and used in the Web of Science database on the 12/06/2018. Only peer-review articles containing primary data and written in English were accepted. The article should discuss pastoral systems based in Spain and NCP should be discussed. The articles should have been published between 2003 and 2019 and not set on an experimental farm. The search string resulted in 296 scientific papers. The papers were then compared against the inclusion criteria, this resulted in 47 articles being examined. An additional 11 articles were then included based on expert recommendation. Initial results indicate that pastoral systems in Spain are primarily studied as regulating systems as regulating NCP were the most common NCP in the analysis (n=99), followed by material NCP (n=65) and lastly non-material NCP (n=45). This suggests that pastoral systems in Spain are rarely considered as cultural systems, and instead they are studied for their importance in landscape maintenance and creation.

Keywords: Spain, Socio-ecological system, Ecosystem services, Pastoralism, Systematic review, NCP

Future of pastoralism in India

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Abstract

Pastoralism is a complicated activity, involving an interrelationship between human population, animal population and natural resources. Essentially an animal husbandry activity, pastoralism offers employment and income opportunities to the rural poor. The pastoral populations of India are not well documented. The pastoralists of India are generally referred to as “nomads”. Nomadic pastoralism is found in the dry lands of Indian states of Rajasthan and Gujarat, the Deccan Plateau, and in the mountainous regions of the Himalayas. Among the pastoral groups, Raika/Rabari and Gujjar from Rajasthan are well known. Though pastoral communities are in the vanguard of conservation of plant and animal diversity, the condition of pastoralists in India is deteriorating rapidly because of increasing diversion of land, especially of the commons, for commercial purposes, influence of globalization, and climate change. Other reasons are lack of official development policies for pastoral communities, lack of a proper animal healthcare for animals during migration, problems related to availability of grazing areas, shifting priorities of young generation and poor marketing infrastructure. Though the odds are stacked against pastoralists, there is hope that pastoralism might have a better future in India, with greater emphasis on the conservation of biodiversity, and the recognition of the role of the pastoralists in conserving genetic diversity.

Keywords: pastoralism, nomads, diversity, animal husbandry.

The Use of Goat Grazing for Prevention of Forest Fires in the West Mediterranean Region of Turkey

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Abstract

In this study, the effects of goat grazing on reducing forest fires are investigated. For this purpose, trial areas were taken in 3 provinces (Antalya, Isparta and Burdur) within the study area which has rough terrain and scrubland. As a result of grazing goat flock in these areas, the amount of flammable material (kg) removed from a unit area (ha) was calculated. Measurements were made in 4 different categories i.e. weak grazing (70% -100%), medium grazing (70-40%), strong grazing (40% -10%) and no grazing in the study area. In addition, the most suitable periods for goats to be grazed without damaging the forests have been determined. The amount of flammable material removed by goat grazing in study areas where grazing is allowed in the state forests is annually -756,500 tons in Antalya Province, -304,000 tons in Isparta Province, -198,000 tons in Burdur Province and totally -1,258,500 tons in entire study area. Thus, goats remove the amount of flammable material from the Western Mediterranean Forests at the rate of 61%. Weak grazing (70% -100%) in grazing classes cannot reduce the amount of flammable material. The grazing intensities that should be used to reduce the forest fire hazard are in medium grazing (70-40%) and heavy grazing (40% -10%). The most suitable grazing period to preventing forest fires is the period between April 15 and June 15. Since there are different forest vegetation in the study area, these grazing periods can be extended to 15 days earlier or 15 days later. Finally, the 3-month period between 01 April and 30 June is the most effective period of grazing for the prevention of forest fires.

Keywords: goat breeding, forest fires, forest protection, fire prevention, forest area, Turkey

Effect of woody plant cover on understory vegetation diversity in Mediterranean shrublands

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Abstract

The aim of this study was to investigate the effect of woody plant species cover on the diversity of the understory vegetation in Mediterranean shrublands. The research was conducted in N. Greece, at the area of Ossa, Lagadas, Thessaloniki. Three different shrub cover classes were identified: open (10-40%), medium (41-70%) and dense (71-100%). Understory species vegetation measurements were conducted in four plots per each shrub cover class. Cover and composition were measured along two transects in each plot while α and β diversity indices were calculated. For α diversity the indices: a) species richness (S), b) Shannon-Wiener index (H'), c) Evenness (J), d) Simpson (D) and e) Berger-Parker index of dominance (d) were used. For β diversity the indices: a) Sorensen's (C_s) and b) Jaccard's (C_j), as well as Pielou's (PS) percentage similarity were calculated for each pair among the three shrub cover classes. The results showed that α diversity of the understory vegetation decreased from open to dense shrub cover. β diversity revealed that the three shrub cover classes differed in terms of species similarity of the understory vegetation. These findings lead to the conclusion that the diversity of the understory vegetation in Mediterranean shrublands is declined as woody species cover increase and a diversified landscape can contribute to the preservation of species richness in these ecosystems.

Keywords: species richness, Shannon-Wiener index, evenness, floristic similarity

Vegetative and reproductive plant height of species populations in relation to land use changes in Mediterranean rangeland ecosystems

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Abstract

Plant height is a functional trait that is directly related with plant competitive ability and its ability to tolerate or avoid disturbance and environmental stress. The aim of this paper was to study the vegetative and reproductive plant height of plant populations of the same species in relation to land use changes in Mediterranean rangelands. At the area of Lofiskos, Lagadas County, Thessaloniki, N. Greece, four land use types were selected: a) abandoned arable field, b) grassland, c) open shrubland and d) dense shrubland with four replicates each, representing four stages of secondary succession after land use extensification and/or abandonment. Vegetative and reproductive plant height of the populations of plant species that were abundant in at least two of the land use types was measured. Vegetative plant height was significantly different between the populations of the same species for the 71% of the species under study, while reproductive plant height was significantly different for the 64% of the species studied. In both cases, the majority of the species appeared significantly higher height in their populations in the advanced stages of succession. Vegetative and reproductive plant height of species population's responds to land use changes caused by extensification and/or abandonment in Mediterranean rangelands.

Keywords: plant functional traits, secondary succession, extensification, abandoned field, grassland, shrubland

Perspectives, opinions, and perceptions of livestock farmers on their sustainability: the case of the Pyrenean region of Pallars in Spain

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Abstract

Traditional small-scale livestock farming activity in the Spanish Eastern Pyrenees is nowadays influenced by market globalization trends as well as regional factors such as nature protection regulations and tourism. This study addressed farmers' perspectives, concerns, and perceptions regarding the challenges that threaten their sustainability. We carried out a face-to-face survey with 103 farmers in Pallars (Catalonia) during 2018. The stagnation in sales prices of products was considered the biggest challenge and one of the underlying causes of the farms' low financial profitability. Farmers also pointed out the highly-burdening bureaucracy, the lack of generational turnover, and the difficult coexistence with wildlife as important problems undermining the livestock sector in the region. Although most farmers positively considered their increasingly valued role in the conservation of biodiversity and nature, their perception of protected natural areas was mostly negative. Respondents reported a total of 613 conflicts with wildlife during the previous year. Wild boars were the species most frequently mentioned for damaging meadows, crops and infrastructures, and causing road accidents and disease transmission. Vultures were held responsible for attacks on flocks while deer species were signalled for fodder competition. These results highlight the urgent need to overcome these obstacles in a participatory way among all stakeholders.

Keywords: mountain farming, global change, protected areas, wildlife, conservation, socio-ecological systems

Livestock and Climate Change in North Africa

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Abstract

A growing body of evidence links livestock to climate change (CC). However, a comprehensive analysis is lacking in North Africa (viz. Algeria, Egypt, Libya, Morocco, and Tunisia). Therefore, this paper analyses the dual relationship between livestock and CC in North Africa, drawing upon a systematic review of 32 documents identified in March 2021 through the Web of Science. Most studies focus on CC adaptation while mitigation is generally overlooked. Livestock contribution to greenhouse gas (GHG) emissions depends on livestock species and pastoral systems. Climate change affects livestock productivity, and fodder and feed production. The livelihoods of North African pastoralists are vulnerable to CC because they are largely based on rainfed mixed and pastoral livestock systems. However, livelihood vulnerability depends on pastoral mobility, farm typology and household livelihood assets. Livestock breeders adopted different strategies to adapt to CC such as herd size reduction and livelihoods diversification. Sustainable management of pastures and rangelands can help not only mitigating livestock-related GHG emissions and increasing carbon sequestration but also improving pastures resilience and pastoral communities' adaptation to CC. Research is needed to accommodate the imperative of CC mitigation while ensuring the adaptation of the livelihoods of livestock farmers and pastoralists to the changing climate in North Africa.

Keywords: animal husbandry, pastoralism, pasture, climate change mitigation, climate change adaptation, Maghreb, Mediterranean.

Pastoralism and biodiversity in Burkina Faso and Niger: A review

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Abstract

Burkina Faso and Niger are two landlocked countries in Sahelian West Africa. Pastoralism is one of the most important livelihood strategies in both countries and can play a central role in biodiversity conservation. This paper analyses the state of research on the relation between pastoralism and biodiversity in Burkina Faso and Niger. It draws upon a systematic review of 36 documents identified through the Web of Science. Literature analysis shows that the effects of pastoralism are rather mixed as they are context-specific and depend on many factors such as grazing intensity and livestock species. In general, pastoralism has a negative effect on plant species diversity, especially in terms of abundance, but with distinct effects on woody (trees and shrubs) and herbaceous species. Pastoralism can also impact the diversity of wild fauna. On the other hand, while there is a general trend towards the erosion of indigenous livestock genetic diversity, due inter alia to cross-breeding, pastoralism and traditional knowledge of pastoral communities result fundamental in the conservation of local, indigenous livestock breeds. Further research is needed to promote sustainable management of pastures and grasslands that ensures biodiversity conservation while preserving pastoral communities' livelihoods in Burkina Faso and Niger.

Keywords: agro-pastoralism, plant diversity, animal diversity, genetic diversity, species diversity, Sahel, West Africa.

Restoration of pseudoalpine grasslands in Oiti National Park, Central Greece

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Abstract

Pseudoalpine grasslands of Oiti National Park are degraded due to the interruption of the traditional land use practices including transhumance, periodical burning and firewood collection resulting in the dominance of competitive plants and, especially, the invasion of the dwarf juniper (*Juniperus communis ssp. nana*). The objective of this research was to study the treatments applied imitating traditional management practices for the restoration of grassland flora. In the autumn of 2013, prescribed burning was applied and after one year an area covered with “wolf” grasses was cut. In addition, an area outside the core of the park that was grazed by sheep was divided into three grazing intensity treatments. In all areas, 33 pairs of protected with mesh wire and freely grazed plots were established in spring 2015. At the end of the grazing period, in July, cover and species composition was ocularly estimated, while biomass was measured in quadrats (2015 and 2016). With the exception of burning, cutting and grazing did not affect plant cover while species composition was positively influenced especially by burning and cutting that favored low growing species with higher nutritional value (*Festuca alpina* and *F. polita*). In contrast, biomass was significantly affected only by burning and grazing. It is concluded that moderate sheep grazing should be legally allowed in the core of the Park including the use of prescribed burning which is very effective in controlling dwarf juniper.

Keywords: prescribed burning, cutting of herbaceous plants, grazing intensity, biomass

Survey of olive agrosilvopastoral systems in Chalkidiki, Northern Greece

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Abstract

Olive (*Olea europaea L.*) is an important evergreen tree species of Mediterranean area that is planted in order to produce table olives and olive oil. Olive agrosilvopastoral systems are found in many regions of Greece; in combination with natural vegetation and/or intercropping. These systems are threatened by abandonment or conversion to intensive monocultures. The aim of this study was to identify olive agrosilvopastoral systems in the region of Chalkidiki, Northern Greece and evaluate their characteristics. In order to achieve this, the Corine Land Cover classification system of land use types was applied on google earth satellite images and onsite observations were conducted. Three different systems were identified; a) silvoarable systems with trees in rows intercropped with cereals, b) silvoarable systems with scattered trees intercropped with cereals, and c) silvopastoral systems with scattered trees with natural vegetation and grazing. These systems were mainly found in the Corine land cover type 223 (olive groves) and occupied 12,052.64 ha of the study area. The majority of the systems were silvopastoral with scattered trees and natural vegetation. The preservation of the agroforestry systems of the area was mainly due to the occupation of the local population with tourism. The adoption of the new CAP agri-environmental measures by farmers could contribute further to their exploitation.

Keywords: Corine Land Cover, silvoarable, silvopastoral systems, tree arrangement.

Spatio-temporal changes analysis (1984 – 2017) of a grazed Cretan landscape using Landsat satellite images

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Abstract

Research on spatio-temporal changes on grazed landscapes of Greece in general and of Crete specifically, indicates that forests, as in all Mediterranean, are expanding. Nowadays, such studies often use digital image analysis methods applied on multispectral satellite images. The recent open access availability of ground reflectance products derived from historical Landsat imagery, which have been geometrical and atmospheric corrected, is expected to increase their use for land use/land cover change research. The aim of this paper was to study the spatio-temporal changes of a typical Cretan landscape (M. Sfakia) and to test the efficiency of the recently available Landsat products, for these purposes. Landsat images of 1984, 2001 and 2017 were processed by classification techniques using remote sensing and GIS software. Forest orthophotomaps and relevant inventory data were also collected, and landscape metrics were calculated. Data analysis of spatio-temporal changes showed a gradual expansion in size and density of forest in silvopastoral areas and of silvopastoral areas in phrygana, increasing landscape heterogeneity. The abandonment of marginal agricultural areas, in combination with the reduction of wood harvesting, are the most important factors of landscape changes in relation to animal husbandry evolution. If this trend continues, it is possible for this Cretan landscape to degrade.

Keywords: Sfakia, remote sensing, open access data, landscape metrics

The impact of animal husbandry on Thessaly's landscape, Greece

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Abstract

Animal husbandry, especially the transhumant sheep and goat farming system, was one of the main factors shaping Greece's rural landscapes for centuries. The last few decades, the abandonment of this traditional, extensive form of animal husbandry, combined with the changes in animal breeds and the increase of animals being kept indoors and given complementary feeds, had a great impact on the landscape. In the area of Thessaly there is a long history of livestock grazing which affected landscape structure. In the lowlands, a characteristic zone with grasslands around the villages is present, contrary to the rest of Greece where it is limited. This study aims to provide an insight on landscape changes during the last century. For this purpose, landscape structure of Thessaly's lowland grasslands was studied using Corine Land Cover 1990 and 2018 in a G.I.S. environment. Overall, the communal grasslands around the urban, lowland areas of Thessaly occupied 7807.1 ha in 1990 and only 4255.8 ha in 2018 (-45.5%). In Western Thessaly these areas were more extensive, probably due to the seasonal movements of transhumants that exploited the lowland grasslands during the winter season. In Eastern Thessaly they occupied a smaller area, probably because transhumants spent the winter at the foothills, leaving the extensive plains exclusively for agricultural exploitation.

Keywords: Land use changes, grasslands, transhumance, Corine Land Cover

The Effects of Global Warming on Goat Breeding in the West Mediterranean Region of Turkey

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Abstract

In this study, the effects of global warming on goat breeding were investigated. The research area is the Western Mediterranean Region in Turkey including Antalya, Isparta and Burdur provinces. The Status of Goat Breeders was determined through survey studies and 126 goat's breeders were interviewed face to face within the scope of the study. In the region, goat breeding is done with traditional methods. Most of the ages of goat breeding people are over 40 years old and they have been doing this for over 20 years. Education levels are generally primary school graduates. Almost all of the growers participating in the research are members of any breeder association. They have information about the support and aids provided by the state and they benefit from these aids. The downward trend in precipitation in Antalya will continue and will remain well below the long-term average total precipitation values. Total rainfall will decrease to 871.6 mm in 2025. In addition, the increase in average temperatures will be +0.7 °C and the average temperature will be 19.6 °C in 2025. In this case, it is concluded that the drought will be more serious in the coastal areas of the Mediterranean Climate Region. In the province of Isparta, where the average annual precipitation amount is 570.2 mm, the annual rainfall amount will decrease to 535 mm in 2025. In addition, the average temperature in Isparta will be 13.5 °C in 2025. According to future projections, there will be a strong increase in average temperatures in Burdur and the increase in average temperatures will be +0.7 °C. The average temperature, which is currently 13.2 °C in Burdur, will be 13.9 °C in 2025. Burdur Province, whose monthly total rainfall amount is 428.1 mm, is expected to decrease below 400 mm in 2025 with a decrease of 35 mm. In this case, it turns out that the drought will be experienced in extreme condition in Burdur Province. Goat breeding is carried out mainly in enterprises in forest and mountain areas in Turkey. Global warming will bring much negativity to human beings, cause some plant and animal species to disappear or decrease but drought-resistant species will survive in future. Goat is very adaptive and it is resistant to drought and thirsty. Hair goat is also very resistant to drought and thirsty, and is fed with woody plant species that are resistant to drought and thirsty. In this respect, the effects of drought and global warming will be felt less on this hair goat productions.

Keywords: sustainable goat breeding, maquis areas, drought, global warming, Turkey.

Assessment of the environmental and social value of Lake Doirani

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Abstract

Doirani is a cross-border lake between Greece and the Former Yugoslav Republic of Macedonia and belongs in Kilkis. The importance of this wetland has led to its protection by European and National Legislation. In recent years, the water balance of the lake has been disturbed and has led to the decline of the fauna and the avifauna. Regarding the aesthetic value of the lake, on the Skopje side there is a great interest in the condition and protection of the lake in contrast to the Greek side where there is indifference, dirt and stench. The central issue of the research was to record the views of the respondents regarding the current state of the lake and whether they consider that they benefit from it. The implementation of the research started from the construction of the respective questionnaire. The sample size was selected at 339 units (inhabitants), while the method followed was that of random sampling, at random locations in the study area. The results showed that most respondents believe that Doirani is in a miserable state and that their quality of life and financial situation is significantly affected by it.

Keywords: wetland-ecosystem services-questionnaire-degradation-aesthetic value-protection

Strategy for the sustainable development of agro-pastoralism in Algeria

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Abstract

Agro-pastoralism is practiced in Algeria, since these last years, on rangelands which know degradation in clear progression. All the studies and researches that have been made on this activity underline the deep socio-economic disruption of which it is the object to the point where its sustainability is, today, really threatened. The results of various research studies provide objective elements that allow for a proper assessment of the current conditions in which this activity takes place. The physical state of the steppe, the management and organization of agro pastoral practices, desertification, erosion and the loss of pastoral crops such as esparto grass are among the elements that adversely affect the sustainability of an environment already weakened by the sedentarization of the population, overgrazing, intensification of livestock and illegal plowing aggravated by climate change that makes the environment even more vulnerable. Because the sustainability of the steppe activity depends on the sustainability of natural resources, it is necessary to review the current strategy of their exploitation. To this end, this contribution aims, from a bibliographic research, to make possible the development of a synergy that will aim to neutralize the currently contradictory interests of the various stakeholders involved in this activity. This synergy has the virtue of providing agro-pastoralism with the sustainable development strategy that it has lacked until now.

Keyword: Agro-pastoralism, Degradation, Sustainable development.

Session 2. Society and culture

Pastoralism in Algeria: transformation, challenges and prospects

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Abstract

Pastoralism plays a significant socio-economic role in Algeria. However, extensive livestock systems, which are of high nature value, are facing many challenges and their decline might have social, economic and environmental consequences. In this context, the present review contributes to a better understanding of the current situation in which pastoralism in Algeria is evolving and the major developments over the last decades. It draws upon secondary data from the scholarly literature as well as grey one (e.g. reports). The analyzed literature suggests that the pastoral regions in Algeria are subject to a number of social, economic and technical transformations. These transformations occur as a result of the breakdown of traditional balances between social groups and natural resources. The socioeconomic factors induced by demographic growth as well as climate change have also profoundly modified the Algerian pastoral systems (cf. decreased mobility, greater dependence on feed supplements). This study reveals livestock systems and practices instability as well as an increase of competition over pastoral resources use. The results also highlight that in the face of those transformations, pastoral societies are becoming economically fragile, pushing pastoralists towards livelihoods diversification to improve their chances of maintaining their farms in economically and climatically difficult conditions.

Keywords: pastoralism, Algeria, livestock production, semi-arid areas, pastoral communities, sustainability.

Patterns of transhumant livestock system on Mount Zireia Peloponnese, Greece

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Abstract

Transhumant livestock system in Greece as well as in Mediterranean basin is deeply rooted in time, having developed a whole cultural characteristic whose societies continue to be the transhumant farmers. In Greece there are more than 3,050 transhumant flocks and the major part of them belong to Sarakatsans, an ethnic group. In the past the flocks moved on foot but now most of these movements carried out with trucks and only local, moved on foot. The aim of this study was to investigate the dynamic over time of a) transhumant animals and b) transhumant routes in Mout Zireia in Peloponnese in Southern Greece. The data were taken from personal communications, publications and data from Payment and Control Agency for Guidance and Guarantee Community Aid (PCAGGCA). According to the results, a noteworthy number of transhumant sheep and goats exist in the study area. The traditional routes on foot have stopped and the animals moved with trucks, a practice that responds to modern socio-economic developments and is a global common custom. The changes in the transhumant livestock system probably due to a general trend of transhumant farmers to adopt innovations and modern standards, restrictions in land uses, changes in their living standards.

Keywords: transhumant routes, cultural heritage, ecosystem services, sheep

Identification and mapping of migration routes of transhumance communities using geographic information system in the western Mediterranean region in Turkey

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Abstract

Turkey's nomads, replaced periodically to graze their goats in the basin of the Mediterranean Region for many years. Hair goat breeding for nomads is both a production system and a cultural value symbol. Nomads who drives the immigrant life style, has come to the Turkish water front. Economy for nomads is based on animal breeding. Geographical mobility and animal breeding are two important factors affecting and shaping the nomadic life style. During these migrations, animals have to graze every day at certain times. For this reason, they cannot travel continuously. For this reason, migrants cannot travel more than 4-5 hours per day. The roads on the Taurus Mountain are generally available, but do not provide access to thousands of animals. The study site is located between 31°4'10 "and 38°27'50" northern latitudes and between 32°33'48 "and 36°3'30" east longitudes. The migratory routes of livestock farming communities from Geographical Information Systems (GIS), ArcGIS package program and Google Earth program. In addition to these, topographical maps and landscaping plans and maps of the Isparta and Antalya Forest Regional Directorates will be utilized. With multifunctional GPS, coordinate values (including x, y values) and length measurement of migration paths can be saved and uploaded as data to related programs. All the data obtained with these maps and observations were transferred to the computer with the GPSTrackMaker program and important points were determined and the migration paths were drawn with the joining of points (vector). According to the migratory patterns made by the nomads, "Small Ruminant Operation Types" were determined. These were (1) Small Scale Sheep Enterprises, (2) Large Scale Sheep Enterprises, (3) Small Local Migration Mixed Farming Enterprises, (4) Long Distance Regional Migrations Goat Enterprises.

Keywords: nomadic people, goat breeding, migration routes, geographic information system, GIS, Western Mediterranean Region, Turkey

Exploring consumer preferences for lamb meat production systems in Catalonia, Spain

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Abstract

Food production and consumption have significant impacts on the environment and consumers make important decisions on a daily basis by opting for some more sustainable types of food and diets. Extensive livestock farming promotes a type of food production that combines the use of the territory's resources with a low use of external inputs for the generation of quality products within a framework of respect for the environment. This research focuses on the analysis of the factors that influence consumer preferences for meat, exploring its link with the generation of social demands for responsible consumption of products of animal origin. A discrete choice experiment was designed to examine the preferences and valuation of the lamb meat production systems. The information was collected by a voluntary survey applied through a digital platform to 402 consumers. The data show that health, animal welfare and environmental impact are easily associated with organic production but less recognized for extensive production. Origin and animal welfare are the attributes most valued by consumers in the Barcelona metropolitan area. In addition, consumers express a positive assessment of the production lamb meat from autochthonous livestock breed. These results contribute to the definition of marketing strategies and the implementation of short circuits to support the economic viability of small extensive livestock production.

Keywords: consumer behavior, food attributes, discrete choice analysis, environmental consciousness.

Session 3. Economy and finance

Economic performance of dairy goat farming in Greece. Preliminary results

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Abstract

The aim of this study is to outline the main technical and economic indicators of the dairy goat sector in Greece. Farm accounting data were collected from 96 goat farms and a comparative analysis was carried out using milk yield and farm size as classification criteria. Results show that farm indicators vary considerably as milk yield and farm size increase. Milk yield is 155.17 kg/doe for the average farm, and increases as the farms rear more animals. The average farm uses 18.59 hours of human labor per doe, while small size farms use more labor per doe, followed by medium and large size farms. Milk yield and farm size are both associated with the composition of human labor, confirming the important role of hired labor in high milk yield and large size farms. Low milk yield farms pay less rent for land/doe than high milk yield farms, while farm size is negatively related to land rent. Results also show that goat farms exhibit loss, but high milk yield farms and large size farms achieve better economic results. The findings of this study contribute to the debate for the development of a more sustainable and resilient goat sector.

Keywords: dairy goat farming, milk yield and farm size classification, farm technical and economic indicators, Greece

Comparative technical and economic analysis of a local sheep breed in Greece and North Macedonia

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Abstract

The development of the sheep sector resulted in the transition from traditional extensive systems to intensive, where local breeds have been gradually replaced by imported improved ones. This has been the case in Greece, while in North Macedonia cross-breeding of local breeds has also been extensive. This study examines the economic performance of the production systems of the local “Pelagonia” sheep breed - which can be found in the cross-border area of the two countries but is actually witnessing declining populations. The results of a descriptive technical and economic analysis demonstrated that the extensive Pelagonia production systems are more profitable than the intensive - despite lower milk yields– mainly due to significant savings in feeding costs. In addition, it showed that the economic results of the Greek extensive group were better than those of the average Pelagonia farm in North Macedonia, except for the net profit where it was slightly higher for the latter. However, a different outcome can be concluded in case that subsidies are not taken into account, as the economic results of the average Pelagonia farm in North Macedonia are more satisfactory than those of the Greek extensive group, indicating that the Greek Pelagonia farms highly rely on income support. The results of the technical and economic analysis are an essential step toward the definition of the framework within which Pelagonia sheep farms will be incorporated in order to induce the emergence of sustainable production systems in both countries.

Keywords: Pelagonia sheep breed, pasture, technical and economic indicators, livestock production systems.

Economic sustainability of agro-pastoral system in Tunisia

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Abstract

The Arid Regions Institute (IRA) seeks to implement sustainable development options and strategies to agro-pastoral systems (APS) in Tunisia through several projects for at least five decades. One of the most recent ones is PACTORES “Pastoral ACTORs, Ecosystem Services and Society as key elements of APS in the Mediterranean”. Mediterranean APS are considered as marginal production systems in arid and Saharan regions. On the one hand, APS harbour high-value natural agricultural lands and they are qualified as one of the most species-rich ecosystems in the world. Some of them are traditionally used to produce local meat and dairy products, highly estimated in market when considering their organic characteristics. Additional APS environmental services include erosion prevention, carbon sequestration and maintenance of soil water and fertility as well as the resulting recreational opportunities and cultural identities. On the other hand, the value of Ecosystem services (ES) is largely invisible to decision makers, businesses, and governments. In fact, recognizing the value of ES, and seeing them as a part of the solution for societal challenges is the only way to ensure human wellbeing in agro-pastoral landscapes. This study highlights the APS's contributions to social welfare. Therefore, a holistic approach is needed that integrates APS in delivering benefits. Furthermore, the financial value of different agro-pastoral products will be evaluated based on their organic character, as well as their impact on the economy and sustainability. The study has the ambition to obtain new data on livestock production systems and typology of APS in El Ouara case study (southern Tunisia) through semi-structured interviews; to assess the economic performance and sustainability of APS; to assess and to value ecosystem services, and to explore the potential similarities between APS in El Ouara and organic livestock management by measuring the Organic Livestock Conversion Index (OLCI), which consists of 31 variables conforming ten indicators.

Keywords: economic, sustainability, ecosystem services, organic agriculture, agro-pastoral system

The sheep meat sector: strategies of actors in the steppe region of Tiaret in Algeria

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Abstract

The development of sheep farming has always been a priority for Algeria to meet the population's needs for animal proteins. The objective of this article is to examine beyond. We used the method of direct interviews with stakeholders according to the established questionnaire the sheep meat producers the functioning of the sector in the region of Tiaret. The morphology and geographical position of the latter give it an agro-pastoral character. Indeed, horse dealers (collectors, 22 respondents) and butchers (31 respondents) are considered to be the main players in the sheep meat marketing circuits in the region. They act as mediators between producers and consumers. This study has enabled us to observe that actors in the region are generally better informed about supply, demand and price levels thanks to an efficient information network and a permanent presence in the market. They are characterized by their practices which are particular aimed at maximizing the margin, following their strategies which consist of the practice of transactions which consist in buying when prices are low and selling under advantageous conditions. The times of sale where the prices are higher are the religious periods of Aid El-adha (sacrifice) and Ramadhan.

Keywords: marketing, market, horse dealer, butcher, steppe

Session 4. Policy, institutions and governance

Policies and Practices in Mediterranean Pastoralism

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Abstract

Within the PACTORES and PASTRES projects a comprehensive analysis of policy framework regulating pastoral systems and rangeland management in the Mediterranean settings have been undertaken. In southern Europe as much as in the Maghreb and the Mashreq, policy rules, subsidies and development trajectories represent important drivers of the reconfiguration that has been taken place in mountainous, dryland and inner settings that characterise large parts of the region. Many pastoral regions show signs of stress, in either socio-economic and ecological terms; problems related to generational renewal and environmental degradation are constant concerns, throughout the region. Climate change, shifts in consumption patterns, environmental concerns, value chain governance, competition with intensive systems and trade dynamics and relationships with encroaching interests and actors are critical features influencing the evolving policy frame on pastoral regions. The important decrease of pastoral farms on either flank of the Mediterranean indicate that more appropriate policy paradigms need to be forged, in order to reverse current trends with a view to enhance the effectiveness and consistency of the significant political and financial investments addressing pastoral practices, farms and territories.

Keywords: pastoral systems, pastoral development trajectories, pastoral management and policies, generational renewal, Mediterranean regions

Key constraints and opportunities for pastoral development projects engineering and rangeland governance in South Tunisia

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Abstract

The Tunisian experience on rangeland and pastoral development during the four last decades shows that pastoral development projects engineering has encountered several problems due to the complexity of rangeland resources, territories, societies, and institutional settings. The performance of these projects has often been explained by the hostility of biophysical conditions, by the scarcity and vulnerability of natural resources and by socio-economic constraints. However, limited attention has been paid to aspects related to management and projects engineering. The aim of this paper is to depict some of the current constraints and opportunities faced by three pastoral investment project management units (PMU) in South Tunisia, while characterizing the wider impact of these projects on rangeland governance. We assessed three pastoral development projects in South Tunisia based on four criteria: i) relevance and coherence of the project; ii) effectiveness; iii) efficiency; and iv) impact orientation and sustainability. The data was gathered using an online questionnaire and focus group discussions with leaders of the three project PMUs. Results emerging from this research show that it is highly important to include infrastructure investments into a broader perspective of pastoral economic and territorial development. In Terms of pertinence and adequacy, it is important for pastoral projects to effectively investigate the real needs of local populations through in-depth participatory development diagnostics, which is recommended to be implemented prior to the development of the log frames of these investments. Finally, it is important for pastoral development projects to invest in building enhanced social capital, networks and norms. The impact of such investments will not be immediate but will certainly contribute to long-term impact and sustainability.

Keywords: inclusive rangeland management, pastoral development, projects engineering, project management units, southern Tunisia.

Collective rangelands as perceived by Tunisian law

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Abstract

This paper proposes an analysis of the institutional and legal framework of collective rangelands located in southern Tunisia and whose total area covers 1.5 million ha. Such an analysis, which will be guided in large part by a review of legal provisions adopted so far concerning management and land tenure security issues of collective rangelands including those recently set out by the law n°2016-69 dated 10/08/2016, reveals the need for an in-depth reflection about the institutional framework for the management of these pastures.

Keywords: institutional framework, legal framework, land tenure, collective rangelands, Tunisia

Territorial Intelligence: A collective opportunity for sustainable development and good governance of rangelands in South Tunisia

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Abstract

Pastoralism is still considered an important **economic** and cultural aspect of the life of the Tunisian farmers practicing agropastoral farming systems. This farming systems provides several ecosystem services of vital importance for local communities, including climate regulations. Our research on fundamental rangeland governance aspects, showed that questions on “how to develop pastoral areas” and “how to sustain rangelands and enhance their governance” are not yet addressed appropriately. To answer these questions, this research was carried out based on the “territorial intelligence - TI” concept. Information, communication and knowledge capitalization are expected to be the basis towards the implementation of this concept. In this paper, we aim to explore the opportunities to apply the TI as a wider framework to enhance rangeland governance through more efficient pastoral development actions and investments. To this end, a mixed approach has been used combining both social network analysis and prospective system method. Results show that the lack of communication between the main economic actors involved in the management of collective pastoral areas, the dominance of the local authorities, and the dependence of the community-based organizations (CBO's) are the main challenges to local development and good governance. This highlighted (i) the need that pastoral development should be inclusive in terms of actors and partnerships and (ii) supporting CBO's to understand and to create opportunities and evolve towards their autonomy.

Keywords: territorial intelligence, collaborative intelligence, rangeland, governance, social network analysis, Tunisia

