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CONFERENCE MINUTES

"Multifunctionality of livestock grazing systems, a lever to envision its possible futures"

(Montpellier, Agropolis, April 19th, 2024)







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Rationale

Livestock farming is strongly questioned in general on its contribution to sustainable food systems, including livestock grazing systems on more specific aspects. Mono-criteria assessments that focus on animal production, greenhouse gas emissions, carbon-sequestration capabilities, threats/preservation of biodiversity, etc. fuel a controversial view of the activity and do not help to think about a future by maintaining its own characteristics… Are there specific ways to chart the future of this activity beyond proposals to intensify productions that reduce its own capacity as a low-input activity? Its links to land use, its social and environmental contributions, its typified productions, the cultural identities that these types of livestock system assert are regularly brandished to contribute to a more positive vision of the activity but sometimes by freezing it in a timeless and conservatory permanence more than prospective. A more objective and holistic assessment of the large multifunctionality of these livestock grazing systems might be one of the possible ways to draw their future. The Action Network "Restoring Value to Grassland" within the multi-stakeholder platform Global Agenda for Sustainable Livestock (GASL; www.livestockdialogue.org) organize this conference to enrich debates about this approach.

General objectives

The aims of the conference were to:

- revisiting the concept of multifunctionality
- report on the work undertaken for several years within the framework of GASL Action Network "Restoring value to grassland" on case studies in contrasting contexts throughout the world and to identify the lessons learnt from cross-cutting analysis
- compare these approaches with other works carried out in different regions of the world on livestock grazing activity
- elaborate on recommendations on the research priorities to be pursued and the design and implementation of appropriate public actions.

This conference should also be considered as a step in the preparation of the International Year of Rangelands and Pastoralists (IYRP) in 2026, and the organization of a pre-congress workshop at the XIIth International Rangeland Congress (IRC - Adelaide, Australia in 2025)

Executive summary

On April 19th 2024, the Action Network "Restoring value to grassland" of the Global Agenda for Sustainable Livestock organized in Montpellier, France, following a four days internal workshop, a one-day hybrid conference entitled "Multifunctionality of livestock grazing systems, a lever to envision its possible futures", hosted in Montpellier by Agropolis International, and supported by the French Ministry of Agriculture, CIRAD and INRAE and Agropolis Fondation.

Watch the full video recording here: https://www.youtube.com/watch?v=Wyhr91stBCs

The conference gathered a large community interested in the future of livestock grazing systems, with more than 160 participants from diverse parts of the world and representative from public and private sectors, academia, NGOs, civil society and international organizations.

A diversity of presentations from the network and external invitees, and interesting debates including livestock actors at farm scale and institutional actors that followed, highlighted how the multifunctionality concept and approach can help overcoming the threats of financialization, monodisciplinary and mono-indicator assessment of the livestock sector for sustainable development. The need for more evidence-based information and tools to facilitate the implementation was mentioned.

These conclusions will help driving the work of the Action Network and GASL globally for more interactions with committed multiple stakeholders, further development of diverse evidence-based documents, guidelines and tools and to design its future action plan 2025-2027, as well as contributing to the dynamics preparing the IYRP for 2026.

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1 Introduction

1.1 The Global Agenda for Sustainable Livestock (GASL): Shirley Tarawali (FAO-GASL Chair and Deputy Director ILRI)

S.Tarawali began by introducing the Global Agenda for Sustainable Livestock (GASL), explaining that it was established over a decade ago as an experimental platform to unite various actors in the livestock sector with a shared goal: to foster a more sustainable future for livestock and its role in transforming food systems and supporting development.

From its modest beginnings, GASL has evolved into a unique multi-stakeholder partnership comprising over 130 members organizations. These represent thousands of constituents across the globe, ranging from smallholder farmers and livestock grazing communities to large commercial enterprises, and include governments, private companies, NGOs, researchers, investors, civil society, and multilateral organizations. This diversity enables GASL to gather a wide array of perspectives without duplicating existing efforts, instead adding value by creating synergies among stakeholders.

The agenda's mission is pursued through three main objectives:

1. Assembling and communicating evidence,
2. Developing actions to encourage policy and practice change,
3. Supporting inclusive dialogue within and beyond the livestock sector.

The speaker emphasized the complexity of sustainable development, noting that livestock sustainability challenges and solutions differ significantly across regions, production systems, and commodities. Therefore, GASL operates through various thematic « action networks » to address key issues collaboratively. These networks tackle controversial and multifaceted topics that no single group can solve alone.

A prominent example of such a network is "Restoring Value to Grasslands," the initiative that organized the day's webinar. Co-chaired by Alexandre and more recently Mariana, this action network embodies GASL's spirit by bringing together diverse stakeholders to explore how to revitalize and preserve grasslands, recognizing their ecological, social, and economic value.

The speaker highlighted the multifunctionality of grasslands, which cover up to a quarter of the world's terrestrial land surface and support an estimated 800 million people. These landscapes host a rich diversity of ecosystems and cultures, from cattle herders and nomads to communities relying on yaks or camels. This diversity reflects the numerous benefits grasslands provide, spanning climate regulation, biodiversity, food production, and livelihoods.

However, such multifunctionality also brings complex challenges and trade-offs, underscoring the need for inclusive, cross-sectoral collaboration. The webinar was described as a unique opportunity to hear from stakeholders working on different aspects of grassland use and management, offering a broad spectrum of perspectives and insights.

Importantly, the speaker clarified that this event is not a conventional research conference, but rather a platform for multi-stakeholder dialogue—a process necessary to generate concrete recommendations and future actions for sustainable grassland and livestock grazing systems.

S.Tarawali concluded by expressing his appreciation to the organizers, speakers, and participants, recognizing the broad international representation and expressing hope that the discussions would lead to tangible outcomes contributing to more sustainable livestock systems and food futures.

1.2 The route of Action Network 2 "Restoring value to grassland" by Alexandre Ickowicz (GASL-AN2 Co-Chair; CIRAD) and Mariana Quiroga Mendolia (GASL-AN2 Co-Chair; INTA)

The speakers presented this Action Network dedicated to exploring and supporting the sustainability of livestock grazing systems through a multifunctionality framework. Initiated around 2015, and becoming operational by 2017–2018, this initiative is not a formal research project but a multi-stakeholder, voluntary network based on field activities and collaboration.

This Action Network is part of the Global Agenda for Sustainable Livestock. It includes around 20 permanent international members and numerous collaborators involved in approximately 10 case studies worldwide. The central aim is to maintain, restore, and enhance the environmental and economic values of grasslands while promoting their social and cultural functions.

The speaker emphasized the concept of multifunctionality, a term used for over 20 years in agricultural discourse. Its relevance is heightened today by the need to address multiple Sustainable Development Goals (SDGs) and the extensive territorial footprint of grazing systems, which may encompass 40–50% of globally usable land.

A slide illustrated the spatial and organizational characteristics of livestock grazing systems, highlighting their ties to specific products, collective land use, and cultural identity, particularly in rural and indigenous contexts.

The speaker criticized the mono-indicator, mono-disciplinary assessments of livestock systems—often limited to greenhouse gas emissions per litre of milk—as misleading. A slide comparison of four diverse grazing systems (in Brittany, tropical Africa, and others) showed how outcomes vary dramatically based on the selected indicators.

In response, the Action Network adopted a comprehensive multifunctional approach. Initial workshops were held to develop a conceptual framework, eventually identifying four analytical dimensions:

1. Production
2. Environment
3. Social
4. Territorial development

Each dimension was modelled with relevant components: for example, the production model considered farming practices, livestock management, products, and regulations. The social model included value systems, organizational structures, and social networks. Environmental aspects addressed soil, water, air, and biodiversity. The territorial dimension, often overlooked, was key to understanding how grazing systems shape local economies and land-use practices.

Slides illustrated these conceptual models in detail, depicting interactions within and across the four dimensions. Through literature reviews, participatory workshops, and case study input, the network defined quantitative and qualitative indicators tailored to each dimension and context.

The six main case studies initially involved are:

- Brazil: studying pasture development in grassland systems.
- Argentina: focusing on indigenous pastoral communities in the Puna region.
- Vietnam: integrating crop and livestock grazing systems in mountainous areas.
- Mongolia: addressing biodiversity conservation and pastoralism.
- Senegal: analysing dairy intensification from pastoral systems.
- France: evaluating multi-use livestock grazing landscapes and the governance of competing land use activities.

Each study adopted context-specific methods to evaluate multifunctionality and engaged stakeholders using appropriate and diversified tools. The network used existing projects as platforms for these evaluations rather than initiating new research.

A significant contribution was the development of companion modelling tools to facilitate stakeholder dialogue. The “toy model” was introduced as an educational tool to simulate simple development scenarios and demonstrate the trade-offs across the four dimensions. A slide visualized how these models help evaluate different impacts of development paths, such as improvements in production versus declines in environmental quality.

In Senegal, a companion modelling approach was employed to co-design a livestock grazing-based dairy value chain, fostering inclusive discussions among diverse stakeholders.

The network is structured into four workstreams:

1. Communication and outreach on multifunctionality.
2. Support and coordination of case studies.
3. Development of methods and tools.
4. Documentation and policy-oriented outputs, including manuals and guidelines.

Despite being voluntary and underfunded, the network strives to improve dissemination through websites and publications. One recent scientific article published in 2022 showcases their theoretical approach and field applications.

The speaker outlined the evolution of the initiative: starting from conceptual design, moving to field testing, stakeholder engagement, and promoting dialogue. A slide traced this process as a cyclical journey, with opportunities to revisit and refine actions based on feedback and new insights.

The goal is to facilitate knowledge sharing—combining scientific, local, and practical knowledge to create a shared vision for sustainable future of grazing systems. Dialogues helped define desired changes, responsibilities, and implementation strategies.

The speaker closed by highlighting three core challenges:

- How to effectively organize and improve dialogue on the ground
- How to hybridize knowledge across domains and stakeholders

- How to assess and support sustainable change

Plans are underway to expand case studies to China, Colombia and Burkina-Faso, ensuring broader representation and learning.

The speaker concluded by reaffirming the open and inclusive nature of the network and encouraged interested individuals to join and contribute.

Reference:

Ickowicz, A., Hubert, B., Blanchard, M., Blanfort, V., Cesaro, J.-D., Diaw, A., Lasseur, J., Le Thi Thanh H., Li, L., Mauricio, R. M., Cangussu, M., Müller, J.-P., Quiroga Mendiola, M., Quiroga Roger, J., Vera, T. A., Ulambayar, T., & Wedderburn, L. (2022). Multifunctionality and diversity of livestock grazing systems for sustainable food systems throughout the world: Are there learning opportunities for Europe? *Grass and Forage Science*, 77(4), 282–294. https://doi.org/10.1111/gfs.12588

2 Keynote presentation

Livestock grazing systems and societal challenges: how to unlock the cognitive dead end? By Saverio Krätli

By guest speaker: Saverio Krätli, Associate research fellow DITSL Germany; Tufts University, Boston US; CEI-ISCTE Lisbon, Portugal; Hon. Ed. in chief of Nomadic Peoples journal.

A global approach to agriculture inevitably encounters profound *qualitative* differences – that is, not simply differences *in degree* but actual differences *in kind*, reflecting the plurality of traditions and reference systems (ontologies) around the world. While this plurality represents a priceless resource to think out of the box in the face of climate change, learning from it in ways that retain its transformative power poses considerable cognitive challenges. What reference system currently drives the global discussion of livestock farming and multifunctionality? What categories and underlying assumptions are at play in the processes of defining livestock systems and their functions? What is routinely taken for granted? To explore the impact of deeply rooted cognitive frameworks on the current understanding of livestock grazing systems, the study of Livestock grazing systems is a good vantage point.

Historical Context and Cognitive Frameworks

Two historical cognitive shifts are explored.

The shift from 'societies with markets' to 'the market society' or market economy (Polanyi 1944). The former, where the market was but one service amongst others, existed from well before the invention of money. Starting in 19th century, societies with markets are being reorganised *in function of the market* within 'the market economy'. This shift is carried out in England first and gradually globalised. Knowledge making based on quantitative measurements (differences in degree) becomes dominant. Resource scarcity (competition) is constructed as the engine shaping social processes, including agricultural systems. The latest stage of this process, financialization, adds its own cognitive

implications, replacing production with debt (or *profit seeking* with *credit seeking*) as the main economic engine. This shift is creating a growing disconnect between the financial industry and the real economy, with profound implications for rural development policies and livestock farming (Giraud 2012; Varoufakis 2017; Feher 2018; Chiapello et al. 2023).

The conceptual and practical separation of agriculture from nature. This second cognitive turn also emerged in 19th century England, alongside the industrial revolution. The new-born animal science developed around the programme of 'emancipating' production from the unpredictability of nature. Animal production was modelled as a mechanistic process in artificially stable environments. The animal was understood in isolation; in fact, very much reduced to the functioning of its metabolism in optimal conditions. In this way, a powerful assumption was mobilised, conceptualising the unpredictable variability of natural conditions as a limitation, an obstacle to production and development. This assumption, still common and deeply entrenched, has guided the understanding of livestock grazing systems and livestock grazing development programmes for the best part of their history.

Together, these two historical cognitive shifts, and the ontology associated with them, continue to shape how livestock farming is analysed globally, including within the debate on multifunctionality.

Qualitative Differences and Livestock grazing Systems

Pastoralist societies are still, largely, on the frontier or expansion of this globalised reference system. While they have known markets for centuries, in the last few decades, with the gradual commodification of water, labour and land they have been living the shift into the market economy. These societies are characterised by their specialisation to benefit from the unpredictable variability of their environments, particularly through mobility, which contrasts sharply with the industrial model of stabilising environments for maximum production (with important externalities). Yet, many livestock grazing development programs continue to promote sedentarisation and market integration, undermining the multifunctional benefits of livestock grazing systems, such as ecological sustainability, resilience to climate variability, and social cohesion.

The cognitive challenge is not just about learning new ways of understanding livestock systems but also about *unlearning* deeply ingrained assumptions. This requires questioning the dominant cognitive frameworks that have become invisible over time but continue to shape our understanding. By loosening or dismantling these frameworks, particularly those centred on market-driven analysis and the mechanistic view of agriculture, we can open up new possibilities for understanding the complexity and multifunctionality of livestock farming systems. With climate change upon us, this cognitive opening has never been so necessary.

Multifunctionality and Variability

These considerations, lead to two basic questions about the multifunctionality model:

1. How does the multifunctionality model account for the practice of embedding variability in production processes, especially when variability is often seen as a limitation?
2. How does the model deal with trade-offs between different functions, particularly when these outcomes are non-fungible or incommensurable?

The example of livestock grazing mobility, which has long been recognised as beneficial, both ecologically and economically, illustrates how even well-documented positive observations can be

side-lined by dominant cognitive assumptions. Despite the proven ecological and social benefits of mobility, most policies persist in promoting sedentarisation, often blaming pastoralists for its consequences on the environment and the increased exposure to the risks associated with climate change. The reflection on multifunctionality remains largely locked in market logics and the understanding of nature as a limitation.

Conclusions

The cognitive frameworks that inform global livestock farming discussions need to be critically examined and their claims to universality need to be challenged. By acknowledging the limitations of these frameworks and making room for a more nuanced understanding of variability and multifunctionality, we can better address the uncertainties of global warming and the socio-economic transformations our new future scenario has made urgently necessary.

The good news is that this inherited system of reference can be loosened up, and even dismantled in critical places, without precipitating operators into a state of paralysis. In fact, such work is necessary in order to increase our objectivity and our capacity to engage with global warming and the political-economic processes that are already cascading in the face of its threat.

A more detailed discussion of underlying assumptions in livestock grazing development, and the way they can guide us in the wrong direction or get in the way of understanding can be found in the first MOOC on 'Livestock pastoralism in Development', on the IIED website. It is free.

3 A series of six AN2 presentations

A series of six AN2 presentations aimed at identifying the salient features of the studies conducted within the GASL Action Network 2 on the three following topics:

- Multifunctionality, multi-stakeholder approach, collective action and ability to reconnect livestock grazing systems and society (Two AN2 case studies: Serena Ferrari, ISRA-CIRAD Senegal and Jacques Lasseur, INRAE France)
- Importance of combining various forms of knowledge to account for and equip multifunctional approaches (Two AN2 case studies: Mariana Quiroga, INTA Argentina and Rogerio Mauricio, Univ. FSJ Brazil)
- What changes are instigated or facilitated for public action concerning livestock grazing systems and its future through the multifunctionality approach? (Two AN2 case studies: Tungalag Ulambayar, Zoological society of Luujin Mongolia and Huyen Le Thi Thanh NIAS, Vietnam)

3.1 Multifunctionality, multi-stakeholder approach, collective action and ability to reconnect livestock grazing systems and society

3.1.1 Promoting sustainable intensification and inclusiveness of the local dairy sector in livestock grazing areas through a multi-stakeholder platform: lessons learned from Northern Senegal

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Abstract

In northern Senegal, dairies collect local milk from mobile pastoralists. To increase their collected volumes, they tend to encourage pastoralists to invest in the ecological intensification of milk production through local feed resources, although this may have a negative impact on pastoralists' resilience. To support stakeholders in understanding the challenges of ecological intensification of the dairy sector, a computer simulator was developed in partnership with a multi-stakeholder platform of the Departement of Dagana, called Milk Innovation Platform (PIL). The simulator served in several workshops as an intermediate object in leading discussions on sustainable intensification of the local dairy sector. This allowed stakeholders to better understand the orders of magnitude considered at the scale of the production basin, to explain the constraints specific to each activity and to move forward in the consolidation of inter-stakeholder coordination.

Keywords: Milk; Senegal; Multi-stakeholder Platform; Dairy; Computer Simulation

Dairy production in Senegal mainly comes from agro-livestock grazing family farming (Corniaux et al. 2012). This production varies seasonally and is largely self-consumed or bartered. The marketing of

local milk in collection value chains is still weak. In northern Senegal, dairies collect local milk from mobile pastoralists. These pastoralists live between two main types of agroecosystems: semi-arid steppe pasture lands (*dieri*) and the alluvial plains of the Senegal River (*walo*) occupied by intensive agriculture. To increase their collected volumes, dairies – the main of which is *Laiterie du Berger* – tend to encourage pastoralists to invest in the intensification of milk production (vertical development) with the mobilization of new resources (inputs, territorial resources) (Lemaire et al. 2019). Pastoralists may be interested in intensifying their production system, but risk losing resilience in the face of climatic shocks (Ancey and Monas 2005) (Corniaux 2008).

To support stakeholders in understanding the impacts of ecological intensification of the dairy sector, a computer simulation was developed through fully configurable generic breeding-environment interaction modeling (Delay et al. 2021). This simulator was developed in partnership with the Dagana Milk Innovation Platform (PIL), a multi-stakeholder platform gathering different categories of actors involved in the dairy sector (dairy units, producer organizations, representatives of milk collectors, animal feed suppliers, NGOs, research institutes, state technical services). The simulator was then used during participatory workshops held under the framework of PIL, and served as an intermediate object in leading discussions on sustainable intensification of the local dairy sector. This allowed stakeholders to better understand the orders of magnitude considered at the scale of the production basin, to explain the constraints specific to each activity and to move forward in the consolidation of inter-stakeholder coordination (Delay et al. 2021).

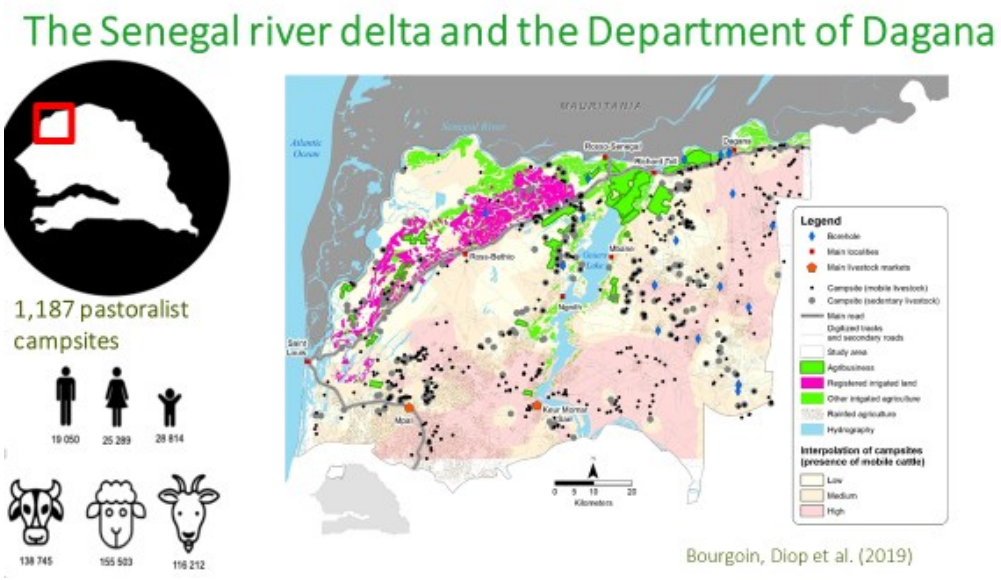

Figure 1 – The area of the case study: the Senegal river delta and the Department of Dagana (Northern Senegal)

The tool: a computer simulation to deliver information

The computer simulator developed to be used in PIL workshops is based on a spatial layout of the land use and distribution of agricultural production systems. It generates a synthetic population of herds based on field surveys (Gaye Papa et al. 2020) and offers the possibility of modifying the level of dairy intensification, that is the number of mini-farms and animal feed stores, as well as the price of residues

and by-products (Cesaro et al. 2021). By doing so, the simulator delivers information on the share of the milk produced and household self-consumption, in order to determine the quantity of potentially marketable milk. By comparing dairy incomes to monthly feed expenses, the simulator provides an average economic balance for non-collected, collected herds and mini-farms.

The interest of the geographical approach in the mobilization of a simulator in multi-stakeholder workshops

The model was used during a series of multi-stakeholder workshops under the PIL on the management of biomass in a trajectory of ecological intensification of the dairy basin. It appeared that using geospatial data to configure the simulator has several advantages.

The horizontalization of inter-stakeholder relations in the sector

The model evolved over the course of the meetings, as the group opened up to new stakeholders. This process was initiated by a discussion between the dairy and agro-industries in the region regarding the supply of biomass during the dry season. The group then mobilized around the efficiency and inclusion of the collection system. We have held discussions at department level, where many mini-dairies participate in the PIL and want the simulator to be a beneficial tool for all stakeholders in the dairy sector.

We had to redefine the geographical scope of the model by limiting it to the department, while integrating a diversity of stakeholders involved in the processing, collection, storage and production of milk. The integration of space in the modelling has the advantage of providing a horizontal representation of the sector, with a spatial positioning for each stakeholder. This horizontal approach is carried out despite the strong differences in volume between the players.

Strengthening the idea of territorial community

One of the workshop results, which was unexpected or at least unintended, was the strengthening of the idea of territorial community. By working on the geography of the department during the multi-stakeholder workshops, the participants gradually became aware of their interdependence and the need for dialogue, even in conflicting situations such as competition between dairies for collection, exclusion of certain producers far from dairies or the low recognition of the work of collectors in the sector by producers and processors, despite the significant risks. PIL is obviously a space for territorialized interprofessional dialogue, but the simulator offered a sort of representation of this community, promoting exchanges in a transparent framework. Following the latest workshops on the collection system, a need emerged to promote the dairy sector of the Dagana department at the national level. Consequently, PIL organized, with the participation of all stakeholders in the sector, a departmental milk fair and developed several milk collection scenarios to be presented before the national Ministry of Livestock.

Geographic information as a pretext

Geographic information is quickly becoming little used by stakeholders. It becomes a basic objective data which contributes to creating a collective consensus regarding the plausibility of the model. Its value as a research subject is relegated to second place for several reasons.

The advantage of running workshops within a multi-stakeholder platform around a sector, with the use of a computer simulator, is to allow, initially, to avoid conflicting subjects between the stakeholders and to focus on the plausibility of the representation in relation to the territory. Once this step is completed, the simulator almost becomes a pretext to bring the stakeholders together around the table, or at least the reason which led them to participate. During the first phases of the workshops, we brought together stakeholders from the agricultural sector and those from the livestock sector to discuss biomass management. These first workshops allowed each stakeholder to express their organizational constraints and the difficulties encountered in setting up a circular economy between farmers, agrobusinesses and livestock grazingists. During the workshops on the structuring of milk collection, discussions focused on the low representativeness of certain stakeholders, such as collectors or producers, in the decision-making of the main dairy. It is clear that geographic information constitutes the basis of the discussions, but it is no longer called into question within the framework of the workshops.

The interest of technical and economic values

This absence of questioning on the geographical dimension of the territorial livestock system is particularly marked when analyzing the results of the simulator. The players mainly focus on milk volumes, self-consumption, the share sold on the markets and the share collected. They are also interested in the turnover and margin of pastoralists. The cow feeding system has been little questioned, despite its importance in the model. At no time did the stakeholders consider the possibility of intensifying production by producing quality fodder. They could then have consulted the map to look for land available for fodder production. During the workshops, the stakeholders never asked to return to the spatial dimension of the simulator, despite an in-depth presentation of the model in this form. This situation can be explained by the nature of the debates and the stakeholders present, mainly private sector actors interested in the socio-economic functioning of the system rather than in its territorial organization or its environmental impacts.

3.1.2 *May multifunctionality concept be an help for redesigning, in a participatory process, livestock grazing systems in southern French Alps?*

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Abstract: A pluridisciplinary research team is involved with an association of municipalities located in Southern Alps (France) to strengthen the capacity of livestock farmers and local stakeholders to redesign relationship between activities to reduce conflicting land using. A prototype of multi stakeholder platform is experienced and we discuss here the contribution of a multifunctional approach of Livestock Grazing Systems (LGSs) to foster mutual understanding and emerging public actions.

Keywords: Livestock grazing farming, Mediterranean mountains, land use, adaptability, participatory approach

Context

Our research is located in the Provence-Alpes-Côte-d'Azur region of south eastern France, in a transition zone between Mediterranean-influenced hills and high mountain valleys. Livestock grazing activities are from a long-time structuring landscape while 50 % of the area is grazed. Historically sheep farming is a strong driver of local socio-cultural identity. But some strong changes are affecting since several decades the socio ecological system:

- Regarding socio-demographic dimensions, the local society is changing from a rural community to a tourist and residential economy, due to the proximity of the highly urbanized areas of the Mediterranean coast and the installation of ski resorts at the top of the valleys. As a result, farmers and their families, who were once at the heart of local life, now have to deal with other stakeholders. They are confronted with a growing diversity of views on what livestock farming should be. They also have to compete with other land uses, particularly those devoted to recreational activities.
- Regarding ecological changes the spontaneous increase of forested areas and the coming back of wolves are reducing the access to forage resources as well as they are modifying grazing practices. At the same time, climate changes strengthen tensions around forage resources while at the same time put fire risks at the agenda. It is, as a consequence, questioning on the equilibrium between forest areas and pasture land.
- On socio-political dimensions, there is a growing concern about consequences of human activities on biodiversity. While at one time livestock grazing was positively considered as a support of biodiversity for endangered species of open areas, the activity is now involved in debates advocating the withdrawal of human activities from natural environments. These debates are in line with the decreasing support for animal productions as a whole and increasing one for farming activities providing vegetables for local food systems.

Site description

The study area is 2000 square kilometres wide; 10 000 inhabitants are present all year long. Hundred sheep farms gathering 40 000 ewes constitute the main farming activity, in addition 25 farms run other livestock activities (beef cattle, dairy goats, …). This area is also well known for transhumance of sheep (another 40 000 ewes) from outside the area on alpine pasture during summer time.

Objectives

The main question addressed to this on-going research can be expressed as follows: is it possible to strengthen the capacity of livestock farmers to redesign LGS by relying on a local participatory process that builds upon the multifunctional character of the activity? Several sub-questions linked to this general one deal with the ways to settle a local arena for discussions that could be self-sustained at mid-term after the research ends; the contribution of analysing livestock farming system in a multifunctional perspective to elaborate on pathways to manage multiple land using

Main achievements, issues, outputs at that stage

Concerning the running on of the multi stake holder platforms, the way we address the question to integrate a wide range of stakeholders is of importance and addressing the question itself is part of the process of interaction between participants. About recruiting participants for the workshop, some categories of actors that are not organized as collective bodies are difficult to reach (for instance secondary residents). Some others that are very organized as collective bodies (the farmers, …) are ready to let spokespersons participate on specific claims that make them hardly entering the discussions.

A wide range of expectations that we can gather under multi-functionality are addressed to livestock farming by people: produce food, maintain iconic habitats and species, limit natural hazards such as wild fires, contribute to local cultural heritage, … From this different and sometime conflicting considerations on “what LGS should be” are formulated. for instance LGS should limit fire risk by grazing undercover but shouldn’t threaten forest regeneration, grazing times and intensity should accommodate the needs of iconic species (ex. black grouse) whatever the consequences on the organization of the grazing calendar, flocks shouldn’t impede hiking but the tourists should be able to meet with the shepherd during their hikes, …The purpose of discussions within the MSP have to contribute in sharing and negotiate about these abundant and sometime contradictory expectations.

About relationship between multi-functionality and abilities to overcome conflicts related to multiple uses of land, interactions between activities define modalities for combined uses of land as well as it defines for each one relevant dimension of LGS ‘s multi-functionality. Eliciting these functions is a way that could facilitate and helps in elaborating arrangements to facilitate these multiple uses of land. The ways to qualify the links between these dimensions is based on experiential knowledges each one is dealing with. This qualifying of multi-functionality is so place based, actor dependent and possibly evolving according experiences

Considering so multi-functionality of Livestock grazing systems may contribute to elaborate relevant public action that comfort future of livestock grazing. the nature of this contribution varies according to the scale of concern of multi levelled policies: obviously local arrangements are not sufficient to redesign LGS, for instance European common agriculture policy will not be decided in the valley but

modification of hiking trail to smoothen conflicting situations can only be discussed and implemented locally. As a consequence, at local scale, addressing multi-functionality can be a driver of change in arrangement and interactions between activities, at upper scales, multi-functionality can be seized as a rationale to advocate for reshaping policy frameworks.

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3.2 Importance of combining various forms of knowledge to account for and equip multifunctional approaches

3.2.1 Sharing knowledge in the Puna of the Northwest of Argentina

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> *"…el propósito último de la sabiduría es el respeto a la vida. Saber qué es la vida para saber cómo la cuidamos*."
> (Le but ultime de la sagesse est le respect de la vie. Connaître ce qu'est la vie pour savoir en prendre soin).

Sharing knowledge in the Puna of the Northwest of Argentina

Many different types and amounts of knowledge are identified in the choreography when various stakeholders are on the way to proposing sustainable improvements of natural grasslands and meat, milk, and fiber production systems. To facilitate the appearance of all the voices and to highlight the agreed richness, conditions, opportunities, risks, and threats the livestock grazing face, it´s necessary to identify the different kinds of actors, their power to change, their role in the context, their knowledge, and their expectations. Seeking to build up an agreed road map for future actions, our team facilitates spaces to listen and propose dreamed future scenarios.

Keywords: Puna; sharing knowledge, grasslands multifunctionality

Share knowledge: Importance of combining various forms of knowledge to account for and equip multifunctional approaches

Context

In the Andean high plateau, the absence of sufficient and appropriate policies to support the local Aboriginal communities, which are crucial in producing high-quality food and fiber, underscores the urgent need for action.

Site description

The study case is situated in the high plateau of the southern part of the Cordillera de los Andes in the Puna region. This plateau, with its endorheic basins dotted by shallow lagoons and salines, presents a cold and arid territory (average temperature around 9°C and less than 120 mm/year of precipitation) at a high altitude (more than 3.000 m a.s.l.) with extreme daily and yearly thermic amplitude. The inhabitants there breed multispecies flocks composed of llamas, sheep, goats, only a few cows (4 – 8), and donkeys and/or horses. They produce meat, milk to make cheese, llama fiber, and sheep wool. The main destiny of the production is self-consumption and sale in local or regional markets, schools´ and hospitals´ canteens, etc. In socio-economic terms, the zone is characterized by isolation and multiple scarcities (access to services, socio-political participation, low prices for their production, shortage of communication media, etc.).

The observed trends are alarming: the flocks are diminishing; formerly mobile pastoralists are gradually becoming sedentary; there is a significant youth emigration; clear signs of climate change are evident, with changes in rain regimes and intensities, long and unusual periods of drought during the rainy season, and many spring water sources drying up. Lithium mining companies' presence and increasing activity are further disturbing the lagoons and salines, impacting the local economy and the fate of the labour force.

Objectives

Our work aims to improve the social perception (and, consequently, the perception of policy-makers) of aboriginal pastoralists' role as high-quality food and fiber producers, their strategies for managing natural grasslands, and climate variability.

What are we looking for? Perceptions change

a) Pastoralist´s self-esteem: putting a mirror to promote reflections about local skills and products the pastoralists produce.

b) Local actors' engagement: “from subjects of social assistance to producers.”

c) Global society perception: “from responsible for grassland´s degradation to sustainable producers of goods.”

Our goal is to promote action, and to that end, we expect to design an agreed-upon road map to support the sustainable development of livestock systems.

Sharing knowledge

One of the steps addressed in our work is the importance of considering the multiple and diverse kinds of knowledge on the site. How do we put all the actors into a collective dialogue to listen to their opinions and perceptions about many topics related to the multifunctional grasslands and flocks?

We identified diverse knowledge dancing in the multistakeholders’ space of dialogue:

- Local Knowledge: The project mainly aims to rescue knowledge about aridity and variability management, extreme climate events strategies, and other knowledge and perceptions about

opportunities, risks, and threats in relation to production, added value to their products, and destinies. We also worked with the communities on local knowledge about native plant uses.

- Scientific Knowledge: Few studies have been done about ecological and production aspects in the zone, and little has been done about local history and anthropology. However, our team has studied aerial net primary productivity, species richness, plant diversity, and plant cover. We made a few measures and estimations regarding precipitation from 2011 until 2020. In addition, recently, we settled on a permanent monitor to follow the vegetation over time: it is expected to measure some features every five years.

- Policymakers and authorities´ knowledge: Our team acknowledges that policymakers and authorities mobilize specific knowledge and face constraints daily. We need to recognize them and consider their timing and restrictions, as well as the opportunities and strengths they have and could use to help pastoralists improve their quality of life with sustainability.

- External society perceptions and common sense: It´s recognized that society in our province and country identifies pastoralists and grazing with land degradation in general. Nobody knows the origin of that common sense, but until now, the field data have not firmly concluded this perception. The opposite is often the case. So, we find the necessity of building up knowledge about local aboriginal communities, their knowledge, strategies, problems, and their capacity to supply healthy and tasty food, high-quality fibre, and wool. On the other hand, new consumers are seeking organic food and raw materials, so there is an opportunity for Aboriginal communities.

- Local dreams and expectations: In the same sense, we consider it essential to explicitly express the dreams and expectations of the local inhabitants of the Puna region. Focusing on their voices and attitudes is imperative to understanding their current context. It´s necessary to listen carefully to all the local sectors of the population: the elderly, adults, youth, and children. Of course, dreams and expectations are different in function to the gender, age, and socio-economic or education condition, so it´s imperative to design strategies to habilitate all the voices and to recognize all the perceptions, fears, constraints, and opportunities the different sectors experience. We must listen to all the different voices, including those different from those of the majority, to avoid discarding the differences and disturbing voices because these might signal anything more in the context.

- Another issue is registering local, regional, and national regulations and norms (especially about environment, health, and taxes). Moreover, it is necessary to consider those unwritten rules and regulations of community obedience that shape the social and productive behaviour of the community.

Achievements and next steps

Through workshops with the community, the cultural and landscape goods were listed, and the practices, strategies, and risks the community recognized were identified. Then, the main components, practices, processes, and concepts people operate and valorise were highlighted. Our team organized and devised different strategies to validate and/or enrich the information, such as personal devolution of collected data, written reports, and video films to trigger debates and reflections.

The pastoralists and local inhabitants are dialoguing. It has been recognized that the authorities and policy-makers should be engaged to proceed. One of our tasks is to enhance the participation and engagement of local authorities. Another one is the possibility of convening personnel of the mining

companies in charge of being the nexus between communities and companies to begin a joint reflection.

The next step is to build up collective scenarios to capture the feelings about past and present contexts and future possible scenarios (if nothing is done vs. if we all propose positive changes). If a future dreamed scenario is outlined, it will be possible to design an agreed-upon road map of actions.

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3.2.2 Natural regeneration of native trees for the implementation of silvo-livestock grazing system for beef cattle production in Brazil

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Abstract

Silvo-livestock grazing systems (SPS) and the use of legumes and/or shrubs forages to complement grazing feeding systems are considered as a sustainable alternative for productive intensification of livestock production in the tropics. Although Brazil has important contribution for cattle production based on monoculture pasture system the silvo-livestock grazing systems seem to expand modestly. The objective of this paper is to present a natural regeneration (NR) of native trees as a tool to scale up the SPS. In addition, it aims to improve the knowledge sharing based on the multifunctional approach. The results are demonstrating that NR has being attracting more famers and the association of private sector enterprise could be one option to increase SPS in the region. The pilot farm has also attracted students, farmers, police makers and companies interested in the NR and SPS which could be an important element for sharing knowledge and expansion of the SPS.

Keywords – Silvo-livestock grazing systems, natural regeneration, carbon market

Share knowledge (KS): Importance of combining various forms of knowledge to account for and equip multifunctional approaches

Silvo-livestock grazing systems (SPS) are multifunctional land-use systems that combine forage plants with perennial shrubs and trees for livestock feeding and complementary uses (Murgueitio et al. 2011). Tropical SPS offer alternatives to conventional grazing systems with vast opportunities for environmental and productive challenges, e.g. ecosystem services, climate change, sustainable productivity, and landscape restoration. Various forms of SPS have been adopted in Latin America over the past years (Chará et al. 2019) and the natural regeneration of native trees is one promised alternative. For this process, the first step to start this system is to identify those native trees species that allow for an open canopy. Secondly, a change in the pasture management is required to allow growth of young trees and bushes. After some years, selective cutting of some trees or bushes in densely planted areas is often necessary.

Already regeneration has occurred on around 500-700 hectares of the Mona Lisa farm, MLF (Located at Maranhao state, Brazil) and is adding value to the livestock system. This natural regeneration process is applicable to small or big scale operations according to the capability of the famer. Since adoption of SPS practices, the profit from the livestock system has steadily increased in comparison with traditional monoculture systems based exclusively on Brachiaria grass. The resulting high biodiversity, fauna and flora, resulting from SPS approach has positively changed the farm landscape, which has enhanced soil conservation and animal comfort and production. These are the facts that push farmer for the SPS direction.

The main objective of this team is to scale up the sustainable livestock production (Marquez et al., 2021) in the state of Maranhao/Brazil using natural regeneration of native trees for implementation of SPS. At the same time, we are aiming to improve the knowledge sharing based on the multifunctional approach which consider that production, social, environment and local development as a function needed to evaluate the livestock system (ICKOWICZ et all, 2022).

The work developed in this pilot farm MLF generated data, which is used by academic proposals resulting papers, reports, abstracts in congress (National and international) and also participation in

several events around the world. During all over the year the MLF has also received farmers, students technicians and local politicians and policy makers. In addition, several actors from the private sector also visit the farm looking for opportunities and busyness (carbon, cellulose, agriculture & veterinary services).

After several meetings with, extension services people, academic staff, farmers, private sector companies and police makers looking for strategies to scaling up SPS, we concluded that our approach to increase SPS areas around our project was not efficient. Therefore, we contact one private company denominated Working trees (USA) that gave to us financial support for implementation of SPS and later we pay then selling the carbon sequestrated by trees, pasture production and wood produced by the trees (increase multifunctionality). For us it is the first positive result to increase SPS area and also the financial return by diversifying products. We hope that this initiative will attract other farmers to recover pasture lands by using carbon credits as financial support for livestock production and could facilitate the involvement of MSP and consequently increase the SPS area in the region. Our next goal is to develop a series of indicators and metrics for SPS evaluation according to each dimension (Local Development, Environment, Social and production). These results could be also used to engage policy makers and consequently policies to scaling up SSP in the region or even in Brazil.

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3.3 What changes are instigated or facilitated for public action concerning livestock grazing systems and its future through the multifunctionality approach?

3.3.1 Measuring Changes in Mongolian Mountain Forest Steppe Livestock grazing Livestock Grazing Systems

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Abstract

This study applies the multifunctionality framework (MF) within Mongolia's livestock grazing context to describe the various actors, interactions, processes, and indicators adapted to the system. It offers a comprehensive assessment reflecting on a five-year collaboration with local stakeholders to support the multifunctionality of the livestock grazing livestock grazing system (LGS). Through this framework, we explore social and environmental dimensions, highlighting the roles of key actors and the outcomes of their interactions. Significant improvements in wildlife conservation, ecosystem health, and community engagement are noted. However, challenges such as rangeland degradation and limited livestock grazing mobility persist, suggesting the need for targeted interventions and further research to tailor the MF indicators to better reflect livestock grazing system nuances and herder priorities.

Keywords: multifunctionality of livestock grazing livestock grazing system, community-based conservation, Mongolia

The Context

Objective: To contribute to the Action Network 2 (AN2) goal by describing the multifunctionality of livestock grazing systems (LGS) and identifying pathways for sustainable food system development, this case study investigates changes facilitated by multiple actors within Mongolia's livestock grazing LGS using the MF approach, particularly focusing on social and environmental dimensions.

Site: The study centered on the 243,000-hectare Khoid Mogoin Gol-Teel Local Protected Area (KMGT LPA) in the mountain forest steppe of Bulgan district, Arkhangai province (Fig.1). This area hosts globally threatened species like musk deer, snow leopard, and argali sheep, along with ecologically important species such as marmot, saker falcon and red deer. It supports the livelihoods of 351 herder households relying on over 30,000 livestock grazing livestock.

Issues: The LPA faces challenges including rangeland degradation, wildlife poaching, illegal logging, and insufficient stakeholder partnerships.

Actors: The LPA engages over 20 stakeholders representing government, private sector and local communities. The Union of Conservation Communities (UCC), comprised of 20 Community-based Organizations (CBOs), plays a central role. Each CBO has 15-35 members including two herders who volunteer as rangers for the LPA. The Zoological Society Luujin (ZSL) has been pivotal since 2018, driving

a wildlife conservation project. Collaborative efforts with local governments align closely with UCC and ZSL across all four MF dimensions, reflecting a complex social-ecological system.

Indicators: The AN 2 team developed a comprehensive list of indicators, from which those that better suit the livestock grazing LGS were selected to measure the results. These adapted indicators are crucial for assessing changes and detailing the specifics of interactions and processes. Despite the high cost of collecting data due to the need for scientific research and expertise, we leveraged secondary sources and project assessments to estimate proxy amounts, describing the LPA's livestock grazing LGS effectively.

Fig.1 Map of Khoid Mogoin Gol Teel LPA

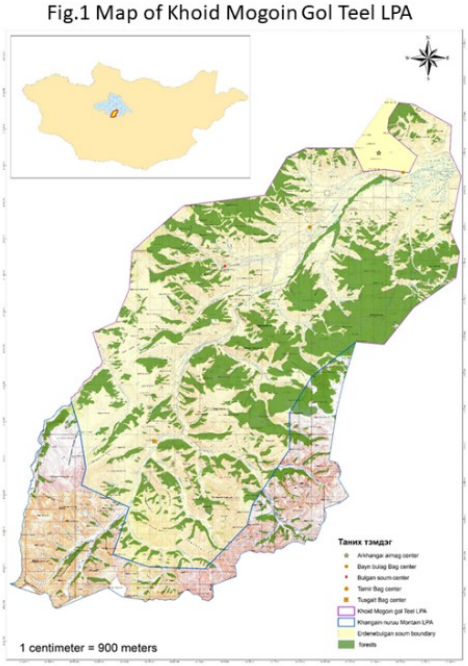

Fig.2 Actors & Interactions

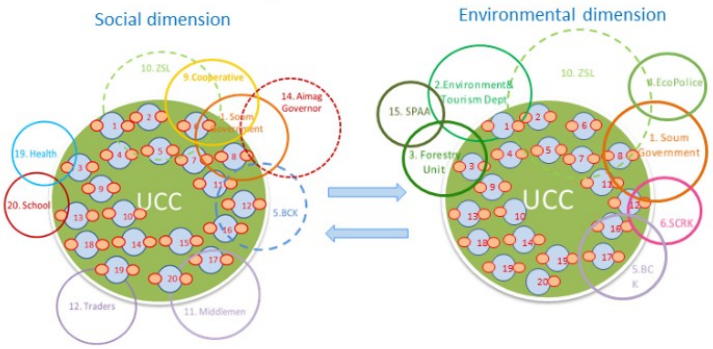

Fig.3 Processes

- VSLA monthly meeting
- ZSL training & events
- Forest cleaning
- UCC annual meeting
- UCC poem competition
- UCC annual sport competition
- UCC Children drawing contest
- VR training/wildlife monitoring
- Cooperative meeting
- Waste cleaning
- Exchange with other CBOs

- Seasonal movement
- VR patrolling
- Law Enforcement (LE) Joint patrolling
- LE Quarterly meeting
- Forest cleaning & regeneration
- Water protection
- Joint Wildlife monitoring
- UCC fencing degraded sites
- UCC Annual meeting
- Nomadic trunk training
- Waste cleaning

Main Interactions and Processes

Various actors interact across the two MF dimensions and engage in diverse processes (Fig.2 and 3). Notably, the UCC emerges as a pivotal participant, actively engaged in environmental conservation and associated social interactions within the LGS. UCC members, whose livelihoods rely on livestock production, engage in activities such as dairying, meat production, wool, and cashmere harvesting. They also manage forest products including timber and non-timber resources. Beyond these core activities, UCC herders contribute to local development through initiatives like road repair, infrastructure construction (e.g., bridges), and tree planting. These efforts emphasize the dynamic involvement of the UCC, highlighting their influence across various aspects of the livestock grazing production process.

Results

In the social dimension, the LPA herders have shown significant engagement in two main associations: the UCC and the Shine Bulgan Sor Cooperative. The establishment of 20 Village Savings & Loan Associations (VSLAs) from none in 2018 demonstrates notable institutional growth. Membership in these associations has also increased to 599, representing around 62% of all herders in Bulgan district. An impressive social well-being indicator is the rise in health insurance coverage within the UCC, which

has climbed to 98% from 78% in 2018. On average, each UCC member participates in four training events annually, attends regular meetings for their respective CBO/VSLA, and joins annual meetings for the UCC/Cooperative. UCC members are actively involved in various seasonal activities, such as patrolling, forest cleaning, waste management, and supporting natural regeneration. Additionally, the herders engage in diverse social activities including sports, poem competitions, and community events, which foster strong social bonds and enhance trust among herders, local government, LPA management, and the ZSL.

Regarding the environmental dimension, the study provides a comprehensive picture of the ecological health within the LPA. The area exhibits a favorable vegetation cover to bare ground ratio of 90% to 10%, with over 1500 different plant species present. Despite this, herders have observed a gradual decline in water sources. The LPA encompasses over 78,000 hectares of forest, approximately one-third of the site, with six dominant tree species, including larch and Siberian cedar. About 9% of the forest has been affected; 63% by fire and 28% by logging. Key environmental achievements for the past five years include the complete cessation of poaching activities, resulting in stable populations of key species like musk deer and argali sheep, with increases in common species such as marmots, red deer, and boars compared to the baseline levels. However, persistent grazing pressure remains a challenge, as the actual number of livestock exceeds the LPA's carrying capacity due to reduced mobility, with an average of only three movements covering around 4 km. Remarkably, the LPA land cover remains largely intact, with only 718 hectares (0.3%) being plowed or damaged and no mining activities, which is crucial for maintaining the health of the rangeland ecosystem.

Conclusion

The application of the MF in the intricate livestock grazing LGS offers a comprehensive understanding of the main actors, their interactions, processes, and indicators, providing valuable insights into the system. While the MF has proven to be a robust tool for monitoring, evaluation, planning, and stakeholder engagement, there is a clear need for adjustments in the indicators to better align with the nuances of rangelands and livestock grazing systems. Adaptations to reflect herders' perspectives and local values are vital to enhance the accuracy and relevance of assessments. However, complexities inherent in livestock grazing LGS, including non-linearity, must be carefully considered during MF application. Further research is essential to address measurement gaps in the production and local development dimensions, enriching our understanding of the MF and its practical application within livestock grazing contexts.

Reflecting on the results from our case study utilizing the MF and tailored indicators, we observed active engagement from 20 different actors across both social and environmental dimensions, emphasizing the critical role of nine actors in the environment dimension and ten in the social dimension. Dominant interactions were notably seen among the local government, the UCC, and the ZSL. The study underscores impressive strides in social and environmental spheres since 2018, with marked enhancements in wildlife protection, ecosystem health, collective actions, and community trust. These positive developments have led to notable shifts in UCC herders' attitudes and values, facilitating improved access to education and financial services. However, ongoing challenges related to rangeland degradation and livestock grazing mobility necessitate targeted interventions and focused strategies to ensure sustained conservation efforts and the well-being of the ecosystem and communities.

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3.3.2 Multifunctionality enhancing Multi-stakeholder platform toward prospective livestock grassland system. Viet Nam case study

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Abstract

The main objective of the case study is to raise awareness of a diversity of stakeholders on multifunctionality of livestock grazing systems (LGS) to feed the process of discussing the future of livestock systems development, the articulation of livestock systems with other activities within the territory (forestry, fruits production, annual crop systems…). The research is expected to feed the discussion with knowledge about the multifunctionality of livestock grazing systems (LGS), the link with sustainability, the trade off and synergies between characteristic of LGS and other activities. Through a prospective exercise we define with the diverse stakeholders some potential changes, and using modelling tool we plan to "implement" these changes to assess the effects on the diversity of LGS

Keywords: Multifunctionality, Vietnam, grassland, grazing system, multi-stakeholder plat form

Context

In the mountains of north-western Vietnam, the smallholder livestock farms rely heavily on natural pastures for animal feed (cattle, buffalo). However, livestock grazing systems are considered insufficiently intensive to meet the national increased meat consumption and reduce the import dependency, and to provide sufficient income to value chain stakeholders to contribute in poverty reduction. These livestock farming is in competition for space and resources with other economic

activities (fruit and forestry plantations), or environmental protection (forest protection). These systems therefore remain weakly supported by local government, and then not considered in the livestock development strategies. Reconsidering the multiple functions of mountainous grazing systems at landscape level might change the assessment of their role in local development strategies.

This study uses an ontology of grazing livestock systems developed by Muller et al. (2020) was mobilized to identify the multi-functionality provided by these systems. The indicators used in the ontology included a series of 21 criteria and 129 indicators those cover the four dimensions: Production, Local development, Ecosystem and Social, and the different levels and entities herd, farm, community and landscape, services and value chain. From this list, we have selected 28 indicators that make sense in the local context, in relation to the challenges of livestock systems, recognized or not by the diversity of the actors involved, and responding to the expectations of the various actors involved in territory and the value chain linked to grazing livestock system (Blanchard et al., 2022). This essential information can help local authorities in their strategic planning of investment and orientation of agricultural and livestock production, resource management and spaces and territories in general. All can help to consider the trade-offs between issues of production, protection of space and resources, economic development. Different stakeholders only concern on some dimensions (production, farmer incomes). The main objective of the case study is to raise awareness of a diversity of stakeholders on multifunctionality of LGS to feed the process of discussing the future of livestock systems development, the articulation of livestock systems with other activities within the territory (forestry, fruits production, annual crop systems…). The research is expected to feed the discussion with knowledge about the multifunctionality of LGS, the link with sustainability, the trade off and synergies between characteristic of LGS and other activities. Through a prospective exercise we define with the diverse stakeholders some potential changes, and using modelling tool we plan to "implement" these changes to assess the effects on the diversity of LGS. (in between the bottom right and bottom left side). A multi-stakeholder platform for discussing livestock sector development necessarily involves agricultural extension actors and local authorities in charge of agricultural development, in addition to livestock sector stakeholders (cooperatives, livestock farmers and livestock by products users, etc.). Developing a tool to evaluate the changes in collective actions at different levels and periods after implementation multi-stakeholder platform to see the impact of the platform is necessary.

Managing local multi-stakeholder platform (MSP) on multifuntionality (MF) of grassland system

Economic circular in agriculture and green agriculture is now ones of key development strategies in the whole country in general and in Dien Bien particular, this is a driver for the application and interest of multifunctionality approach to livestock systems in Dien Bien. The integration of knowledge from multiple sources (multi-dimension, multi-scale, multi-actor, multi-sector, etc.) and the formalization of knowledge so that it can be viewed and discussed by the players (maps, infographics, simplified indicators, etc.) are needed.in the economic circular.

Actions to support and develop livestock farming systems in Vietnam are often not the result of collective actions. R4D provides knowledge on existing systems, their performance, performance gaps, possible innovations to improve the performance of existing systems, etc. Within the framework of some R4D initiatives, the knowledge produced is mobilized to initiate dialogues with actors on their different expectations of livestock systems, on the synergies and trade-offs between systems and

between functions of livestock systems, on the possible evolutions of livestock systems and their effects. The definition of interventions and collective actions (national and provincial development programs, private sector interventions, R4D projects) depends on other factors. It is required to involve additional actors in a MSP and clearly define their roles, problems, solutions and profits in the system. The highlighted synergies and trade-off between interests, roles, problems and profits of different sectors and actors need to be discussed with players.

Sharing knowledge for MF assessment

The application of the multifunctionality approach has made it possible to define the expectations shared by the actors on the role of livestock systems in territorial development (production, income), but also their specific expectations (employment, livelihood). This study had also shown that some functions provided by livestock systems for the territorial development were not expected by any actors involved in the study (supply of organic fertilizers, autonomy of nitrogen, recycling of unused agricultural by-products). Results from these multi-stakeholder dialogues need to be summarized and deliver to the local authority, policy maker when they designing and modifying annual and a period agriculture planning; and a pilot for the most priority action should be designed with the involvement of projects and local authority and different stakeholders. However, as multifunctionality implies considering multiple dimensions (economic, environmental, social, production), the studies carried out by the research team involved in the field could not consider, in a satisfactory manner, all these dimensions... Complementary studies would be desirable to integrate new and important dimensions for the actors in this study area (GHG and sequestration, employment, labour, organization of actors for example).

Clear road map and pathway in line with the local development strategies and considering the multiple functions of the farming systems needs to be considered. Strong involvement of local authorities and policy makers and their support require clear outputs and outcome as well as in right time/ period and parallel with the local development strategy are perquisite but the most difficulties. The application of the multifunctionality approach should make it possible to change the perspectives of the actors, to develop the orientation of the interventions and actions of change of the livestock systems towards more sustainability and considering the multiple functions of the farming systems. The evaluation of these changes remains very complex. Assessing the evolution of perceptions of certain actors is complex, without a clear vision of the perception before and after an intervention.

Monitoring changes

Circular economic approach is current trend in the world as well as in Vietnam. Therefore, MSP with the integration of different actors and sectors are suitable. Global and societal trends are pushing players to change perceptions and their practices towards more sustainability in the same time… It will be impossible to causally link these changes with the application of the multifunctionality approach.

In the case of Vietnam, when reporting the achievement, data of a year, a period, normally the local authorities analyze the current situation, and compare them with the previous year, previous period and with the planned ones. Therefore, it makes senses to develop relevant indicators when do planning and then also apply for evaluating the actions later on.

An analysis of the evolution over time of the consideration of livestock systems in the texts (Provincial decisions and regulations) could be interesting, and a prerequisite for a more specific study. The issues are considered including the expectations of livestock systems; the indicators used to describe their performance; concepts associated with livestock systems and the changes over time in the description of systems, expectations and indicators.

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4 A comparison of analysis of livestock grazing systems multiple functions

4.1 Grassland management for livestock-based sustainable livelihoods in India, by Dr. Bharat Kakade

Invited speaker: Dr. Bharat Kakade, BAIF, India.

BAIF Development Research Foundation (BAIF), an Indian civil society organisation of international repute, reaches out annually to 4 million families from 100,000 villages in 15 states of India through livestock, tree and crop-based sustainable livelihoods, climate action and rural enterprises.

India is endowed with a rich livestock diversity of about 303.76 M cattle, buffaloes, mithun (gayal) and yak, 74.26 M sheep, 148.88 M goats, 9.06 M pigs and about 851.81 M poultry (20th Livestock Census of the country, 2019), premier status in global milk production (Ministry of Fisheries, Animal Husbandry & Dairying, GOI), second in egg production, fifth in meat production (FAOSTAT, 2021) and a Gross Value Added (GVA) of 30.87% and 6.17% of the Total GVA (Annual Report 2022-23, DOAH, GOI), making it the most reliable source of livelihood for the rural population which comprises 64% of the total population in the country while accounting for 16% of the income of small farm households.

The prevalent grazing systems in India include pastoral livestock, common pool land resources, sedentary grazing and agropastoral livestock with about 13 million pastoral livestock belonging to traditional castes while other non-traditional pastoral livestock are engaged in mobile herd rearing of camels, cattle, ducks, donkeys, goats, pigs, sheep and yaks. Around 77% of the livestock are maintained in extensive grazing systems and contribute 53% of the milk and 74% of the meat in the country while the manure serves as a valuable fertilizer and source of income for crop farmers (LIFE Network et al., 2016).

Indian grasslands, a part of the open natural ecosystems and supporting 500 million livestock and more than 20 nomadic tribes and sequestering 146 tonnes of carbon per hectare per year, are threatened by intensive agriculture, afforestation and renewable energy projects (https://india.mongabay.com/2022).

Collapse of village-level traditional institutions (Anon. 2011), carrying capacity less than 1.0 adult cattle unit per ha and decline of ecologically relevant pasture lands such as Shola grasslands of Nilgiris, Sewan grasslands of Bikaner, Jodhpur and Jaisalmer, semi-arid grasslands of Deccan, Rollapadu grasslands in the semi-arid tracts of Andhra Pradesh; Banni grasslands of Gujarat and Alpine grasslands of Sikkim and Western Himalayas have been observed due to invasion of unpalatable alien grass species, neglect, poor maintenance and over-grazing (Ajoy and Singh, 2013), erosion of fodder diversity, loss of native fodder species, land degradation and encroachment.

BAIF has introduced silvo-pasture on 2660 ha community livestock grazing lands/commons for effective grassland management, participatory community management with women as the focal point, training and capacity building, grazing and regeneration, ecosystem services, planning and monitoring, control of biotic pressure apart from breed improvement, vaccination campaigns for dairy animals, feed and fodder promotion and herd management. This has resulted in annual grass production of 1800-2200 kg per ha, increased biodiversity, groundwater recharging, community land free from encroachment and access to fuel wood with significant impact on the livelihoods of livestock-based smallholder community with fodder sufficiency, healthy large and small ruminants and increase in milk production, productivity of small ruminants and ultimately the family income. On an average, the total biomass on the regenerated commons is around 62 tons/ha as compared to the earlier average of 23 tons/ha on non-regenerated commons. Thus, Silvo-pasture demonstrates the potential for sustainable land management approaches by optimising the multifunctional potential of landscapes and ensuring resilience and well-being of the people and the fragile environment.

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4.2 Unveiling the past and present drivers shaping multifunctionality in South Africa's drylands, by Igshaan Samuels

Invited speaker: Igshaan Samuels, ARC, South Africa

In South Africa, before the large-scale privatization of land during the colonial and apartheid periods, rangelands were considered multifunctional landscapes. These landscapes supported a range of ecological, cultural and economic activities, supported by an indigenous system of mobile livestock grazing. Livestock production was not only a means of food security but also held cultural and social significance. Synchrony with nature was maintained through transhumance and long-distance movements, allowing pastoralists to move livestock to key resources areas like mountainous regions during times of drought, ensuring resilience of livestock grazing livelihoods.

With the arrival of colonial powers, traditional mobile livestock grazing systems were systematically eroded. Colonial frontier expansion resulted in the appropriation of indigenous grazing lands, establishment of racially based mission stations, and the imposition of fenced property boundaries. These changes marked a significant shift from flexible, adaptive mobile system of grazing to a more rigid, and capital-intensive ranching with conservative and fixed stocking rates. Livestock farming became profit-driven, focused on mono-species production especially sheep, and largely detached from variability that dictates the ecological contexts of the arid zone. This privatized and modernized system of livestock farming discouraged mobility and undermined the multifunctional roles that rangelands once played.

Post-1994 democratic reforms in South Africa opened new opportunities through land reform and abolishment of racially based policies. Former mission stations for the indigenous Nama pastoralists underwent land reform but challenges persist in making these lands economically viable and ecologically sustainable.

Today, there is a growing recognition that for rangelands and pastoralist livelihoods to endure in the face of increased climate variability particularly drought, landscape connectivity is essential for herds to escape unfavourable climatic and weather conditions as well as accessing the seasonal availability of forage and ephemeral water sources. Mobile pastoralism, when supported, can provide critical adaptive capacity by enabling livestock to move between agroecological zones. Diversifying income sources such as ecotourism, hospitality, crop farming, and off farm business activities have also become a survival imperative for livestock farmers in the region. In addition to grazing, indigenous communities rely on medicinal plants for human and veterinary use, firewood, subsistence cropping, remittances and social state grants an additional livelihood opportunities and sources of income.

There is also increasing pressure from external land uses such as mining, especially for copper and heavy metals, which have a long history in Namaqualand. In recent decades, diamond mining has expanded, later declined, but it is still present. Simultaneously, conservation initiatives to protect arid biodiversity hotspots like the Succulent Karoo biome, the richest desert in the world in terms of plant diversity and endemism. Renewable energy developments, including the province's green hydrogen strategy, represent a new layer of land use in addition to livestock farming.

In this complex and rapidly evolving arid landscape, land tenure remains a critical issue. Current systems reflect a patchwork of communal land, state land, and private ownership, each with different rights, restrictions, and responsibilities. The challenge moving forward is to drive toward integrated landscape approaches that recognize the multifunctionality of land and the diverse needs of its users. Stewardship models, co-management strategies, and inclusive planning are already being promoted as ways to balance conservation, livelihood resilience, and economic development. Reconnecting landscapes, enabling mobility, and diversifying livelihoods will be key to ensuring that both ecosystems and communities adapt to a changing world.

4.3 The multiple values of European grass-based farms along pedoclimatic and stocking density gradients, by B. Dumont

Invited speaker: B. Dumont[1] with the collaboration of M. Benoit[1], J.M.G. Bloor[2], M.S. Corson[3], F. Joly[1], H.M.G. van der Werf[3]

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The debate on the sustainability of animal farming is often polarised around greenhouse gas (GHG) emissions and land use, while the potential benefits of grassland-based ecosystem services (ES) in farm assessments are overlooked. In this presentation, we discuss benefits of providing a more holistic assessment of ruminant farming systems based on two farm networks. First, we combined life cycle assessment and land-cover matrices to assess trade-offs between per-ha human-edible protein (HEP) production, environmental impacts, and provision of ES of five cattle farms from lowlands in western France and southern England. Life cycle assessment identified two climate-neutral strategies, one based on extensive grazing (0.53 livestock units (LU)/ha) on a biodiversity-oriented farm (Mondière et al., 2024), and the other based on land sparing, which increased HEP production 11-fold, while C storage on half of the farm area that was "returned to nature" compensated for GHG emissions. Integrating the weights of stakeholder perceptions modified farm preference rankings. When HEP production was given one-third of the total weight, an agricultural rewilding option (0.18 LU/ha) and an agroecological dairy farm (0.79 LU/ha) obtained the highest multifunctionality scores. In a second farm network, we analysed economic and environmental performances of five sheep farms that optimised ewe productivity and feeding costs. Farms were located in contrasting biogeographical areas along a gradient of decreasing agronomic potential from Ireland to Mediterranean rangelands in France (Benoit et al., 2019). The two farms that relied the most on grassland and rangelands had the best economic and environmental performances while minimising feed-food competition. These farms, however, generated a high seasonality of production that does not fit with the meat industry's demand for a regular meat supply throughout the year. Analysing these two networks thus shows that monocriteria assessments reveal only a small part of the story and do not help people to think about a sustainable future for ruminant production systems. To capture the diversity of stakeholders' narratives, a more pluralistic perspective of multifunctionality is needed that acknowledges the value that farmers give to production and biodiversity (Oostvogels et al., 2024). To promote dialogue between stakeholders, we need to develop tools, such as serious games (Dernat et al., 2023), that allow citizens and farmers to share their knowledge and values, and exercise their analytical skills. By combining these approaches, we aim to redesign ruminant production systems so that they can meet citizens' and farmers' expectations while limiting their climate change impact.

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5 Round-tables

5.1 Round Table 1. Is Multifunctionality a useful concept to envision possible futures for livestock grazing systems given contrasting challenges (from North to South, from East to West)?

5.1.1 Emmanuel Coste, Confédération Nationale de l'Elevage, France

Multifunctionality is a core principle for many French livestock grazing farms. Farmers often operate within mixed systems that integrate livestock, grasslands, and local ecosystems. Sustainability in livestock farming is understood through three pillars: economic production, environmental stewardship, and social cohesion. Livestock farming contributes significantly to the production of milk, meat, wool, and leather. Beyond production, farms maintain strong environmental ties, particularly through the use of grass pastures.

Biodiversity is a daily reality for these systems, though it brings challenges—such as conflicts with growing wolf populations, which threaten livestock and lack adequate management measures. Environmental synergies are also evident in mountain regions, where ski resorts collaborate with farmers to maintain pastures that improve snow conditions. Agroforestry is another example, where trees are used to enhance biodiversity and provide feed for animals in certain regions.

Farmers actively manage the landscape in ways that promote ecological balance while supporting production. Decisions about land use and environmental care are made at the farm level, aiming to maintain both productivity and ecosystem health. Social sustainability is equally important, particularly in maintaining human activities in rural and mountainous areas. In these regions, livestock farming is often the only viable agricultural option due to land constraints.

The link between farming and territory is strong, especially in less accessible zones where livestock grazing systems support local economies and cultural heritage. Livestock grazing system is not just an agricultural practice, but a way of life deeply embedded in the identity of certain regions. The role of livestock grazing systems in preserving rural vitality and environmental diversity cannot be overstated. Farmers navigate both opportunities and constraints in managing these complex systems.

While the three classical pillars of sustainability are acknowledged, many farmers see territoriality as a fourth essential dimension. Regional specificities shape production models, requiring tailored approaches to sustainability. The multifunctional role of livestock grazing systems reflects a balance between economic needs, environmental protection, and social responsibilities.

5.1.2 Arona Diaw, Technical director, Laiterie du Berger, Senegal

The speaker presented Senegal as a case study, highlighting the work of the Innovation Dairy Platform, a local multi-stakeholder initiative using a multifunctional approach. This platform has helped increase awareness among actors in the dairy value chain about the social and environmental impacts of their

activities. It enables stakeholders to collectively identify challenges and co-develop context-sensitive solutions that consider the full value chain and local territory. A key advancement has been the ability to make forecasts and improve milk production planning through data sharing between producers, collectors, and processors. Research institutions support this process by providing data access and helping stakeholders understand the broader implications of their decisions. The speaker pointed out a mismatch between existing livestock policies in Africa and the realities on the ground, which often favor intensification and exotic breeds over local systems. Bridging formal and informal actors remains difficult but essential for promoting sustainable development. The value chain approach, supported by measurable evidence, strengthens advocacy efforts aimed at governments and NGOs. Demonstrating measurable social and environmental impacts has improved access to private funding, referred to as "branded finance." This financial support is helping to reinforce the platform's work and ensure its long-term sustainability.

5.1.3 Anne Mottet, United Nations, IFAD, Rome

The speaker shared insights drawn from his experience working on sustainable livestock systems at both FAO and IFAD. She began by discussing the work initiated at FAO in response to a request from a country in 2018 to develop a tool to measure the performance of agroecology. Agroecology, being a holistic approach, required a tool that could capture its environmental, social, and economic dimensions. FAO developed a multi-criteria tool to assess the multifunctionality of food and production systems.

The tool includes ten key criteria grouped across economic, social, environmental, and institutional dimensions. On the economic side, it measures productivity, income, and especially added value, recognizing that high productivity does not always equate to sustainable livelihoods if significant income is lost to land costs. The tool emphasizes added value as a critical indicator of economic sustainability.

Socially, the tool integrates existing frameworks to assess gender empowerment and opportunities for youth. It highlights the importance of considering how production systems provide access and benefits to women and young people—areas often overlooked in traditional evaluation tools.

On the environmental side, the tool uses agricultural biodiversity and soil health as proxies to evaluate environmental performance. These criteria reflect the ability of systems to sustain ecological balance. The consultative process that led to the tool’s development, which involved over 70 participants, also introduced human health as a crucial factor. Health-related indicators include exposure to pesticides and dietary diversity.

Dietary diversity is especially relevant when evaluating the nutritional role of livestock, particularly ruminants. Livestock play a crucial role in providing high-quality proteins and nutrients, making their contribution to food systems essential.

A cross-cutting criterion is land tenure. It is a central issue tying together economic, social, and environmental aspects. In livestock grazing systems, secure access to land and grazing resources is fundamental to sustainability.

The speaker then transitioned to her current work at IFAD, where pastures and rangelands form a significant component of the livestock portfolio. Since 2010, 14% of IFAD's livestock investments have focused on pasture and rangeland management and livestock mobility. Another 11% has gone toward improving livestock grazing systems support services, including the development of legal and institutional frameworks.

These investments amount to nearly USD 2 billion and encompass areas such as animal health, animal husbandry, restocking, advisory services, and post-harvest activities. IFAD places particular emphasis on grazing and extensive livestock systems in West and Central Africa, Central Asia, and increasingly in East Africa.

These investments are not limited to technical aspects. They address productivity, breeding, mobility, land degradation, fodder quality, and transboundary diseases. Additionally, IFAD aims to improve access to services, including technical support, financial services, and market infrastructure.

The organization also focuses on promoting gender equality and job opportunities for youth within livestock grazing communities. This comprehensive approach ensures that interventions go beyond productivity to enhance the resilience and sustainability of livestock grazing systems.

Finally, IFAD collaborates directly with communities and governments, promoting adequate policy frameworks to support sustainable livestock systems. Through this integrated model, IFAD addresses the complex challenges livestock grazing systems face and strengthens their role in achieving sustainable food systems.

5.1.4 Hsin Huang, International Meat Secretariat, Paris

The speaker's intervention focused on promoting a comprehensive and balanced understanding of livestock systems through the lens of multifunctionality. He emphasized that livestock should not be viewed merely as a source of meat, milk, and eggs, but rather as a system providing diverse functions and services. This broader framework offers a powerful tool for defending the role of livestock in society and engaging effectively with various stakeholders.

He argued that while environmental and health concerns are legitimate and widely shared, focusing too narrowly on singular issues, particularly greenhouse gas emissions, can be misleading—especially in the case of livestock grazing systems. Livestock systems, particularly livestock grazing ones, are frequently criticized for their environmental impact, but such a perspective often neglects the multifunctional contributions these systems deliver.

To support this more nuanced approach, the speaker highlighted the necessity of engaging not just with the Ministry of Agriculture but also with other governmental bodies such as the Ministries of Health and the Environment. He underlined the importance of cross-sectoral collaboration and communication, advocating for a framework that governments and stakeholders across various sectors can adopt and adapt according to their local priorities and contexts.

The notion of multifunctionality encompasses both public and private goods. While market mechanisms can sometimes address private goods effectively, public goods—such as ecosystem

services, cultural heritage, and rural livelihoods—require public policy intervention. Without recognizing the public good dimension of livestock systems, meaningful dialogue and sustainable policy action become challenging.

The speaker acknowledged that multifunctionality is inherently complex, especially given the wide variety of geographic, economic, and cultural contexts across the globe. However, he maintained that the shared theoretical framework of multifunctionality enables different actors to navigate this complexity according to their own regional and systemic needs.

He stressed that adopting a unified framework allows stakeholders to align their goals while respecting local differences, thereby enhancing the credibility and coherence of livestock policy discussions. This shared approach can facilitate better communication with civil society, NGOs, and international partners, ensuring that livestock's diverse roles are accurately represented.

In conclusion, the speaker advocated for multifunctionality not only as an analytical tool but also as a strategic foundation for policy and dialogue. He cautioned against tunnel vision and encouraged the livestock sector to proactively demonstrate its multiple contributions to society. Ultimately, he positioned multifunctionality as perhaps the only viable path forward for achieving sustainability in livestock systems while responding to global challenges and criticisms.

5.1.5 Michele Nori, European Commission-DG AGRI, Brussels.

The speaker opted to address both guiding questions simultaneously. He highlighted that livestock is often under scrutiny due to what he termed the "inefficiency trap" and its role in climate change debates. In many discussions, livestock is viewed primarily as a climate problem, which neglects its broader contributions.

To shift this narrative, he emphasized the need to promote the multifunctionality of livestock systems. This includes recognizing their roles not just in production, but also in delivering environmental and social services. Sustainability, he noted, must be understood through its three core pillars: economic, environmental, and social.

He credited previous speakers, such as Arona, for raising these dimensions and built on their points. A key example presented was the EU's emphasis on managing permanent grasslands. Permanent grasslands offer critical ecosystem services, such as biodiversity support and carbon sequestration. Their maintenance provides public goods that go beyond food production. The speaker argued for compensating these services through public policies and funding. In his view, livestock should not be seen only as a food producer but also as a provider of valuable public services. Livestock plays a crucial role in managing specific ecosystems, particularly in mountainous and Mediterranean areas. Extensive livestock systems, although less "efficient" by market standards, offer high ecological and social value. Policy design, therefore, must seek to bridge these pillars effectively. One of the key challenges, he stated, is how to measure environmental and social externalities. Market prices can evaluate production, but public goods and social impacts are harder to quantify. Developing accurate mechanisms to value, monitor, and reward these contributions is essential. In policy terms, this remains one of the greatest difficulties.

To address this, he proposed focusing on three measurable pillars: land, livestock, and labor. Land and livestock can be measured through existing frameworks, including market and environmental indicators. However, labor – the human element – is often neglected in sustainability policies. He emphasized that labor includes income, knowledge, time, and the lived experience of farmers. Young people are increasingly turning away from livestock farming due to hard work and limited financial returns. This demographic challenge threatens the generational renewal needed for sustainable livestock systems.

In Europe, there is a unique political framework that supports extensive livestock systems and its multifunctional value. The Common Agricultural Policy (CAP) plays a central role in promoting grassland management. CAP's support for Areas with Natural Constraints is further evidence of Europe's commitment to extensive systems. However, the speaker cautioned that turning these positive principles into effective practice remains difficult.

Multifunctionality is hard to recognize and integrate into models and life cycle assessments (LCA). Conflicts with other policy priorities, such as climate goals, animal health, food safety, and trade, create tensions.
He stressed the importance of reconnecting land, livestock, and labor in both policy and practice. This "re-coupling" is vital to ensuring that grazing systems produce social and environmental benefits alongside quality food. Human labor is what links land and animals and shapes sustainable outcomes. Without it, issues such as overgrazing, undergrazing, or land abandonment become more likely. Thus, labor must be central in public policy discussions about sustainability.

Policies must reward and value the human contribution to multifunctional livestock grazing systems. In conclusion, he called for a policy framework that fully embraces livestock's multifunctionality by integrating land, livestock, and labor. Only then can the true value of livestock grazing systems be recognized and supported sustainably.

5.2 Round Table 2: Is Multifunctionality an actionable lever for development projects and public action involving these forms of livestock systems?

5.2.1 Philippe Thomas, European Commission-DG INTPA

Philippe Thomas, representing the EU Directorate-General for International Partnerships, spoke from the perspective of donors regarding the sustainability of livestock grazing systems. He opened by acknowledging that while the concept of multifunctionality is often highlighted as crucial for sustainable development, the practical implementation frequently falls short. Many livestock projects tend to pursue narrow objectives, often limited to value chains or biodiversity conservation, lacking a truly multidimensional approach.

Despite claims of integrating social, economic, and environmental dimensions, these initiatives often remain siloed. Ph. Thomas emphasized that interventions must be adapted to the specific contexts of partner countries, especially in arid and semi-arid regions. He identified several critical issues affecting the functionality and sustainability of livestock grazing systems.

Firstly, economic challenges, particularly the impact of cheap imports such as powdered milk or chicken, undermine the viability of local livestock production. These imports often make local production economically uncompetitive. Secondly, demographic growth in regions like the Sahel increases pressure on land and resources, demanding innovative strategies for land management.

Thirdly, environmental fragility, especially desertification and climate variability, threatens livestock grazing ecosystems. Ph. Thomas questioned whether there is enough empirical evidence showing that livestock contributes positively to environmental goals, such as soil fertility. He called on the scientific community to provide this evidence to inform better policies.

He also pointed to the complex social dynamics, territorial tensions, and security concerns that complicate livestock grazing systems development. Furthermore, Ph. Thomas critiqued the static thinking that often underpins policy and project design, stressing the need for forward-looking, adaptive strategies. According to him, the key is not debating whether livestock grazing systems are good or bad, but recognizing the reality of shifting land use and ecological degradation.

He highlighted the need for more provocative and systemic thinking, especially across the Sudanian belt, where transformations impact not just livestock grazing zones but also coastal nations. These systemic changes demand integrated and inclusive responses that go beyond traditional sectoral boundaries.

In his view, multifunctionality should not be the sole focus: systemic approach is essential to capture the full range of interrelated challenges. Ph. Thomas noted that regions like West Africa require approaches tailored to their unique complexities, especially with emerging geopolitical dynamics such as new regional alliances.

In a world facing climate change, insecurity, and demographic pressure, he argued for a fundamental rethinking of strategies and narratives around livestock grazing systems. He shared a story from a Belgian organic farmer to illustrate that sustainable farming models must integrate livestock to maintain ecological and economic balance.

This anecdote served to reinforce the idea that reinventing agricultural models is necessary, rather than maintaining outdated divisions between crop farming and livestock systems. Scaling this mindset from the local farm to the global context, he stressed the importance of evidence-based research in shaping policy. Ph. Thomas concluded by urging for a reframing of the debate: not about defending livestock grazing systems, but asking whether we can afford to do without it—particularly in fragile regions like the Sahel.

He ended with a challenge to policymakers and stakeholders to rethink assumptions and consider the indispensable role of livestock in global food systems and rural livelihoods.

5.2.2 Alexandre Bouchot, Agence Française de Développement

The speaker, a team task leader from the Agence Française de Développement (AFD) based in Dakar, presented insights on the sustainability of livestock grazing systems in the Sahel during a roundtable discussion. He emphasized his role in managing projects across the region, notably the Pepisao project,

which aims to establish a shared vision of livestock grazing systems and pastoralism in West Africa. Building on points raised by previous speakers, he highlighted the need for deeper contextual analysis to address livestock grazing needs, particularly in crisis-prone border areas where mobility is severely restricted.

Drawing attention to the importance of understanding local experiences, he noted that livestock grazing systems cannot be examined in isolation but must be integrated into broader systemic approaches. Despite increasing pressures for agricultural intensification and chemical fertilization, he argued that livestock grazing systems remains indispensable for West Africa over the next two to three decades due to its socioeconomic significance and efficient use of marginal lands. He challenged narratives promoting sedentarization as a conflict mitigation strategy, labeling such approaches as ineffective and disconnected from the realities on the ground.

The speaker called for a shift from the prevailing "peaceful transhumance" narrative—popularized since the 2013 Nouakchott meeting—to one that acknowledges pastoralism as part of the solution rather than the problem. He explained that framing transhumance as something requiring "peace" perpetuates stigmatization of livestock grazing communities, contributing to cycles of frustration, insecurity, and conflict. This narrative change is critical to addressing restricted mobility, which exacerbates food insecurity, poverty, and social disintegration, often drawing vulnerable populations into armed groups.

Addressing multifunctionality in livestock grazing systems, the speaker underscored its value as a core principle for development initiatives. AFD, as a funding agency aligned with the Sustainable Development Goals (SDGs), embraces multifunctionality while ensuring interventions do not harm any SDG targets. This has driven a shift from sectoral to territorial approaches, focusing on natural resource management, local dialogue, and strengthening local governance. However, he noted challenges due to entrenched sectoral logic within many partner countries, necessitating long-term advocacy for integrated, systemic solutions.

Context adaptation was identified as another critical factor, particularly given persistent myths about abundant arable land in Africa that fuel land grabbing and agricultural intensification at the expense of livestock mobility. The speaker highlighted pastoralism’s wide-ranging contributions across social, economic, environmental, and territorial dimensions, including food and nutritional security, organic manure production, soil carbon sequestration, maintenance of rural social fabrics, and mitigating land conflicts.

He stressed that vicious cycles linking food insecurity, poverty, and insecurity are closely tied to mobility restrictions, further aggravated by border constraints. Environmental benefits of livestock grazing systems should be communicated to international donors, who often view livestock farming negatively due to global debates on its environmental impacts. This requires balancing climate justice considerations with the need for context-appropriate solutions.

In conclusion, the speaker reiterated that promoting multifunctionality is essential for fostering systemic approaches and context-sensitive interventions. AFD supports multi-sectoral territorial projects engaging various ministries while avoiding fragmented projects that dilute resources. He advocated for comprehensive conflict-sensitive analyses to inform project design and long-term strategies beyond the traditional project framework.

Ultimately, he called for a new narrative by the upcoming Nouakchott+10 meeting and beyond—one centered on "multifunctional territories" and "integrated systems"—to replace outdated notions of "peaceful transhumance." This shift would better reflect the true value of livestock grazing systems, address structural challenges, and promote sustainable, locally defined solutions for the Sahel's livestock grazing landscapes.

5.2.3 Fiona Flintan, CGIAR-ILRI, Italy

Speaking from Rome, F. Flintan addressed the pressing issue of land governance within livestock grazing systems. She emphasized that multifunctionality in livestock grazing landscapes demands equally multifunctional governance systems. These grazing systems are embedded in complex, layered landscapes that include diverse forms of land tenure. Governance must accommodate various levels—landscape-scale, dry-season grazing areas, and individual farms.

Additionally, there are specific features within these landscapes such as water bodies, trees, and wells that represent individual tenure niches. Multiple user groups coexist, including both primary and secondary users. These users engage with the land in ways that are often seasonal and dynamic. Therefore, flexibility in land use governance is crucial throughout the year.

Mobility across these multifunctional landscapes is also essential to livestock grazing. However, this complexity presents significant challenges to the establishment of effective governance systems. Even capable governments struggle to put in place systems that support multifunctional use effectively. The absence of such systems leads to widespread tenure insecurity for livestock grazing systems and other land users.

Tenure insecurity undermines the ability of communities to defend their resources. It contributes to encroachment and loss of access to key land and water sources. Affected groups often receive no compensation when their land is seized or repurposed. The result is increased land use conflict and diminished resource stewardship.

Insecure tenure also discourages long-term investment in productivity and land restoration. Without confidence in future access to land, users are unlikely to invest in sustainable land management. The speaker stressed that this remains one of the central challenges facing multifunctional land systems.

Although some positive examples exist, they remain limited. She highlighted Tanzania as a country with progressive policy and legal frameworks. Tanzania enables local-level land use planning and empowers village-level governance. These structures allow for the issuance of customary rights of occupancy, including to groups.

Such systems facilitate cross-boundary cooperation for the protection of shared grazing areas and water bodies. They also enable livestock-keeping groups to acquire collective tenure certificates. These examples show the potential of locally grounded, inclusive governance frameworks.

Nonetheless, such successes are rare and progress overall remains slow. The speaker characterized tenure insecurity as the "elephant in the room" in discussions of sustainable livestock grazing systems.

Despite years of discourse, tangible advances have been limited. She called for renewed attention to this issue, particularly in the context of multifunctional landscapes.

Improving governance in livestock grazing areas is critical for both livelihoods and environmental sustainability. Securing land rights is foundational to ensuring equitable access and responsible land use. Without addressing governance and tenure, broader sustainability goals will remain out of reach. The speaker concluded by reaffirming the urgency of developing governance systems that align with the realities of multifunctional landscapes.

5.2.4 Gregorio Velasco Gil, FAO-Livestock grazing Knowledge Hub, Italy

The speaker, representing the FAO's Animal Production and Health Division, emphasized the importance of a multifunctional approach to livestock grazing. He recalled his early involvement with CIRAD's initiatives on Livestock and Local Development (LIFLOD), particularly during the 2016 International Rangeland Congress. He highlighted the significant progress made since then in understanding and applying multifunctionality frameworks to livestock grazing systems.

He supports an integrated approach to managing natural resources that recognizes the diverse functions livestock grazing systems provide. These include biodiversity conservation, carbon sequestration, local breed adaptation, and more. While many actors work on these various functions, public policy and investment often remain narrowly focused on production outputs. This narrow view limits the broader recognition and support of livestock grazing systems' multiple values.

The speaker noted that national governments, technical and financial partners (PTFs) typically prioritize production-oriented outcomes. He argued for a shift in focus towards the full range of livestock grazing services and functions. To achieve this, stronger partnerships and a collective commitment are necessary to integrate multifunctionality into public policy.

He stressed the need for public action that assembles all the components of livestock grazing systems into cohesive policies. Such integration should occur at the country level to ensure sustainable management of livestock grazing landscapes. Addressing more controversial and critical aspects, he referenced the difficulty of implementing a governance framework for multiple users of the same land.

He cited FAO's technical guidance on wilderness livestock grazing lands as an example, underscoring the challenge of engaging all stakeholders in participatory decision-making. Current approaches to development projects and policy often remain sectoral, excluding cross-sectoral collaboration essential to multifunctionality.

G.Velasco-Gil pointed out the absence of multifunctionality in existing national policies, which typically regulate individual sectors in isolation. This creates barriers to recognizing the interdependence of different systems coexisting in the same territories. He stressed the necessity of involving various ministries—not just agriculture or livestock—in developing integrated, holistic policies.

The discussion must also address trade-offs and synergies among social, economic, and environmental goals. Prioritizing one pillar at the expense of others risks destabilizing the entire system. The speaker

highlighted examples such as conservation projects excluding livestock grazing or rangelands being exploited for carbon markets, reflecting a growing trend toward financialization of ecosystem services.

He questioned how to manage the increasing marketization of livestock grazing services without harming traditional communities. This concern, he suggested, should be central to discussions within networks like the one hosting this roundtable. He concluded by affirming his commitment to supporting multifunctionality in livestock grazing systems from his position at FAO.

He acknowledged the complexity of the challenges ahead but expressed optimism about collective action. His intervention called for systemic change in how we understand, govern, and invest in livestock grazing systems. He urged for inclusive policymaking that embraces the multifunctional nature of livestock grazing systems as essential to sustainable development.

5.2.5 Benoît Dedieu, INRAE-ACT, France

B. Dedieu having participated to the initial steps of the Action Network 2 more than 10 years ago, this meeting is a very good opportunity to discuss what has been done since that time. Some comments:

- The multifunctionality is an invitation to think the future of livestock considering all the functions and not only the economic, productive and environmental functions. It refers to the land used by livestock, the land properties for different stakeholders, to the animal products produced with livestock grazing resources and to the households and the communities, that is to say their food security, their dignity, their culture and their well-being. That's all that is concerned with multifunctionality. There is a question that was asked by Saverio this morning: "who defined the functions? "That is an important point to be clarified in the process, but in general we need to consider that we need to have a wide outlook of the functions linked to livestock, to grazing land and to households.

- We had discussions about multifunctionality assessment frameworks. We won't go into the debate of the different assessment frameworks which are very diverse: we listen to Bertrand Dumont' framework, we have also the presentation of the Tape framework by Anne Mottet. There are also other frameworks, we could discuss until the night on the criteria and metrics but what is specific to the multifunctionality framework is the intention to combine not only production aspects, environmental aspects, social aspects, but also the local development aspect. That is to say how activities, actors, landscapes are linked by the functions that are issued from the livestock grazing systems. We think that the local development point is one specificity that has to be cleared up and also put in the front of the discussion about livestock farming systems assessment.

B. Dedieu would also mention other points that we need to discuss about assessments nowadays: it's the inclusion to food systems on one side and it's resilience on the other. Resilience not only considering climate change, climate hazard but also prices, predation hazards and sanitary ones. Remember 3 years ago, the limitation to mobility for humans and animals. Resilience was cited this morning and it is very important nowadays to consider in assessment frameworks the question of resilience.

- Another point which is important is the question of the attractivity of the professions linked to the livestock grazing systems that is to say the satisfaction the farmers have of being livestock farmers, their incomes - that was discussed just before, the duration of work, the autonomy at work, the meaning of work. All that gives sense and satisfaction to workers, farmers but also wage-earners and family workers (because workers are not only farmers). It is important to consider this dimension for the future of livestock grazing systems. When you discussed also of livestock grazing systems you refer to workers and family style of live and maybe to community style of life and there are strengths and weaknesses of these styles of life, that is to say access to services, sanitary services for example, education, roads, or market and so on. That should be included as a domain of interest, notably in pastoral regions where the questions of the infrastructures and services are very important. The attractivity of the professions and the capacity of the communities to benefit from social services, lead to the question of how do the young generation and notably the young women consider being a livestock farmer or wage earner. We know that in many situations, what the youth wants to do is to go away. If we don't take that into account what are we doing thinking of the future of livestock grazing systems?

- B. Dedieu have a regret for the day: from his past frequentation of AN2, there have been important debates on and a process of modelling of the knowledge on livestock grazing systems within the group, considering the 4 domains, production, environment, social and local development; considering entities, considering processes, and we haven't discussed of that today. He thinks it's an important input of the group and elements have still to be worked by the group. What has been produced as knowledge on livestock grazing systems through the different case studies should be formalized, should be enhanced to explicit what are the entities and the processes at stake considering the different domains of the multifunctionality of livestock grazing systems assessment.

- To what multifunctionality leads, as operational contribution to the development? We had examples this morning on how the concept helps to organise debates at local - territorial level about the future of livestock, between different stakeholders belonging to the farmers communities, belonging to NGOs, being public actors, being sectors actors. One argument about the future of the livestock grazing systems is the concern of the local actors. Do they support? are there controversies? Are there barriers to discuss of the future of livestock locally? These territorial dialogues play a role on the perception, by the farmers, of their social insertion and on the support they can benefit from locals directly (facilities) or indirectly (ambiance). The speaker think we have to take into account this particularly benefit of the multifunctionality approach, the capacity to organise dialogues at the local level on what different actors are waiting livestock for.

- We had an example this morning of ideas to go further, going to the co-design by stakeholders and farmers of new livestock grazing systems. We know it's very difficult because if you could put everybody around the table to design farming systems, the farmers may go away, not being ready to share the ideas of an ideal of livestock farming for the future. The speaker thinks we have to go on thinking on the way to organise this co design, that is to say livestock grazing systems future that fit with different stakeholders ambitions.

As a last point: B. Dedieu think multifunctionality can help to make the livestock grazing system participating to the future of livestock in the society in general, not only in grazing regions but also in intensive farming regions. Some part of the society, notably in occidental countries, refuse livestock when they consider the future of agriculture or landscape, devoted to nature on one side and to crops for direct feeding to human on the other. Ecologists want rewarding without animals. Some animal welfare defenders just consider we don't have to raise animal. The origin of the debates is often industrial livestock farming. But in general, there is no differentiation of what the livestock grazing systems provide as an alternative way of thinking livestock. I think that could be another target point for the future.

6 Wrap-up and closing, by Bernard Hubert (GASL-AN2, INRAE, EHESS, France)

First of all, I'd like to briefly remind you of the significance of this conference in view of the major uncertainties hanging over livestock farming throughout the world. Livestock farming is at the crossroads of the major issues and threats facing our societies: climate change, the preservation of ecosystems and biodiversity, the depletion of resources derived from those, the sustainability of agri-food systems, and various activist movements challenging livestock farming (animal welfare, production of greenhouse gases, etc.). The question of its future is more than ever on the agenda of public policy, research, professionals and citizens' movements. And that's why we believe that the multifunctional dimension of livestock farming is the best response we can give to the possible future of livestock farming and the people who make a living from it.

Today I have heard contributions and questions based on three main themes: the strong dependence of livestock farming on political and cultural contexts, the complexity of the situation and the role that collective action can play in developing appropriate responses.

1. A determining political and cultural framework

As Saverio Krätli reminded us from the outset in his introductory speech, this situation is the result of the great transformation brought about by the development of capitalism based on modernity and the separation of humanity from the nature web - of which it was a part - in order to constitute its so-called "environment". It has led to the creation of a set of mechanisms and institutions to implement this separation, this delinking, starting with the reduction of the animal to a machine, paving the way for the modernisation and rationalisation of what has become "animal production" on the basis of the complex interactions between humans and animals that form the founding principles of livestock farming.

To simplify matters, we can say that there are now two visions of the relationship between man and nature, which coexist but have very different objectives:

- One vision, based on the **dualism** between humans and the living world, is clearly separate. This is the domain of *techne*, which favours utilitarian relations with nature or defends against its possible disorders, relying on artefacts and seeking to homogenise and stabilise the living world to facilitate action and reduce uncertainties, in order to exploit natural resources considered as a given stock. It

relies on the power of technology and is assessed according to performance criteria that are mainly technical and economic, and it benefits greatly from technological advances;

- Another approach sees these relationships as a **duality**, i.e. two sides of the same intimately interconnected world. This is the field of *physis*, a way of situating ourselves in an environment made up of evolving, unpredictable behaviour, This is the whole world of the domestication of animals (or plants) entirely shaped by interactions with humans (and which more often than not have no living wild antecedents), resources that are not given but emerge from interactions, it's a question of taking advantage of complexity, it comes up against the limits of knowledge, and is quickly judged on its inadequacies, snubbing that techniques have their own history independent of theoretical frameworks...

This is what we heard from our colleagues in India, South Africa and France (at least in part), as well as from our working groups in Argentina, Mongolia and Vietnam, which often marginalised the land used by livestock grazing societies, sometimes to the point of destroying their very existence. It is also, from another angle, the reduction of these societies and their complex relationships with the living world, animal and plant, to the sole question of their contribution to the production of greenhouse gases, which B. Dumont has described as 'carbon tunnel vision', the very negation of all the other interrelationships between livestock farming and the world, the pure and simple negation of its multifunctionality.

2. A complexity that should not be reduced

As Igshaan Samuels pointed out, the multifunctionality of livestock grazing livestock systems is a complex of interactions, and any attempt to reduce it to a few simple relationships can only lead to clumsy and inadequate action. What we need to do is redesign and rebuild sustainable livestock farming, without reducing its complexity to a single dimension, and considering the inseparable diversity of resources on which these systems are based, the ecosystems grazed, the animal breeds, the rules for managing commons, the know-how of the pastoralists, etc. This is why we are arguing for the need to redesign and rebuild sustainable livestock farming through a multifunctional vision.

This means revisiting the performance criteria applied to them, and therefore the framework for developing the measures used to assess them and the metrologies implemented. Moreover, the aim is to reflect a diversity of views on these systems, without seeking to produce a common, shared vision, which would implicitly reduce this vision to that of those whose voices dominate the others. Hence the need to give priority to collective action in order to give a voice to all those who feel concerned (see next section). In fact, it is most often at local level that this kind of recomposition can be put in place to reshape the policy framework by mobilising all the stakeholders concerned. The aim is to draw up a new framework for livestock farming based on the co-construction of agreements rather than compromises between conflicting interests.

3. Collective action: from a perspective of a Social learning approach

The assumption here is that agreements built on a shared appreciation of reality are more likely to be long-lasting, thinking that the social productivity of controversies is allowing exploration and stabilisation of states of the world and of communities through the convergence of perspectives. Stakeholders determine the remedial actions to be undertaken through a modus operandi based on

shared, co-constructed agreements rather than by means of compromise between conflicting interests. Stakeholder interactions centered on the issues they are dealing with take place at several decision levels and in different sorts of social spaces. Understanding what takes place at the local level is particularly valuable since this is where people have a practical and experiential relationship with the objects and processes that are to be managed. Required changes (e.g., in land use, in management practices, in getting priorities, in relinking human being and animals to their natural environment, etc.) are most likely to emerge from action, social relations, and experiences that take place locally where interdependencies can be explored practically. This perspective does not escape the fact that the 'local' level is linked to the 'global' level through institutional or political structures.

It follows from these assumptions that technical and organisational change cannot merely be prescribed (e.g., through regulations) but also calls for the implementation and management of deliberative processes that might lead people to change their understanding of the situation and consequently to adapt their practices. From such a perspective, social learning is defined as an iterative process of knowledge co-production (i.e., of 'knowing') among stakeholders brought into interaction. Knowledge here is understood as an individual's point of view on entities constituting the world. The process aims to bridge the epistemological gap between knowledge (established and formalized) and knowing by doing (local, indigenous, practitioner knowledge, etc.) through a "generative dance" (as Cook and Brown invite us).

The outputs are not predetermined, it's not a linear process but it has to be assessed regularly in order to fix drifts either to re-design the goals if they seem to be unreachable … It could be helped by tools and instruments, like serious games or modelling, considering a model as an instrument not as a goal. Its heuristic value relies on that it aims to change a situation by changing its understanding by the concerned stakeholders and, thus, change how they implement action.

This day confirms the relevance of the working guidelines and perspectives we have set ourselves in GASL Action Network 2 and the priorities we have identified for moving forward: (1) facilitating collective action by setting up Multi-Stakeholders' Platforms or supporting them where they exist, (2) giving full scope to the different forms of knowledge of these stakeholders and producing new ones, (3) generating change in current situations to make them more favourable to the development of farming systems by giving ourselves the means to assess the conditions and terms of these transformations.

ANNEXE: Conference agenda

Montpellier, Agropolis. Friday 19th April 2024 - 9:00 – 17:30

Morning: 9:00-12:15

- *Welcome to Montpellier* Agropolis, CIRAD and INRAE
- *Introduction* to GASL and Action Network "Restoring value to grassland": Shirley Tarawali (FAO-GASL Chair), Alexandre Ickowicz (GASL-AN2 Chair) (30mn)

- *Keynote presentation* on ***'Livestock grazing systems and society challenges': how to unlock the cognitive dead end?*** (Guest Speaker: Saverio Krätli, Associate research fellow DITSL Germany; Tufts University, Boston US; CEI-ISCTE Lisbon, Portugal; Hon. Ed. in chief of Nomadic Peoples journal, 30+15 minutes)

- *A series of presentations* aimed at identifying the salient features of the studies conducted within the GASL AN2 network on the three following topics: (3 X (2x10 + 10)) minutes and 30 minutes of synthesis exchange)

    - Multifunctionality, multi-stakeholder approach, collective action and ability to reconnect livestock grazing systems and society (AN2 case studies: Serena Ferrari, ISRA-CIRAD Senegal and Jacques Lasseur, INRAE France)
    - Importance of combining various forms of knowledge to account for and equip multifunctional approaches (AN2 case studies: Mariana Quiroga, INTA Argentina and Rogerio Mauricio, Univ. FSJ Brazil)
    - What changes are instigated or facilitated for public action concerning livestock grazing systems and its future through the multifunctionality approach? (AN2 case studies: Tungalag Ulambayar, Zoological society of Luujin Mongolia and Huyen Le Thi Thanh NIAS, Vietnam)

LUNCH: 12:15 – 13:45

Afternoon: 13:45-17:30

- **A comparison of analysis of grazing livestock systems multiple functions** by invited personalities from different regions of the world (Europe, South Africa, Asia, South America). (4 x 20+10 minutes)

- Bharat Kakade, BAIF, India: "Grassland management for Livestock based Sustainable Livelihoods in India"

- Igshaan Samuels, ARC, South Africa: "Unveiling the past and present drivers shaping rangeland multifunctionality in South Africa's livestock grazing drylands"

- Bertrand Dumont, INRAE, France : "The multiple values of European grass-based farms along pedoclimatic and stocking density gradients"

1. **15h45 - 16h00 : Coffee break**

2. **16h00 - 17h15: Two round-table/Panels/Debates** (30 + 40 min)

1. *Is Multifunctionality a useful concept to envision possible futures for grazing livestock given contrasting challenges (from North to South, from East to West)?*

Arona Diaw LDB, Emmanuel Coste CNE, Anne Mottet FIDA, Michele Nori EC-DG AGRI, Hsin Huang IMS.

2. *Is Multifunctionality an actionable lever for development projects and public action involving these forms of livestock?*

Philippe Thomas, EC-DG INTPA; Gregorio Velasco Gil, PKH-FAO; Alexandre Bouchot, AFD; Fiona Flintan, CGIAR-ILRI; Benoît Dedieu, INRAE-ACT.

17:15 - 17h30: Wrap-up and closing: Bernard Hubert (GASL-AN2)