Multifunctionality of pastoralism: linking global and local strategies through shared visions and methods

July 16 & 17, 2016
Welcome to Saskatoon Xth IRC Workshop on Multifunctionality of Pastoralism

It is our pleasure to welcome you on behalf of the Global Agenda for Sustainable Livestock (GASL), and the World Bank under the auspices of the Livestock Global Alliance (LGA) to the 3rd Workshop on Multifunctionality of Pastoralism, organized by the LiFlod Network.,

Our first Workshop was held in Hohhot (China) as a side event of the VIIIth IRC in 2008. The second was in Rosario (Argentina) in 2011 linked to the IXth IRC. The proceedings of both workshops are available (see below) as will be the proceedings of this workshop as soon as possible after the meeting.

We hope that this third Workshop is as successful as the others and we are relying on you the attendees generating a rich quality of dialogue and exchange! Success depends on you !
We are grateful to the donors who enabled us to organize this event: Cirad, Inra, Agropolis international, FAO-GASL, the World Bank, the LGA, the French Ministries of Agriculture and of Foreign Affairs.

This workshop is part of the Action Plan of the "Restoring Value to Grassland" Action Network developed within the Multistakeholder Partnership "Global Agenda for Sustainable Livestock" (http://www.livestockdialogue.org). This plateform is supported by FAO. The Global Agenda recognizes that for livestock to be sustainable, the sector needs to respond to the growing demand for livestock products and enhance its contribution to food and nutritional security; provide secure livelihoods and economic opportunities for hundreds of millions of pastoralists and smallholder farmers; use natural resources efficiently, address climate change and mitigate other environmental impacts; and enhance human, animal, and environmental health and welfare. The Global Agenda provides a multi-stakeholder global Partnership, to comprehensively address the sector’s multiple challenges towards sustainable development. It facilitates global dialogue to foster local practice and policy change, focusing on innovation, capacity building, and incentive systems and enabling environments. Focusing on grassland and rangeland livestock systems, the "Restoring Value to Grassland" Action Network aims

"To maintain, restore and enhance environmental and economic value of grasslands, while promoting their social and cultural functions globally".

The Agenda builds consensus on the path towards sustainability and catalyzes coherent and collective practice change through dialogue, consultation and joint analysis. - See more at: http://www.livestockdialogue.org/about-agenda/about-the-agenda/en/#sthash.4sOtt74w.dpuf

References:
- Revue d’élevage et de médecine vétérinaire des pays tropicaux, 2015, 68 (2-3), Livestock Farming and Local Development, Special issue in English

Rationale
While around one billion people in the world live from livestock farming, rangeland covers one third of the world land. The Livestock-Rangeland couple secures diverse functions for the human population in different livelihood domains including food supply and food security, rural income and savings, food trading and agro-industries, soil fertility and crop fertilizers, production of goods (wool, leather...), tillage and rural transportation, leisure, landscape, social relationship, medicine, etc.

Facing the new environmental challenge defined during the COP21, the Livestock-Rangeland couple has to tackle some impacts, at both the local and global scales, especially regarding greenhouse gases (GHG) emission, biodiversity loss and water pollution, in order to better contribute to sustainable development. Globally, the new environmental issue focuses on biodiversity conservation and reducing deforestation, desertification, GHG emissions, pesticide consumption and fossil energy. The contribution of pastoral systems to food security and nutrition challenges is also at stake, considering the world demographic tendencies and the forecast of an increasing demand for animal source food in the emerging and developing countries. At the local scale, the main challenges are to face higher frequency of climatic events (droughts, overflows ...), low attractiveness of livestock and rural activity, especially for young people, adaptation to new standards and to a volatile and unpredictable market, and integration of new generic technologies.

However, in this complex global-local context, the impacts and contributions of pastoral and agro-pastoral systems are still poorly qualified and quantified and their perception still varies among different stakeholder groups. Hence, these are strong limitations to the development and the adaptation of these systems.

The World Bank, the FAO, the Global Agenda for Sustainable Livestock (GASL), the LIFLOD network (with the support of Cirad and Inra) and TerrAfrica are organizing a workshop to be held just prior to the start of the 2016 International Rangeland Congress in Canada in Saskatoon, 17-22 July 2016 to present and share current knowledge on the multi-functionality of pastoral and agro-pastoral systems in order to identify development pathways that better articulate visions and perceptions of pastoralism stakeholders at different scales.

Purpose
The objective of the workshop is to present the state of the art of international research and development work and how they address the multi-functionality of pastoralism at various scales. The workshop aims at building and approving a generic conceptual model that integrates the different factors needed to answer the questions linked to livestock sustainable development at the local and global level with a special focus on (i) linking international policy debates (Food Security; Climate Change; Biodiversity) to local stakeholders expectations from livestock activities (ii) defining and
characterizing the different functions of pastoral systems at different scales and in different agro-ecological and socioeconomic situations (iii) consolidating “innovation”, “knowledge issues” and “efficient support actions” to progress towards sustainable strategies and projects for pastoral systems. By hypothesis, multifunctionality is built on:

- The agro-ecological, social and historical contexts within which livestock systems have developed;
- Heterogeneous stakeholders having developed diversified knowledge about local ecosystems and having different expectations for livestock activities (economic returns, local product, ecosystem services, cultural symbols…) and for herder’s families (viability, security, sustainability…)
- A complex bundle of access and usage rights for natural resources, including land and water
- A specific environmental policy and a body of collective actions
- A complex network of livestock value chains specific to local products, traditional food habits, local commercial circuits or primary products flows oriented towards urban markets or export.
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**Background/Introduction:** The multifunctionality of livestock in developing world is widely recognized. Most countries are actually witnessing several changes (population growth, development of animal product markets, climate change, etc.) affecting breeding systems and their functions.

**Description/purpose/Objectives:** The compared approach of the evolution of livestock multiple functions is a challenge for research. It helps anticipate changes and future sustainable development of agricultural landscapes. It is based on field knowledge of researchers of the Joint Research Unit Selmet observing ongoing developments of livestock in 14 highly contrasted landscapes (9 in West Africa savannah zone : Mali, Burkina Faso, Senegal); 1 in Madagascar (Vakinankaratra), 1 in Egypt (North West coast), 2 in Brazil (Amazon), and 1 in Vietnam (North mountain). The multivariate approach (PCA, HAC) of the "scoring" of changes awarded by the experts allowed to propose evolutionary trends over the last 50 years (1960-2010).

**Lessons learned/Results:** Four main trends appear (Fig 1). The first trend (T1 Fig1a; Paragominas Fazendas in Brazil) is characterised by a huge development of economical functions (exports), balanced by a strong environmental degradation and large increases in GHG emissions. The 2nd trend (T2 Fig1b; Fatick in Senegal, Dentiola and Diou in Mali, Marsa Mathrut in Egypt, and Paragominas traditional systems in Brazil), by the emergence of commercial livestock farming activities associated with a degradation of the living environment, erosion of biodiversity, and a rise in competition over natural resources. The 3rd trend (T3 Fig1c: Koumbia in Burkina, orontiéna in Mali, Widou and Kolda in Senegal, Highlands in Madagascar and Son La in Vietnam) by a more moderate evolution with an improvement in economic and social areas and a slight deterioration on environmental functions. The 4th trend (T4 Fig1d: Kanoula in Mali) is more dramatic with a regression of livestock functions in almost all areas.

**Conclusions/Next steps:** This comparative approach of changes in livestock functions on a range of situations distributed in developing countries and over a long period (50 years), highlights a trend of overall improvement of the economic functions of livestock, accompanied by a degradation of functions in environmental and social areas, especially in the landscapes with high level of population density. For the future, the challenge would be to avoid a T3 - T2 - T1 pathway, where economic development propser at the expense of the environment. The study will undergo detailed quantitative and diachronic analyzes. Such analyzes stress the need for long term livestock observatories to evaluate scenarios for the future of landscapes.
Migration and adaptation features in pastoralist communities

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Concerns about increased marginalization have let institutions to put pastoralism on the agenda such as the International Fund for Agricultural Development.

A survey to evaluate the global political integration and the enabling environment of pastoralists was carried out in 26 countries distributed in 5 subcontinents and in depth in 8 selected pastoralist hotspots.

Mobility is a critical livelihood feature that enables pastoralist to adapt to harsh conditions. Results revealed that Afar, Arkhangai, Chaco and Altiplano were characterized by limited mobility, while pastoralists in Tiris Zemmour, Gourma and Wagadou reported migrations from significant higher distances and were only exceeded by pastoralists from the Chalbi territory. Impeded mobility was probably the reason of why in this survey migration and herd splitting were only mentioned by 50 \% and 29 \% of the pastoralist when asked about drought adaptation mechanisms while selling of livestock even at low prizes was for 62 \% of the pastoralists the main coping mechanism during periods of stress.

It is remarkable that pastoralists chose distressful coping mechanisms which require longer periods to recover over adaptive mechanisms that do no harm. Perhaps there are constraints that limit full mobility. If mobility played a decreasing role as coping mechanism, market access becomes important.
Le Projet Régional d’Appui au Pastoralisme dans le Sahel (PRAPS) : une initiative multifonctionnelle pour renforcer la résilience des populations pastorales du Sahel

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Le Projet régional d’appui au pastoralisme au Sahel (PRAPS) fait partie de l’Initiative Sahel lancée par la Banque mondiale (BM). D’un montant de 248 millions de Dollars, le projet regroupe 6 pays (Burkina Faso, Mali, Mauritanie, Niger, Sénégal, Tchad) et est coordonné au niveau régional par le Comité permanent inter-Etats de lutte contre la sécheresse dans le Sahel (CILSS) sous le leadership politique de la Communauté Economique des États de l’Afrique de l’Ouest (CEDEAO) et de l’Union Economique et Monétaire Ouest-Africaine (EMOA). Le PRAPS, qui entame sa première année de mise en œuvre, investira dans les infrastructures d’élevage et fournira des services afin d’améliorer la santé animale, la gestion des ressources naturelles, l’accès aux marchés et les mécanismes de gestion et de prévention des crises pastorales. Le Projet va soutenir l’amélioration de la productivité, la durabilité, la résilience des moyens de subsistance d’au moins deux millions de pasteurs, en ligne avec les priorités définies par la Déclaration de Nouakchott sur le Pastoralisme. Le projet prévoit des investissements stratégiques dans les zones marginales, transfrontalières et le long des axes de transhumances historiquement défavorisées, peuplées en grande partie de ménages pauvres et vulnérables aux chocs externes tels que les catastrophes naturelles et les conflits. A ce titre, le PRAPS, travers ces quatre composantes techniques prend en compte plusieurs dimensions de la multifonctionnalité du pastoralisme savoir : (i) les préoccupations environnementales en lien avec l’atténuation des effets du changement climatique et l’amélioration de la biodiversité, (ii) la mise en valeur et perpétuation du savoir-faire des pasteurs et agropasteurs tout en intégrant les progrès techniques disponibles dans la conduite de l’élevage, la gestion et la gouvernance des parcours ; (iii) l’amélioration des revenus des pasteurs et le renforcement de leur résilience par la diversification et la promotion d’activités génératrices de revenus ; (iv) le renforcement de l’intégration régionale pour faciliter une transhumance apaisée.

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Towards Total Economic Valuation (TEV) of Pastoralism in Chad

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The prevalent multi-functionality of pastoral systems should be so far addressed through their TEV (Krätli, 2014). Supported by the PREPAS\textsuperscript{7}, we take this process one step further by valuing the production of Chadian pastoral households for their own consumption.

A socioeconomic database collected in 2015 from 476 households allows comparison between relevant income indicators and a survival threshold of 384 SD/person/year tabulated as lateral thinking of poverty traps.

Livestock monetary incomes insufficiently satisfy 61% of vital needs while additional income diversification permit to reach at most 63%. By integrating the self-consumption, households ensure their food security.

Pastoral systems support different functions as income generation, work force for diversification and food security. The provisioning of other services from pastoral systems are themselves insufficiently measured (biomass production, biodiversity, water cycling, social impacts\textsuperscript{7}). That will be the next phase.

\textsuperscript{7} The PREPAS (Projet de Renforcement de renforcement de l’élevage pastoral dans le Batha, le Wadi Fira et l’Ennedi in French), which aims to strength pastoral farming in the regions of Batha, Wadi Fira and Ennedi. Funded by the Swiss Cooperation for 3 phases of 4 years, the first phase of this project is implemented since 2014 by CA 17 through a consortium constituted by CIRAD and COSSOCIM with a strong partnership of IRED.
Recovering traditional pastoralist management for long-term sustainability

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**Background/Introduction:** North Africa and the Middle East have a strong pastoralist character, with arid and semi-arid climates and, unsurprisingly, all its peoples (berbers, arabs) traditionally dedicated and culturally adapted to livestock keeping. Pastoralist management in the region has traditionally been based on a set of rules for sustainable exploitation of natural resources. Several factors, however, threaten the survival of pastoralist systems. While land privatization and increased inequality among livestock keepers is putting the traditional management at risk, subsidies to animal fodder and capital-intensive investments have greatly increased the livestock numbers, triggering land degradation.

**Description/purpose/Objectives:** Analysis of traditional governance systems can help designing strategies to adjust them to modern legal frameworks, while a better understanding of the environmental services provided by pastoralism can also help designing more favourable policies.

**Lessons learned/Results:** Both Hima governance systems in the Mashqeq and Agdal systems in the Maghreb have been increasingly studied and understood in the region, with initiatives to apply them to modern frameworks. At the same time, different national institutions are working on applying environmental criteria to restore degraded lands and regain sustainability of pastoralist production.

**Conclusions/Next steps:** The importance of re-learning from traditional approaches is proven to be key to achieve sustainable management in rangelands. However, it is also important to apply modern perspectives, which is only achievable through educated members of the pastoralist communities who steer the process. The valuation of pastoralist products for sound rural development necessarily needs the acknowledgement and promotion of environmental values in pastoralist systems.
Pastoralist ownership as a way for sustainable development in East Africa

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Background/Introduction: Pastoralist systems have been an important livelihood in East Africa for many centuries or even millenia. The particular climate of the region, with two dry and two humid seasons, allows for sustainable milk-based livestock economies that provide food security for millions, while pastoralist coexistence with megafauna has allowed the conservation of the world's most functional ecosystems. Development is advancing quick, however, with increasing challenges for the maintenance of these systems.

Description/purpose/Objectives: Increased investment in agriculture developments and infrastructure provision is fragmenting the landscape and posing barriers both for pastoralist and wildlife mobility, as it is done without proper planning to guarantee compatibility with existing activities. Locals do often not take advantage from the opportunities of higher income due to increased demand of animal products and high-end ecotourism because of lack of education or/and access to decision making. Moreover, the crisis of this traditional production system is threatening fundamental ecosystem services that are important for the wider society.

Lessons learned/Results: The increased evidence for higher sustainability of locally owned initiatives, such as nature conservancies or restored communal governance schemes, have yielded positive results both in guaranteeing food security and reducing conflict, and in increasing the income and services provision of local communities. Community-steered introduction of technologies such as mobile phones has also helped local communities in better designing their development strategies.

Conclusions/Next steps: The involvement of the pastoralist civil society, when adequately accompanied by education and empowerment strategies, devolves the control of their fate to local communities, who are in place to take future-oriented decisions. The consequences are beneficial not only for pastoralists but for society at large.
In arid and semi arid lands (ASALs) of the Horn of Africa (HoA), pastoralism and mobile mode of livestock rearing have a vital social and production roles. Herd mobility is not only essential for effective risk management, it also enables pastoralists to harness the environmental variability and enhance livestock production. The rangelands of HoA harbour various wild plant and animal species from which pastoralist generate livelihood through fuel (wood and charcoal), honey, bush meat, non-wood forest products (resin and gum), edible fruits and medicine. The ASALs is the main supplier of live animal and animal products both for domestic market and export for the region. Furthermore plants and animals of the ASLs are protected through ex-situ conservation, protected area management. In general the ASALs in the Horn of Africa contribute considerably to national economies and to the pastoral society, as they support agriculture, livestock rearing, tourism, biodiversity conservation and wild resource harvesting.

Pastoral communities are however under pressure because of human population growth, conflict, competing land claim, breakdown of traditional governance institutions and land grabbing for large scale farming. Declining legitimacy of traditional governance institutions and lack of enforcement of formal institutional framework, regardless of state custody over communal rangelands, drive unregulated rangelands management in the region. With declining role of traditional governance institutions grazing regimes, stocking regulations and pasture conservation within many pastoral societies are disappearing leading to range degradation.

The Intergovernmental Authority on Development (IGAD) member States reached consensus at 2011 head of States Summit in Nairobi to build drought resilience through a 15 years programe called IGAD Drought Disater Resilience and Sustainability Initiative (IDDRSI). The program was designed to holistically approach the challenges of ASALs: natural resource management, improve market access, complementary livelihoods, pastoral early warning and peace and security among others. Different development partners joined the effort of IGAD members States.

This paper highlights institutional and socio-political complexities of rangeland management in the Horn Africa and presents how IGAD and the World Bank approached the complex problems of pastoralist through Regional Pastoral Livelihoods Resilience Project. Others tools developed by IGAD such as IGAD Transhumance protocol, transboundary animal disease control strategy and Regional animal identification and traceability are discussed.
Natural grasslands are a major feed source for cattle production in the Northern highlands of Vietnam. However, as market develops, and cash crop production increases, so too does pressure on land, with less and less area available for natural pastures.

This study analysed the diversity of the functions of grasslands and their perception by various stakeholders resulting in motivation to (or in low interest for) improving pasture management.

The availability of communal grazing-land is a major factor affecting cattle herd size, management practice and profitability of beef production. Beef produced in extensive grazing systems is preferred by traders and consumers, with the development of beef cattle value chains providing new opportunities for farmers to improve natural pastures management and to extend growing-pastures on upland fields. The grazing areas are composed of uncovered grasslands, but also of forest lands, fallows and interstitial areas (border of fields, roads ...).

Pastoral systems are characterized by multi-functions of livestock that contrast with the vision of commercial firms invested in the development of mono-cropping such as maize production. Although Government has encouraged beef production development in the highlands, multi-functionality of livestock, forest and crop cultivation are not mentioned in the development programs.

And grasslands are not formally recognized by local institutions as a valuable feed source. Consequently, government support funding is rarely requested to improve natural pastures. Collective action is required from all different stakeholders to manage them sustainably.
Tilling the biome and tradition: the expansion of soybeans as vulnerability for livestock farming in southern Brazil

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In Southern Brazil, for over three centuries livestock has developed an important role in the conservation and maintenance of the Pampa biome, typically recognized for its nutritious and favorable natural pastures for livestock breeding.

Currently, this space has been the subject of socio-productive changes, mainly identified through the expansion of soybean crops.

In this context, this study aims to identify to what extent the increase in soybeans areas have represented a position of vulnerability for livestock farming and what are the response strategies for this situation.

Thus, among the 60 farmers interviewed, 78% still consider an early assessment of this activity, given its recent entry in this environment, while 22% identified as a vulnerability, pointing out impacts such as: the increase in land price, dispute over land areas with livestock, reducing livestock activity impacting the production cycle and the replacement of animals, environmental harms and their own health through the aerial spraying with pesticides, and degradation of the areas previously occupied by rangelands.

Few are the reactions contrary to soybeans mainly by the delay in perception as a vulnerability to the farmers.
La Crianza Andina. Servicios multifuncionales de los pastizales naturales de la Puna argentina

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Background/Introduction: La relación que se ha establecido a lo largo de milenios entre las poblaciones pastoriles y los pastizales naturales de alta montaña, muestran una compleja trama que genera múltiples servicios mutuos. No obstante, los pastores de la Puna siempre han sido responsabilizados por los procesos de desertización que parecen ocurrir en estas tierras secas, cuestión que nos proponemos discutir.

Description/purpose/Objectives: La Puna es un altiplano (3.500 msnm) con clima seco, ventoso y con gran amplitud térmica, vegetación escasa y con restringidas posibilidades de realizar agricultura. Los conquistadores y luego el Estado Nacional han promovido acciones de tipo extractivas de sus dos principales riquezas advertidas: mano de obra y minerales. Este trabajo busca poner en evidencia los servicios ambientales múltiples existentes entre los habitantes de la Puna y los pastizales naturales, como otra riqueza de importancia global.

Lessons learned/Results: -La Puna se encuentra salpicada por humedales: cuantiosas reservas de agua y biodiversidad, capturadoras de carbono y, ademá s, importantes abrevaderos y campos de pastoreo para animales domésticos y especies silvestres, algunas en riesgo de extinción, como flamencos y vicuñas. -Los nevados regulan el régimen hidrol gico con agua de buena calidad para consumo humano, riego y energ a.
- La vegetación nativa provee forraje, medicinas, tinturas, le a y materiales de construcción, ademá s de conformar un sistema radicular profundo que favorece la circulación y almacenamiento de agua y nutrientes del suelo.
- La alta radiación es tolerada por las plantas arbustivas que, a su vez, sombrean el suelo, detienen el viento y generan microambientes aptos para la vida de plantas herbáceas y micro fauna asociada. -Los pastores de la Puna crían llamas, ovejas y cabras, recorriendo distintos pisos ecológicos altitudinales y aprovechando la oferta diferencial de forraje, agua y refugio. El pastoreo trashumante requiere del acervo cultural transmitido por generaciones, y nutrido con nuevos conocimientos adaptados y resignificados.

Conclusions/Next steps: Se señala que la cultura andina se basa en la co-crianza, concepto que antecede y se equipara a la idea de servicios mutuos ambientales. En la cosmovisión andina no hay manejo, sino cuidado y conversación (la mutua escucha) entre seres animados e inanimados para dar continuidad a la vida.

Afirmamos que los pastores de la Puna son productores de alimentos de excelente calidad en tierras secas. Ante el cambio climático que enfrentamos es necesaria la construcción de un di logo de saberes recuperando el reservorio de herramientas para la vida en desiertos de altura.
Cold and dry rangeland located at the Southern of the Americas, the Patagonia stayed out of colonization process until the second part of the 19th Century. Before this time, the few settlements, such as Punta Arenas and Canelones, were just small harbors for sailing ships, trading between the Pacific coast and Europe of Atlantic coast of the Americas. Irritated by the frequent conflicts with Indian tribes, spurred and supported by British government searching new rangeland for their sheep flocks in cramped in the Falklands, the Argentinean army decided to colonize the Patagonia, starting by the North.

From 1879 to 1881, the colonization of the Patagonia, La conquista del Desierto advanced at the rhythm of the sheep flocks. In other words, the sheep flocks accompanied the troops. Migrants arrived from diverse regions of the world, mainly from Europe and Mediterranean. Rapidly sheep farming has emerged as the best option to valorize the huge and dry steppes, especially for the wool production, and consequently to settle the new land.

So, sheep farming became the main land-use, often the only land use, and consequently the sheep farm progressively became the key-element of the Patagonia policy. All Argentine governments of the 20th century sought to develop, at least to keep the sheep farming, in order to better control the land and its subsoil rich in oil and various minerals.

Recently, tourism also became an interesting activity, especially along the Atlantic coast with a lot of diverse marine animals and along the Andean Cordillera, many times in partnership with sheep farming through ecotourism.

In conclusion, even if sheep farming has many functions for the families of Patagonia shepherds, like in any pastoral society, its role in regional policymaking was essential, until to become the flag of the Patagonia.
Literature mentioned the cattle as a major tool of the Amazonia colonization, especially due to the large ranches built after deforestation of forest plots during forty years, from the 60s to the beginning of the 21st Century and the real implementation of the environmental law.

However, arriving to the agricultural frontier of Amazonia, many migrants usually have just their willingness to improve their life conditions. Some of them have received from the government or have bought a piece of land to survive. The others, less lucky, were landless several years, many times working in ranches and in small farms, until to be able to buy or take their own land. For all, their first own cattle was one of the more significant change of their new life on the frontier, especially due to the relevant functions of livestock, such as dairy products for home consumption, income of the calves selling and the first saving. Later, the family herd raised and new functions of livestock became more important, as for example valorizing the grassland planted after slash and burn agriculture, investing the income of cropping system, using the cattle manure to fertilize cash crops and orchards, guarantees for loan, social status, etc.

So, if cattle were an essential tool for the ranches in the Amazonia, it was also a significant key-factor for the settlement of small holders, mainly due the multi-functionality of livestock. However, the settlement has led to strong environmental damage decried everywhere. So, since the middle of 00s, the global context has changed: 1. Effective fight against global warming which has resulted in major changes in the governance of territories, forcing pioneers to stop deforestation and implantation of new pastures; 2. Markets for the products of livestock are become increasingly selective about the environmental impact; 3. Global change, partially linked to deforestation, such as drought period in dry season in some areas that challenges the resilience pasture; 4. Concentration in livestock sector and stronger external market dependence; 5. Negative image of cattle breeder in the Amazonia, especially defunded by environmental NGOs (Greenpeace & Cie).

In our poster/paper, we propose to discuss the impacts of these changes on multi-functionality (see resilience) livestock.
Natural grasslands are a major feed source for cattle production in the Northern highlands of Vietnam. However, as market develops, and cash crop production increases, so too does pressure on land, with less and less area available for natural pastures.

This study analysed the diversity of the functions of grasslands and their perception by various stakeholders resulting in motivation to (or in low interest for) improving pasture management.

The availability of communal grazing-land is a major factor affecting cattle herd size, management practice and profitability of beef production. Beef produced in extensive grazing systems is preferred by traders and consumers, with the development of beef cattle value chains providing new opportunities for farmers to improve natural pastures management and to extend growing-pastures on upland fields. The grazing areas are composed of uncovered grasslands, but also of forest lands, fallows and interstitial areas (border of fields, roads).

Pastoral systems are characterized by multi-functions of livestock that contrast with the vision of commercial firms invested in the development of mono-cropping such as maize production. Although Government has encouraged beef production development in the highlands, multi-functionality of livestock, forest and crop cultivation are not mentioned in the development programs.

And grasslands are not formally recognized by local institutions as a valuable feed source. Consequently, government support funding is rarely requested to improve natural pastures. Collective action is required from all different stakeholders to manage them sustainably.
Pastoralism - Key to global crises

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**Background/Introduction:** Pastoralism is a sustainable response to the five global crises - Food, Energy, Employment, Climate and Peace. Pastoralists are the ones who have safeguarded millions of sources of the nomadic culture, tradition and food, and inherited the land for centuries dignifying our history and ancestral law.

Customary land tenure systems, extensive rangeland use and production, mobility, flexibility, adaptability and resilience strategies are at the heart of pastoralism that provide vital response to unique ecological challenges and better solutions for more sustainable and equitable development. In such challenging territories pastoralism presents the best livelihood strategy to provide food, income and employment; these benefit not only pastoral communities, but also those living in farming areas, urban centres and coastal regions, who all profit from regional trade and from the value chains of pastoral products. Pastoralism also provides essential eco-system services such as carbon sequestration and biodiversity conservation.

Pastoralists use our traditional knowledge and land tenure systems to access rangeland, produce food and seize market opportunities. Mobility is essential for adaptability and resilience strategies of our communities to cope with climate variability and to mitigate crisis situations. Pastoralist women play a crucial and increasing role in conflict resolution, cohesiveness, peace building and strengthening the food sovereignty. When there is not enough food, people fight each other. Pastoralist women’s role is essential to build peace in this situation. Women are the ones who hold peace. The climate change impacts women. Pastoralist women play important role in food security, safeguard seeds and breeds, create employment through adding value to the livestock products and transfer knowledge to youth.

**Description/purpose/Objectives:** Nomadic pastoralism is the key livelihoods in the dry and extensive rangeland ecosystem in Central Asia that has been proven for centuries. In Central Asia the pastoralism has been largely affected by the socialist system in the past and that impact has been kept until today on the issues particularly of inheriting the traditional knowledge, local food systems and rangeland management. Rural employment creation through supporting territorial markets is an emerging topic for the pastoralists that needs policy support.

**Lessons learned/Results:** Building a platform of pastoralists and other stakeholders through the Pastoralist knowledge hub on the discussion on the value of pastoralism and its sustainability has been played crucial role in information sharing, bringing issues to discussion and intervention and eventually influencing policies. Pastoralists have been protecting their rangelands through collective actions in Mongolia that have made them possible to grow healthy food with high nutrition from healthy animal.

**Conclusions/Next steps:** In order to overcome and mitigate the challenges in pastoralism, there are needs for advocacy and capacity building for the pastoralist champions and their processes of national, regional and global coordination, motivating and supporting leadership and balanced representation of pastoralist women and youth and strengthening the existing networks like MANIP, PACA and WAMIP. Peoples. It is essential to develop local food production, which has high nutritional value, and protect the territorial markets and sustainable use of rangelands in pastoralism.
Multi-functionality of livestock helps develop dairy production in Indonesia

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A Foundation related to a large dairy multinational, in partnership with a local NGO and a cooperative of milk famers, implemented a dairy project in Ciater, Lembang district, West Java, Indonesia, in order to improve the livelihoods of smallholders willing to engage into or increase their dairy production. The project provided selected households with dairy cows, improved the feeding system within the farmers barns, the milking, etc.

The study results show that at the farmer level the project translated into a significant increase of the herd size, especially through the increase in the number of lactating cows. Although no significant impact on revenues could be detected at the farmer level, the perception of the project by the farmers was generally very positive with an overwhelming 91% of the farmers stating that their situation had improved through the project. The multi-functionality of dairy production was a very important factor of success. As expected by the project and according to local stakeholders, most dairy families saw an improvement in their livelihoods, mainly due to higher dairy incomes.

At the same time, the integration between crop and livestock activities allowed, on the one hand to use the manure of the dairy cows for the cropping system and, on the other hand to better valorize the byproducts of the cropping system, especially the crop residues (e.g., straw of grains, leaves of cash crops, etc.), diverse weeds and other forages growing between the irrigated plots and on common lands. Moreover, at the farm level, dairy production provided full or part-time jobs to one or two adults, even with a number of dairy cows not exceeding 3-4 heads.

Trained by the dairy project, the new and experienced dairy farmers could apply their skills in other areas, e.g., to improve the quality of the products. Moreover, in the same time to be a significant investment, dairy cattle is an excellent saving for the farmers’ families. Finally, local stakeholders mentioned the attractiveness of milking activities for the development local tourism.
Qilian Mountains is located in the highlands of the North-Eastern Tibetan plateau.

Animal breeding, especially yaks and sheep, is the main agricultural activity due to the harsh climatic conditions.

As all the Tibetan Plateau, the great challenge in the Qilian Mountains is to maintain a rural activity for Chinese minorities without degraded the rangeland which is the water tower of urban and rural industrialized China.

Therefore rangeland plays a very important role in the whole Social-ecosystems. The authors described the changes in rural livelihood, farming systems and rangeland management based on data collection in fifty farms located in two counties, Tianzhu and Sunan, Gansu Province, respectively settled by Tibetan and Uyghur populations.

The data shows that there are multifunctional in farming systems, agro-ecological, socio-economic and ecosystems services of rangeland, especially in the farm scale.
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Background/Introduction: Pastoralism is a sustainable response to the five global crises - Food, Energy, Employment, Climate and Peace. Pastoralists are providers of food; use minimum input to convert marginal resources into productive outputs; depend on hands than machines and generate dignified employment; their production systems are extensive which are efficient, sustainable and environment friendly; and believe in values which promote sharing of common resources and customary norms.

Description/purpose/Objectives: In the entire South Asia the pastoralists are largely ignored from the government policies and development schemes. Additionally there is a tremendous pressure on common property resources which is the main reason for the decline of pastoralism in the region. Furthermore the global markets have adversely affected the local markets and bargaining power for the pastoralist produce. Lessons learned/Results: Policy advocacy for people centred land governance and creating market opportunity for pastoral produce are recognised as the critical interventions to strengthen pastoralism in South Asia. Pastoralism is one of the few context in South asia which traditionally is gender neutral.

Conclusions/Next steps: Organise the pastoralists and their organisations in South Asia for policy advocacy, particularly on common land. Document and Disseminate positive stories on pastoralism and its contributions to food sovereignty, energy efficiency, job creation, green economy and peace building. And finally create opportunities for pastoral youth to find a dignified existence in pastoralism.
Livestock dynamics and sustainable development of a French wet mountain territory: local stakeholders’ points of view

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The Livradois-Forez is a rural medium mountain territory in the center of France, where livestock is a major activity, based on the breeding of ruminants, and the valorization of grassland and pastoral areas. Like in lots of French mountain regions, because of globalization and local changes, the future of livestock is often questioned, whereas it contributes to the sustainable development of the territory.

The objective of our study was to investigate how local stakeholders perceive the present and future role of livestock in this development. Individual interviews were carried out with 28 persons involved at different stages of the livestock chain (production, up- and down-stream, territorial, agricultural and environmental).

The discourses analysis shows various but complementary regards on the roles of livestock between economic, social and environmental aspects. The described forms of livestock farming able to fulfil these roles are very different. At farm and production scale, the divergences of views are particularly marked (high volumes with little added-value versus little volume with a high added-value).

At sector and commercialization scale, two models are also highlighted (industrialized and globalized versus local and artisanal). But at territory scale, the vision is more shared, in favor of diversified livestock farming and commercialization.
In the continental French Mediterranean area, the livestock activities are still a major user of the spaces occupied by spontaneous vegetation, but this pastoral activity faces various challenges.

Three institutions of research (INRA), extension (Institut de l’Elevage) and training (Montpellier SupAgro) have built a group in 2015, UMT Pasto, supported by the French Ministry of Agriculture, in order to address the issues linked to those challenges, in partnerships with the various stakeholders dealing with the pastoral activities and the development of territories.

The objective of the poster is to present the challenges and the three lines of actions built by the group: i) supporting the contribution of the pastoral activities to the sustainable development of territories; ii) conceiving technical and strategic management of pastoral livestock farming system; and iii) thinking the devices for extension and training.

Those lines are illustrated by debates and actions regarding the themes at the agenda of the group such as: i) the modalities of installation in pastoral activities, ii) the use of new technologies to support pastoral activities, iii) the place of the trees, iv) the bundle of services provided by the pastoral activities at the territory scale, v) the state of extension and training institutions.
Multifunctionality of livestock to support plain-mountain complementarities. The Fricato case study in the french mediterranean area

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Introduction: A shift between intensive farming in plains and the weak maintenance of livestock pastoral farming in french mediterranean mountains is a result of the public policies applied to agriculture modernisation during second half of 20th century. this development scheme seems to show its own limits. In peri-urban areas, like Claira village in the Pyrénées Orientales department, following wine crisis 40% of arable land are under abandonment. It seems that due to a new agreement considering livestock farming multifunctionality, these could become a resource for this activity, strengthening so synergies between livestock farming from foothill and lowland farming. The Fricato development project, under progress, contribute in that way to elaborate more sustainable and diversified farming activities.

Objectives: The Fricato project is associating local stakeholders from lowland and landless livestock farmers from the foothill of the Canigou mountain. It aims at giving access for livestock farmers to the peri-urban abandoned arable lands to grow forages on an agro-ecological way. This is so promoting diversified landscapes of lowlands and livestock farming of foothills through delivering winter forages. As a wide range of activities and stakeholders are embedded, our study is a comprehensive approach to understand expectations and point of views of actors as well as the ways this could reinforce complementarities between lowlands and mountains.

Lessons learned/Results: 1) The animations from local authorities toward landowners let arable land available for forage farming. Other local communities in lowlands are joining the project. The livestock farmers spatially distant and isolated get integrated in a collective action rooted at regional scale. 2) Through the first step of this project, it as been possible to design the functional unit of such a project : 7 to 10 livestock farmers gathering 100 hectares available to grow winter forages. 3) Common learning took place between stakeholders (livestock farmers, landowners, residents, hunters associations), it accompany an emerging skill linking diversification of agrosystems in lowlands and sustainability of livestock pastoral systems. 4) Farmers are taking advantages of lower dependencies toward purchased forages. Some remaining questions have to be solved i) ability for small livestock farmers regarding investment on the cropping chain and storage facilities without public funding ;ii) a profitability for livestock farmers to return fallow lands to cultivated ones is possible only on mid term while landowners may engage on land availability for short terms.

Conclusions/Next steps: Such projects could be extended at régional scale depending on the public incentives and involvement of local authorities to coordinate actions. These organisation of complementarities lowlands/mountains rely on a deep recognition of the multifunctionality of livestock farming shared between stakeholders, rooted in local projects. It is a guaranty to extend the experiment and to keep the small size livestock farmers in the play. Otherwise other operators, as large size crop-livestock farmers, could take the advantage to extend their activities.
Role of livestock in income diversification of farmers in the Bekaa region of Lebanon

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Livestock farming holds a vital place in the heart of the rural communities in Lebanon, either economically, socially or environmentally. According to FAO (2012), almost 60 percent of livestock farmers in Lebanon depend on dairy animals as their main source of income. In the absence of permanent and planted pastures, the pastoral system relies heavily on grazing natural and seasonal rangelands, sometimes complemented with hand-feeding especially during winter.

The role of livestock in income diversification was investigated in 2 areas of the Bekaa valley, the North Bekaa (2002) and the West Bekaa (2015) both known for their large population of small ruminants and their various agricultural activities. Results from the two regions are compared regarding the feeding systems that are found, the role of pastoralism in sustaining livelihoods and the trends of change to which pastoral systems are being subjected.

Findings show that facing different challenges, the pastoral system in both regions has coped by decreasing herds’ numbers, limiting the herds’ mobility and resorting to more off-farm activities contributing to the families’ income, as well as diversifying the farms’ activities such as introducing the processing of traditional dairy products. Nevertheless, the indigenous animal breeds which are well adapted to the prevailing environmental conditions of the country were preserved.
Few studies describe the farming systems in New Reclaimed Lands (NRL). The new lands were reclaimed by Egyptian government then distributed to beneficiaries and graduates. It has been developed for irrigated agriculture during the second half of twentieth century and settled by migrants from old agricultural lands, including landless peasants from the areas of high population density in the Nile delta and valley.

Farming systems in these areas have been studied especially the animal component, livestock practices and performances. CLIMED Project aims to obtain data to describe and understand better crop-livestock systems in NRL, assess their performances and dynamics in today’s Egyptian and Mediterranean context, as well as define priorities in terms of research and development policies. Description of farming systems data was based on field survey of 160 farmers in five zones.

The results revealed high complexity of farming systems due to; multi-functionality of animal production, high dependency of livestock on feeds produced on farm, and social factors at farm level. Farm surveys showed huge challenge of developmental services facing local market, the very limited access to land, future constraints in water management, and the little attractiveness of agriculture to youth.
The biological bases of environmental values of grasslands/ rangelands: the case of carbon.

How can carbon storage of pastures contribute to a climate smart cattle farming in Amazonia (French Guiana)?

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Background/Introduction: Soil is the major terrestrial reservoir of carbon (C), storing more than twice the amount of carbon than the atmosphere. The world’s permanent pastures cover 30% of land surface, contains 30% of the C soil and could potentially offset up to 4% of the global Green House Gas (GHG) emissions (Lal, 2004). So, the carbon (C) sequestration in the soil of permanent pastures is an opportunity to mitigate emissions of greenhouse gases (GES).

Description/purpose/Objectives: According to the FAO, approximately 80% of deforested areas were converted into pastures resulting in rapid carbon (C) emissions (~ 733 tCO2eq. ha⁻¹) (Blanfort et al., 2014). But pasture seems to be a good candidate for soil conversion of deforested area, while ensuring their basic food production function. The main goal of our study was to understand the long-term dynamics of C in deep soil of permanent tropical pastures established (with the grass Brachiaria humidicola) after deforestation from 1970 in French Guiana.

Lessons learned/Results: Our data suggest that in French Amazonia old permanent tropical pastures (≥ 24-year-olds) in French Amazonia can restore the C storage observed in native forest with appropriate practices (no fire and no overgrazing, but a mixture of grasses and legumes and a grazing rotation plan). A unique combination of a large chronosequence study and eddy covariance measurements showed that pastures stored between 1.27 ± 0.37 and 5.31 ± 2.08 tC ha⁻¹ yr⁻¹ while the nearby native forest stored 3.23 ± 0.65 tC ha⁻¹ yr⁻¹. This carbon is mainly sequestered in the humus of deep soil layers (20-100 cm), whereas no C storage was observed in the top soil (0-20 cm layer). Our results also suggest the restoration of SOC storage in old pastures is triggered by the development of C₃ plant species in pastures traditionally established with a C₄ grass (Brachiaria sp.). These This suggests that the restoration of SOC storage could be (i) accelerated in young pastures by sowing or planting a mixture of C₃ legumes.

Conclusions/Next steps: Clearly, efforts to curb deforestation are a priority in order to preserve forest biodiversity and C stocks in humid tropics. But it seems now that, in a climate-smart agriculture way, the current challenge is to manage these deforested areas to maintain the productivity of agricultural ecosystems and in the same time their capacity to mitigate GES. Here we show that, two decades after the establishment, the tropical pastures accumulate SOC over time, while sustainable pasture management allows farmers to maintain these pastures in the long-term without the loss of soil fertility often observed in cultivated soils (McGrath et al., 2001). Conservation of soil fertility should help limit the conversion of new fertile areas and consequently, deforestation. Beyond local and regional issues, our research is part of the current scientific questions about the role and challenges of grazed ecosystems in climate change and in the context of land use change. Livestock certainly remains a major GHG contributor, but it is confirmed that the sector can significantly reduce emissions including carbon storage. Livestock could reduce by 30% its greenhouse gas emissions by greater use of better agricultural practices and existing technologies, while maintaining the objectives of doubling production in the south in particular in connection with the increase in demand.
Locations of the case studies

The figures correspond to the page number of the abstract of the case study
A number of lessons that could be crafted into best practice guidelines have emerged from different pilot sites identified in Montpellier 2014 and which have since been loaded into a database. Within the different pilot sites of the database, 4 themes were identified to be presented in a booklet of good practice:

- Theme 1: Enabling institutions including Land tenure/transhumance; Community collectives around planning, decision making and management; Cooperatives for product supply; Financial mechanisms for ecosystem services
- Theme 2: Capacity building including: Education; Farmer to farmer learning; Sharing knowledge between different stakeholders
- Theme 3 Supporting Practice change: Stakeholder motivation; Family life cycle (succession; next generation); Collaborative approaches to influence individual practice change
- Theme 4; Resource management including: Measuring; Monitoring; Reporting / verifying; Technological inputs

The Good Practice Guide includes 7 contributions from all over the world.

1. The Dera: A Traditional Shepherding Institution (Rajasthan – India)
2. Laiterie Du Berger: Milk Collection in Ferlo Grasslands (Senegal)
3. Linking Herders to Markets for Environmental Services (Mongolia)
4. Sustainable Grassland: Livestock Programme (China)
5. Natural Regeneration of Native Trees: For the Implementation of Silvopastoral System (Brazil)
6. Sustainable Grazing: Mentorship Programme (Canada)
7. Commoning the commons: Rehabilitating Community Lands (India)

Detailed Information will soon be available on the Global Agenda Homepage: [http://www.livestockdialogue.org/](http://www.livestockdialogue.org/
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