The role of Small-Scale Livestock Farming in Climate Change and food security

Executive Summary

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Foreword

This study was conducted as part of the Development Education Project AP UE DCI-NSA ED/2010/247, co-funded by the European Commission. The program is being deployed between 2011-2013 in five countries, by as many members of the VSF-Europa network, namely: Agronomes et Vétérinaires Sans Frontière (France), SIVTRO (Italy), VSF Belgium, VSF Czech Republic and VSF Norway.

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The initiative aims to sensitize students, general public, farmers and policy makers to the importance of Small Scale Livestock Farming in the context of climate variability. The study shows that small-scale livestock farming has the potential to adjust to climate change, especially in some specific regions of the world. Moreover, due to its specific functions, small-scale farming can be considered as an important way to mitigate carbon emissions from the whole livestock sector.

This study can be considered as a take-off for a campaign that will run for over 3 years and will raise the awareness of and mobilize support for small-scale livestock farming.

The original text was slightly changed by the editors. Its full version is available for download at ***www.smallscalefarming.org***

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Executive Summary

Since the FAO Livestock's Long Shadow Report in 2006, there has been mounting research on the role of livestock in food security, the growth in the livestock sector, and its impact on climate change (CC). As of 2000, the livestock sector has been estimated to account for 18% of man-made GHG emissions.

Other authors instead suggest that this value is largely underestimated, as livestock production seems to make up 51% of total GHG emissions. In any case, the livestock sector is a major contributor of GHG emissions and therefore one of the targets of any mitigation policy. In addition, the livestock sector absorbs 58% of direct human appropriation of biomass, 70% of agricultural land (from which 33% is designed to feed crop production) and 30% of land globally. Unfortunately, only few attempts were made to address the issue of livestock and CC, and differentiate within it different categories of livestock farming systems, so to inspire specific policy measures to deal with these farming systems according to their different category.

This report aims at contextualizing the role small-scale livestock farming (SSLF) plays in the CC debate and at highlighting its potential contribution to food security. The two major hypotheses arising from the study are: **a.** SSLF can contribute to CC mitigation and needs to be integrated into the difinition of policy measures; **b.** actions taken by local communities, mostly based on traditions and local knowledge, can serve as a reliable set of CC mitigation measures while contributing to global food security. The questions the report tries to address can be summarized as follows: **(i)** how sustainable are small-scale livestock farming systems and can they contribute to CC mitigation; **(ii)** how efficient are SSLF practices in producing animal source foods needed by growing population and in responding to future food security challenges; **(iii)** how successfully SSLF communities have traditionally adjusted to climate variability and how their strategies can help better respond to CC. As part of the report we will illustrate how SSLF, and more specifically pastoralism, fit into the new solutions.

To address the above issues, the report provides a new categorization of livestock production systems, going beyond conventional categories. Our attempt is to integrate the classification process with livestock farming systems' multiple inputs and to link the above process to each type of production system, so as to add a food system approach to the categories. Subsequently the report critically reviews the existing literature on livestock production and mitigation alternatives. Finally, based on four case studies, it presents the adaptation measures undertaken by small-scale livestock farming communities in Turkana (Kenya), Alaotra Lake (Madagascar), Khar-o-Touran (Iran) and Huancavelica (Peru), and illustrates key socio-economic drivers that intensify CC's effects and undermine their adaptation capacity.

Categories of livestock farming

It is well known that livestock farming is one of the highest contributors to GHG emissions. However livestock farming can be practiced in multiple ways. In this report, we propose three main categories of livestock farming: small-scale livestock farming (SSLF), which includes pastoralism, small ranching, backyard pig and poultry production, and small mixed farming (both irrigated and rain-fed); medium-scale livestock farming (MSLF) with the highest variability of farming types, including large ranching and large mixed farming (both irrigated and rain-fed); and finally, large-scale livestock farming

(LSLF) mainly consisting in landless industrial production. The classification is made on the basis of four variables, namely: farm **size**, use of **external inputs**, use of **land**, and the most typical **supply market** the farm has access to.

The SSLF approach is applied holistically to specific socioecological contexts. Its main objective is to evaluate the resilience of the system. The system is characterized by small farms, limited use of inputs, primary role of extensive grazing and by supplying mostly local and informal markets. The MSLF approach is more reductionist as it is focused on the farm or on the animal. Its main objective is to optimize the system productivity. It is characterized by medium-scale farms, moderate use of inputs and prevailing use of arable land, with access to local, regional and global markets. The LSLF approach is based on economies of scale, under chrematistic premises. Its main objective is the expansion of the system. It is characterized by large-scale farms, use of large amount of inputs and no direct use of land, with more access to global markets. The distinction between these categories is crucial since they show radically different contributions to the climate issue.

SSLF is the livestock system that competes least for human food, given its dependence primarily on grazing and scavenging. Pastoralism is practiced on 25% of the global land. Some communities practice mobile grazing, others are sedentary, although generally depending on communal grasslands. Ranchers who keep animals extensively on rangelands, are found in temperate zones where high-quality grassland and fodder production can support larger numbers of animals. These areas include parts of Europe, North America, South America, parts of Oceania and some parts of the humid Tropics. In this case animals are almost exclusively kept for income, and the land tends to be their property. Another subgroup of SSLF, largely spread among peri-urban farms, is backyard pig and poultry production, where livestock is fed through crop residues and scavenging. This system is characterized by being very efficient in recycling residues. According to some estimation, scavenging poultry can provide a 600% return on a minimum investment. More than 90% of rural families in most developing countries keep one or more poultry species. Finally, mixed farming systems are those SSLF systems where cropping and livestock rearing are more closely linked together. Rain-fed mixed farming systems are found in temperate regions of Europe and Americas and sub-humid regions of tropical Africa and Latin America.

They are mostly characterized by individual ownership, often with more than one species of livestock. Irrigated mixed farming systems prevail in East and South Asia, mostly in areas with high population density. Most of small-scale mixed livestock keepers undertake other gainful activities to guarantee their livelihoods. As in the case of pastoralism, backyard pig and poultry production, small ranching, and small mixed farming, are similarly characterized by the high multifunctionality of livestock – draught power, manure, pest control, crop residues, etc. In total, SSLF and MSFS together produce 83% of beef meat, 99% of mutton, 45% of pork, 28% of poultry meat and 39% of eggs. Thus, their importance in terms of quantity is considerable, mostly in the case of ruminants.

Despite the importance of SSLF and MSLF, in the last few decades, a significant shift has been reported in livestock production, away from a local multi-purpose activity (SSLF and MSLF) more into market-oriented livestock production systems (LSLF) located close to urban centres. This shift is combined with a sharp increase in cereal-fed monogastric livestock species and a decrease in ruminants.

Pastoralism, with ruminants in grasslands, backyard pig and poultry production, with scavenging monogastrics, and small mixed livestock farming, with ruminants fed with crop residues, are efficient and sustainable methods of providing high-quality proteins with minimal environmental impacts, by relying on grasslands and residues. These small livestock keepers leave insignificant environmental footprints in terms of inputs.

SSLF, food security and CC

In terms of SSLF capacity in producing animal source foods for a growing population, the first question that needs to be raised is whether or not an increase in animal production is indeed required. In fact, some authors suggest that the present increase in animal source food production is supply-driven rather than demand-driven, triggered by a combination of supply increments, fostered by multilateral organizations in developing countries, and favoured by the externalization of environmental and social costs, a mix that in the end affects both product prices and consumer habits. In addition, such supply-driven increase in livestock production is causing health, environmental and social problems, consequently disempowering both producers and consumers at the same time. Accordingly, a growing number of authors claim the need to reduce the amount of meat consumed, particularly in rich countries. A redistribution of livestock consumption from food surplus to food deficit regions could produce human health and environmental benefits. Hence, in order to question properly the capacity of SSLF systems to feed the world, we should consider that the projected increase in production of animal source food may be based on wrong assumptions (i.e., to be solely demand-driven), and that it may not be desirable from a human health perspective, not from an ecosystem and social health one. However it is clear that the issue of food security needs to be integrated into a wider perspective where other social and environmental drivers and outcomes are addressed along with it.

Consequently, it seems no longer acceptable to address the world future demand for animal source food by the same approach that in the last two decades led to increased exploitation of land, fossil fuels, water, etc., and further acceleration in the shift away from SSLF towards LSLF. Additionally, greater expansion of LSLF could reduce the amount of human-edible food as food crops to feed livestock are increasingly tapped. The same applies to water, if one considers that LSLF requires almost five times more water to produce the same amount of edible animal source food, and that the proportion of people living in water-stressed regions is increasingly growing.

In order to guarantee animal source food security in the current situation of shortage of natural resources, population growth, and increasing climate variability, the livestock sector must shift its focus from increased production toward enhanced resilience. However, this is not contradictory with increasing, production when required, as long as resilience remains the primary focus. Accordingly, it seems that a major shift towards SSLF systems, and a reduction in meat consumption in rich countries, could represent a major contribution to counteract the current world food insecurity.

As observed in Turkana, Alaotra Lake region, Khar-o-Touran, and Huancavelica, SSLF communities are extremely efficient in producing animal source foods, thanks to their ability to take advantage of human-inedible forage and marginal lands, to produce high-quality and human-edible foods; to preserve socio-ecological balances that avoid depletion of natural resources and social arrangements; and to promote moderate meat consumption.

Differences between livestock farming categories

Relevant to the debate on livestock, CC and food security, the differences between the three livestock farming categories, as they move from SSLF and MSLF to LSLF, can be grouped into five clusters:

(I) Increased treatment of livestock farming as an industry.

Particularly LSLF, and to a less extent MSLF, imposes industrial production practices to livestock farming – mechanization, intensification, use of agrochemicals, monoculture, feedlots, etc. Among other things, this entails the concentration of production in LSLF operations to meet a large population of consumers living in the cities and buying from supermarkets. Consequently, this system is highly dependent on transport. The present global food system, based on LSLF, is characterized by a high dependence on fossil fuels, with devastating effects on GHG emissions. Livestock production, as a result of the shift from SSLF to LSLF, is being transformed from an energy-generating activity into an energy-consuming one.

LSLF has become heavily dependent on farmers' continuous investment in energy intensive machinery and fossil-fuel driven energy. This dependence is so high that in industrial agriculture the correlation between yield gains and input increases is perfect. As an example, grain-fed beef requires 35 calories for every calorie of beef produced. Thus, the livestock revolution expanding LSLF in developing countries can be perceived as a major climate threat. The gradual separation of livestock farming from grasslands, as we move from SSLF to MSLF and finally to LSLF, is in line with a decreasing role of ruminant livestock species, which often entails the degradation of carbon-rich grassland with a high potential for carbon sequestration, or their conversion into croplands (and correspondent GHG emissions).

(II) Increasing monofunctional role of livestock farming.

Livestock for small livestock keepers, and particularly pastoralists, represents more than just a source of food or of income. For SSLF communities, livestock provides fibres, social status, draught power, manure, recycling residues, cultural identity, financial security etc., all having importance in food security and maintenance of livelihoods. For instance, throughout the Horn of Africa, pastoralists define their wealth and poverty in terms of livestock ownership. Thus, it is not strange to picture the shift from traditional SSLF and MSLF towards LSLF as a process of substitution of multifunctional livestock production to commodity-specific livestock production. The highly multifunctional role that livestock plays in SSLF societies, as opposed to LSLF systems, is well reflected by the fact that approximately 80% of the value of livestock in low-input developing-country systems can be attributed to non-market roles, while only 20% is ascribable to direct production outputs; whereas, by contrast, over 90% of the value of livestock in high-input industrialized-country production systems is ascribable to the latter.

(III) Increasing separation between livestock and agriculture.

Every ton of additional humus in the soil relieves the atmosphere of the burden of 1.8 tons of CO_2. This points to the crucial necessity of integrating agriculture with livestock farming, and the major difficulty of landless industrial livestock production in mitigating GHG emissions. LSLF, by promoting a separation between agriculture and livestock, undermines the natural storage of CO_2 as organic matter in the soil. The animal food is cultivated away from where the animals are raised, over-exploiting soils that suffer from nutrients deficit, which must be compensated for with fertilizers, and these in turn are important contaminants, generating GHG emissions. As a matter of fact, a big share - often above 50% - of the energy use in farming is devoted to the production of synthetic fertilizers, in particular Nitrogen fertilizers and pesticides. Hence, the chemical fertilizers, required by monocultures for animal feed production generate enormous quantities of NO_2.

At the same time, the nutrients produced by intensive livestock farms in the form of Nitrogen or Phosphorus become pollutants. It is estimated that the total amount of nutrients in livestock excreta is as large as the total amount of nutrients contained in all chemical fertilizer used annually. Furthermore, manure performs better than artificial fertilizers for soil structure and long-term fertility. In the last 50 years, the great use of chemical fertilizers and other unsustainable practices of industrial agriculture have triggered an average loss ranging between 30 and 60 tons of soil organic matter for every hectare of agricultural land. Some authors point that reverting soil fertility to pre-industrial levels would capture 30- 40% of current excess of CO_2 in the atmosphere.

Animals are inefficient nitrogen users. This is particularly true for ruminants. Nonetheless, when ruminants are fed with roughage - like grass or bran - and their excreta return to soils - as in SSLF and to less extent in MSLF - their nitrogen inefficiency has no remarkable negative impact in the way of GHG emissions. Likewise, manure deposits on fields and pastures do not produce significant amounts of methane, while factory farms and feedlots that manage manure in liquid form release 18 million tons of methane annually.

(IV) Decreasing capacity of valorizing marginal lands and products.

Another major difference between SSLF, MSLF and LSLF, is that while the latter and grain-fed MSLF compete directly with human beings for food; SSLF valorizes crop residues, human-inedible forage and marginal lands that could hardly be used for other purposes. It is clear that livestock keeping can contribute to further lowering GHG emissions by further using as feed roughage and nutrient rich residues from farms and households, and by reducing the amount of grain cultivated on high-input systems.

Livestock farming makes its most important contribution to food security when it is conducted in environments where crops cannot be grown easily, such as rangelands in case of pastoralism and ranching, and when livestock scavenge public land or are fed on crop residues, using feed sources that cannot directly be eaten by humans. In this way, SSLF makes notable contributions to the balance of energy and protein available for human consumption. LSLF, however, converts high-quality carbohydrates and proteins, which might otherwise be eaten directly by humans, into a smaller amount of higher-quality energy and proteins. In this latter case, livestock farming clearly contributes to increasing food insecurity and natural resources depletion. It is also clear that reducing the amount of human-edible food required to produce the livestock feed would be a valuable contribution to food security, as well as to CC mitigation

(V) Increasing reduction of diversity at all levels.

Biodiversity is a source of genetic diversity, which might be extremely useful to develop resilience in the livestock sector to the new stresses that can emerge in the future, by facilitating new adaptation strategies and production options. Linkages between biodiversity and livestock production systems are two-fold. Livestock-keeping communities promote and preserve biodiversity by maintaining marginal lands, i.e. important reserves of biodiversity, and by actively breeding a wide variety of livestock species and breeds, which are used in a great number of farming practices.

The promotion and preservation of biodiversity, both in a wild and domesticated setting, varies considerably between SSLF and MSLF, and LSLF. Biodiversity preservation is key to guarantee sustainability in SSLF systems and their adaptation to upcoming changes. Conversely, LSLF uses mostly three species - pigs, poultry, cattle - and very few breeds within these species - high-yield breeds fundamentally.

The breeds and lines selected for high-output production need standardized feed, intensive veterinary treatment and environmental control to prevent infections. These breeds have been selected for their high output and good feed-conversion ratios under high-external input conditions. Resistance to diseases and pests, heat and water stress, vitality, fertility and mothering abilities are largely neglected attributes. In addition, the high densities of animals with low immune systems found in LSLF easily translates into emergence of more diseases. This situation makes LSLF very vulnerable to climate variability, due to its extremely low capacity to adapt to changes. Conversely, SSLF systems breed and nurture 40 livestock species and almost 8,000 breeds. However, the expansion of LSFS together with the rejection of SSLF is favouring the disappearance of many local breeds, and thus limiting the capacity of the livestock sector to adapt to present and future climate variability.

Measuring GHG emissions

The interpretation of the notion of productivity is crucial to evaluate the amount of GHG emissions generated by different categories of livestock farming. In fact, the underlying notion of productivity calls for revision as it cannot any longer be the only criterion followed to measure GHG emissions, the amount of meat produced, the number of eggs laid by a hen yearly or the amount of milk produced daily. In fact this is linked to a narrow consideration of food security. It should be clarified that productivity is strictly related to the item being measured and the method of measurement applied, and in the CC debate, GHG emissions must relate to the climate impact of the whole product life cycle, including the feed footprint. The measurement most conventionally used to determine GHG emissions takes into account the volume of CO_2 emitted per mass of livestock product obtained, but there are other possible ways of measuring productivity.

Indeed, the use of different metrics favours different livestock types or systems. For example, as extensively-reared animals produce less edible output per unit of GHGs emitted than their intensively-reared counterparts, when the measurement applied correlates emissions with the quantity of livestock product obtained, LSLF is favoured. Instead, when a resource-sensitive measurement is applied, intensively reared animals show larger emissions per unit of resources used compared to pastoralism, ranching, backyard pig and poultry production, and small mixed farming. Thus, extensive grazing systems prove to be highly productive, if productivity is defined in terms of output of limited resources. Pastoral systems are found to be more productive per area unit due to the ability of pastoralists to move their herds opportunistically and take advantage of seasonally available pastures. Failures are also related to the value of the informal economy, the subsistence function of SSLF, the value of maintaining the ecosystem healthy and other land uses.

Livestock and mitigation strategies

The mitigation potential of the SSLF systems, as observed in Turkana, Alaotra Lake region, Khar-o-Touran, and Huancavelica, is enormous. It mainly consists of guaranteeing the maintenance of carbon-rich grasslands and soil fertility, utilization of close markets and little dependence on chemical inputs, and undertaking of carbon smart diets. In global terms, several strategies have been implemented in livestock farming with the objective of mitigating its GHG emissions: (i) mitigation through market mechanisms; (ii) mitigation through technological and managerial schemes; and (iii) mitigation through behavioural modifications. In general it can be stated that while SSLF tend to be related to strategies of mitigation through behavioural modifications, and MSLF to strategies of mitigation via technological and managerial schemes, LSLF is generally associated to mitigation strategies that use market mechanisms. Yet, each group of strategy has its own drawbacks.

(I) Mitigation through market mechanisms

Mitigation strategies based on market mechanism are not affecting SSLF communities positively, and are mostly thought to be implemented by LSLF operations. These communities have mainly access to informal and local markets, consequently are prevented from participating in low-carbon labelling schemes. SSLF communities are also excluded from GHG emission trading systems due to the high transaction costs that would have to be incurred. These mitigation strategies imply the privatization of carbon, allowing the distribution of the 'rights to emit', and rights trading. The underlying carbon-offsetting principle is fundamentally flawed since it hampers improvements in emissions' reduction.

(II) Mitigation through technological and managerial schemes

Although SSLF undertake quite a number of management practices concerning the high CC mitigation potential, such as moderate grazing, soil conservation, and use of local resources; most technological mitigation strategies being developed tend to be thought for LSLF operations, such as application of biochar, or technologies to reduce production of enteric CH_4 and N_2O through animal breeding or optimizing the balance between the content of carbohydrate and protein in the animal feed. The production of biogas from manure can also be operated by small livestock keepers. However, it entails the risk of favouring livestock corralling and intensifying the current lack of manure for soil conservation and GHG sequestration. Most of the technological mitigation strategies tend to suffer from too much narrow approach to the problem of GHG emissions by livestock farming. An excessive focus on GHGs sequestration offers a reductionist mitigation 'solutions', with no real impact and some distraction from the real challenge: reversing the fossil fuel dependence and changing the consumption patterns it induces, and restoring soil fertility.

(III) Mitigation through behavioural modification

Mitigation through the promotion of 'climate-smart diets' offers good opportunities for boosting the role of SSLF in CC mitigation, by favouring local consumption, organic production, and moderate meat consumption. However, research to establish how changes in behaviours can be achieved is still in its infancy compared to the abundance of works concerned with technological solutions to mitigate GHG emissions. This imbalance reflects the low priority given by policy makers to behavioural change as a strategy towards GHG mitigation.

Adaptation strategies of SSLF communities to climate variability

The main CC-related hazards affecting small-scale livestock farming systems, that call for adaptation strategies are: increased temperature, changes in seasonal rainfall patterns and more erratic rainfall, higher prevalence of weather extreme events and higher atmospheric concentrations of CO_2. Specifically, in Turkana, Alaotra Lake region, Khar-o-Touran, and Huancavelica, high prevalence of droughts with occasional flooding, and increasing calendar unpredictability, have been the CC-related hazards identified in all four cases.

The adaptation potential of SSLF systems to climate-related hazards, as observed in Turkana, Alaotra Lake region, Khar-o-Touran, and Huancavelica, is remarkable. SSLF consists in a class of livestock production systems developed to guarantee the livelihood of communities living in climate margins, namely mountains, cold regions, and drylands. Their knowledge, institutions and customary practices, highly adapted to the local conditions and developed throughout centuries of co-evolution with changing environments, can be of great value to adapt the whole livestock sector to the current situation of increased climate variability.

SSLF communities implement their own adaptation centred on four types of adaptations: **(i)** enhancing mobility, i.e. moving herds to areas with better grazing and water conditions and securing access to critical resources during difficult times; **(ii)** boosting social cooperation and reciprocity, i.e. adopting strategies such as food sharing, livestock loans, joint ventures, friendly collaboration, communal planning, communal ownership, splitting the herd among different family members, communal grazing, and labour exchange, thus strengthening the sense of belonging to a community and increasing the resilience of the community to future changes by fostering mutual support and exchange of knowledge and capacities; **(iii)** favouring diversification and multi-purpose strategies, as a precautionary strategy to reduce the risk of losses in front of the upcoming of possible unexpected changes; or **(iv)** preserving and promoting biodiversity, both on a wild and domesticated level, including shifting towards other types of livestock more adapted to new socio-ecological conditions, such as browsers –camels, goats - or short-cycle animals – poultry, pigs, dairy cows.

The cost-effectiveness of these autonomous adaptation strategies, and the fact that most of them are of an anticipatory and endogenous nature, show that much can be learned from the adaptation strategies that SSLF communities undertake. Other adaptation measures undertaken by these communities are planned and promoted by external institutions. These include **(v)** empowering community members by offering them services and training, such as schooling, health care, and pastoralist field schools; and finally **(vi)** offering to these communities schemes of sedentarization, food relief and improved market access, to try to improve their livelihoods. In this case they are both anticipatory and reactive. Other strategies can be autonomous or planned, depending on the contexts, such as **(vii)** adoption of fodder crops and pasture enclosures, which in some cases can also lead to livestock corralling, to guarantee more stable feeding conditions for the livestock.

Adaptation to climate variability is a never-ending process, because vulnerabilities and impacts are permanently evolving, which means that some forms of adaptation that prove appropriate now, may not prove so in the future. Furthermore, we might find that socio-institutional innovations, however less spectacular – and less expensive in monetary terms - may strengthen resilience further compared with other technical innovations. However, it is not less true that not all autonomous innovations end up enhancing communities' resilience. While SSLF autonomous innovations should not be idealised, top-down interventions should be always critically assessed.

Socio-economic drivers intensifying CC impacts on SSLF communities

As seen in Turkana, Alaotra Lake region, Khar-o-Touran, and Huancavelica, SSLF communities are highly effective in CC mitigation and adaptation, while guaranteeing animal source food security. However, as identified in all four cases, to guarantee SSLF endurance and to preserve its related benefits, it is urgent to deal with a set of socio-economic drivers that hinder the development and promotion of the above livestock farming categories: **(i)** demographic growth, **(ii)** neglect of SSLF knowledge, customary practices and institutions in policy-making, and **(iii)** increasing integration of SSLF societies within the market economy.

In our case studies, as well as in many other ssituations, we are withessing the gradual disruption of local traditional knowledge, abandonment of communal planning and institutions, increase in social differentiation, and overexploitation of the limited resources of rangelands. Rising tensions, both within the community and among communities, and growing levels of malnutrition, are being identified as urgent issues in Turkana, Alaotra Lake region, Khar-o-Touran, and Huancavelica. These drivers are critically damaging the considerable capacity of SSLF to enhance GHG sequestration, CC-related hazard adaptation, and animal source food security, which need to be specifically tackled.
Finally, the following set of recommendations has been drafted, to counteract these damaging trends in the specific case of the four case studies:

- In Turkana, action is urgently needed to stop the violence between neighbouring pastoral communities, and to direct humanitarian aid more towards pastoralists restocking and training and less towards food relief.
- In the Alaotra Lake, action is urgently needed to stop livestock raids, control grassland fires, and prevent further soil erosion and favour soil preservation measures.
- In Khar-o-Touran, action is urgently needed to stop the violence between pastoralists and settled farmers, and ensure more control of the natural resources for pastoralists.
- In Huancavelica, action is urgently needed to stop the violence between neighbouring pastoral communities, and favour grassland preservation measures to prevent degradation.

Rising temperatures, and an increasing number of extreme weather events, are the most visible features of Climate Change: a huge environmental emergency, undisputedly related to human activities.

Livestock farming and the underlying deforestation alone represent 18% of global greenhouse gas emissions. But looking at this only as a figure, would mean to ignore the fact that there are different types of livestock farming.

Is extensive smallholder livestock farming, which relies on natural pastureland, as responsible for Climate Change as intensive industrial husbandry, which relies on intensively grown crops imported from overseas?

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