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The CLEANED approach for flagging and addressing environmental issues

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Key words: Livestock, environment, ex-ante assessment, decision-making.

Abstract

While livestock presents an important livelihood strategy for many smallholders, it is also held responsible for important environmental impacts. In this paper, we used an online survey to identify the perceptions of global livestock experts on environmental impacts of livestock and how these might be tackled. We then explored how the CLEANED environmental ex-ante assessment tool (Comprehensive Livestock Environmental Assessment for improved Nutrition, a secured Environment and sustainable Development = CLEANED) responds to this and how it can be used to influence decision making towards more environmentally-friendly livestock production.

According to the survey, there was general agreement between researchers, development practitioners and policy makers alike that livestock production systems are at risk of global environmental change while at the same time contributing to it. The major risks are perceived to be climate-related. The major impacts associated with livestock production, on the other hand, are considered to be land-related (degradation and competition for land), closely followed by pressure on water and GHG emissions. More sustainable livestock production practices are cited as most promising to reducing livestock's environmental impact. The preferred technologies include managed grazing, improved pastures, silvo-pastoral systems and planted forages. A lack of rapidly available, site- and system-specific knowledge about such solutions and their potential environmental impacts are considered an important barrier to their successful implementation. The CLEANED environmental ex-ante assessment model aims to fill part of this gap. It can compare the relevant environmental impact indicators of the different solutions brought forward. The model has also been designed to be flexible when applied to a wide variety of contexts and provide systems-specific results.

The expert survey further revealed that researchers, development practitioners and policy makers all based decisions on information, obtained from a variety of sources such as journal papers, internet searches and professional networks. The importance of journal papers, however, decreases as an information source from researchers over policy makers to development practitioners, while the use of professional networks and internet searches increases for these groups. This finding points to the importance of the participatory approach taken by the CLEANED team and the need to present results in appropriate multi-stakeholder forums and targeted internet posts. Further recommendations are made for increasing the use of the tool, i.e. making the outputs from the tool easier to interpret and training a variety of stakeholders in its use.

Introduction

Livestock are kept by hundreds of millions of smallholders across Africa, Latin America and Asia. Livestock play a central role in supporting household livelihoods through provision of income and nutrition. Despite the opportunities and benefits that livestock production could bring, it is widely observed that livestock systems are key drivers of global environmental degradation (Foley et al. 2011), including increased nutrient loads, GHG emissions, water use, grassland degradation and land-use conversion (Steinfeld 2006; de Vries and de Boer 2010; Godfray et al. 2018). The predicted demand increase for animal sourced food (Alexandratos and Bruinsma, 2012) poses a danger that the necessary rise in livestock production could become environmentally unsustainable, particularly as many ecosystems are already under heavy pressure.

Efforts to maximize livestock production, productivity and profitability thus need to be balanced with long-term sustainability and environmental stewardship. It is therefore important to assess potential environmental impacts before embarking on large-scale development projects geared towards livestock production intensification (Notenbaert et al. 2016). We developed an indicator framework and associated user-friendly tool for ex-ante assessments of environmental impacts of development interventions in livestock Value Chains, i.e., the Comprehensive Livestock Environmental Assessment for improved Nutrition, a secured Environment and sustainable Development (CLEANED). It evaluates land requirements, productivity, water use, soil health, economics and greenhouse gas emissions associated with livestock production enterprises. It compares the environmental impacts of different livestock production practices in different livestock production systems. It brings potential synergies and trade-offs between land use, water use, GHG emissions and soil health to the

forefront. The CLEANED framework is intended to support decision-making and to help prioritise the development action of governments, donors, NGOs and farmer organisations in data-scarce environments (Notenbaert et al, 2014). It has been applied in a number of projects across the global tropics. The tool has been used in Kenya, Tanzania, Burkina Faso, Ethiopia, Uganda, Nicaragua, Honduras and Vietnam to assess the environmental impacts in dairy, beef, pig and dual-purpose cattle value chains.

In this paper, we explore how this tool responds to the perceptions of global livestock experts on environmental impacts of livestock. We further reflect on the best implementation strategy for influencing decision making towards more environmentally-friendly livestock production.

Methods

As a validation exercise for the CLEANED tool (Comprehensive Livestock Environmental Assessment for improved Nutrition, a secured Environment and sustainable Development), we carried out a survey to explore the perceptions of environmental impacts of livestock and available solutions amongst livestock experts from the policy, research and development realms. The expert survey was conducted through the SurveyMonkey platform and distributed to researchers and partners of the CGIAR Research Program on Livestock and through mailing lists of relevant professional and institutional networks. The survey was accessed between 22nd July and 15th November 2019. The survey consisted of fifteen questions soliciting the experts' perceptions in four domains. First, we elicited the respondents' perceptions about the most important environmental impacts of livestock within their region of work. Second, we enquired about their assessment of the most significant risks and adaptation needs associated with livestock production. In a third domain, we solicited the experts' ideas about the most promising options/solutions to reduce the environmental impact of livestock production and increase resilience. Finally, we dug deeper into the source and use of information for decision-making. For the full list of questions, and more information on data collection and analysis methods we refer to the supplemental information of Paul et al. (2020).

Then, we further reviewed the CLEANED model, its applications and feedback we got from partners and stakeholders during trainings and practical applications. We compared the functionality of the revised model and insights emerging during its practical application with the experts' opinions and needs. All reviewed reports, papers and blogs associated with CLEANED are compiled for easy access on <https://ciat.cgiar.org/ciat-projects/environmental-assessments-of-livestock-systems-using/>.

Results

A total of 260 experts responded to the survey. The large majority of respondents (70%) were researchers, 13% described themselves as development practitioners and 6% as policy makers. Almost half of the respondents (45%) work mostly in Africa, 26% in the Americas, 17% in Oceania and Asia, and 7% in Europe, while the remaining 5% works across different regions. There was general agreement between researchers, development practitioners and policy makers alike that livestock production systems are at risk of global environmental change while at the same time contributing to it. While small regional differences exist, the major risks are perceived to be climate-related. As noted in Paul et al. (2020), the major impacts associated with livestock production were considered by the respondents to be land-related (degradation and competition for land), closely followed by pressure on water and GHG emissions. More sustainable livestock production practices were cited as most promising approach towards reducing the environmental impact of grazing livestock. The preferred technologies include managed grazing, improved pastures, silvopastoral systems and planted forages.

Survey responses not previously reported further revealed that lack of rapidly available, site- and system-specific knowledge about such solutions and their potential environmental impacts were important barriers to the successful implementation of management solutions. Finally, the expert survey revealed that researchers, development practitioners and policy makers all based their decisions on information, obtained from a variety of sources such as journal papers, internet searches and professional networks. The importance of journal papers, however, decreased as an information source from researchers to policy makers to development practitioners, while the use of professional networks and internet searches increases for the latter two groups.

Discussion

The CLEANED tool calculates the environmental footprint of a livestock enterprise, in terms of (1) the area of land required for feed production, (2) productivity, (3) economics, (4) soil health, (5) GHG emissions and (6) water use (Mukiri et al., 2019). These indicators fully align with the environmental dimensions of concern, as prioritised by the global experts. In addition, the first step in a CLEANED assessment is the delineation of

a study area. Heterogeneity in terms of agro-ecology, market linkages, production objectives, herd composition, feed basket and practices within such area requires stratification into analysable homogeneous units. In the CLEANED model, these are described as different enterprises or systems (Notenbaert et al. 2014). The classification into systems/enterprises allows for the calculation of system-specific footprint indicators. As illustrated by the CLEANED applications documented in, for example, Osele et al. (2018), Notenbaert et al. (2020), Van der Hoek et al. (2020), the CLEANED tool can assess the environmental footprint changes of technologies brought forward as promising solutions. As such, it fills the important knowledge gap identified by the experts, i.e., system-specific knowledge about such solutions. Strengths of the method include the relative ease of use and limited data requirements, in combination with multi-disciplinary impact quantification along different environmental dimensions (in absolute as well as relative terms) (Notenbaert et al., 2020).

The comparison of the experts' opinions with the CLEANED model indicate the usefulness of the CLEANED tool for decision makers at different levels such as donors, government agencies and NGOs. They can and have used it to provide input in investment decisions of local implementers, both in the private and public sphere.

One of the main challenges that users face is the difficulty in interpreting the model output. They find it difficult to estimate how 'sustainable' an environmental footprint is (Van der Hoek and Mukiri, pers. communication). Our analysis gives rise to a number of recommendations for improving the CLEANED model's potential impact. In terms of further model development, we intend to establish a benchmarking system. This system would include an analysis that enables either comparison with natural resource stocks of resources and/or a best practice indicator in similar livestock production systems in the same country, region or worldwide. The system could help to translate the CLEANED analysis results into a simple traffic light system.

The information provided by the experts about where they source information influencing their decision-making processes, points to the importance of the participatory approach taken by the CLEANED team and the usefulness of presenting results in multi-stakeholder forums and targeted internet posts.

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