Situation analysis of the national Livestock Market Information System (LMIS) for Mali

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INTRODUCTION

With mobile technology rapidly penetrating Africa at a larger scale, ability to capture data at individual and household levels has provided tremendous opportunities to gather near real-time trade information over livestock to ensure informed decision making by Sahelian vulnerable smallholders especially the women main owners of small ruminants. However, the idea of taking advantage of technological opportunities is not so new in the Sahel. Many information systems were developed and increasingly improved since the 1980s without leading to truly sustainable and socially long-term development mainly in the main primary agricultural sectors. Among these later, livestock sector is to date, an obvious enigma for many research and development actors in the Sahel countries.

The current situation has historical roots that Ancey (2016, p.1) explains by a double misunderstanding: "*on the one hand, the underpinning schemes in the information systems do not help policies managing the specific core features of the reproduction of the pastoral systems; on the other hand, the pastoral population's avoidance strategy, which has historically allowed them to escape from pressure exerted by the administration, currently hinders their ability to influence fundamental debates within their countries*". Fieldwork in Mali in July 2016 made it clear that it was not only the case of pastoralists but also of sedentary mixed crop livestock farmers as well.

In Sub-Saharan Africa in general and in the Sahel in particular, a first generation of Market Information Systems (MIS) was broadly based on famine warning systems that focused on specific country and products, to exclusively deliver price related information, and collection on pre-identified and sampled markets, in order to compute median price information disseminated for free. Another important feature included their dependency on public funding from government structures or projects and above all, on international funding. With growing access to internet-based web applications and mobile phones, a second generation of MIS emerged in the 2000s with ability to leveraging private sector involvement and provide additional information beyond market price index (input prices, weather forecasts, trading platforms matching producers and buyers etc.).

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The LMIS for Mali was launched in this context with the goal to provide timely, accurate and low cost useful information to various actors involved or in relation with the Malian livestock sector. The LMIS is among the five major components of the Mali Livestock and Pastoralist Initiative (MLPI) identified by USAID for Mali. Since 2008, USAID has launched initiatives in Mali including the USAID-Feed the Future–Mali Livestock Technology Scaling Program (FTF-MLTS), led by ILRI with an established project component to revitalize the LMIS for Mali, based on the following question: ***how to sustain delivering useful and close to real-time market information to livestock value chain actors and stakeholders in a demand-driven context?***.

This urgent and complex issue requires a rigorous diagnosis of the current situation. Thus, the purpose of this contribution is to provide swift assessment of the LMIS for Mali. It draws on a review of selected papers published in international journals and grey literature as well as from multiple navigations on the LMIS website and mostly from in-depth interviews with the managers of the Observatoire du Marché Agricole[4] (OMA) hosting the LMIS.

I-   Background on the Livestock Market Information Systems for Mali

Following severe and successive drought periods of the 1970s and 1980s in the Sahel, emphasis was placed on food security. Market information systems (MIS) have been developed in the Sahel by national administrations supported by international donors to prevent and manage food crisis by improving the functioning of markets, developing cereal balance sheets (Egg and Gabas, 1997), to allow the implementation of cereal production readjustments and surplus reallocation throughout the Sahel region. The information systems have been gradually upgraded (Franck Gaultier et al., 2014) to improve on output performances. (Toure et al., 2012). The prevention of food crises taking into account the evolution of conceptual approaches to food security and also the importance of support provided by humanitarian organizations in compensation for poorly coordinated sectoral policies (Touré et al., 2012).

As elsewhere in the Sahel, Mali followed this path and as a large livestock producer and exporter, this sector was increasingly integrated in the national monitoring systems. Almost all livestock trade in Mali is in the form of live animals inasmuch as current policies have been unfavorable to the development of animal product processing. The livestock sector significantly contributes to trade in live animals that increased in real terms from US$ 13 million in 1970 to US$ 150 million in 2000 in West Africa (Williams *et al*, 2006).

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[4] Particular thanks to M. Francis Keïta who is the current manager of the LMIS for Mali and deputy coordinator of the Observatoire du Marché Agricole (OMA) for Mali, responsible for financial administration and monitoring of the network. He is also Treasurer General of the Network of Market Information Systems (MIS) of West Africa (RESIMAO), which groups 12 countries (with proposed extension to the 15 ECOWAS countries). There is an ongoing and strong demand to integrate all CILSS countries (including Chad and Mauritania).

As growing agricultural sub-sector, livestock sector also contributes to 19% of the gross domestic product (GDP) and remains the third source of export earnings from commodity exports after gold and cotton. However, the livestock sector does not always receive the attention it deserves in terms of public policies and investments (Alary *et al*, 2011) and benefits less than 2% of the national budget and only about 8 to 12% from the allocated budget to rural development sector (Dembélé, 2016[5]).

As dominant segment of the animal production system, Malian pastoralists and agro-pastoralists continue to face up to many risks that exacerbate their vulnerability. One source of this situation is the poor functioning of markets (Bizimana *et al*, 2015). Cattle market is poorly integrated due to long distances and high transaction costs that constraint easy access to livestock markets.

Among the multiple ways to improve this situation, the development of information and communication tools (ICTs) for market information could be a strong lever of market integration (Van Campenhout, 2012) as was the case in Niger, between 2001 and 2006, where use of mobile phone significantly reduced grain prices dispersion. More specifically, ICTs would help provide accurate information to agricultural and livestock value chain actors (Zoltner and Steffen, 2013) and to usefully link smallholders to the markets (Magesa, 2015). However, the real impact of market information systems (MIS) remains particularly difficult to measure as rates of return to investment in MIS are strongly influenced by assumptions made about supply and demand elasticity's (Staatz *et al*, 2011) while it is shown that the use of mobile phones as vectors of information dissemination contributes to market efficiency (Aker, 2008), farmers' decisions to increasingly sell in distant markets (Kpenovoun *et al*, 2009) and a significant rise in income (Kizito, 2011). Market information would be useful if the final users can act on it and if it is also complementary with other government programs and policies such as infrastructure development and investment in education (Kizito *et al*, 2012). On the other hand, it is proven that SMS-based information dissemination does not lead to significant improvements of farmers' activities even if these actors believed that it would help on negotiations (Fafchamps and Minten, 2012) while others conclude no-influence on cereal market integration (Bassolet and Lutz, 2011).

Although the idea of developing dynamic and effective livestock market information system has been revitalized with USAID cooperation, the need of market information along livestock value chains was not so new in Mali. In 1969, a government-funded system took the initiative to establish a centralized Information system located to the Malian livestock production and meat board (OMBEVI). Then, efforts to strengthen livestock market integration were made during the structural adjustment program with the launching of a more adequate "Market Information System" (MIS) in 1989 as a key component of the country's cereal market reforms to provide timely, accurate and low-cost information on price and supply for government, donors and stakeholders. In 1998, the restructuration of

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[5] Amadou Dembélé, Head of DNPIA (Direction Nationale des Productions et Industries Animales) interviewed on the eve of the Aïd-al-Udha (important Muslim feast that recommends the sacrifice of sheep and sometimes goat) by the online Malian Journal online (www.maliactu.net) of September 9, 2016 (http://maliactu.net/mali-sous-secteur-de-lelevage-au-mali-une-mine-de-richesse-a-mettre-en-valeur-a-tout-prix/)

the MIS resulted to the establishment of the Observatoire du Marché Agricole (OMA). This was to ensure that the country is better equipped to meet future challenges such as the growing integration of regional markets, new business opportunities, capacity building of Malian stakeholders to assess new market opportunities and partners and the need to develop appropriate grades and standards to respond to different market segments (Dembele and Staatz, 1999; Dembele *et al*, 2003). In 2008, a USAID-funded initiative under the Mali Livestock and Pastoralist Initiative (MLPI) re-launched the Livestock Market Information System for Mali to benefit from the growing development of mobile phone services as opportunities to disseminate livestock market prices and volume data to livestock sector actors and consumers (Bizimana *et al*, 2015). Today, there co-exists two different data collection systems on animal products in Mali: one under the supervision of the Direction Nationale des Productions et Industries Animales (DNPIA) that includes a livestock component among agricultural products monitored and the Livestock Market Information System (LMIS) managed by OMA.

II-   THE DESCRIPTION OF THE LMIS FOR MALI

After an initial phase of implemention in 6 livestock markets in 2008 (Kidal, Gao, Gossi, Konna, Niamana and Kati), then 27 in 2009 and 32 markets in 2012, the ambition was to reach and cover 70 markets. However, the coup d'Etat that occurred in Mali in 2012 stopped the process. The idea of restarting the process emerged with the FTF-USAID project coordinated by the International Livestock Research Institute (ILRI). Thus, 14 markets were sampled in the project intervention areas to collect price data in view to operate the LMIS.

Institutionally, the LMIS depends on the Observatoire du Marché Agricole[6] (OMA), a body of the Assemblée Permanente des Chambres d'Agriculture du Mali (APECAM) with the support of the Ministry of Agriculture and as integral part of the national system of food security supervised by the Presidency of Mali.

The LMIS technical device was developed by the "Agri Life Research" department of the University of Texas in collaboration with the agents from DNPIA and OMA. However, only the OMA and the University of Texas have privileged access to the LMIS database.

The LMIS is supported by data collected on primary collection markets (*e.g.*, market of Mpessoba), intermediate markets (*e.g.*, market of Koutiala) and regional markets (*e.g.*, assembly market of SIKASSO that is also a terminal market exporting towards international markets of Ivory Coast). At all stages, the agents of the DNPIA ensure data collection through its various divisions: agents of the UAPIA[7], SLPIA[8] and the M&E services of the DRPIA[9]. The Observatoire du Marché Agricole (OMA) provides technical training courses for all agents.

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[6] The Agricultural Market Information Network for Mali
[7] Unité d'appui aux Productions et Industries Animales
[8] Service local des Productions et Industries Animales
[9] Directions Régionales des Productions et Industries Animales

Example of reported data to the data server	**Illustration 1 – data collection instrument**
MK S NIA FRANC 2008*01*01 C*ZP*498 MM*M*140000	
- *MK (Market): information on the sampled market*	
- *S (Send): send the message*	
- *NIA: Market code (e.g., market of Niamana)*	
- *FRANC: enumerator name*	
- *2008*01*01: date of collection (e.g., 01/01/2008)*	
- *C*ZP*498: bovine species and number of animals in trade (e.g., 498 Fula zebus were presented on the market of Niamana)*	
- *MM*M*140000 (Male Mature, Medium conformation, average price calculated on the 5 collected prices)*	

Data collection requires the observation of procedures tested and validated by the OMA. Initially, enumerators walk around the market to make their first estimates of available supply and the number of presented animals. Then they apply investigation instruments on dominant species on the market. They collect data based on dominant species and identify livestock categories differentiated by sex, age, and body size and conditions (adult males, castrated males, others males, adult and young females and body condition: Fat, medium and lean). By species, category and body condition , they compute and report on prices using average of the prices of animals.

A first level of data aggregation is made by the enumerators to generate average prices. Data collected on a sample of contracts are transmitted by mobile phones on the server using Short Message Service (SMS). Thus, a number of codes were developed and assigned to each market (*e.g.*, KAT for the market of Kati), each collector (*e.g.*, SAM for Samaké) to each species (*e.g.*, C for cattle), to each animal breed (*e.g.*, ZP for Fula Zebu) in each age category at the date of collection (*e.g.*, 21 September 2016). Once in the server based on the OMA, data is retrieved for compilation, analysis and reporting (weekly, bi-weekly, quarterly and/or annual). The same data is available on the website www.malibetail.net and can be used to conduct prices analyzes at timescales defined above. Then, OMA's agents perform a second level of data aggregation and analysis. The gaps between two situations are analyzed and interpreted by the head of the department "Analysis" of OMA. The processed information is disseminated via cell phones as SMS (text messages). The OMA also has a Web interface facilitating access to market data-based on requests. The web interface also provides access to graphical analyzes. Information on price and conformation of the previous week are also displayed on livestock markets. Thirty contracts were established with local radio stations to closely disseminate market information in local languages.
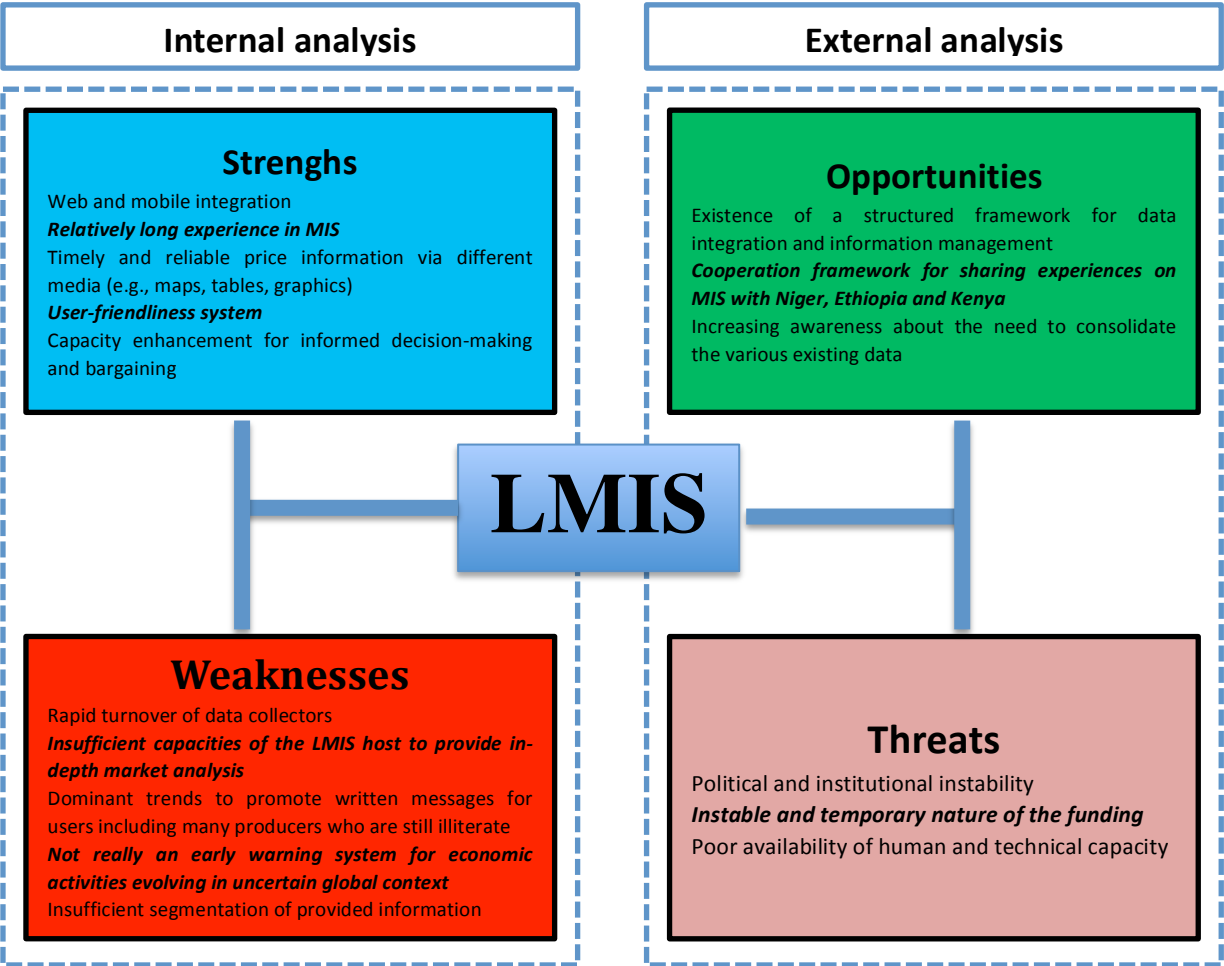
Core funding sources of LMIS activities come from the Malian government through a share of 5% of the total allocation of XOF 300 million granted to the OMA. This grant covers the operating expenses of the OMA (salaries, enumerators, motorcycles etc.). The LMIS also

benefits from the support of external partners such as ILRI through the USAID-FTF project that funds the LMIS up to 60 million to cover the collection operations (field work, small equipment, etc.). The LMIS could potentially benefit from additional funding from PRAPS[10].

To function, the LMIS is supported by a staff of 14 enumerators, 2 senior managers from DNPIA, 3 senior managers from OMA and 2 regional directors who play a role of regional supervision and 2 others executives for M&E activities. In terms of equipment, the system consists of a new generation of data servers located primarily in OMA offices and secondary in DNPIA offices, mobile phones and GPS for enumerators, two laptops, Internet connection and a video projector and the team have motorcycles for field works.

III-   SUMMARY OF FINDINGS OF THE RAPID APPRAISAL OF THE LMIS FOR MALI

According to the current situation, a SWOT analysis was applied to establish a reliable and rapid diagnosis based on strengths and weaknesses of the internal environment and opportunities and threats of the external environment of the LMIS for Mali.

Internal analysis

External analysis

Strenghs

Web and mobile integration
Relatively long experience in MIS
Timely and reliable price information via different media (e.g., maps, tables, graphics)
User-friendliness system
Capacity enhancement for informed decision-making and bargaining

Opportunities

Existence of a structured framework for data integration and information management
Cooperation framework for sharing experiences on MIS with Niger, Ethiopia and Kenya
Increasing awareness about the need to consolidate the various existing data

LMIS

Weaknesses

Rapid turnover of data collectors
Insufficient capacities of the LMIS host to provide in-depth market analysis
Dominant trends to promote written messages for users including many producers who are still illiterate
Not really an early warning system for economic activities evolving in uncertain global context
Insufficient segmentation of provided information

Threats

Political and institutional instability
Instable and temporary nature of the funding
Poor availability of human and technical capacity

Additional lessons that could be learned from the SWOT analysis are as following:

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[10] The World Bank - Regional Sahel Pastoralism Support Project

- *Too exogenous seed funding*
  Like the majority of MIS in Sub-Saharan Africa, the LMIS for Mali has always been re-launched with external funding from donors such as USAID. The close dependency of start-up financing to international cooperation is as much a form of vulnerability and could be potentially issuing for the sustainability of the system.

- *Unclear business model*
  There are no real business models that ensure the financial sustainability of the system that seems to be always dependent on donor support. Discussions with team manager of the LMIS do not allow having a clear view on income generation policy in view to cover operating costs of the system (user-fees' policy, advertising for additional revenue, partnership with mobile network operators and so on). The price market information is usually considered and designed as a public good with a strong involvement of public services making it difficult for private companies to find their place in the system.

- **Diversification of information**
  Malian animal productions' systems are almost exclusively dependent on pastoral and agro-pastoral systems as primary animal suppliers. As for others Sahelian production systems, Malian production systems are a livelihood and an economic activity involving production, consumption and marketing of goods and services in a global change setting (climatic, economic, socio-political). In very traditional low-input low-output pastoral systems, market dynamics were not a major concern. However, the Malian pastoral system is dynamic and globally today the majority of livestock owners even in remote extensive systems are dependent on markets to some extent. This relatively recent increased involvement and dependence of agro-pastoralists and pastoralists on markets is not without risks: market shocks can occur due to many factors: drought, market quarantines on animal sales, food and feed animal price instability or others. During market shocks, livestock prices often plummet while food prices increase and this is now a common shock-induced pattern in drylands. The major reason why pastoralists use livestock markets is to satisfy their own consumption needs (mainly in cereals), which usually are aggravated and increased during dry seasons and droughts. In this context, this important node of information user chain might expect additional information going beyond prices and including animal feed prices, weather forecasts and alerts, crop-related information, transport costs and so on.

  On the other hand, discussions with fattened animal value chain actors allow us to identify their ignorance of the existence of the LMIS.

- **Enumeration**

  The LMIS for Mali depends a lot on up-dated field data collected on sampled markets. The market-based enumerators, as primary level of data collection, play a significant role to ensure a complete and continuous provision of price data. They directly go on public marketplaces, observe current transactions and average the five prescribed prices then report the collected information by using mobile phone. The market-based enumerators

for the LMIS are public agents of the UAPIA[11]. As an integral part of the whole system, these agents are paid, trained and managed to some extent through the LMIS system. The availability of these public agents is challenging. Overlapping of duty tasks may arise if for example, they are mobilized for a mission other than one on data collection. In the current situation, there is no guarantee that ensuring a priority given to data collection and market-based enumerators are neither punishable nor unchallengeable by the OMA.

IV- MAIN RECOMMENDATIONS

4.1. TO CREATE CONDITIONS FOR LMIS SUSTAINABLE DEVELOPMENT

To achieve the objective to sustain the development of the LMIS, there is a clear need to produce and disseminate accurate, timely, affordable, and useful price information.

4.1.1. *Accurate* and *close to real time* market price information:

4.1.1.1.   To increase the reliability of data collection by ensuring the real availability of the market-based enumerators and by providing them with regular refresher courses in terms of data collection method and basic tool analysis.

4.1.1.2.   To challenge continuously data validation systems including feedback mechanisms from end-users in view to report data that seems irrelevant and incorrect.

4.1.1.3.   To cover human resources requirements by integrating integrate two executives in econometrics analysis and server management specialist and equipment requirements by acquiring a large capacity inverter to enable to cope with the untimely power cuts.

4.1.1.4.   To explore the possibilities to launch crowdsourcing approaches and test their feasibility in the Malian context in view to move towards crowdsourcing information systems

4.1.2.   *Affordable* price information:

4.1.2.1.   To develop a reasonable business model in view to determinate "Who *pays what?*" This process should start with the principle to secure the LMIS's liquidity requirements, to cover its ongoing operations and to increasingly move away from the dependency of donor external funding.

4.1.2.2.   To devote an in-depth reflection on the status of price information usually seen as "public good" that exacerbates the traditional duality of objective functions between the government seeking the collective well-being and private actors seeking profits. It might be interesting to raise a stable public-private partnership that allows the government developing evidence-based policies

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[11] Unité d'appui aux productions et industries animales

and the private sector managing collection and distribution of price information. This requires a long-term pricing model and/or competitive options for service delivery.

4.1.3. *Useful* price information:

4.1.3.1. To provide demand-driven services making LMIS more responsive to the needs of all livestock value chain actors, including smallholders, women and those who are poor and marginalized.

4.1.3.2. To develop appropriate grades and standards to respond to different market segments.

4.1.3.3. To find mechanisms to better disseminate appropriate informational products (Short Message Services (SMS), voice-activated messages (Interactive Voice Response technology) in local languages for illiterate actors[12] in partnership with mobile network operators, policy-briefs, local radios, televisions) for specific users (producers, wholesalers, retailers, governments, universities, research institutions). The objective is to pass from information availability to reaching people with information they can understand and use.

4.2. TO FACILITATE AN AUTONOMOUS DEVELOPMENT OF THE LMIS FOR MALI

4.2.1. To pursuit the ambition to cover 32 or even 70 livestock markets as previously planned.

4.2.2. To integrate the monitoring of the market of Bamako and others regional ones to better address the dynamics of domestic consumption.

4.2.3. To ensure a complete hosting of all technical aspects of the LMIS through a growing technical transfer from the University of Texas to the technical team of the OMA.

4.2.4. To assert a larger regional role given the significant contribution of Mali in the regional export market. Thus, the LMIS for Mali should also report some relevant prices in destination markets of Senegal, Ivory Coast, and Guinea and so on.

4.3. TO STRENGTHEN PRICE MARKET ANALYSIS

4.3.1. The LMIS is designed to collect prices tabulated on current transactions. However, it might be interesting to promote policy-oriented foresight analysis to facilitate timely anticipation and understanding of market parameters.

4.3.2. To extent the analysis to actually traded volumes in view to contribute to in-depth understanding of market dynamics.

4.4. TO PUSH RESOLUTELY AHEAD TOWARDS AN EARLY WARNING SYSTEM

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[12] In 2015, the adult literacy rate in Mali was 35.2 per cent (PNUD, 2016)

4.4.1. To pay a particular attention to pastoralists and agro-pastoralists as dominant actors of the animal production system in Mali, who face many challenges, especially with respect to the marginalization of pastoral communities and increased competition with other user groups, particularly crop farmers for access to natural resources.

4.4.2. To provide, beyond price information, specific information and indicators to manage trends and changes for pastoralists, agro-pastoralists and policymakers.

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