



Note

Assessing Current Nutrient Use and Manure Management Approaches Opportunities & Challenges in the EAC

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Summary

East African representatives are engaged in negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) that have implications for agriculture and agro-processing, especially under the Koronivia Joint Work on Agriculture. The information from the ground may help them in advancing their negotiating agenda, as appropriate, with concrete examples and stories. This note will seek to give an overview of the current nutrient use and manure management approaches adopted by farmers in EAC (East African Community) countries. It will look at the existing systems and approaches, and their challenges and opportunities in adopting more sustainable and resilient systems. It will also discuss what the governments and their UNFCCC negotiators may do to go beyond what is already in place in their country/region.

Introduction

To maintain agricultural productivity, improve livelihoods and ensure food security, productive soils containing good nutrients are required. A nutrient is defined as any substance that plants or animals need in order to live and grow. Nutrients can be found in manure which is an organic matter, mostly derived from livestock waste and that is spread on the land in order to make plants grow well. Manure is then an organic fertiliser that can contribute to the fertility of the soil. It has been used as a fertiliser since ancient times and, if well managed, can be an asset, promoting sustainable agriculture, and increasing crop production, particularly for smallholder farmers. When managed properly, the nutrients in manure can be beneficial, but if applied at rates higher than what plants can absorb, the nitrogen and phosphorus in manure can lead to ground and surface water impairment.

The nutrient Use and Manure Management Approaches also have links to environment and climate change. Indeed, integrated manure and urine management practices can prevent harmful short-lived climate pollutant emissions while also providing benefits for farmers through cost savings and additional income.

This note will aim to add to the picture by outlining some of the existing government methods and approaches for nutrient use and manure management in the agriculture sector among EAC member countries. It will also look into initiatives on the ground implemented by farmers, agro businesses, communities, being their own initiatives, or supported by international organizations and NGOs programmes. It will then present areas where more support and effort from the governments and their UNFCCC negotiators can be most useful.

Nutrient use & Manure management systems : Setting

the scene and expounding the environmental impacts

In the EAC region, the agricultural sector is formed mainly by small-holder farmers who cultivate small parcels of land. To maximise production in such relatively small areas, farmers use different methods including application of inorganic (chemical) fertilisers, manure (organic fertilisers), improved seeds, pesticides and other nutrients. The system chosen is influenced by (i) the type of crop cultivated; (ii) the availability and capacity to access such nutrients and manure; (iii) the type of farming and/or livestock system used; (iv) the availability and types of grazing feeds; (v) the geographical area they operate; and (vi) the support received from the government and other development stakeholders.

Current nutrient use and manure management systems in the region

Manure management refers to the capture, storage, treatment and utilization of animal manures in an environmentally sustainable manner. Manure can be retained in various holding facilities either in liquid, slurry or solid form and is often mixed with ash, crop residues or animal beddings. Indeed, mixing manure brings to faster decomposition, increased volume of manure produced and odor reduction.

Several methods of manure management systems have been identified and each system of manure management has its own challenges:

- **Grazing** is when animals manure is deposited directly on the field during grazing. The loss challenges associated are substantial nutrient losses especially nitrogen that occur through leaching and volatilization;
- **Kraals** corresponds to animals kept in an enclosed land area to be used for cropping in the future on rotational basis. The challenge is the high losses of nutrients through leaching;

- **Dry lot storage** is made with manure and urine captured using bedding materials. The substantial losses of nutrient that can occur particularly through urine leaching and surface run-off can be challenging;
- **Composting** means piling up crop and other farm wastes in layers to make them decompose quickly. Composting is done to produce an organic fertiliser that is balanced in plant nutrients. This organic fertiliser improves soil fertility, moisture retention and soil aeration.
- **Slurry storage** means storing together urine and feces (the manure is usually in semi-liquid form). The drawback is the volatilization losses. But they are dependent on ventilation depth of storage tanks and length of storage;
- **Lagoon** is the technic treating liquid manure in anaerobic lagoon with or without the solids separated. Leaching through lagoon bottom discharge into water surface and odor are often the problems highlighted and high ammonia and some methane and nitrous oxide emissions may occur.
- **Fuel** can be obtained from manure directly burnt as fuel handled anaerobically for biogas production. The Nitrogen, Carbon and Sulphur losses can be a result of burning and high water content of slurry can make it difficult to handle.

The East African countries do not all use the same techniques and manure management systems. For instance, it was reported that in Kenya, rabbit urine or urea added to some leaves and ash is popular in the Busia County amongst sugarcane farmers. Whereas in Uganda, farmers in the Luwero district explained that they are applying cattle manure; supplementing it with poultry manure, goat manure, rabbit manure and pig manure in order to increase crop yields, reduce the diseases, and lower costs of purchasing the manure as well as using biogas as a source of energy.

Environmental impacts

There are positive effects from some of the systems in relation to the environment and curbing emissions. For instance, slurry is connected to biogas which is less emitting than traditional sources of fuel. For composting, farmers sort out the waste to be used e.g. separating plastics and biodegradable waste which contributes to proper waste management and in some cases recycling. In instances where agroforestry for manure is practiced, it helps curbing emissions.

But on the other hand, some negative impacts can be observed if the systems are not well established. These include :

- Concerns in regards to emissions of methane with open systems and the use of cow dung;
- Cutting down trees in making compost or mixing with cow dung manure where farmers have not established special agroforestry for manure;
- Freed cows destroying plants and trees where farmers do not practice zero-grazing;
- Risk of slurry overflowing affecting the environment if farmers using biogas have no use for the slurry;
- Production of gases like CO₂ contributing to global warming with the poor management of biogas plants;
- Accumulation of toxic wastes in the air if solid fertilisers are applied wrongly and convert to gaseous form.

As such, in Kenya, a number of respondents decried the proliferation of Water Hyacinth in Lake Victoria as largely brought about by nutrients resulting from poor usage of manure. Additionally, the high application of manure, use of raw livestock waste, wrong timing, and imbalance use of nutrients can have negative impacts on the environment. This happened in Tanzania where it was reported that contamination of water and sediments; loss of soil fertility through removed

organic matters; and killing a host of beneficial plants as well as micro and macro organisms were identified as a result of discharge of pesticides, fertilizers and raw livestock waste into water sources and soil along farm sites, and transported through air/wind or underground and surface running water.

The Policy framework

As mentioned, if well organised, the nutrient use and manure management systems can help curbing emissions and contribute to the fight against climate change. In order to be set up, the best practices need to be encouraged by relevant programmes and policies. Below are some examples of national frameworks, policies and tools that are deployed by EAC member countries in the agriculture sector.

Burundi

Burundi is a country where almost the entire population depends on agricultural production. Unfortunately, more than 36% of the soils are acidic and have aluminic toxicity. This put the survival and social peace of the entire population under threat. The Ministry of Agriculture, Environment and Livestock (MINEAGRIE) is in charge of the management of aspects related to soil protection and productivity with its technical services of the Soil Fertilisation Department and the Fertiliser Inspection and Quality Control Department. This specialized Ministry organises almost all the related policies and programs, including the National Agricultural Investment Plan (NAPI), the National Agricultural Strategy (NAS), the National Adaptation Plan (NAPI), the National Strategy and Action Plan on Biological Diversity (SNPA-DB), the National Strategy and Action Plan to Combat Soil Degradation (SNPA-LDS), the National Fertiliser Grant Program (PNSEB).

The NAS plans to intervene to "restore, improve and conserve land fertility through an intensive erosion control programme and promote agro-sylvo-zootechnical integration" while one of the orientations of the SNPA-DB is to "encourage the

population and other productive sectors to become involved in activities to protect biodiversity and the sustainable use of genetic resources"; and the SNPA-LDS plans to "encourage national associations to come together in a national forum on soil management".

Lastly, since 2012, the Government of Burundi has adopted the PNSEB to address the problem of agricultural production and productivity by making mineral fertilisers and amendments available and accessible, thus contributing to food security and increasing agricultural incomes. The programme aims to (1) ensure the availability and access of mineral fertilisers and quality soil improvers, (2) subsidize fertilisers and soil improvers for all food crops, and (3) ensure the efficiency and transparency of the subsidy system.

Kenya

In Kenya there is not a policy solely dedicated to addressing sustainable nutrients use and manure management. However, there are broad policies that in one way or another address the issues. A key one is the Kenya Climate Smart Agriculture Framework (KCSAF 2018 -2027) that consists of a strategy, an implementation framework and monitoring and evaluation (M&E) mechanisms to increasing productivity, building resilience and reducing greenhouse gases emissions. The implementation framework incorporates promotion of appropriate livestock manure management as an action that synergises adaptation and mitigation. Other broad policies include the Crop Production Recommendations (covering compost and biogas), Livestock Policy, Maize subsidy policy, National Agriculture Strategy, draft Agricultural Policy, draft Dairy Nationally Appropriate Mitigation Actions (NAMA) and the draft Agricultural Soil Management Policy. The last two are posed to have detailed provisions but are yet to come into action.

In March 2019, the national government proposed a ban on use of human waste and

animal manure for food safety purposes but this was resisted by farmers.**Rwanda**

Rwanda has put in place policies and strategies to promote sustainable nutrient use and manure management approaches. For instance, the Rwandan fertiliser policy was developed in 2014. In this policy, “Organic fertiliser” meaning fertiliser derived from non-synthetic organic material, including sewage sludge, animal manures, and plant residues produced through the process of drying, cooking, composting, chopping, grinding, fermenting or other methods and makes a declaration of nutrient value on the label. For the sake of environmental sustainability, the policy states that the use of organic and bio-fertilisers together with inorganic fertilisers shall be popularised and an integrated approach to plant nutrient management that counters soil degradation and maintains soil fertility shall be adopted.

Additionally, the Nationally Appropriate Mitigation Action (NAMA) for the period (2016 - 2030) for the agriculture sector in Rwanda focuses on the development and implementation of sustainable fertiliser production and use. Lastly, the new Strategic Plan for Agriculture Transformation (PSTA4) adopted in 2018, the updated National Agriculture Policy adopted in 2018 and the Rwanda’s Green Growth Climate Resilience Strategy (GGCRS) are also part of the strategies to promote sustainable nutrient use and manure management approaches. Those respectively targets the adoption of integrated soil fertility management that combines agri-environmental practices, resource recovery and reuse of fertiliser-enriched products, incorporating manure, crop residues and composting into current systems of agricultural practices; place significant emphasis on sustainable rural development and the agricultural sector as levers to achieve economic growth, poverty reduction and food security.

Tanzania

Tanzania already has a policy and legal framework for agriculture sector. This provides

both overall guidance to the sector and also specifically for fertilisers and other nutrients. The policy and legal framework include the National Agriculture Policy 2013 (currently being revised); the National Livestock Policy (NLP) 2006; the National Fertiliser Act 2009 (amended in 2014); the Plant Protection Act 1997 and the Plant Protection Regulations 1998.

The NLP envisions a livestock sector that is commercially run, modern, sustainable and that ensure food security and improve income while conserving environment. On the nutrient use and manure management, the policy promotes production and utilization of manure to improve livelihood and conserve environment. As part of its implementation, the government have conducted campaigns and initiatives to promote the use of fertilisers in crops and pasture farms as well as management of manure and slurry.

The Fertiliser Act is also a key framework to regulate, among other, agricultural fertilisers utilization. The Act provides procedure for registration and restrictions on dealing with fertilisers and sterilizing plants.

Uganda

Policies in Uganda do not always explicitly mention livestock manure management, but it is often considered as a component of waste management. Therefore, the responsibility for managing this resource is often shared by Ministry of Agriculture Animal Industry and Fisheries as well as Ministry of Water and Environment, leading to incoherent policies, and denial of these responsibilities. However, the country has no explicit manure management policy and there are limited actions to promote good practices or to enforce the manure related policies. The availability of a responsible ministry in a country does not necessarily lead to effective manure legislation, control, and enforcement.

Nevertheless, nutrient use and manure management are aligned with the strategic investment framework for sustainable land management (UNDP 2014). The Uganda’s

Nationally Determined Contributions (NDC) identifies manure management practices as one of the policies and measures for its additional mitigation ambition. In the Uganda Green Growth Development Strategic Framework, it is mentioned that combining nutrient recycling with soil conservation technologies and fertilisers is likely to improve soil fertility. Additionally, the Nationally Appropriate Mitigation Actions (NAMA) adopted by the Ministry of Agriculture Animal Industry and Fisheries (MTIC) addresses the proper treatment of manure.

Lastly, the country adopted the National fertiliser policy in 2016 which encourages fertilisers availability on the market and recognises fertiliser as a capital intensive commodity that importers and agro dealers as well as farmers need to access by financial support.

Assessment initiatives by international organisations, NGOs and/or farmers and agro-businesses

Beyond government policies and frameworks in place. Some international organisations and NGOs developed and are implementing various projects in the region to support farmers and agro-businesses on the ground efforts for Nutrient Use and Manure Management. Below are some promising examples.

The ProSecEau (Water and Sanitation Sector) project in Burundi

The German Society for International Cooperation (GIZ) through its ProSecEau project in collaboration with the Burundian Agency for Hydraulics and Rural Sanitation is implementing the project aimed at the recovery and use of human waste as organic manure. This project has produced a protocol for the installation of ecological toilets and a system for collecting and using urine to fertilise the fields. The ecological

toilet infrastructures are installed in urban areas and especially in large communities such as schools. This unique project, which combines hygiene, sanitation and agriculture, is at the pilot phase in the provinces of Rumonge. The main challenge according to a project manager is that it is not yet easy to convince communities of the value of this waste. It's a matter of habit and hygiene.

The Sustainable Agriculture Community Development Programme (SACDEP) in Kenya

In Kenya, the SACDEP, in partnership with Nature Conservancy and Nairobi Water Fund teaches farmers to practice agro-forestry by growing nitrogenous or leguminous plants and showing dairy farmers how to utilise animal waste in order to improve milk production and increase income. These are helpful in producing nutritious manure and contributing to trap CO₂ from the atmosphere.

The promotion of organic farming by the Participatory Ecological Land Use Management (PELUM) in Kenya

In Kenya, PELUM Association - a network of civil society organisations- is working with small-scale farmers to promote organic farming, including the use of manure and agricultural residues. This association offers technical support and their interventions are accompanied by extension services.

The Gako Organic Farming training programme In Rwanda

The Gako Organic Farming Training Centre (GOFTC) is providing sustainable agriculture or organic farming training to promote composting as a way for Rwandans to improve their soil fertility. According to Mme Richard Munyerango, the Director General of GOFTC, the organic agriculture is still in its infancy in Rwanda, but it has serious room for growth. Promoting sustainable agriculture could respond to one of the food-related challenges of the country which is that most people cannot afford the higher prices of organic food.

Enhancing effective delivery of agriculture policies and regulations for equitable access to quality inputs' project in Tanzania

Implemented by the Agriculture Non-State Actors Forum (ANSAF), this project identifies factors influencing the access to good quality inputs for poor farming households and defines measures to improve access to good quality inputs and markets. This project lies on (i) advocating for enforcement of good policies, laws and regulatory frameworks creating enabling environment for effective delivery of quality inputs; (ii) monitoring the effectiveness of the bulk fertilisers procurement system; (iii) continuing creating awareness through community radio programs on quality inputs control mechanisms and farming practices; (iv) supporting the training of farmers on the importance of quality inputs uses and control mechanisms; (v) supporting small-holder farmers to access the extension service on inputs application; (vi) efforts to decline in counterfeit inputs incidences; (vii) formation of platforms for quality inputs control.

The SNV (*Stichting Nederlandse Vrijwilligers*)¹ Uganda project

This project, funded by the British Government, not only promotes manure management but also avails farmers in western Uganda with guidance and skills including how to make manure and use it on their farms. This project also set up demonstration farms to show farmers appropriate soil and water conservation techniques, such as terracing, mulching and use of grass filter strips, as well as recommended agronomic practices, such as proper spacing, intercropping, pruning, manure use and pest and disease identification.

The Way Forward: Recommendations to Governments and UNFCCC Negotiators

After, consultations with various stakeholders in the agriculture sectors of mentioned countries, including Government representatives, International Organisations and Donors, NGOs, as well as farmers, the below are actions were identified as most useful to be pursued by governments and UNFCCC negotiators:

1. Governments and local administrations should intensify education among farmers in relation to soil fertility management, cattle manure timing of application, placement methods, rates and the combined use of manure and organic fertilisers to maximize crop yields, boost farmer economies of scale and provide better food security;
2. Governments should sensitize farmers and decision makers about the long-term benefits of sustainable manure management and develop appropriate policies for manure management ;
3. Governments should create an efficient link between experts and farmers to access knowledge and technical assistance to accelerate action and access financing;
4. Policy makers, including UNFCCC negotiations, should enact policies & strategies to identify issues on nutrient use and manure management, in order to implement relevant interventions and means of implementation;
5. Public and private actors should enhance access to quality and affordable agricultural inputs;
6. The research institutes and other relevant non-state actors should be better supported (i.e. capacity building) to be able to

¹ "Foundation of Netherlands Volunteers"

continuously monitor the manure fertiliser use programme and guide on the soil nutrient gaps as well as related environmental concerns;

7. The farmers and agro-processors should access more capacity-building initiatives on sustainable farming practices, nutrient use and manure management approaches: especially on proper utilisation of (organic) fertiliser.



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