

Research Application Summary

Contributing factors to the siltation of valley dams: Case of Karamoja Region, Uganda

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Abstract

Pastoralism is the main livelihood of the people in the Karamoja region of north-eastern Uganda with 80% of households owning cattle which represents 20% of the total livestock population in Uganda. The region has an arid and semi-arid climate with average annual rainfall ranging between 350-1000mm per year. Water scarcity as a result of the low rainfall is a major obstacle for humans and livestock production. To remedy this challenge the Government and development partners constructed valley dams to store water for use during time of scarcity. Despite their importance, the valley dams are faced with siltation that threatens water availability and the livelihood of the people. To gain a better understanding of the factors that contributed to the siltation of the valley dams, this study looked at both human and natural factors that affect siltation in the Karamoja region. It was concluded that human factors were the major factor that contributed to the siltation of the valley dams.

Key words: arid areas, Karamoja, livelihood, semi-arid areas, Uganda, water

Résumé

Le pastoralisme est le principal moyen de subsistance des habitants de la région de Karamoja au nord-est de l'Ouganda, 80% des ménages possédant du bétail, ce qui représente 20% du cheptel total en Ouganda. La région a un climat aride et semi-aride avec des précipitations annuelles moyennes comprises entre 350 et 1000 mm par an. La rareté de l'eau en raison de la faible pluviométrie est un obstacle majeur pour les humains et pour la production animale. Pour remédier à ce défi, le gouvernement et les partenaires au développement ont construit des barrages de vallée pour stocker l'eau à utiliser en période de pénurie. Malgré leur importance, les barrages de la vallée sont confrontés à un engorgement qui menace la disponibilité de l'eau et les moyens de subsistance des populations. Pour mieux comprendre les facteurs qui ont contribué à l'engorgement des barrages de la vallée, cette étude a examiné les facteurs humains et naturels qui affectent l'engorgement dans la région du Karamoja. Il a été conclu que les facteurs anthropiques étaient le principal facteur contribuant à l'engorgement des barrages de la vallée.

Mots clés: zones arides, Karamoja, moyens de subsistance, zones semi-arides, Ouganda, eau

Introduction

The Karamoja region is located in the North Eastern part of Uganda on Latitude 1°30' and 4°N and Longitude 33°30' and 35°E and covers an estimated area of over 27,200 km². The area is administratively divided into seven districts, namely, Napak, Amudat, Kaabong, Nakapiripirit, Kotido, Moroto and Abim. It has a population of 1,372,386 million people. Pastoralism is the main livelihood of the Karamojong with 80% of the households owning livestock which represented 20% of the total livestock population in Uganda (Mugerwa, *et al.*, 2014). The Ministry of Agriculture, Animal Industries and Fisheries/Uganda Bureau of Statistics estimated the population of livestock in the Karamoja region at 5,964,755 in 2008. The climate of the region is arid and semi-arid with a unimodal rainfall pattern, varying between 350-1000 mm per year which is among the least in the country and as such, water availability is a major constraint for humans and livestock production (Nalule, 2010). Rainfall failures has often resulted into loss of livestock and this has forced the herders to walk for long distances in search of water especially during dry season when some water sources such as seasonal streams and rivers on which the cattle depend dry up. This is made worse by the effects of climate change where rainfall has been more erratic.

To remedy this challenge the Government of Uganda and Development Partners constructed 46 valley dams under the water for production programme in the region to store water for livestock, human and other uses (Avery, 2014). Despite the important role played by the valley dams, their functioning has been under threat from siltation (Mugerwa *et al.*, 2014; Government of Uganda, 2018). In the Karamoja region, siltation has affected water quality and quantity, reduced storage capacities and lifespans of the valley dams resulting into conflicts among water users, flooding, and death of animals especially the young, sick and old ones. Though siltation is not a new phenomenon and no valley dam is immune from it, the rate at which it occurs can render the whole project useless. According to Lwenya and Yongo (2010), the rates at which individual dam loses their water storage capacity vary according to size of the reservoir, its trap efficiency, supplying watershed, soil type, climate, land use and conservation practices. To gain a better understanding of the siltation problem in Karamoja, this paper reviewed the major factors which contributed to the siltation of valley dams in the region.

Factors contributing to the siltation of valley dams in Karamoja region.

Siltation is an offsite effects of soil erosion that is influenced by natural factors and accelerated by human activities. Natural factors that influence soil erosion includes the area geology, climate, relief and vegetation cover while the human factors that accelerates soil erosion includes any human activity that affects vegetation cover such as farming, deforestation and infrastructural developments.

Sub-standard work. Many valley dams were built without appropriate engineering work, hydrological investigations and designs and as such the constructed dams often fail to store water and/or experienced excessive silting (African Development Fund, 2002). Some valley dams constructed with funding from the Government did not meet the required standard specified in their contract documents. This has been attributed to corruption and

lack of accountability. Poor dam designs and workmanships have been observed for the siltation of valley dams such as Kailong in Kotido district, Kawomeri in Abim district and Motpodereva in Amudat district (Mugerwa *et al.*, 2014).

Management challenges. The valley dams under water for production programme were constructed by the central government with limited involvement of the local authorities and the local people. In practice, the central government signs a contract for the work with a company. The company goes down with a team of workers and does the work (Avery, 2014). The project is only handed to the community and local government after completion (Office of the Auditor General, 2014). As such, the communities have developed a tendency of looking at themselves as recipients and others as providers. Although the Government has formed water user committees tasked with the operation and management of the valley dams, most of the formed management structures only exist on papers. In addition, the water user committee's membership was voluntary, they lacked facilitation, adequate skills and equipment required to manage the valley dams especially the large and deep ones such as Nakicumet and Kobebe valley dams. Moreover, vandalism of valley dam structures by the Karamojong is a common practice in the region. Installed pipes and metals are often removed by the herders for making bangles for beautifying themselves and spears for hunting. At Kaloe valley dam for example, the watering troughs have been destroyed and the water pipes leading to the trough from the pumping borehole disconnected.

Direct animal watering. Direct watering of cattle in the valley dams is a common practice among the pastoral communities even in areas where animal drinking troughs exist (Mugerwa *et al.*, 2014). This habit is promoted by lack of knowledge on the effects of direct watering, high animal density, poor construction designs and communal ownership, among others. Direct watering also contributes to the pollution of the valley dams due to direct defecation and urination of the livestock into the dam. Kobebe valley dam which is a source of water for livestock from Kenya, South Sudan and Uganda suffered from direct watering and high livestock densities. According to Moroto district authorities, the dam supported about three (3) million livestock within a period of five years after its completion.

Land use. Cattle are a major source of livelihood for the inhabitants of Karamoja region. Cattle are used for social and economic purposes such as food, barter trade, ploughing, payment of dowry and for prestige. Increase in livestock population and convergence of different pastoral groups especially during dry season on major valley dams has resulted into environmental degradation through overgrazing, soil compaction and soil erosion with an offsite effect of increased siltation of the valley dams such as Kobebe in Moroto district and Nakicumet in Napak district (Mugerwa *et al.*, 2014). Faced with rapid increase in population, climate change and reducing land resources for cattle in addition to efforts by development partners and the Government, the Karamojong are now diversifying their sources of livelihoods through mining, sale of woods, burning of charcoal and engaging in small-scale agriculture (Egeru *et al.*, 2014). Increase in crop farming in the region has been favored by loss of livestock to raids and diseases. These activities constitute a major pressure on land resulting into soil erosion. For example, mining of gold and other minerals in the Karamoja sub-region contributes large quantities of sediments in the rivers and valley dams (Houdet *et al.*, 2014).

Climate change. Climate change has led to increased variabilities of rainfall, temperature, humidity and other climate variables. Rainfall has become very erratic. Increase in flood intensities and frequencies result into deposition of un-proportionally large quantities of silts into valley dams thus reducing their storage capacity. This is the case especially of flash floods in the Karamoja region (Nalule, 2010). Rainfall scarcity especially during dry seasons resulted into drying up of many water sources for livestock. Pastoralists are forced to congregate at the few remaining water points resulting into high animal densities. The high animal density results into overgrazing, soil erosion and siltation of the dams. Kobebe valley dam in Rupa sub-county of Moroto district has experienced degradation because it is a meeting point for livestock from the Karamoja and Turkana region in Kenya during periods of rainfall scarcity.

High rainfall erosivity. High rainfall with very high intensities received within a short time coupled with low vegetation cover has contributed to massive soil loss and siltation of valley dams in the Karamoja region (Egeru *et al.*, 2014).

Relief. Silting of valley dams in the Karamoja region has been influenced by the relief of the area. The north and south parts are hilly but mountains and plateaus also exists. The hilly areas coupled with steep slope increase the erosive power of water resulting in to higher sediment loads and excessive siltation of valley dams (Nalule, 2010).

Low vegetation cover. Vegetation cover in the Karamoja region is generally low. The region is dominated by savannah grassland and isolated woodlands. This is as a result of low rainfall amount that ranges from 350-1000 mm per year. The available vegetation is further affected by over grazing, bush burning, deforestation and unsustainable small-scale farming practices. The low vegetation cover exposes the soil to water erosion (Nalule, 2010; Egeru *et al.*, 2014). The overall impact is that much soil is eroded and deposited in the valley dams causing siltation.

Conclusion

The paper review focused on both human and natural factors that contribute to the siltation of valley dams in the Karamoja region of Uganda. The review concluded that most of the factors that have contributed to the siltation of valley dams were anthropogenic in nature.

Recommendations on reducing the rate of siltation of valley dams in Karamoja region

- To improve ownership and management of the valley dams, the Government should involve the local authorities and the communities right from the start of the project. They should be able to participate in the project design, implementation and its management after completion. Stakeholders consultation and sensitization on valley dam projects are key to its sustainability.
- The Government should come up with mechanisms to enhance the supervision of construction work to ensure quality and reduce the chances of corruption.
- There should be continued capacity building support to the water user committees and local government officials, provision of manuals and equipment for the operations and maintenance of the dam by the central government.

- Site suitability assessment surveys must be conducted with in-depth analysis of both social and natural factors that may affect the project. Community views, local knowledge and existing community power structures and distribution of water resources should be clearly taken care of.
- New valley dam projects must take in to consideration sediment management options, build separate cattle drinking troughs to avoid direct water drinking by livestock. Major maintenance operations for the partially functional and non-functional valley dams have to be launched to ensure desilting and repair of damaged dam structures such as cattle drinking troughs.
- Soil and water conservation measures including mass tree planting has to be promoted by leaders from the central government and local administrations.

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