

Research article

Improving farmers group resilience to climate change risks through circular economy in Fort Portal, Uganda.



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Climate change: the impact on Fort Portals' farmers.

Climate change is not something new. The first scientific discoveries were made early 19th century. During the last decades it has become clear that humanity faces a great challenge in protecting itself from the effects of climate change and reversing global warming. This process needs a large reserve of resources, something that local farmers in many developing countries do not have. Stresses caused by increasing temperatures and changes in precipitation are very likely to reduce cereal crop productivity affecting the food security in the sub-Saharan continent and have the potential to increase existing threats to human security including food, health, and economic insecurity. A farmer from Fort Portal stated that "Crops that I used to grow in the 1990s, when I grow them these days they don't give enough yield" (Africa talks climate, 2010). Surveying 125 farmers in the Fort Portal area as part of the research showed that farmers face significant precipitation related climate change hazards. Heavy unpredictable rains are a great cause for concern, while simultaneously a lack of rain is causing droughts impacting their livelihoods.

Circular economy of sanitation and solid waste management for agriculture.

This research article is investigating the implementation of the circular economy of sanitation and solid waste management for agriculture programme in Fort Portal, Rwenzori Region of Western Uganda by WASTE advisers on urban environment and development. The main programme objective is to strengthen the local circular sanitation economy model for agriculture. The programme aims to focus on the production of co-compost as their main waste re-use activity. The 'circular' aspects of producing co-compost involve the re-use of organic waste and its nutrients by collecting, recycling and applying co-compost in agriculture. Faecal sludge is included to both manage a piece of the overwhelming human waste management problem as well as enhance regular compost for a nitrogen-rich soil improver for agriculture application.

A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the 'take-make-waste' linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources. (Ellen Macarthur Foundation, 2020)

Applying [co-]compost in agriculture returns crucial nutrients like carbon and nitrogen to the soil, thereby closing the 'loop' and strengthening the circularity of resource use. Furthermore, using organic solid waste and faecal sludge prevents it from being dumped in the natural environment and especially in close proximity to inhabited areas, addressing the health and environmental hazards for local households and preventing environmental pollution.

Potential of climate change mitigation and adaptation through (co-)compost.

(Co-)compost has several mitigation and adaptation benefits. Mitigation of climate change impacts can be done through 1) carbon sequestration by adding and storing carbon from organic waste and faecal sludge in the soil; 2) using (co-)compost as an alternative for chemical fertilizers; 3) decreasing waste pollution and thereby methane emissions by recycling organic waste and faecal sludge.

Applying (co-)compost can also increase adaptation capacity of farmers by 1) improving yield and crop quality; 2) improving soil conditions with an increase in water retention capacity and micro organisms/nutrients; 3) safeguarding local natural resources by preventing waste & faecal sludge pollution of the local ecosystem.

Evaluation reports of the programme by (Gupta, 2019) and (Rajkumar, 2020) in Nilgiris, India showed that the most direct benefits for farmers when using (co-compost) are higher financial and natural capital. Financial capital through higher agricultural outputs and cost reduction of replacing chemical fertiliser. Higher natural capital due to the improved soil conditions and better ecosystem conservation via the recycling of organic waste and faecal sludge.

Research

The research conducted in Fort Portal looks at the potential of producing and applying co-compost to increase resilience and adaptation to climate change. Climate change poses a huge risk for the livelihoods of farmers in Fort Portal. Increasing climate change adaptation is increasingly important for already-vulnerable communities. WASTE supported this research to find out more about how its programmes can build climate change resilience (in this case amongst farmers, a key piece of the Fort Portal community). The objective of this research was to understand how climate change impacts farmers in Fort Portal and how the programme can work to increase their resilience to climate change.

In this context resilience is defined as the capacity to absorb extreme events, adapt to hazards and transform to a less vulnerable life, in particular affecting the Ugandan communities' main livelihood source, agriculture.



Simplified circular economy model

Improving livelihoods is part-and-parcel of the Financial Inclusion Improves Sanitation & Health (FINISH) Mondial programme, the context in which this study was undertaken.

Methodology

To research the impacts of climate change on farmers and how the FINISH Mondial programme can contribute to increasing their resilience, 125 farmers in the Fort Portal region were surveyed. The farmers are linked to five farmer groups. These groups are male, female and mixed groups located in the south, east and west division of Fort Portal, Uganda. The group sizes are between 20 and 31 farmers per group of which 68 are female and 57 are male.

Respondents were asked to score their 'subjective resilience'. Approaching resilience of the target group subjectively means that their resilience (the ability of households to cope with, adapt to and transform) is measured according to their personal experience and perspectives. One of the main advantages of measuring subjective resilience is that it offers a view into the perspective of those who are most familiar with the local context and the factors that contribute to their resilience: the people themselves (Jones & Tanner, 2016). Households have been experiencing the impacts of climate change for multiple years and have developed a good understanding about their capabilities and capacities to deal with the disturbance and changes. Furthermore, subjective resilience is described by the households themselves using scoring statements, rather than by a 'development expert' who may use their own scientific or academic methods (Diener, 2009).

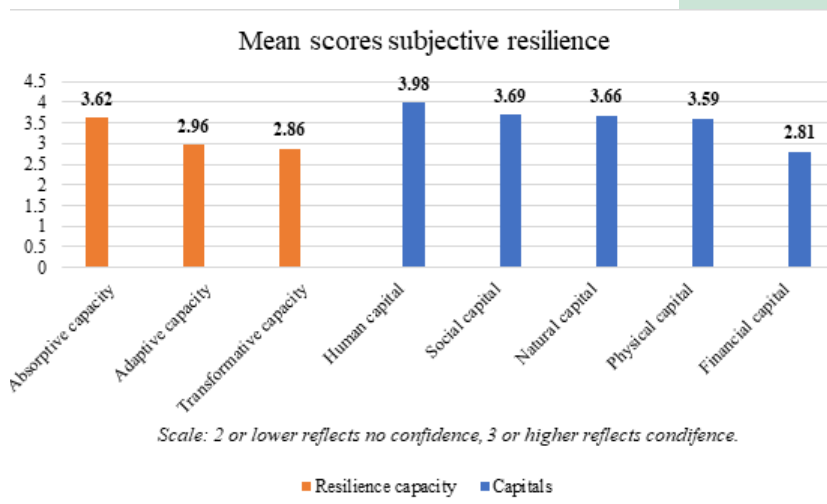
Therefore, this study aimed to centre a bottom-up perspective of the primary data collection. The farmers' level of worry and perceived impact of climate hazards, confidence in their own capacity to absorb extreme future climate events, adapt to hazards and transform to a 'less vulnerable' life were analysed using mean scores, running paired samples T-tests to look for statistical differences and a single factor analysis to identify possible underlying relations among the survey data.

How resilient are farmers in Fort Portal?

The study found that farmers in Fort Portal, Uganda face significant precipitation related climate change hazards. Heavy unpredictable rains are a great cause for concern, while simultaneously, a lack of rain is causing droughts and impacting their livelihoods. Subjective measurements indicate that absorptive capacity of the target groups show no sign of great weaknesses. The latter means that farmers are confident about their ability to absorb the impact of a worrying climate hazard. Farmers are less confident about their (adaptive) capacity to adapt their practices and livelihood to a changing climate and (transformative) capacity to permanently transform their livelihood in the face of climate change hazards, which seems to be underdeveloped. This underdevelopment poses a risk by holding back their future adaptation towards climate change hazards. In practice it means that farmers do not have the means to transform their way of living into a climate resilient sustainable livelihood.

When looking at the livelihood capitals, financial capital was highlighted to be the least developed of the group survey. On average, males report a lack of confidence in, and do not recognise the importance of financial capital in the event of a climate hazard that they reported worries them the most. Especially males with no secondary income reported to share this belief. The data shows male farmers self-report lack of financial capital more than female farmers, but more research is needed to verify discrepancies in perception versus reality of financial capital.

Evaluation studies show a contribution of the FINISH Mondial programme mainly towards financial capital and natural capital via the application of co-compost. But it does not stop there.



Mean scores of subjective resilience in livelihood capitals and resilience capacities.



Surveying subjective resilience of farmers in the Fort Portal area, Uganda.

WASTE can show its commitment to making farmers more resilient to climate change by implementing the suggested three entry points outlined below. These entry points are suggested based on the research findings and create an all-in approach via which WASTE can validate its potential of creating more climate change resilience amongst the farmers in Fort Portal as part of their holistic approach to strengthening the local circular sanitation economy.

Increasing farmers' resilience to climate change.

This research has also identified three entry points to increase the resilience capacity of the farmers. Besides known the climate change mitigation and adaptation potential of (co-)compost these action points provide an advise according to the specific context based on the survey data.

- The first entry point looks at diversifying the income of the most financially underdeveloped group of farmers in Fort Portal. This can be done by assisting them in finding a secondary income in one of the main programme activities or related sanitation economy markets (e.g. renewable energy production, pit-emptying, masonry, soap-making, etc.).
- The second entry point entails facilitating better access to micro-finance to link farmers to the programmes existing financial inclusion model. This would allow them to invest in climate-smart innovations (including co-compost, irrigation technologies, etc.) and building their capacity to adapt to the identified increasing climate hazards including both unpredictable [heavy] rain, lack of rain and drought concerns.
- The third entry point entails tapping into the farmers expressed willingness to learn new sustainable farming practices. Capacity can be built with farmers to adopt (co-)compost and new sustainable farming practices, eventually strengthening their 'adaptive' capacity. This supporting environment can be created by partnering with agricultural knowledge institutions/organisations to link the circular sanitation economy and agriculture sector.

Why does this research matter?

First and foremost is the hands-on advice that this research provides for the programme. By implementing the entry points described above, the FINISH Mondial programme's foray into strengthening the circular sanitation economy for agriculture can contribute to the development of climate change resilience amongst the target group. This will strengthen the programme's multi-faceted, inclusive approach which not only creates a more sustainable agriculture and waste management (with the production of (co-)compost), but also develops higher resilience to climate change amongst a significant livelihood group in Fort Portal.

This initiative may also demonstrate the need for a cross-sectoral approach to the Sustainable Development Agenda, open up more partnership and funding opportunities,



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where sanitation programmes could be seen as simultaneously strengthening climate change mitigation for vulnerable populations. More funding opportunities may also mean that such programmes can include more specifically vulnerable groups to strengthen financial inclusion and improved livelihoods, building capacity for agricultural communities to address their sanitation needs while future-proofing their main livelihoods to the impacts of climate change.

This research aimed to examine one piece of how circular [sanitation] economy initiatives can be linked to agriculture in Fort Portal, Uganda, as a foundation for developing climate change adaptation programmes, despite being a relatively new concept.

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