FOOD SECURITY AND NUTRITION CLUSTER

On-going research:

Researchers: **T Madanzi and W Mahohoma**
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Faculty of Agriculture and Natural Resources Management

Research Topic: Assessment of streambank cultivation and its contribution to greenhouse gas emission, water pollution and environmental degradation in the Midlands Province of Zimbabwe.

Project Description

Extreme weather events like droughts due to climate change have seen many farmers resorting to stream bank cultivation. Sustainability and viability of this system is hinged on the maintenance of natural resources through reduced soil disturbance and degradation. Water and soil being key resources, must be jealously guided through farmer education on deforestation and stream bank cultivation. ln addition proper organic practices like fertilizer and pesticides application; and irrigation by smallholder vegetable producers are pivotal to stay clear of land degradation as well as maintaining sound biodiversity especially in water bodies. Very little is known on the impact of stream bank cultivation on physical, biological and chemical changes in riverine systems in Zimbabwe. In Zimbabwe cultivating within 30m of river or stream is prohibited. Despite these laws being enforced, poverty has driven many disadvantaged household to cultivate crops such as vegetables along the river/stream banks. Due to intensive crop production along streams and rivers, excess supply of nutrients (eutrophication) from both inorganic and organic sources has led to deterioration of water quality (Moyo and Phiri 2002), and has led to the disruption of the natural functioning of the riverine ecosystem (Bere, 2007). To match high crop productivity , farmers increase application of organic and inorganic fertilisers beyond the recommended levels resulting in loss of nutrients particularly nitrogen through leaching into the streams, rivers, ground water bodies is lost as greenhouse gas for example nitrous oxide (N2O) (Masaka et al., 2014). Proper nutrient management in intensive crop production systems becomes critical for sustainable production of the system through developing nutrient management systems that do not pollute the environment. In order to meet high levels of production, farmers have also resorted to use of pesticides to control pests and diseases which in turn are washed away in to the riverine systems. There has been very little attempt in investigating the changes in biota along the course of the riverine and relate these changes to changes in water quality. In Zimbabwe, it is estimated that 50-70 tonnes of soil are lost every year per hectare. (Scoones 1997) Stream bank cultivation has potential to result in higher loses of soil as farmers plough within the stipulated 30m from the river or stream and biodiversity.

Siltation of rivers and dams downstream due to erosion has potential to reduce both agricultural activity and ecosystem goods and services. Poor agronomic practices along stream banks which lead to erosion also have potential to cause land degradation.

Researchers: **W M Chiota and P Chaibva**
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Research topic **:** Growth and yield response of cowpea (*Vigna unguiculata* (L.) Walp to rock phosphate and *Tithonia diversifolia* amendments:

Research Description

Cowpea (*Vigna unguiculata* (L) Walp is an important grain legume in the dry savannah of the tropics (FAO, 2005). Cowpea has quick growth and rapid ground cover making it an important component of sustainable subsistence agriculture in marginal lands. Cowpea is adapted for drier regions where rainfall is scanty and sandy soils with little organic matter (Singh, 2005). In Zimbabwe cowpea is mainly grown for its dual purpose of leaf as well as grain harvest (Dube and Fanadzo, 2013). Phosphorus is critical to cowpea yield because it is reported to stimulate growth, initiate nodule formation as well as influence the efficiency of the rhizobium-legume symbiosis (Haruna and Aliyu, 2011). Phosphorus (P) insufficiency however is a chief restriction in crop production (Richardson *et al,* 2009) and the application of inorganic P Fertilisers in developing countries is restricted by the inaccessibility and prohibitive costs of acquiring these fertilisers (Van Kauwenbergh 2006). Therefore it is paramount importance to advocate for abundant and more affordable alternatives of P. Indigenous, unprocessed phosphate rocks (PRs) have gained recognition as prospective means of restoring soil productiveness (Schneider *et.al.,2009)* and where indigenous deposits of phosphate rocks (PRs) are available ,their use for application to soils is considered a relatively cheaper way of adding P. In the case of low reactivity phosphate rock, there may be need to amend them with organic plant residues to improve P availability. Among these low reactivity rocks is the Dorowa phosphate rock (DPR) mined here in Dorowa, Zimbabwe. Many resource-poor farmers depend on organic inputs to maintain soil productiveness (Batiano and Mokwunye 1991) and among the organic inputs applied are crop residues, multipurpose tree leaves and prunings, and livestock manure (Mafongoya et al., 2000). However , the majority organic soil improvements are deficient in P (Palm et al., 1997) they can improve soil parameters such as soil pH, exchangeable AI and Ca, which are closely related to P fixation. Probable reasons for this observation included the nutrient contribution and discharge of P,as well as indirectly by lowering or enhancing P fixing ability. In a study by Zaharah and Bah (1997), green manures (GM) were found to increase the extent of dissolution of PRs of low reactivity and reduced that the more reactive PRs. Commonly known as Mexican sunflower, *Tithonia diversifolia* is annual, aggressive leaf weed adaptable to most soils (Jama et al., 2000; Olabode et al., 2007) and is efficient in absorbing nutrients (Liasu et al,2008). The elevated nutrient status, abundance and adaptability of *Tithonia diversifolia* to various environments coupled with its rapid growth ,very high vegetative matter turn-over and near nil investment cost on its production makes it a suitable candidate for soil regeneration among smallholder farmers. Integrated use of organic soil amendments with modest rates of locally available inorganic P sources like phosphate rocks could be a cheaper and more appropriate option for small peasant farmers in terms of reduced costs, increased yields and enhanced sustained soil fertility.

Researcher: **M Chandiposha**
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Faculty of Agriculture and Natural Resources Management

Research Topic Agricultural Extension workers' knowledge, attitude and decision making systems about climate change in Midlands Province.

Research Description

The project aims to collect information and knowledge, attitude and decision making systems from agricultural extension workers in the Midlands Province. That information will help to formulate adaptation and mitigation measures towards addressing climate change (UNFCCC 2007, Unganai (1996) revealed that climate change is evident in Zimbabwe basing on data generated 60 years ago. Lack of knowledge influence people's willingness to act and support adaptation strategies of climate change (Tobler, 2012). Farmers are among the people who can worsen or reduce effects of climate change depending on their behaviour (UNFCCC, 2007). In Zimbabwe, most farmers work closely with Agricultural Extension workers and knowledge tend to flow from these to the farmers.

Researcher: **Munyaradzi Gwazane**
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Research Topic The effect of paclobutrazol on growth, quality and yield parameters of potato *(Solanum tuberosum)* varieties in the Lowveld of Zimbabwe.

Research Description

Potato is an important crop for its nutritional value (Ngwerume,2002 and Dean, 1994) and food security. Despite its importance, its production is limited by season and area. Potato is mainly grown during winter and in places which do not experience high temperatures, since this is important for tuberization. (Levy et al, 2007). High temperatures tend to promote vegetative growth at the expense of tuber production (Tsegaw and Hammes, 2004: (Tsegaw et.al, 2005) Alternatively, a chemical called paclobutrazol can be used on potato grown in the high temperature zones thereby breaking the barriers of seasonality and area preferences. The principal mode of action reported for paclobutrazol is through the inhibition of gibberellin biosynthesis and abscisic acid catabolism through its interference with ent-kaurene oxidase activity in the ent-kaurene oxidation pathway which are the key steps in gibberellic acid biosynthesis (Rademacher 1997).

***Researcher*:** **C D Hahlani**
Department of Developmental Studies

Faculty of Arts

***Research topic*:** A comparative study of key management issues in Rozva and Fuve- Panganai small scale irrigation projects of Masvingo Province in Zimbabwe.

Research Description

This research project is aimed at a comparative assessment of the key issues or factors in the management of Rozva and Fuve- Panganai small scale irrigation projects. Studies on small scale irrigation interventions have yielded missed results. Six studies of small –scale irrigation systems in Nepal and Bangladesh provide evidence that irrigation can sustain and improve rural livelihoods as part of an overall package or rural development measures (Bradeen et al). However in Swaziland ,despite so much effort and investment in rural water supply for irrigation purposes to improve rural household's food security through improved productivity, food insecurity still prevails in the country (Peter,2011). The study of irrigation projects in Mberengwa and Beitbridge districts of Zimbabwe found out that in Mberengwa district farmers had better incomes compared to Beitbridge district (Nhundu et.al, 2010) Thus, small scale irrigation projects have had a varied impact on livelihoods depending on specific issues or factors at play. Rozva, a 21 hectare irrigation scheme supporting 33 smallholder farmers from two villages in Bikita District of Masvingo province was established in 1994 and is located 80 kilometres from Masvingo town along the Masvingo –Birchenough highway- Fuve-Panganai, on the other hand at 300 hectares, is the largest irrigation scheme in Zaka District. The scheme is located about 100 km south east of Masvingo town in Ward 15 of Zaka District and was established in the mid-to-late 1980s) Small scale lrrigation in Zimbabwe was introduced in the 1930s and was initiated to boost Agricultural production through agricultural intensification particularly for farmers practising agriculture in Natural Regions lll ,IV and V where rainfall is erratic and unreliable. On the back of a comparative study of the two irrigation projects, it would therefore be interesting to find out some of the key management issues affecting the performance of irrigation projects.