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Community participation in transformation of rural livelihoods and climate smart farming technologies in the semi-arid lands of Kenya

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Semi-arid areas in developing countries continue to depend on rain-fed agriculture which is exacerbated by climate change and poor governance. Despite efforts and investments by governmental and non-governmental organizations to address the issue of food insecurity in the semi-arid areas of Kenya, the problem still persists. The communities have designed themselves to be resource poor whereas they are not. This paper argues that the communities have accepted their incapability to utilize their naturally occurring resources and foot their own development. Yet, there exist transformational models that have involved empowering communities to realize and reframe opportunities. The purpose of this paper was to document outcomes of transformational leadership model and its effectiveness on community participation and engagement in improving food security and climate change adaptation outcomes. The study involved key informant interviews and showed that the community Christian Impact Mission had transformed, engaged and empowered communities through mind-set change and green farming technologies with the locally available resources. Without any donor support, a semi-arid community in Yatta sub-county has since successfully footed their own development, realized food security and engaged in sustainable and climate smart agricultural technologies. The study argues therefore, that participation and inclusivity of communities by development organizations is imperative for realization of food security and climate change mitigation and adaptation actions.

Key word: Community, empowerment, food security, transformational, leadership.

INTRODUCTION

About 153 million individuals, that is, 26% of the population above 15 years of age, in sub-Saharan Africa suffered from severe food insecurity in 2014/15 (FAO, 2015). Food insecurity is accelerated by huge food bills due to the high food prices and changing climate. This leaves the food insecure communities to rely on food relief. Yet food relief makes the locals develop a fatalistic mind-set that they are resource poor.

Amongst this population, about 10 million people live in ASAL areas which cover 80% of Kenya's land mass.

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Over 60% of these people live below the poverty line (IFPRI, 2016). These households usually have scanty savings and few other sources of income to cushion them from external shocks. The households' vulnerability is further acerbated by reliance on rain-fed agricultural production and the negative effects of climate change that pose threat to agricultural productivity. The government of Kenya has ratified sound legislations to deal with the changing climate and importantly conserve the natural resources for future generations. However, most often than not, the legislations are theoretical and take a top-down approach that excludes local communities' participation.

Usually, people are aware of their turbulent environmental concerns, e.g. water scarcity, land degradation, climate variability, exploitative brokers and poor infrastructure that all contribute to household food insecurity. However, lack of involved engagement of the local community perpetuates the environmental and social concerns, e.g. food insecurity and the communities remain trapped in cycles of poverty and hunger. The Kenya Constitution 2010 is cognizant of community participation in sustainable management of natural resources (Muigua et al., 2015). However, the communities do not always benefit from resources geographically located in their areas (Muigua et al., 2015; Mutune et al., 2015). This study argues that communities can contribute to sustainable management of natural resources and achieve food security. They can also utilize natural resources to attain direct benefits from the natural resources they privately own. However, this requires transformational leadership for community empowerment and participation so that community can have a mind-set change that in turn helps them find their own footing.

A community that lacks empowerment, participation and transformational leadership is destined to dependency and manipulation because the communities accept their incapability to solve their problems. For instance, perennial reliance on food aid/relief promotes powerlessness and dependency syndrome and people cannot chart their own destiny and consequentially inequality, hunger, poverty and exclusivity. Yet, there are cases of transformative leaders and strategies that have transformed an impoverished community that depended on hand-outs to one that can drive its own development agenda even without external donor funding (Masika, 2016). These leaders involve their followers to creativity and approaching old situations in new ways. Transformative leaders are described as those who help others to do more than they originally intended and often even more than they thought possible (Bass and Riggio, 2006; Hall et al., 2012). These leaders set more challenging expectations and typically achieve higher performance (Bass and Riggio, 2006). Transformative leaders are charismatic, inspirational, intellectually stimulating and considerate of their followers. These leaders reframe opportunities so that the physical environment is transformed from a situation of threat, e.g. deforestation, water scarcity and soil erosion into a situation of opportunity. There exist some models that have led communities to self-discovery and mind-set change for transformation and adaptation to climate change (Maathai, 2010a).

However, there are scanty studies that have documented the effect of transformative leadership and community involvement in poverty and hunger alleviation. Thus, there is imprecise documentation of the nexus between the community transformational leadership models, sustainable food security and environmental resilience. This study was undertaken with the objective to evaluate impacts of transformational leadership in enhancing food security and sustainable development in the semi-arid Yatta Sub County in Kenya. The case studied here was informed by input from operation *mwolyo* out (OMO) community initiative and confirms that community involvement is imperative and a core ingredient for strengthening the inclusivity and effectiveness of food security and climate change mitigation/adaptation legislations.

Conceptual background and hypotheses

A model of transformational leadership for community empowerment in food security

The process of enabling communities to increase control over their lives is key. Empowering leadership means providing autonomy to communities (Bass and Riggio, 2006; Lai et al., 2011). Transformational leadership refers to a leader moving followers beyond immediate self-interests through idealized influence (charisma), inspiration, intellectual stimulation, or individualized consideration (Bass and Riggio, 2006; Lai et al., 2011). Transformative leadership elevates the followers' level of maturity and ideals as well as concerns for achievement, self-actualization, and the well-being of themselves, others (intergenerational equity), the organization and society. The community is allowed and encouraged to direct and control themselves in carrying out their responsibilities in achieving their goals (Bass and Riggio, 2006; Jahan, 2010). Transformative leadership inspires the community to manage and control their own natural resources sustainably. In this case, transformational leaders steer a community from a situation of impoverishment and hopelessness towards food sufficiency and sustainability. With transformative leadership, a community is an empowered community; a community that is with an enhanced sense of collective sense of efficacy which in turn lead to enhanced team's effectiveness.

Similarly, idealized influence and inspirational leadership are displayed when the leader envisions a

desirable future (for instance stability in food security and environment). The leader articulates how it can be reached, sets an example to be followed, sets high standards of performance, and shows determination and confidence. Followers want to identify with such leadership (Bass and Riggio, 2006; Erkutlu, 2008). This way, a transformative leader will involve the community to realize that they are not resource poor but rather encourage intellectual stimulation. Intellectual stimulation is displayed when the leader helps and involves followers to become more innovative and creative so as to overcome societal and environmental concerns. For instance, adapting crop diversification/intercropping to overcome poor nutrition and soil erosion.

Moreover, the transformative leader pays attention to the developmental needs of his/her followers and support and coach the development of their followers, thus individualized consideration is displayed. Communities' best understand their own felt needs and what development issues need prioritization. Thus, a transformative leader allows community participation and delegates assignments as opportunities for growth and sustainable development (Bass, 1999; Burns, 1978; Bass and Riggio, 2006; Erkutlu, 2008; Maathai, 2010b).

Description of study area

Yatta is located in Machakos County which is part of former Eastern province of Kenya. It covers an area of 1,057.30 sq. km and has a population of 147,579 (KNBS, 2009). The constituency is made up of five wards, namely Ndalani, Matuu, Ikombe, Katangi and Kithimani. Like the greater eastern region, Yatta's climate is semi-arid and receives unevenly distributed and erratic rainfall range of between 500 and 1300 mm. The main source of livelihood for the people of Yatta is subsistence farming, whereby they grow mainly maize, millet and sorghum which are conducive for the dry conditions and also livestock keeping such as cattle, goats, pigs and sheep. According to Kenya National Bureau of Statistic's Integrated Household Survey (2009), poverty levels in Machakos County were at 59.6% against a national average of 47.2%.

The populace mostly relies on rain-fed agriculture and maize is the staple crop but the rainfall has become more erratic with effects of climate change. To cope with loss of livestock and poor crop production, communities in Yatta became solely dependent on *mwolyo* (relief food) from either the National Government or Non-Governmental Organizations (NGOs) operating in the region. The food relief made the locals to develop a fatalistic mind-set that they are resource poor. Yet, Yatta has seemingly rich red-loam soils and beautiful hilly terrain that is perfect for tourist attraction through hiking safaris, camping and ecotourism (Machakos County Integrated Development Plan, 2015).

Yatta constituency is dominated by dry bush with trees scattered within the savannah in the higher areas. The hilly parts were once forested land but have undergone massive deforestation due to demand for agricultural land which started immediately after the colonial period. However, pockets of forest are still found along the rivers, ranges and hilltops.

The Christian Impact Mission (CIM), a Non-governmental Christian development agency based in Yatta, trains farmers on tools for holistic community transformation. The integrated approach has included mindset change, training on green farming techniques and technologies aimed at ensuring sufficient crop and livestock production and sustainable utilization of the natural resources.

MATERIALS AND METHODS

Study design

This study employed qualitative approaches to evaluate the impact of transformative leadership and community empowerment on sustainable food production, especially from the perspective of more environmentally turbulent community. The cross sectional study involved interrogation on the effect of CIM intervention on food security in the ASALs of Kenya.

Data collection methods

Both secondary and primary data were used to answer the study objectives. Primary data was collected through in-depth interviews and key informant checklist guide. The researcher purposively selected 39 key informants that were engaged in the CIM activities and thus could inform the study objectives (Table 1). The interview checklists were prepared before execution of the study. Also, participants' observations particularly making tours on the transformed farms and seminar presentation conducted by CIM leaders and followers informed the study objectives. Secondary data was gathered from published journals, books and CIM documentaries of transformation model in Makueni, Tanzania, East Pokot and Yatta.

Data analysis

The main goal here was to describe the impact of transformative leadership on food security in an ASAL region. The qualitative information gathered through interviews, seminars and informal discussions was transcribed and interpreted in the theme context analysis of transformative leadership and food security.

RESULTS

A transformational leader organization

The Christian Impact Mission's (CIM) transformational farm is impacting the ASAL regions towards sustainable food security. The CIM was founded in 1976 by Bishop Dr. Titus Masika as a free service to society. In 1987, the founder bought 42 acres of land in Yatta. However, it

Table 1. Overview of key informant interviews.

Stakeholder	Number of interviews	Number of respondents
Christian Impact Mission (CIM) Founder	1	1
Model farmers	8	10
CIM beneficiaries	20	20
CIM officials	8	8
Total	37	39

was not until 2005 when he relocated to Yatta. In 2009, the East African region witnessed drought that led to acute food insecurity and consequently death of people and livestock. These prompted the CIM founder to take action to free a people dependent on government food aid in times of famine.

The CIM initiated the programme dubbed Operation *Mwolyo Out*[1] (OMO) program in the county aimed at changing the mind-set of Yatta residents. Importantly, the OMO program, an initiative of the community, involved the community and identified their felt needs which chiefly included:

1. Water scarcity as a real hurdle to community empowerment and food security. Reportedly, water scarcity enhanced inequality among men, women and girls; because women and girls in the county had to walk over 23 km every day to fetch water. Sometimes girls missed out and dropped out of school in search of water or look after their younger siblings as the mothers went out to fetch water. The water fetched was ferried on the women's backs; which meant many of such trips per week strained the women's backs. With a sizable number of the men migrating to urban areas for 'greener pastures', this impacted negatively on their families' agricultural productivity, nutrition, health and security.

Thus, the community through the leadership of the CIM founder started the OMO initiative. Working together as a team, the community solved water paucity in six months. This team work was reported to operate through participatory excavation of water pans in every interested household. The households in round-turns helped each other to excavate the water-pans reportedly without any donor funds. The water pans were meant for harvesting green water run-off. During the study, more than 2000 households had excavated water pans in their homesteads.

2. Food insecurity depicted by the community's high dependency on external food aid. Key informants narrated that the OMO initiative used various climate smart strategies that were invented by the community themselves to reverse the situation. The sustainable water harvesting systems in the form of water pans enabled the community to grow diverse high value crops out of season. Some of the key informants attributed the OMO program to better agricultural income. Some of the crops grown, e.g. eye bullet chilies, garlic and tomatoes, were for export and had not been grown by farmers before the advent of the OMO program. Reportedly, because of the sustainable run-off water harvesting systems, the households had experienced a bumper harvest and increased disposable income in period of four months. However, study did not quantify the relative changes in income as an effect of OMO program.

(3) Illiteracy was the other challenge that the CIM and OMO program had to overcome. The OMO beneficiaries interviewed reported that previously, enrollment to school was relatively low because most households had employed child labour and their children had to spend most hours looking for water and off-farm employment. However, key informants attributed increased school and college/university attendance to OMO community initiative.

In general, because of the OMO community initiative, households had better access to water, markets, and good soil conditions. Moreover, the CIM founder provided the transformative leadership that communities initially lacked thinking critically and innovatively. With the OMO initiative, the community employed collective action to overcome their common felt needs. The following section presents the integrated approached that the CIM and OMO community initiative is employed in addressing the community concerns for sustainable agricultural production and food security.

Transformative and community empowerment approaches

Mind-set change

With climate change, rain-fed agriculture has continued to be very susceptible making the people in ASAL areas to remain food insecure. The food aid commonly known as *mwolyo* was a disaster coping mechanism among the Yatta community. The act of needy women in long queues waiting to collect food aid, mostly maize and beans, is known as *mwolyo* in the study area. Before CIM interventions, communities in Yatta became solely dependent on food relief from either the National Government or Non-Governmental Organizations (NGOs) operating in the region. Due to the hopelessness, many

youths engaged in drunkenness while some men decided to migrate to urban areas in search of opportunities leaving behind desperate single mothers taking care of children with *mwolyo.*

The beneficiaries of CIM program maintain that no community can change with a poor and static mind-set. The CIM refers to the poor mindset as the *MBOKS* mentality, that is, when the people have eyes yet they do not see, ears yet do not hear and brains yet have refused to think for their own good but instead to wait for outsiders (government and donors) to come, see, think and act on their behalf. As noted by Masika (2016), no community can change with a *MBOKS* mentality. For instance, the CIM leaders explained that the *MBOKS* mindset is assuming crops 'need' rain and without it nothing can be grown. That is, a *MBOKS* mind-set because crops just need water, any water, to grow and thrive. For instance, the area of study, Yatta sub-county, is endowed with rivers, including Tana River, an endowed ground water table and a good topography for rain water harvesting. Thus, according to the CIM leaders, the mindset change was about putting emphasis on sustainable water harvesting systems and irrigation instead of being dependent on rain-fed agriculture which is very susceptible to climate change. In effect, by the end of 2016, about 2000 households in the sub-county were reported to have water pans. Thus, the OMO program has become a successful blueprint for creating a self-sustaining community that have transformed from food relief dependency to becoming donors themselves.

The other community transformation and empowerment approach by the OMO program was planned development, systematic and orderly thinking processes. By implementing ordered plans and thinking, the value-chain was built to eradicate hunger and poverty. The training on systematic farming and planning approach had been implemented through the one acre rule strategy.

One acre rule strategy

Under the one acre rule plan, individual farmers were made to farm on one acre plots, each with a water pan for watering crops as opposed to rain-fed agriculture. This strategy also relied on off-season farming and market-led agriculture. Any crop planted and harvested off-season is regarded as a high-value crop because it fetches higher prices, when the supply is low and the demand is high. Under the one acre rule, farmers grow onions, tomatoes, capsicum, bullet eye chilies water melon and kales. Also, the availability of water meant households could grow fodder and fodder trees for the livestock. As a result, farmers diversified livelihood by keeping dairy cows and goats, fish, rabbit, pigs and poultry farming. The livelihood diversification was made possible by water availability, a situation that was different before the advent of CIM and the OMO initiative. A key informant recalled a plenteous harvest attributed to water availability from the water pans and earth dams, he had this to say:

"Water availability enabled us to start keeping livestock and plant new crop. Before CIM, there was no fodder, maize the commonly harvested crop never survived the erratic rains and the community was desperate and stuck in poverty. Now with the CIM and OMO initiative, we export crops like capsicum and garlic. The community has experienced a transformed mind-set and the CIM project has made us realize one does not need rain to grow crops but water which they could harvest through water pans. This fundamental change started with us and is here to stay. "

This was recounted seven months after the inception of the OMO initiative, unlike the eastern parts of the same region that did not have the OMO model and had to wait for rains to start planting.

The CIM transformational leadership blueprint has since been replicated with great success in other ASALs of Kenya, particularly in East Pokot, Baringo, Kitui and Makueni County. The CIM founder informed the study that for instance in Makueni, OMO had been implemented in over a dozen wards reaching over 800 people, ensuring water harvesting at domestic level and improving family lives. The model has also been adopted in Tanzania in collaboration with World Vision.

Climate smart adaptation strategies

When asked, key informants said that the community was aware that climate had changed and their most observable indicators included: rainfall variability, increased drought periods thus leading to loss of livestock and crop produce, and increased temperatures that led to more incidences of crop and livestock pest and disease in the area. To cope with the negative effects of changing climate, the community through the CIM program had taken up sustainable adaptation measures. Some of the innovative practices recounted and observed by the researchers included water pans for rain water, the one acre production rule, Zai pits, crop diversification, livestock diversification, zero tillage, agroforestry and homemade charcoal refrigeration system, as variously narrated above and by this key informant:

"Focus on removing farmers from 'poor mind-set' (mboks) mentality allows adoption of the model which ensures farmers participate in agriculture throughout the year and not wait for rainy seasons. By harvesting water, they are able to grow high value crops and also produce

enough fodder for dairy cows, improved goats, pigs, rabbit, chicken, duck and fish. It is a self-sustaining system that is less susceptible to climate change".

Water harvesting has enabled household to carry out farming off-season hence high value crops, and produce enough fodder for livestock. Notably, households diversified in agricultural production under the one acre rule are a mechanism for coping with the adverse effects of climate change. The use of water and soil conservation technologies, e.g. Zai Pits by more than 6000 households, guaranteed bumper crop harvests in Yatta. The agro-forestry practices that involved inclusion of nitrogen fixing leguminous trees, e.g. *Sesbania sesban*, (Sesban) and *Calliandra* spp. (Kaliadra) also served as animal feed and livelihood diversification strategy.

The Zai-Pits are run-off water harvesting systems with a diameter of 15 to 30 cm and a depth of 10 to 15 cm. The Zai-Pit concept collects rainfall and runoffs, promotes the efficient use of limited quantities of organic matter and ensures the concentration of water and soil fertility at the beginning of the rainy season.

The CIM farmers have built a resilient model which ensures climate variability does not lead to food insecurity in Yatta. With water readily available all the year, they have optimal adaptation strategy in the face of climate change. Unlike the CIM farmers, the non-CIM farmers are still dependent on rain-fed agriculture which is susceptible to climate change thus making them need *mwolyo* more often. In making a resilient and sustainable community, CIM has not worked and walked alone but with local communities, World Vision, Norwegian Church Aid, and County Governments.

DISCUSSION

Most rural households in Kenya, rely on a diversified livelihood portfolio with crop and livestock production being most prominent. These livelihoods are, however, threatened by the changing climate characterized by prolonged drought spells, erratic rainfall patterns, increased temperatures thus disease and pest incidences. These climate based factors result in food insecurity, particularly in the ASALs of Kenya and sometimes forcing households to rely on food relief from government and non-government institutions. However, there exist transformational leadership models that have involved and empowered communities to realize and reframe their own opportunities so that the environment is transformed from a situation of threat characterized by water scarcity, hungry people, emaciated livestock, crop failure, hopelessness and sometimes death of people and livestock, into a situation of opportunity and resilience.

When an uncertain, unstable and turbulent environment emerges like the case of Yatta Sub County, then transformational leadership in community empowerment becomes handy. Transformative leadership involves inspiring followers to commit to a shared vision and goals for a community, challenging them to be innovative problem solvers and developing followers' leadership capacity via coaching, mentoring and provision of both challenges and support (Bass and Riggio, 2006). The transformative leadership in Yatta Sub-county is synonymous with that of the Nobel Peace Prize Laureate 2004, the late Prof. Maathai. Maathai led the rural women from a state of degraded environment, water and fuel scarcity to one of adequate and nutritious food, incomes, enough energy for cooking and a healthy environment. This was achieved through sowing seeds of different sorts- the ones necessary to heal the wounds inflicted on communities (Maathai, 2010b). The wounds, e.g. water scarcity, had robbed the community of their self-confidence and self-knowledge. What became clear is that individuals within these communities had to rediscover their authentic voices. Consequently, democratic space was expanded where communities made decisions on their own behalf to benefit themselves, their community, country and the environment that sustains them. When communities experience self-discovery, they are able to participate in development and implementation of legislations.

For instance, Kenyan Climate Change Act 2016 has the guiding values and principles of low carbon climate change resilience and development. One approach into this is to ensure participation and consultation with the stakeholders, particularly, the community. The OMO initiative confirms the importance of community involvement and community engagement as essential components in effective climate mitigation and adaptation strategies (Yang, 2018; Wiseman et al., 2010; Brocklesby, 2003).

The other approach is practice of climate smart agriculture (CSA). Climate smart agriculture is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate (GoK, 2017). For instance, soil and water conservation technologies on farm including water harvesting not only results to improved farm yield and fodder for livestock but also contributes to conservation of natural resources, improved human nutrition and response to climate change effects. The climate change and mitigation strategies e.g. agroforestry adopted by the community not only eradicate food insecurity but results in reduced carbon emissions.

Besides, a community that realizes self-identity/ discovery via participatory identification of its own needs leads to provision of a solution not only contributing to sustainable development but also experiencing increased democratic space and culture of peace (Wangari, 2010a). The Yatta community demonstrated that in the process

of replenishing and reclaiming the environment, the communities help themselves (Maathai, 2010b). When the soil can produce abundant foods and adequate water, the community becomes more hopeful, peaceful and empowered.

The CIM enormously contributes to Sustainable Development Goal-SDGs particularly to end hunger (goals 1); poverty (goal 2), achieve gender equality (goal 5) through empowerment of the community, particularly women and girls. The availability of water means that girls spend more days in school and women relieve water fetching time for other productive activities. A food secure community with improved nutrition is a stable and peaceful community. Such a populace is likely to experience self-identity/discovery and hence experience an expanded democratic space. Moreover, the community is able to decisively elect its leaders and publicly participate in development and governance of a nation. The OMO project has transformed Yatta people from a land of women and men dependent on food relief to people who are now replenished and co-exist in harmony with nature. Thus, CIM is a blueprint case towards attainment of Kenya Vision 2030 and SDGs that articulate for improved environment, enhanced economic prosperity and resilient society.

CONCLUSION AND RECOMMENDATIONS

This case study has shown that poverty and hunger is a mind-set. Semi-arid areas and populace are not resource poor rather they have latent wealth. All they need is transformational leaders who can direct the community to realize tangible livelihood benefits and in return unleash their potential and capability to adapt to environmental concerns like climate change. Communities can foot their own development without external donor aid/funding. Therefore, in developing countries and in the ASALs of East Africa, community empowerment and engagement is imperative for the operationalization of environment and food security legislations for sustainable development. More broadly, the study concludes that the process of replenishing and reclaiming the environment requires realistic practices, inclusivity and decisive action at global, national, regional, local and household levels. A participatory and inclusive approach towards sustainability should therefore, involve maximum community participation in decision making and implementation of environment related legislations.

All development organizations seeking to improve human welfare and environment should involve communities in the design and implementation of possible interventions to their felt needs and with their locally available resources. The operation OMO transformative leadership model should be replicated in all ASALs of Kenya and beyond. The governmental and non-governmental agencies should recognize in their programs and plans, the climate smart agricultural strategies employed by farmers as mechanisms for adaptation and mitigation of climate change and sustainability.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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