



International Journal of Advance Research, IJOAR .org
Volume 2, Issue 3, March 2014, Online: ISSN 2320-9186

DAMMED AND DAMNED? CONSEQUENCES OF LARGE SCALE LAND USE CHANGES ON ENVIRONMENT, LIVELIHOOD AND FOOD SECURITY IN THE YALA SWAMP ECOSYSTEM, KENYA, EAST AFRICA

Agatha M. Nthenge¹, Romulus Abila².

1 Department of Environment and Resources Development, Chuka University, P.O Box 109-60400, Chuka, Kenya,

2 School of Water Resources Science and Technology, South Eastern Kenya University, P.O. Box 170 – 90200, Kitui, Kenya

Corresponding author: dheghe2002@yahoo.com or agatha@chuka.ac.ke

Key words:

Wetland conversion, Food security, Livelihoods, Yala swamp, Environmental Impact Assessment (EIA), Multi National Company (MNC), Corporate Social Responsibility (CSR)

Abstract

African wetlands are among the most productive ecosystems and as such play an important role in ameliorating the effects of global warming, biodiversity conservation as well as major source of natural resources which drives many rural economies. Yala swamp is a large fresh water wetland, a recognized biodiversity hotspot and support local livelihoods in the Lake Victoria basin in western Kenya.

This study evaluated the socio - economic and environmental impacts of converting large parts of the swamp to farming to support perceived food security. Primary qualitative data was collected from semi-structured questionnaires and in-depth interviews of randomly selected stakeholders. One hundred questionnaires were administered to the stakeholders who included men, women and youth. Secondary data was collected from published work, books, print and electronic media.

The results indicate that although the conversion of the Yala swamp wetland is contributing in Corporate Social Responsibility (CSR), there exists a strong conflict with the local community. Overall the local community and the environment have been negatively impacted and there will be long term negative consequences regarding environmental degradation, food security and livelihood opportunities. This study recommend that the Kenya government should commission a new Environmental Impact Assessment and enact and implement a strong wetland policy. There is also need for awareness creation and sensitization to enhance participation of local communities in decision making. Other livelihood diversification programmes to reduce dependence on the wetland are also recommended.

INTRODUCTION

Developing countries rely heavily on exploitation of natural resources like forests and fisheries for their economic development. This often leads to a conflict between the need for economic development and sustainable management of natural resources and conservation of biodiversity. Wetlands are some of such highly exploited resources (Maltby, 1986).

Wetlands in Africa are an important source of water and other resources necessary for survival of local communities. Wetlands are complex ecosystems with multiple values, including ecological, socio-esthetical, intrinsic and economic values. For example over 2,000 known species of indigenous freshwater fish and several wildlife species live in African wetlands (Roggeri, 1995). Socio-esthetical value is reflected, for example, in the tradition of some tribes to have initiation rites in wetland areas, while intrinsic value is the value residing in the wetlands themselves. Further ecological functions of wetlands include hydrological cycle and flood control, pollution and eutrophication abatement through sediment trapping as well as carbon sequestration hence mitigating global warming (Turner *et al.*, 1994). Economically, wetlands play an important role as a source of livelihood to local communities for example through supporting subsistence agriculture and commercial fisheries.

Despite their significant ecological, economic and social functions, wetlands are still among the least understood and appreciated ecosystems. The failure to account for the economic value (i.e. assign a 'Dollar equivalent') of tropical wetland benefits derived by local communities dependent on natural wetlands means that tropical wetlands are prime targets for 'reclamation' by national governments and, more recently by Multi National Companies (MNC's) for agriculture and other economic activities because they are often viewed as 'wastelands' (Mitsch and Gosselink, 1993). Sustainable management and utilization of wetlands is therefore critical to the long-term health, safety and welfare of many African communities. Despite their highlighted importance, wetlands are being modified and degraded, often driven by economic and financial motives at alarming rates in Africa in disregard to their long term sustainability and their important ecological functions (Schuyt, 2005; Mwakaje, 2009).

Study Area

The Yala Swamp, a 17,500Km² wetland located along the North-Western shores of Lake Victoria, Kenya covering the administrative districts of Siaya, Bondo and Busia, is one of the most extensive freshwater wetlands in East Africa (Fig 1). The wetland supports local communities that derives livelihood directly from activities like fishing, hunting, construction material production and agricultural production (Abila 2002). In addition, Yala Swamp has also been recognized as a biodiversity hotspot and an important refugium for conservation of cichlid fish diversity threatened by introduction of the exotic Nile Perch (*Lates niloticus*) and other anthropogenic impacts in the Lake Victoria basin (Abila *et al.*, 2008).

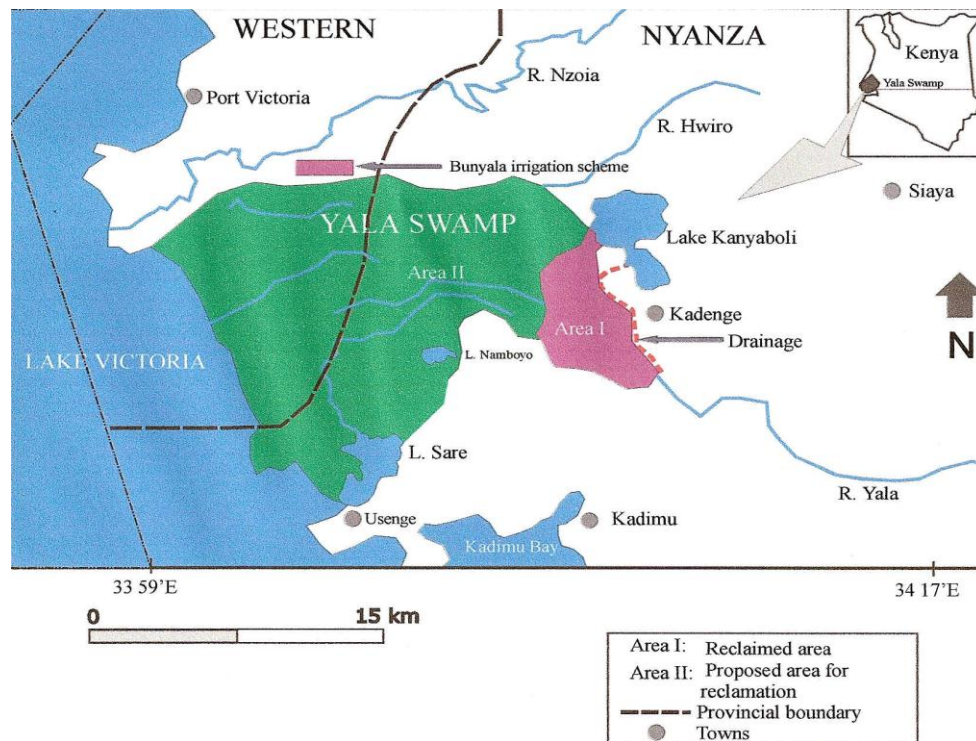


Figure 1: Map of Yala swamp Wetland in Kenya. Source: Abila *et al.* (2004).

In 2003, a US based multinational company, Dominion Group of Companies (herein referred to as Dominion Farm (K) Ltd), obtained a 25 year lease from the Kenya Government to convert part of the wetland for among other activities rice production and aquaculture. The activities of Dominion Farm (K) Ltd have since distorted the ecosystem utilization scenario and are likely to give rise to new socio-economic scenarios in the Yala swamp.

While the traditional economic utilization patterns of the Yala swamp wetland have been discerned and economic valuation of the wetland resources have been attempted (Abila, 2002, Mwakubo *et al.*, 2007), there is urgent need to assess the potential short and long term ecological and socio-economic consequences of the large scale land use changes as envisaged and currently being undertaken by the Dominion Farms (K) Ltd.

The goal of this study was therefore to critically examine the contributions and consequences of activities of the Dominion Farm (K) Ltd on land tenure and food security, environment and socio-economic development in the Yala swamp.

MATERIALS AND METHODS

Sampling

Data for this study was collected from the field at the Yala swamp, Kenya, between 1st May and 30th June 2008. The local communities who are the fundamental stakeholders in Yala Swamp were interviewed. During the first two days, a reconnaissance survey was done to map and identify suitable villages for selecting the respondents. Village elders and local administrators provided a list of households in their areas of jurisdiction. Thereafter, a meeting was organized with the village elders where the aim of the research was explained and approval sought for interviews to be conducted in their areas. Time and cost factors contributed to determination

of sample size. Purposive sampling was used to get the sample size. Finally, one hundred respondents were selected based on proximity to the swamp, utilization of the swamps resources, and those relocated to pave way for Dominion Farm's (K) Ltd activities.

A structured and open ended questionnaire was developed by the research team and administered by three local residents. The interviewers had been trained to administer questionnaires during previous HIV/AIDS, gender and poverty study in the area and were therefore familiar with administration of questionnaires. The questionnaire was written in English language and administered in the local *Dholuo* language for respondents who did not know how to read and understand the English language. This was to get the local communities' views about the socio-economic roles the Yala swamp played/plays as a source of their livelihood as well as the impacts of Dominion Farm (K) Ltd activities on their livelihood and the ecosystem.

The open-ended unstructured questions were administered in order to obtain more in-depth responses from the primary stakeholders about their experiences, perceptions, opinions, feelings and knowledge about the emerging issues surrounding the activities and impacts of the Dominion Farm (K)Ltd on respondent's lives. Secondary data relevant to the study were obtained from policy documents, published work and reports.

Data analysis

Data collected from this study was analyzed quantitatively and qualitatively using the Statistical Package for Social Sciences (SPSS). Pie-charts and tables were also drawn to represent an analysis of socio-economic activities and access to the swamp. Qualitative data was classified into themes and categories and analyzed descriptively to determine the impacts of Dominion's activities on local communities' livelihood, food security and the environment.

RESULTS AND DISCUSSION

Traditional patterns of utilization of Yala swamp wetland

Yala Swamp wetland plays a vital role in local communities' livelihoods. Nearly all respondents depended directly or indirectly on the wetland for their livelihood (fig 2). Before the Dominion Farm (K) started its activities, 84% of the respondents indicated that they depended entirely on the swamp and they had no other means of earning an income and survival. However, 13% did not know the importance played by the swamp in their livelihoods while only 3.1% of the respondents reported that they did not depend on the swamp for survival and had other employment opportunities.

Patterns of exploitation of the Yala Swamp Wetland.	
Activity	% of people involved
Grazing	61
Fishing	44
Fuel wood	60
Building & Construction materials	23
Agriculture	82
Water for domestic use	93
Brick Making	14
Others (Beeking, traditional vegetables, wood fuel)	12

Figure 2: Traditional patterns of utilization of Yala swamp

Fishing

Some 44% of the respondents carry out fishing activities for survival. The fishermen use the ox-bow lakes found in the swamp, namely Lake Namboyo, Sare and Kanyaboli to harvest fish for sale and consumption. Most of the fish caught (43%) by the locals is taken to the local market for sale, 7% is used for household consumption only while 50% is shared between trade and consumption. This shows that the fishing activity is very important to the locals as it generates income as well as food for consumption.

Building and construction materials

The swamp provides building materials used for construction. The Yala swamp is a papyrus (*Cyperus papyrus*) dominated wetland but large areas also contain reeds (*Phragmites*) and other vegetation which local people use for thatching, making chairs, doors, mats and basket weaving. The products are sold in the local markets in Kenya. The study found that 23% of the respondents depend on papyrus harvesting and products to earn a living. Brick making for house construction is also an important economic activity and 14% of the respondents indicated that they are directly involved in this activity.

Agriculture

82 % of the respondents carried out farming activities and grew crops and vegetables mainly for domestic consumption and sale. Crops and vegetables grown include maize, beans, potatoes, rice, tomatoes, onions and citrus (oranges).

Grazing

The swamp was identified as an important grazing area and serves as a refuge especially during the dry season. Some 61% of the respondents directly depend on the wetland as a source of pasture for livestock. Animals kept include cattle, sheep and goat.

Water source

Access to water for domestic use and safe drinking is a fundamental human right as stressed by the World Summit on Sustainable Development (2002). Nearly all respondents (93%) depend on the swamp for supply of water for domestic use. Water is also used to facilitate transportation between different parts of the swamp and various villages.

Others

Other benefits derived from the swamp by the locals include wood fuel for cooking and traditional vegetables which grow wild in the swamp. This is also used to supplement the locals' diet. Local residents also use the swamp for bee keeping. They construct home-made bee hives which are placed in different places within the swamp and honey harvested is used for consumption and sold in the local market.

Impact of Dominion Farm (K) Ltd activities on Livelihoods and Food security

Overall, the survey found out that with the entry of Dominion Farm (K) Ltd, most of the local communities' sources of livelihood have severely been curtailed due to restricted access to the swamp. As a result there seem to be a concomitant increase in poverty due to lack of alternative livelihood sources.

Nearly all (94%) of the respondents were aware of the activities of the company in the area. Activities identified include cotton farming, crop growing (soya beans, maize, and sunflower), rice farming and milling, bee keeping, dairy and fish farming. Some 28.6% of the respondents said that they approved all these activities carried by the company and did not object the expansion of the activities. However, 49 % approved some of the activities which they felt were beneficial but felt that other activities carried out were negatively impacting on their livelihood and /or the environment

The study revealed that 94% of the respondents have been denied entry to the swamp since the company began its activities while only 6% had access to the swamp (Fig 3). Access routes and roads had been blocked making movement within and between villages more difficult. This study shows that 58.1% of the respondents believed that their livelihood had changed negatively and the level of poverty has increased due to loss of opportunities while 41.8% reported no change in the level of poverty in the area. The respondents attributed the increasing poverty levels to loss of livelihood opportunities like fishing, grazing and loss of land for cultivation.

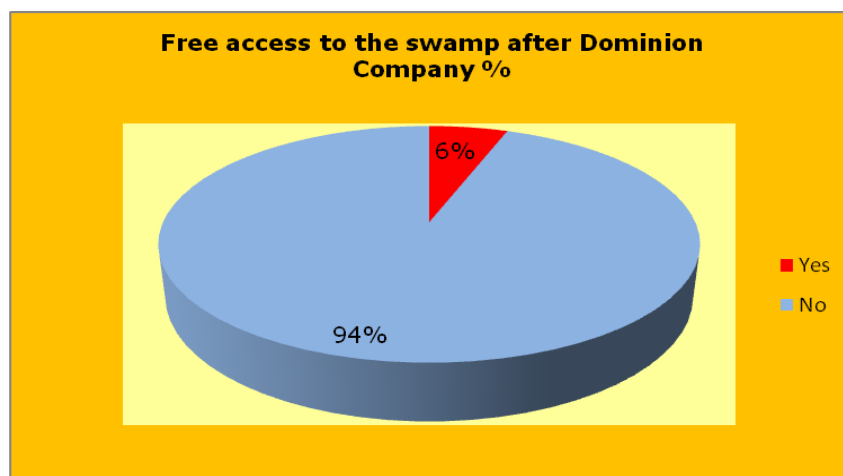


Fig 3: Access to the swamp after entry of the Dominion Company

Since the acquisition of the wetland, Dominion Farm (K) Ltd gives members of the local community whose farmlands have been taken two bags of maize after every harvesting season. This makes the local community entirely dependent on the company for food hand-outs yet many households have large and extended families to feed, a culture in many African communities. According to the respondents, this has resulted in lack of food for the local community leading to increased food insecurity in the area. Although the residents responded that they were being provided with free maize and cheap rice, this was not enough to cater for their large families. They added that they needed to be allowed to grow their own crops to supplement the little food they were getting from the company.

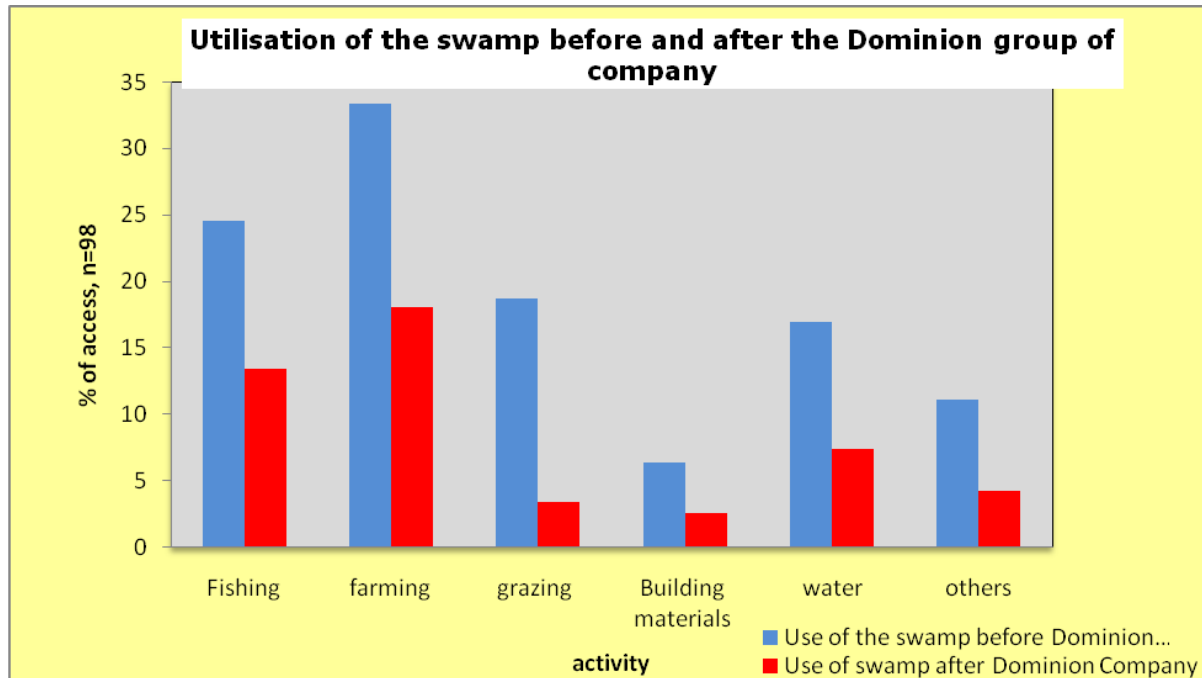


Figure 4: Utilisation of Yala swamp before and after Dominion Farm

Land tenure and use rights

Land tenure and use rights have been one of the most sensitive and emotive issues in Yala swamp. Since Dominion Farm (K) Ltd started its activities, Yala swamp ownership has been dogged by a series of conflicts with different stakeholders claiming ownership. The Swamp is a 'trust land' owned by the Bondo and Siaya County Councils on behalf of the community (Trust Land Act Cap 288). It has no formal protection and has been a free access land used by the community to eke a living. However, with the arrival of the Dominion Farm (K) Ltd, this perception has drastically changed and only 7.1% of the local community still believes they still own land in the swamp. Some 49% reported that Dominion Farm owns the swamp while 6.1% believe that the local County Council owns it. According to 14.3% of the respondents, the Kenya government has the right of ownership while the same percentage said they didn't know who owns the swamp.

The laws of Kenya recognise private land ownership (RLA, CAP 300) and the local residents feel that their rights have been infringed on this issue and that the Dominion Farm (K) Ltd has altered land rights as local residents were forced to abandon their ancestral land with little compensation. The respondents hold high value to their ancestral homes as they believe that they connect with their dead ones through spirits. The overall feeling by members of the local community is one of disfranchisement from their

traditional heritage by a foreign organization working in cahoots with the government. Land tenure and use rights in the Yala swamp thus still remain a very divisive issue.

Environment

In this study, 61.2% of the respondents said and enumerated the activities of the company that had altered the ecology of the swamp while 36.8% felt that the company had not interfered with the swamps ecosystem. 50 % of the respondents reported that the company was using aerial spraying using toxic pesticides and herbicides which killed their livestock and fish species. There were also reports of loss of indigenous vegetables which withered due to the effects of the toxic chemicals. Oil spillage and polythene paper pollution is also another problem respondents attributed to the company. Due to the digging of canals and building of dykes to change the water course system, the area has become permanently water logged and this has created a conducive environment for the breeding of mosquitoes.

There has been regular flooding since the drainage of the swamp was carried out as the wetland's ability to act as buffer has been heavily compromised. The loss of papyrus which absorbs nutrients may eventually lead to eutrophication of Lake Kanyaboli.

Dominion farm's Corporate Social Responsibility (CSR)

The following were identified as tangible corporate social responsibilities undertaken by the Dominion farm (K) Ltd.

- Infrastructure development including construction of access roads, improving existing schools and putting up a health facility.
- Employment. According to the local residents interviewed, the company has created several job opportunities especially for women who are employed as casual labourers when opportunities are available. Major complaints against the company were that employment opportunities did not target 'locals' and corruption and nepotism were rife when recruiting.
- Tsetse fly control and supply of mosquito nets. According to the local residents, the company is involved in free distribution of treated mosquito nets to households. This will go a long way towards combating malaria within the community. In addition, the company has also been involved in the spraying of the area around Yala swamp with insecticides to control tsetse-fly.
- Increased business opportunities and market for goods. The company has established a trading centre near the swamp which has improved business opportunities in the area. This has created opportunity for members of the community to venture into self employment.

DISCUSSION AND CONCLUSION

Developing countries depend heavily on natural resources- agriculture, forestry, fishing and mining for their economic prosperity (Turner *et al.*, 2000). Majority of people in these countries live near or around the natural resources and they depend on them for survival. The large MNC's have found their way into developing countries targeting the same resources to carry out development projects.

This study found that Dominion Farm (K) has impacted negatively on the livelihood of the local community and has contributed to environmental degradation in the area. The reduced livelihood opportunities in terms of access to the swamp, loss of land and apparent pollution of water bodies may in the long run lead to higher poverty levels and precarious food security situation within the Yala Swamp community. The barring of the community from growing their own food crops which makes them depend on food hand-

outs from Dominion Farm (K) Ltd and other Aid Organizations may not be sustainable in the long run. This would make the community vulnerable to hunger, malnutrition and high mortality rates. Sub-Saharan African populations have been noted to be especially vulnerable to drought, famine and disease (Downing, 1996) and current studies suggest that ecosystem changes caused by anthropogenic activities as found in Yala Swamp will have particularly severe negative impacts on livelihoods of rural African communities (Kangalawe, 2009). To make a worthwhile and meaningful contribution to the welfare of the local community in Yala Swamp, Dominion Farm (K) Ltd must involve itself in the activities and approaches that are of benefit to the community. Dominion should instead encourage formation of farming cooperatives and contract the local community to grow rice while it provides extension and technical support. This approach has worked successfully with sugarcane processing companies in Kenya. This would go a long way towards addressing the issue of land tenure and land rights in the wetland.

Overall, the findings of this study indicate that in the short-term, the local community has lost a substantial amount of their livelihood support and the long-term effects of Dominion Farm's activities will have far reaching negative consequences.

Land is highly valued by many people in Africa who depend on it for agriculture, settlement and grazing animals among other activities. The arrival and activities of Dominion Farm has drastically changed the use rights of the people by blocking free access to the wetland.

Moreover, there has been a change in perception on the resource ownership. The acquisition of the wetland by the multinational company appears not to have involved members of the local community. Land is a very sensitive issue in the area and the local community strongly feels that they were shortchanged and are not benefiting from the development activities carried out in their midst. To address this, Dominion Farm should enlist the support of the population, integrate poverty alleviation in its CSR initiatives and consider the needs and rights of the community. In addition, the process of compensation should be reviewed and adequate compensation given which should be equal to the value for their land. Dispossessing indigenous people of their land will lead to creation of 'land squatters', a phenomenon common in many Kenyan large scale irrigation projects with serious socio-political consequences. The perceived change in land tenure and ownership is therefore a major source of conflict and long term sustainability and success of the project lies largely upon resolving this conflict.

To achieve sustainable development, The World Summit on Sustainable Development (2002) stressed the need to take environment and natural resources into account in development projects by promoting those activities that utilize natural resources wisely. Dominion Farm (K) Ltd has carried out development projects in Yala swamp without integrating environmental protection and management in its strategic plans. It is evident from the analysis that environment has been compromised at the expense of development leading to loss of species and habitat, pollution, floods, change of river course system and compromised health of the local community. In the long run, it is the local community who will bear the costs associated with destruction of the environment. While it may be argued that Dominion Farm has contributed positively on creation of job opportunities and infrastructure development among other benefits to the local community, the costs and long-term consequences associated with the swamp's destruction outweigh these benefits. The costs associated with loss of habitat and species, genetic resources, loss of recreational and tourism opportunities, water pollution, disruption of local's livelihood and rural societies in the area may change the swamp to an irreversible state making it unfit for human settlement and species survival. Majority of the local population are aware of the environmental consequences posed by Dominion Farm and the future of their only source of livelihood seems bleak.

Although it has been argued that "some deterioration in environmental quality is a necessary and justifiable cost of economic

growth” and that ‘the management of natural resources for sustainable use is a luxury which poor developing nations can ill afford’ (Welford, 1995), carefully planned and executed projects can greatly mitigate the potential environmental impacts. This seems not to have been the case with the development project studied. ‘Development and progress’ may have different meanings to local communities and investors like Dominion. Progress and development for multinational corporations and many national governments means foreign investment, industrialization and wage labour jobs (Welford, 1995). However, to many rural communities and indigenous people, ‘progress’ means land rights, formation of co-operatives, fair trade partnerships, and protection of communal resources like forests, rivers and wetlands. This difference in what constitutes development and progress may explain the high occurrence of conflicts and protests especially in developing countries against MNC’s as is evident in the case of Yala swamp.

In order to promote sound development, plans and mitigation measures to reduce the level of pollution and rehabilitate degraded land must be put in place. Many current environmental problems have arisen from over-exploitation of natural resources or poor planning and design of development projects, coupled with inadequate assessment of potential impacts. While Dominion Farm commissioned an Environmental Impact Assessment (EIA) report to identify, quantify, predict and evaluate the impacts of their activities, it now appears that the EIA may have been of a compromised standard. Within a span of five or so years, there have been enormous risks posed to the environment. Sound EIA is a tool that allows proper analysis of development projects and identifies mitigation measures in the case that projects are perceived to pose risks to the environment (Dixon *et al*, 1986). Therefore, the EIA conducted has failed to address risks posed by the company’s operations. A new EIA should be commissioned to exhaustively address all the contested issues.

The lack of proper enforcement and weak environmental laws and regulations may have also contributed to environmental pollution and degradation in the swamp. This may be as a result of lack of awareness on the importance of natural resources like wetlands, lack of resources to formulate and enforce sound environmental policies coupled with high level corruption. Environmental protection in Kenya is regulated by Environmental Management and Co-ordination Act of 2002 (EMCA) and is enforced by National Environment Management Authority (NEMA) whereby the organization enforces the ‘polluter pays principle’ which authorizes companies and industries to meet the cost of polluted habitat and rehabilitate the degraded area. This study has therefore identified strengthening governance and enacting and enforcing a strong environmental policy as key to successful management and utilization of the Yala swamp resources.

The study has further revealed presence of serious and sensitive environmental issues caused by Dominion activities. These need to be specifically and urgently addressed. In developed economies, just one of these environmental issues raised would be adequate to institute legal action against the company. The study further reveals that the local community is highly aware of and sensitive to environmental issues.

There is evidence of CSR programmes carried out in the area which includes infrastructure development, training and provision of social services. Despite these benefits, Dominion Farm (K) has faced protests and strong opposition from the local community. This may be as a result of the communities’ high expectations and perceptions to help them fight poverty and improve their socio-economic well-being. The creation of employment opportunities, infrastructure development and provision of social services has contributed in capacity building and community empowerment and this may in the long run help in reducing poverty levels and improve the general standards of living for the local population. Dominion Farm (K) Ltd can therefore be a critical partner to the Kenya government in meeting the Millenium Development Goals (MDGs).

However, despite the potentially social uplifting undertakings by Dominion, the local community appear not to have fully embraced

the presence of this MNC in their midst. This could have resulted from unmet expectations and poor or nonexistent coordination and communication between the various stakeholders. To address these, the company needs to understand the culture and practices of the local community and learn and understand how they have interacted with the swamp and the surrounding environment. Dominion Farm should include representation of the community in planning and decision making process and improve communication and public relations with the local population. This will create a harmonious relationship and co-existence with the local community, promote a sense of respect and honour for the community who in turn will have a sense and feeling of ownership of the project. Such initiatives can be undertaken through government, Dominion or NGO supported educational programmes through community based organizations (CBOs). The education programme should specifically target the role of governance in natural resource management to address issues of transparency, accountability, favouritism and nepotism. The programme should further target the role of local community in environmental protection as well as development of business and entrepreneurial skills among the youth and women. Business opportunities could be enhanced through credit provision, improved extension services and strengthening local institutions for example through formation of cooperatives and Trust funds. Such undertakings would empower the community and would reduce the overdependence on the wetland as a source of livelihood. Finally, a programme targeting HIV awareness, education and prevention should be initiated.

This work has successfully produced an evidence based assessment of key stakeholders and their relation to the Yala swamp, a significant step towards designing an acceptable management programme for the wetland. Such a management plan should be holistic, integrating the divergent needs and views of the principal stakeholders.

Acknowledgment

This study was funded by University of Edinburgh Small Grants. I am grateful to the University for facilitating the financial support to carry out the work. The authors are grateful to Ben Okang and his two enthusiastic assistants for administering the questionnaires and to the many stakeholders who freely volunteered to give information.

References

- Abila R (2002). Utilization and economic valuation of the Yala swamp wetland, Kenya. In: Gawler, M. (Ed.). Best practices in participatory management. Proceedings of a workshop held at the 2nd International Conference on Wetlands and Development, Dakar, Senegal. *Wetlands International*. Pg. 96 – 104. IUCN– WWF. <http://www.iucn.org/themes/wetlands/pdf/DakarProceed1.pdf> (accessed on 12/08/08)
- Abila, R, Walter Salzburger, Millicent F. Ndonga , Dickson Otieno Owiti, Marta Barluenga and Axel Meyer (2008). The role of the Yala swamp lakes in conservation of Lake Victoria basin haplochromine cichlids: evidence from genetic and trophic ecology studies. *Lakes and Reservoirs: Research Management* 13, 95 – 104.
- Dixon *et al.* (1986). *Economic Analysis of the Environmental Impacts of Development Projects*. Earthscan Publications Limited. London.
- Downing, T. ed. (1996). *Climate change and world food security*. Springer Verlag, New York, Berlin, Heidelberg.
- Kanagalawe, R.Y.M. (2009) Ecosystem changes and implications on livelihoods of rural communities in Africa. *Afr. Jnl. Ecol.* 47, 1-2.
- Maltby Edward (1986). *Waterlogged Wealth: Why waste the world's wet places?* Earthscan Publication. London and Washington DC.
- Mitsch, W.J. and Gosselink, J.G. (1993). *Wetlands*, 2nd edition. New York, John Wiley
- Mwakaje, A.G. (2009) Wetlands, livelihoods and sustainability in Tanzania. *Afr. Jnl. Ecol.* 47, 179-184.
- Mwakubo M. S., Ikiara M. M. & Abila R. (2007) Socioeconomic and ecological determinants in wetland fisheries in the Yala Swamp. *Wetlands Ecol. Manage.* 15, 521–528.
- Schuyt, K.D. (2005) Economic consequences of wetland degradation for local populations in Africa. *Ecological Economics*, 53(2), 177 – 190.

Roggeri, H., (1995) *Tropical Freshwater Wetlands – A Guide to Current Knowledge and Sustainable Management*. Kluwer Academic Publishers, 1995.

Turner, R.K., Pearce, D., Bateman, I., (1994) *Environmental Economics – an Elementary Introduction*. Pearson Education Limited, England, 1994.

Turner, R.K., van den Bergh, J.C.M, Soderqvist, T., Barendregt, A., van der Straaten, J., Maltby, E., van Ierland, E.C., (2000) *Ecological-Economic Analysis of Wetlands: Scientific Integration for Management and Policy*, *Ecological Economics*, 35, 7-23.

Registered Land Act (RLA) Cap 300 of the Land Laws of Kenya.

Trust Land Act Cap 288 of the Land Laws of Kenya

Welford R.J et al. (1993), *Environmental management and Business Strategy*. Pitman Publishing. London.