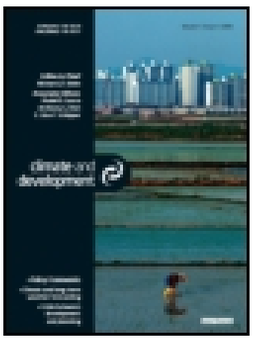

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climate and development

CASE STUDY

The role of gender in improving adaptation to climate change among small-scale fishers

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Climate change disproportionately affects marginalized groups, especially women. To guide the integration of gender roles in interventions to improve adaptation, we examined gender roles among fishers on Lake Wamala, Uganda, which has been increasingly affected by climate change. We found lower participation of women than men in preharvest and postharvest fishing activities, with 99% of fishers and 92.9% of fish processors and traders combined being men. The men had more fishing experience, started fishing at a younger age and exited at a later age, targeted more species, used more fishing gears and bought more fish for processing and trading. Although we observed diversification to non-fishery livelihoods, such as crop and livestock production to increase food security and income among others, income from these activities was not controlled or shared equally between men and women. Compared to men, women worked longer hours, engaging in more simultaneous activities both in and out of the home and reported less time resting. The income controlled by women was used directly to meet household needs. The implications of these differences for adaptation, what men and women can do best to enhance adaptation and how some adaptation practices and interventions can be implemented to benefit both men and women are discussed.

Keywords: adaptation; climate change; small-scale fishers; gender; livelihoods; Uganda

Introduction

Africa is the most vulnerable continent to the impacts of climate change, due to dependence on climate-sensitive natural resources and rainfed agriculture, high poverty levels and weak economic and institutional capacity (Niang et al., 2014). Climate change risks adversely affect economic sectors that depend on agriculture and natural resources, such as fisheries (Pörtner et al., 2014), and pose threats to sustainable development, particularly in sub-Saharan Africa. Among poor and marginalized groups, women are especially vulnerable to the effects of climate change because they not only depend on the sensitive resources which are crucial in providing livelihoods of families, but also have limited adaptive capacity (UNFPA, 2009).

Women are particularly more vulnerable than men because they are poorer; less mobile; play a central role in securing household water, food and firewood; and have higher dependence on climate-sensitive natural resources, have limited access to resources like credit and have limited role in decision-making (UNDP, 2009; 2010). Consequently, women and men are impacted disproportionately by the influence of climate change events and women are faced with more problems like loss of lives, food insecurity and loss of livelihoods (Ikeda, 1995; UNFPA, 2009). For instance, the death toll from the 2004 Indian Ocean Tsunami in Asia was greater for women than men due to more exposure to their household roles that kept them around houses and their inability to climb on top of houses or swim (Birkmann & Fernando, 2008; Guha-Sapir, Van Panhuis, & Lajoutte, 2007; Oxfam International, 2005). In Bangladesh, cyclone Aila in 2009 caused migration, and while men found work under a government-sponsored programme, women lost their livelihood options (Kartiki, 2011). In Mexico, unlike men who lost income from remunerated work, women lost home yards of fruits, vegetables, chicken and ducks, reducing their abilities to provide household food due to hurricanes Mitch and Stan (Jungehülsing, 2010, cited in Goh, 2012). In Kenya, women reportedly reduce food/meal intakes during food shortages related to droughts (Serna, 2011, cited in Goh, 2012).

In rural areas, the division of labour between men and women strongly influences adaptive capacity at the household level. Productive activities like agriculture are carried out by both men and women, but women dominate the labour force in such enterprises (Doss, 2011; FAO, 2011;

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ITCILO, 2013). Unlike men, women have other household tasks of bearing and caring for children, preparing food, collecting fuel wood, fetching water and many other domestic tasks (ILO, 1998; ITCILO, 2013). Women's participation in decision-making is limited, and most of their activities are unpaid and of lower social value compared to men's activities.

Differences in gender roles are also evident in small-scale fisheries (Kleiber, Harris, & Vincent, 2014). Although men and women engage in different and overlapping fishery activities like fishing, net mending, fish processing and trading, women may dominate most of these activities in small-scale fisheries if postharvest activities are included (Harper, Zeller, Hauzer, Pauly, & Sumaila, 2013; Weeratunge, Snyder, & Choo, 2010; Williams, 2010). However, men typically dominate offshore and long-distance fishing activities, which are more hazardous and associated with higher value fish species (Bene, Steel, Luadia, & Gordon, 2009; Chapman, 1987). Fishing by women is restricted to near the shore using simple fishing gears (Chapman, 1987) and mainly complements the fishing activities of men (Gereva & Vuki, 2010; Matthews & Oiterong, 1991; Savard & Fraga, 2005; Tindall & Holvoet, 2008). As a result, women have less control over fishery activities, mainly engage in less profitable fishing activities and have more access to fish of poor quality.

Since women dominate most agricultural and fishery activities, and are stewards of household food, water and fuel security, they have substantial potential to increase household adaptive capacity, for example through management of diversified livelihood strategies (Commission on the Status of Women, 2008; UNDP, 2009). Conversely, men as household decision-makers and custodians of resources may also play an important role in enabling adaptation. Therefore, adaptation interventions and practices would be more successful if gender roles are integrated in their planning and implementation. This requires knowledge of gender-specific differences in access and control of resources, and benefits derived from them – which may differ or are not well-known across regions, sectors and communities.

This study examined gender roles in a fishing community to generate knowledge to guide promotion of gender-sensitive adaptation strategies, supporting policies, and contribute to gender-segregated statistics needed for fisheries management. We specifically examined gender roles in fishing activities as well as in non-fishing activities the fishing community has diversified to, the benefits of diversification to both men and women and the ways in which men and women in the community use their own time to undertake different activities. Drawing from the results generated, we discuss their implications for adaptation to impacts of climate change, potential for men and women to enhance adaptation and how some applicable adaptation practices and interventions can be implemented to benefit both men and women.

Research area and the changes in its resources and the environment

The study examined gender roles in a small-scale fishing community on Lake Wamala in central Uganda (Figure 1). The lake is the sixth most important source of fish in Uganda in terms of quantity (DFR, 2012). Its native fish stocks initially consisted of the African catfish (*Clarias gariepinus*, Burchell), the lungfish (*Protopterus aethiopicus*, Heckel) and haplochromine species. Three tilapia species, Nile tilapia (*Oreochromis niloticus* L.), Blue spotted tilapia (*Oreochromis leucostictus,* Trewavas) and Red belly tilapia (*Coptodon zillii*, Gervais), were introduced into the lake in 1956 to boost fish production. Following these introductions, the lake's fish yield increased from about 1000 tons annually in 1960 to a peak of 7100 tons in 1967. However, this dropped to 500 tons in 1982 (Okaranon, 1993), increased to about 4500 tons in 2000 and dropped again to 1200 tons in 2013 (NaFIRRI, unpublished catch statistics). The contribution of Nile tilapia to annual commercial catches increased from <10% of total catches in 1960 to 78% in 1975, decreased to 57% in 1989 (Okaranon, 1993), increased again to 90% in 1999 but later decreased to 20% in 2012 and <1% in 2013 (Natugonza et al., 2015). Meanwhile, the contribution of the African catfish increased from about 5% in 1975 to 20% in the 1990s and by 2013, it was contributing about 85% to total fish catches (Natugonza et al., 2015). The changes in fish yield of Nile tilapia were attributed to overexploitation (Okaranon, 1993, 1995). However, recent research indicates that climatic factors played a stronger role (Natugonza et al., 2015).

Lake Wamala has experienced major environmental changes to the extent that it has been classified by UNEP (2009) as a major environmental change hotspot in Africa. The lake is experiencing reduced water levels and surface area, which in turn influences fish catches (Goulden, 2006; Natugonza et al., 2015, 2016). Ultimately, these affect livelihoods, and the riparian and fishing communities around the lake are responding in various ways such as diversification of livelihood activities (Musinguzi et al., 2016).

Management of the lake to maintain benefits to livelihoods has therefore become a bigger challenge that needs to be addressed. UNEP (2009) recommends adaptation and remedial measures in designated environmental change hotspots, and programmes to support adaptation among communities around Lake Wamala are required to increase resilience and sustain livelihoods. This study was intended to contribute to these by generating knowledge to guide how gender roles can be applied to improve the effectiveness of the adaptation practices and interventions.

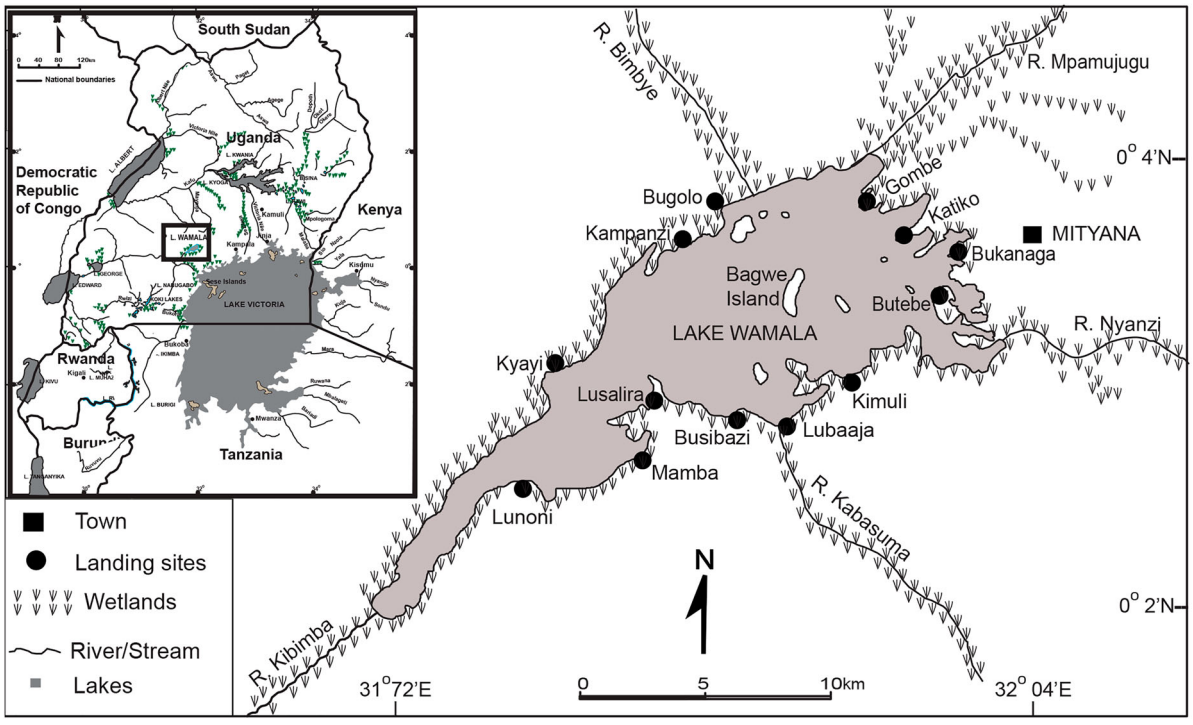


Figure 1. Location of Lake Wamala indicating some landing sites, with inset location map of Uganda.

Approach and methods

Part of information on gender roles in fishery activities on the lake was obtained from a frame survey undertaken in 2012. The frame survey was designed as a complete enumeration of fishers on all landing sites, fishing gears by size and type, fish species targeted, fishing experience and alternative non-fishery livelihood activities the fishers diversified to. Altogether, the survey enumerated 785 fishers around the lake and provided good information on the extent to which men and women participate in fishing and other activities around the lake. This was supplemented by information on the participation of men and women in postharvest activities (fish processing, fish trading and fish transportation) adopted from Timmers (2013), obtained through a quantitative survey conducted to analyse gender relations within the fish value chain of Lake Wamala. It targeted 56 respondents engaged in fish trading, fish processing and fish transporting around the lake from five landing sites, namely Gombe, Katiko, Butebe, Lubaaja and Lusalira (Figure 1).

In addition, daily activity analysis and benefit analysis flow chart tools, modified from Socio-Economic and Gender Analysis Approach (FAO, 2001), were respectively used to determine daily livelihood activities of an average man or woman, how they distribute their time to the activities during dry and wet seasons and the benefits derived from diversification out of fishery livelihood activities to men and women. Diversification to non-fishery activities is the main adaptation strategy around the lake to climate change-related events (Musinguzi et al., 2016). Application of the tools followed the guidelines of FAO and CCAFS (2013) to better integrate gender issues into climate change research. Data were obtained using two focus group discussions (FGDs) organized at the Katiko landing site (Figure 1), one with a group of men and another with that of women, consisting of 10 members each. The FGDs engaged members of different socio-economic groups and the age of participants ranged from 27 to 50 years for men and 18 to 49 years for women. The objectives of the FGDs were explained before pre-designed guide questions were administered to obtain the data. Descriptive statistics including averages and proportions were determined for quantitative data and compared for men and women. Important observations from the FGDs were identified, noted and compared between men and women. A time budget was prepared to present seasonal and daily allocation of time to activities for an average man and woman around the lake.

Results

Demographic, fishery and non-fishery livelihood characteristics

The key demographic, fishery and non-fishery livelihood characteristics of men and women are summarized in Table 1. Men dominated fishing activities (99%), had more fishing experience, started fishing at a younger age and exited at an older age. The men mainly targeted the

Table 1. A comparison of some demographic, fishery and diversification to non-fishery livelihoods by men and women.

Category	Variables	Gender	
		Men	Women
Demographic characteristics	Proportion of fishers	99%	1%
	Age (range) of fishers	15–90 years	26–55 years
	Fishing experience (range)	0.5–72 years	1–20 years
Target species	Nile tilapia	46.7%	83.3%
	African catfish and lungfish	52.2%	16.7%
	Haplochromines	1%	–
Gear type	Gillnets	55.6%	83.3%
	Hooks	43.6%	16.7%
	Gillnets and Hooks	0.8%	0%
Gear size	Gillnets (range)	31.8–114.3 mm	88.9 mm
	Hooks (range)	4–14	10
Secondary fishing activities	Fish trading and processing combined	92.3%	7.7%
	Fish processing	25%	75%
	Fish trading	97.9%	2.1%
	Fish transporting	100%	–
	Number of fish purchased	4–400	20–40
Livelihood diversification	Non-fishery activity	65.3%	83.3%
	Crop farming	77.9%	60%
	Animal husbandry	16.8%	40%
	Business	5.3%	–

African catfish and lungfish, and women the Nile tilapia. An almost equal number of men used gillnets or hooks, whereas the majority of women used gillnets which are easier to operate. Gillnets and hooks that men used were of multiple size ranges while those of women were of a single size.

Fish processing and fish trading combined were dominated by men (92.3%). However, women dominated fish processing while men dominated fish trading (Table 1). Men bought more fish for processing and trading than women. Fish was bought from landing sites and transported to different locations for processing and marketing. Women who bought more fish than they could transport on their heads used transportation such as motorcycles and taxis and incurred transport costs. Although some men used similar means, many of them avoided incurring extra costs by owning their own motorcycles or bicycles. All women in fish processing and trading reported that they used some of the fish bought for home consumption but 67.4% of the men in similar activities did not report to use some of the fish bought for home consumption. More women (83.3%) diversified to non-fishery livelihoods than men (65.3%). A higher proportion of the men (77.9%) diversified to crop farming and a higher proportion of the women (60%) diversified to animal husbandry.

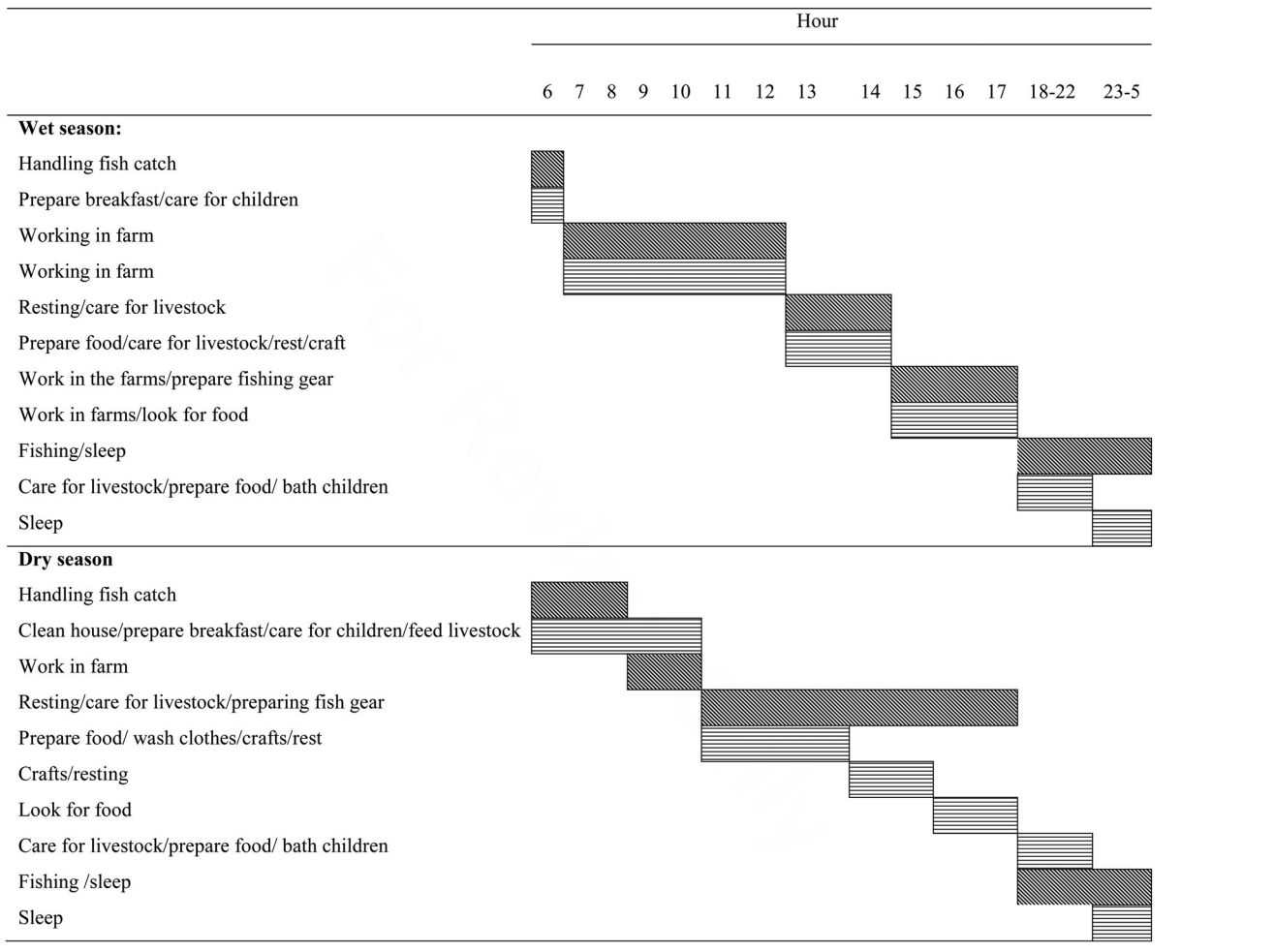
Daily livelihood activities and time budget for daily activities

During the FGDs, men reported their main activities as fishing, crop and livestock agriculture, brick laying, trading in shops and produce, informal employment such as providing labour for other people, and offering transport using motorcycles (locally known as *bodaboda*). Fishing was the main contributor to household basic needs, and income from fishing provided credit that was invested in crop and livestock agriculture. The men reported that both men and women were responsible for agricultural activities but women were more responsible for food crops and the income from their own crops and livestock, and men for commercial crops.

The women reported their main activities as crop and livestock agriculture, and running small restaurants, bars and retail shops. This supplements information from the frame survey (Table 1), which did not indicate that women participate in business-related activities. Very few women were involved in fishing. They engaged in additional activities such as making crafts from which they generated income. The women confirmed that they controlled agricultural activities that provided food for the household, while income generating activities were controlled by men who marketed the agricultural products and only gave women some of the money at their discretion.

The ways men and women allocated their daily time to the different activities are indicated by the time budget in Table 2. Overall, men and women spent time on productive activities during wet and dry seasons such as fishing, working in farms, caring for livestock and making crafts, but women were involved in additional domestic activities like caring for children, preparing food, collecting fodder and water and cleaning the house. While men carried out most of their activities sequentially, women's activities were mostly simultaneous. The men spent most of their

Table 2. Daily time budget (6:00 hours to 24:00 hours) for men (diagonal hatches) and women (horizontal hatches) during wet and dry seasons.



time on fishing in both wet and dry seasons but devoted more time handling fish catch in the dry season and more time working in the farms during the wet season. The women spent more time in the farms in the wet season and did not work in the farms in the dry season. Although the women engaged in productive activities such as feeding livestock and making crafts during the dry season, they spent more time on other household chores such as caring for children and preparing food. In both seasons and for both men and women, resting was simultaneous with other activities. However, the resting time was longer in the dry season than in the wet season, and women engaged in more activities simultaneously with resting in both seasons than men, indicating that they rested for less time compared to the men.

Benefits from diversification

Men reported that diversification was mainly for income, employment, food security and meeting other household needs. These benefits had increased mainly with diversification to crop and livestock agriculture. Other benefits included manure and feed for livestock and mulching materials. They reported that both men and women controlled the benefits but men were more responsible on how the income was spent.

Women reported similar benefits as men from diversification to crop and livestock agriculture. Women were more responsible for feeding livestock, applying manure and mulching farms under the guidance of men. The income from these activities was used for school fees, household items and buying food items they did not have. However, women reported that men used some of the income for which they were not accountable to women, such as drinking alcohol. The major benefits from women's off-farm activities such as making crafts included income generation as well as the provision of household items like mats, which supplemented benefits from crop and livestock farming. Women reported that with the income they received from activities they controlled, they care for relatives and children, purchase household items and save in credit groups.

Discussion

This study was intended to provide some guidelines on how differences in gender roles can be applied to improve adaptation among small-scale fishers. The study showed gender differences in fishing activities, with lower participation of women in fishing, fish processing and trading, and differences between men and women in fishing experience, species targeted and fishing gears used. Both men and women diversified to non-fishery activities, though with varying proportions and differences in how they control the activities and income from them and how they allocate time to their daily activities. These results contribute to the documentation of gender divisions of labour in small-scale fisheries, which largely finds men dominating fishing and women postharvest activities of fish processing and trading (Ahmed, Rahman, & Chowdury, 1998; Bennett, 2005; Kebe, 2009; Rana & Choo, 2001; Weeratunge et al., 2010). However, in some fisheries, women have been found to dominate fishing activities if postharvest activities are included (Harper et al., 2013; Weeratunge et al., 2010) and the evidence from Lake Wamala where men dominated fish processing and trading suggests that the role of women in postharvest fishing activities may be more context-dependent.

The age of the fishers and their fishing experience (Table 1) suggest that men on Lake Wamala start fishing earlier and younger, are more experienced and exited at a later age than women. More experienced fishers have better fishing skills, knowledge of fishing grounds and fish distribution and greater competitive advantage under declining stocks (Inoni & Oyaide, 2007), which provide men on the lake greater advantage to exploit and benefit from fishing than women. The use of multiple fishing gear types and sizes targeting multiple species by the majority of the men compared to women suggests that the fishing activities of men are more diversified than those of women. As an indicator of adaptive capacity, this diversification suggests that men on the lake could be better positioned to respond to climate change-related changes in fish yield and species composition (Allison, Andrew, & Oliver, 2007; Natugonza et al., 2015; Turner et al., 2007). Hooks on Lake Wamala emerged with increased dominance of African catfish and lungfish stocks (Musinguzi et al., 2016), and their limited use by the women meant that they do not benefit from the dominance of these fish species as much as the men.

Fishing in Uganda is open access and women's limited participation in fishing activities on Lake Wamala could be associated with other barriers such as limited mobility and credit, high energy requirements, associated dangers and cultural taboos (Arce-Ibarra & Charles, 2008; Geheb, 1997; Rubinoff, 1999). For instance, a cultural myth that is believed about the origin of the lake considers women sitting on boats to commit an indecent act that leads to storms and reduced fish catches, and fishing as a man's occupation; hence, women who engage in fishing are mocked (Sekiwunga, personal communication). Such traditional norms limit the participation of women in fishing activities (Kamau & Ngigi, 2013) and could be responsible for the lower and delayed involvement of women in fishing activities compared to men on the lake. Women's participation in fishing could also be limited by the types of boats used on the lake which are similar in design and propulsion method, to dugout canoes which are unstable and dangerous to use and more suitable for men (Xiaogang, 2001). Time constraints that are more experienced by women in fishing activities (FAO, 2011; Kamau & Ngigi, 2013) could be limiting their use of hooks, which are more labour intensive than gillnets, involving time demands to look for baits (Chitamwebwa et al., 2009; Tilquin & Lechela, 1995). In addition, use of hooks and bigger mesh size gill nets is more dangerous and this limits women to the smaller mesh gill nets probably targeting small Nile tilapia near lake shores.

Lack of quick transport that limits women to fish processing and small quantities of fresh fish trading that require little transport (Socioeconomic Data Working Group, 1999) could be responsible for the preference of women around Lake Wamala for fish processing and their access to smaller quantities of fish for processing and trading. On the other hand, ownership of motorcycles and bicycles by some men that probably improves mobility and access to distant markets seems to be related to their preference for fish trading and the access to bigger quantities of fish for processing and trading compared to women. Since credit determines quantities of fish available for processing and trading, the differences in the amount of fish processed or traded among men and women could also be related to the credit gap that exists in fishing activities with men having more access to credit than women (FAO, 2011). Access to credit is also critical in acquisition and maintenance of fishing gear and the less access to credit for women could explain their major use of single fishing gear types and sizes (Inoni & Oyaide, 2007).

Fishers respond to the risky nature of fishing by adopting multiple income generating activities (Allison & Ellis, 2001), and this explains the diversification of fishers to non-fishery livelihood activities including crop and livestock farming. The benefits the men and women reported as derived from these activities are in line with the benefits of diversification among other fishing communities (Allison & Ellis, 2001). However, income generating non-fishery activities and the income generated from them were mainly controlled by men, contradicting the observations made by Thompson (1985) and Rubinoff (1999) that women in fishing communities have power over income.

The time allocation budget for the men and women (Table 2) illustrated how they distribute and use their time

Table 3. Some adaptation practices possible on Lake Wamala and their required interventions (modified from Allison & Ellis, 2001; Badjeck et al., 2010; FAO, 2013; Musinguzi et al., 2016).

Adaptation practices	Required interventions
Adjustments in target species, gears and fishing grounds	Improving access to credit and provision of low-interest loans
Tracking temporal and spatial distribution in fish stocks	Provision of low-interest loans
Decreasing or increasing fishing days	Increasing awareness about risks and promoting alternative livelihood options
Decreasing or increasing time on fishing grounds	Increasing awareness of risks and promoting alternative livelihood options
Quitting fishing	Improving access to technological innovations, promoting alternative livelihood options, improving access to extension services and skills development in new technologies
Diversification to non-fishery livelihoods like crop and livestock agriculture	
Proper fisheries management and wetland conservation	Increasing awareness and developing capacity for conservation
Increasing access to climate information	Increasing access to physical infrastructure like roads, disseminating climate information in local languages and improving enforcement of laws and regulations
Using traditional knowledge to develop adaptation strategies	Improving mobility and raising awareness on the importance of local knowledge

among different activities and provides some insights on how adaptation can be enhanced through proper allocation and distribution of time. The time budget was in line with reports that men mostly work out of the home while women work in and out of the home (ITCILO, 2013; ILO, 1998; Levine et al., 2001). It suggests that both men and women have time constraints – which are expected to increase with the demands for adaptation to the influence of climate change. Therefore, enhancing adaptation around Lake Wamala will require mitigation of the time constraints by, for example, promoting interventions like low-cost water harvesting and wood fuel-saving technologies. These would increase the availability of water and fuel in homes, reducing the time women spend looking for them, thus creating more time for other activities.

Implications of the differences between men and women for adaptation

Some possible fishery-based adaptation practices on Lake Wamala and their required interventions are summarized in Table 3. These are based on known adaptation strategies in small-scale fishing communities at individual, household and community levels (Allison & Ellis, 2001; Badjeck, Allison, Halls, & Dulvy, 2010; FAO, 2013) and observations on the lake (Musinguzi et al., 2016). These adaptations can facilitate flexibility in fishing activities (Allison et al., 2007), reduce risk, increase capacity to cope with uncertainty (Ellis, 2000) and promote climate-smart fisheries and livelihoods (FAO, 2013). The interventions provide guidance on the investments required for adaptation, adoption of new adaptation practices, use of existing ones (Deressa, Hassan, Ringler, Alemu, & Yesuf, 2009) and sharing of ideas and innovations (Perry & Sumaila, 2006). In addition, some interventions enable community members to: gain assistance from others; access information; escape from extreme events such as floods (CARE, 2010); recognize the necessity to adapt; and acquire knowledge about available options, assess them and implement the most suitable ones (Fankhauser & Tol, 1997).

Implementation of any of the interventions to enhance fishery-based adaptations on Lake Wamala, including adjustments in target species, gears and fishing grounds, can be more beneficial to the men than women as the men dominated fishing activities. Facilitating the adaptation practices that require adjustments in fishing techniques can also be more beneficial for men as they were more experienced and more skilled to facilitate the adjustments. Furthermore, if the adaptations and new techniques require financing, the men's control over income and decisions over how it is used can provide advantages over women. Using participation in fishery activities as a basis for identification of households for engagement in interventions to facilitate diversification to non-fishery activities can also be more beneficial for men and male-headed households who dominate the fishing activities. These disparities in benefits between men and women exist because of the differences in the participation of men and women in fishing activities and the control of income generating activities and income from them. Therefore, to benefit more women around the lake, adaptation interventions would also need to consider activities out of fisheries.

What men and women can do to enhance adaptation and how some adaptation practices and interventions can be implemented to benefit men and women

There are activities that men and women can do best to enhance adaptation. The main activities of women on Lake Wamala and the time budget agreed with the

observations of Commission on the Status of Women (2008), UNDP (2009) and FAO (2011), that women are major providers of agricultural labour, primary users of natural resources and stewards of household food, water and fuel security (FAO, 2011). Therefore, they possess the expertise and are properly positioned to enhance the adaptations possible around the lake (Table 3). The women around Lake Wamala used their income mostly for household needs, and women fish processors and traders diverted some of their fish for home consumption. These positions can be targeted by adaptation programmes to promote adaptation practices that aim at food, fuel and water security and natural resource management. The reported control of women over mulching materials and manure around the lake could be tapped into in enhancing climate-smart agriculture practices and enhanced production of non-fishery livelihood activities of crop and livestock farming. In fact, women have greater awareness and adoption rates of agriculture-related climate-smart practices such as crop residue mulching, manure management, no/minimum tillage, cover cropping and range land management practices (Ampaire & Mango, 2014). Women also have community mobilization expertise for adaptation (Enarson, 2001; Guha-Sapir, 1997) and could be used to set up community-based organizations, which can facilitate raising awareness using climate information on climate change and adaptation practices (Perry & Sumaila, 2006).

Men on Lake Wamala also have a major role to play in enhancing adaptation as they have productive activities that result in household benefits and divert some income from fishing to non-fishery activities. These attributes should be exploited by interventions to enhance adaptations as increased participation and support of the men in productive activities avail more labour, promoting diversification of livelihood activities as a form of adaptation and reduce on the time constraints of women. This can directly increase the number of household livelihood activities, food and income security. Men could contribute more to this by reducing or stopping the reported diversion of income to non-productive activities like drinking alcohol and use the income to provide support for more productive activities. Fishers on Lake Wamala adapt to periods of reduced fish catches through reducing fishing days, time on fishing grounds and quitting fishing (Musinguzi et al., 2016), and these would enhance adaptation if they are encouraged to utilize the time created in productive activities like crop and livestock farming. Another way that men can enhance adaptation on Lake Wamala is through changing their attitudes towards women, and, for example, enable equal control of income and decision-making on how it is spent and participate in household chores they think are mainly for women. Tapping into the expertise and position of the women to enhance adaptation necessitates efforts to empower them to have among others, equal participation in decision-making, economic opportunities, access to resources like land and income and protection against domestic violence and discrimination. Much as this achievement requires legal and policy interventions (FAO, 2011), men are key especially at the household level as it requires them to change their attitudes towards women (Carvajal-Escobar, Quintero-Angel, & Garcıa-Vargas, 2008).

Closing the gender gap in adaptation can be improved by carefully designing the implementation of the adaptation interventions such as those listed in Table 3 to benefit both men and women. FAO (2011, 2015) has recommended policy and institutional changes to this effect, including forming and facilitating women groups to improve their capacity to access resources such as credit, technologies, awareness and skills. Interventions for adaptation should also be introduced and implemented in a participatory and inclusive manner, encouraging women's participation and addressing the barriers to their participation. For instance, extension services, inputs and other incentives provided by social support organizations to support adaptation primarily target men (Perez et al., 2014), and effort should be put in place to increase women's participation, develop women-specific interventions and support local-based social groups with equal presentation of men and women. Policies vary by country but in Uganda, policy interventions that are important include those in the national climate change policy (Ministry of Water and Environment, 2015) that provides for reducing the vulnerability of women, recognizing their role in adaptation, providing incentives for livelihood diversification from fishing as a single source of livelihood and participatory fisheries management. If implemented, these will ensure benefit and participation for men and women.

Conclusion

This study has highlighted some of the different roles of men and women in livelihood activities in a fishing community and how they could be utilized to promote adaptation to the influence of climate change. Although the results cannot be generalized for all communities, they unveil the gender dynamics that occur in communities at local levels whose understanding is vital for successful adaptation, gender-responsive policies and fisheries management. The activities of men and women showed that both are vulnerable to climate change as they mainly depend on fisheries and agricultural activities. The vulnerability of the women around the lake is exacerbated by lack of control over income generating activities, income from them and decisions on how it is spent. There is a need for interventions to support those activities like climate-smart agriculture practices that women can do best to benefit adaptation to climate change so as to increase income and food security. Unlike men, women reported that they spent most of their income on household needs.

This means that improving the participation of women in any income generating activities can improve household income and food security, increasing resilience to climate change and should be encouraged. The integration of these capabilities of women is beneficial, but the capabilities of men as indicated should also be considered to strengthen the overall resilience of households.

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