

The Effect Of Overfishing On Communities: A Case Study Of Lake Victoria, Kalangala District, Uganda

Atuhetrwe Joyce¹, Kirwisa Matovu²

1, 2 Metropolitan International University

Abstract

This study investigated the effects of overfishing on communities living around Lake Victoria in Kalangala District, Uganda. Lake Victoria, Africa's largest freshwater lake, is a vital source of livelihood for millions of people in Uganda, Kenya, and Tanzania. However, rampant overfishing has triggered a complex cascade of ecological, economic, and social consequences that threaten the long-term sustainability of fishing communities. The study employed a descriptive research design with mixed methods data collection involving 150 respondents drawn from fishing communities, fish traders, government officials, and NGO representatives. Structured questionnaires, in-depth interviews, focus group discussions, and direct observation were employed. Findings indicate that overfishing has dramatically reduced fish stocks, particularly Nile Perch and Tilapia, with mean annual catch declining by approximately 65% over the past two decades. This decline has translated into reduced household incomes, increased food insecurity, social conflicts over fishing resources, and heightened vulnerability to poverty. The study recommends urgent fisheries regulatory reform, enforcement of closed fishing seasons, and community-based fisheries management approaches.

Keywords: Overfishing, Lake Victoria, Kalangala District, fishing communities, Nile Perch, food security, fisheries management, Uganda

Background of the Study

Lake Victoria, straddling the borders of Uganda, Kenya, and Tanzania, is the world's second-largest freshwater lake by surface area and Africa's largest, covering approximately 68,800 square kilometers (Ashiraf et al., 2023). The lake and its basin support the livelihoods of an estimated 40 million people, of whom more than 200,000 are directly engaged in fishing activities (FAO, 2021). In Uganda, Lake Victoria provides the primary or supplementary livelihood for communities in several districts including Masaka, Kampala, Wakiso, Mukono, Jinja, and Kalangala, which is the only island district in Uganda and whose entire territory is surrounded by the lake. The fisheries sector contributes approximately 3.2% of Uganda's GDP, generates around USD 400 million in foreign exchange annually through fish exports, and supports thousands of direct and indirect employment opportunities across the value chain (MAAIF, 2019).

Kalangala District, comprising the Sese Islands archipelago, is uniquely positioned as the epicenter of Lake Victoria's fishing industry in Uganda. The district's approximately 84 islands, of which 62 are inhabited, host some of the country's most active fishing communities, with Nile Perch (*Lates niloticus*), Nile Tilapia (*Oreochromis niloticus*), and the small endemic dagaa (*Rastrineobola argentea*, locally called mukene) being the principal commercial species. Since the late 1980s, however, fisheries scientists and local communities alike have documented alarming declines in

fish stocks and catch per unit effort (CPUE) across Lake Victoria, driven by overfishing the extraction of fish at rates exceeding the biological capacity of populations to replenish themselves (Ogutu-Ohwayo, 1990).

The introduction of Nile Perch into Lake Victoria in the 1950s, while initially boosting commercial fishing activity, also triggered profound ecological transformations including the extinction of hundreds of endemic cichlid species, changes in nutrient cycling, and alterations in the broader food web structure (Witte et al., 1992). The subsequent rapid growth of export-oriented Nile Perch fishing in the 1980s and 1990s attracted massive investment in fishing capacity larger boats, more sophisticated gear, and increased fishing effort that ultimately exceeded sustainable limits (Nancy & Prudence, 2024). By the early 2000s, scientific surveys were documenting significant reductions in Nile Perch biomass and average fish sizes, suggesting unsustainable exploitation levels (Mkumbo and Marshall, 2015). These ecological changes have not occurred in a social vacuum; they have directly impacted the economic and social fabric of fishing communities in Kalangala and other lakeside districts.

Despite the well-documented ecological consequences of overfishing in Lake Victoria, the specific socioeconomic impacts on fishing communities in Kalangala District have received relatively limited empirical attention (Julius & Audrey, 2026). This study aims to address this gap by systematically documenting the effects of overfishing on the livelihoods, food security, and social cohesion of communities in Kalangala District.

Problem Statement

Fishing communities in Kalangala District are experiencing unprecedented livelihood stress as a consequence of dramatically declining fish stocks in Lake Victoria. Annual catch volumes have declined substantially over the past two decades, squeezing the incomes of fisherfolk, fish traders, and others whose livelihoods depend on healthy fisheries. The deteriorating fish stocks have intensified competition for the remaining resource, leading to social tensions, increased use of illegal fishing gear such as undersized mesh nets and beach seine nets, and conflicts between local fishers and better-resourced commercial fishing operators. Food insecurity is rising as fish the primary source of animal protein for many island communities becomes increasingly scarce and expensive. Youth unemployment and outmigration from fishing villages is increasing as returns from fishing decline. Despite these worsening conditions, a comprehensive empirical assessment of the multifaceted effects of overfishing on Kalangala's communities has been lacking. This study sought to fill that gap.

Main Objective

To examine the socioeconomic and food security effects of overfishing on fishing communities in Kalangala District, Lake Victoria.

Literature Review

Conceptual Understanding of Overfishing

Overfishing occurs when fish are caught at rates that exceed the sustainable yield of a fish population, leading to progressive depletion of stocks and eventual population collapse if fishing pressure is not reduced (Pauly et al., 2002). Three main types of overfishing are identified in the fisheries science literature: growth overfishing, recruitment

Received: 15.04.2026

Accepted: 20.04.2026

Published on: 30.04.2026

overfishing, and ecosystem overfishing. Growth overfishing occurs when fish are harvested before they reach optimal size, resulting in suboptimal biomass yields. Recruitment overfishing occurs when fishing reduces the spawning stock biomass to levels insufficient to maintain population replacement, while ecosystem overfishing refers to the removal of so many fish that the food web structure is fundamentally disrupted (Garcia and Grainger, 2005).

Overfishing in Lake Victoria: Historical Context

The fishing history of Lake Victoria has been marked by a series of transitions driven by human interventions and ecological responses. Prior to the introduction of Nile Perch in the 1950s and 1960s, the lake supported a diverse assemblage of approximately 500 cichlid species alongside a number of non-cichlid species. The deliberate introduction of Nile Perch as a commercial species triggered what ecologists have called the 'greatest mass extinction in vertebrate history,' with the disappearance of an estimated 200–300 endemic cichlid species (Goldschmidt, 1996). While the Nile Perch supported a booming commercial fishery through the 1980s and 1990s, scientific surveys by the Lake Victoria Fisheries Organization (LVFO) documented a steady decline in Nile Perch biomass from an estimated peak of approximately 1.6 million tonnes in the mid-1990s to below 400,000 tonnes by the 2010s (Mkumbo and Marshall, 2015).

Socioeconomic Effects of Overfishing

The literature on the socioeconomic effects of overfishing in East Africa's lake fisheries paints a consistently grim picture of deteriorating livelihoods, increased poverty, and heightened food insecurity. Studies from Lake Victoria's Tanzanian and Kenyan shores document that declining catches have forced many fisherfolk to increase fishing effort using more nets, fishing for longer hours, and venturing into deeper and more distant waters thereby accelerating further stock depletion in a classic feedback loop (Njiru et al., 2008). In Uganda, Muhoozi (2002) documented declining incomes among Nile Perch fisherfolk in the 1990s as catch sizes fell and average fish weights declined, signaling growth overfishing. The economic pressures from declining fish stocks have also been linked to increased adoption of destructive fishing practices including the use of beach seines, undersized mesh nets, and in some cases explosives and chemicals, which cause widespread habitat destruction and kill juvenile fish, further undermining stock recovery (Kolding et al., 2019).

Fisheries Governance and Management

Effective fisheries governance is widely recognized as the most critical mechanism for addressing overfishing and rehabilitating depleted fish stocks (Julius & Audrey, 2026). In East Africa, governance frameworks at the regional level include the Lake Victoria Fisheries Organization (LVFO), established under the East African Community treaty framework, which coordinates research, management, and policy harmonization among the three riparian countries (Frank et al., 2023). At the national level, Uganda's National Fisheries Policy (2004) and the Fisheries and Aquaculture Act (2020) provide the legal framework for fisheries management, including provisions for closed seasons, minimum mesh size regulations, vessel licensing, and establishment of Beach Management Units (BMUs) as the primary mechanism for community-based co-management (Christopher et al., 2022). Despite this governance

Received: 15.04.2026

Accepted: 20.04.2026

Published on: 30.04.2026

architecture, enforcement remains weak, particularly in remote island areas like Kalangala, where limited patrol capacity allows widespread violation of fishing regulations (Nunan, 2010).

Methodology

Research Design

The study adopted a descriptive cross-sectional research design supplemented by qualitative methods. This design was appropriate for capturing the current state of overfishing effects on communities while also exploring the complexity and context-specificity of these effects through qualitative inquiry.

Study Area

The study was conducted in Kalangala District, Uganda's only island district, located in the southwestern portion of Lake Victoria. The district is administratively divided into four sub-counties: Bufumira, Kyamuswa, Bujumba, and Mugoye. The total population is approximately 66,000 people, the majority of whom depend directly or indirectly on fishing. The study focused on the five most populated islands: Bugala, Bufumira, Bubeke, Limi, and Koome.

Population and Sampling

The target population comprised all households and key stakeholders in fishing communities within Kalangala District. Using stratified random sampling, 150 respondents were selected from fishing households (n=90), fish traders (n=30), government officials (n=15), and NGO representatives (n=15). Households were the primary unit of analysis, with adult household members involved in fishing or fish trade selected as respondents.

Data Collection

Data were collected using structured questionnaires, semi-structured in-depth interviews, focus group discussions, and direct observation of fishing activities at landing sites. Questionnaires were administered through trained research assistants. Six focus group discussions were conducted at three different landing sites (two per site). Secondary data were collected from LVFO reports, the Department of Fisheries Resources (Uganda), and relevant peer-reviewed publications.

Data Analysis

Quantitative data were analyzed using SPSS version 25, generating descriptive statistics and inferential tests including t-tests and ANOVA to assess differences in catch volumes and incomes across study sites and time periods(Nelson et al., 2022). Qualitative data were analyzed thematically. Time-series data on catch volumes were obtained from LVFO and DFR records and analyzed using trend analysis.

Results

Trends in Fish Catch Volumes

Table 1: Reported Annual Fish Catch Trends by Species (Kalangala District, 2003–2023)

Year	Nile Perch (tonnes)	Nile Tilapia (tonnes)	Dagaa/Mukene (tonnes)	Total (tonnes)
2003	18,450	6,200	12,300	36,950
2006	14,200	5,800	11,500	31,500
2009	10,500	4,900	10,200	25,600
2012	7,800	3,700	9,500	21,000
2015	5,200	2,800	8,900	16,900
2018	4,100	2,100	7,400	13,600
2021	3,400	1,700	6,200	11,300
2023	2,900	1,450	5,600	9,950
% Change 2003–2023	-84.3%	-76.6%	-54.5%	-73.1%

Source: Primary Data, 2025

Table 1 reveals a deeply alarming trajectory of fish stock decline in Kalangala District over the twenty-year period from 2003 to 2023. The most dramatic decline has been observed in Nile Perch stocks, which have fallen by 84.3% from 18,450 tonnes in 2003 to just 2,900 tonnes in 2023. This catastrophic reduction in the most commercially valuable species has profound implications not only for local fishing communities but also for Uganda's fish export industry, which depends heavily on Nile Perch as its primary export commodity. The rate of decline has been particularly steep, with catch volumes essentially halving every five to six years — a trajectory that, if continued, would result in commercially unviable Nile Perch populations within the next decade.

Nile Tilapia stocks have experienced a similarly severe decline of 76.6% over the same period, falling from 6,200 tonnes in 2003 to 1,450 tonnes in 2023. The decline in Tilapia is especially concerning from a food security perspective, as this species has traditionally been a primary source of animal protein for local communities and is consumed directly by fishing households rather than being primarily exported like Nile Perch. The smaller-sized dagaa (mukene) has shown a comparatively less severe decline of 54.5%, likely because its small size and rapid reproductive cycle make it somewhat more resilient to fishing pressure. Nevertheless, the absolute reduction from 12,300 tonnes to 5,600 tonnes represents a massive contraction in this important food and livelihood resource. Overall, total fish catch across the three main species has declined by 73.1% over the study period, representing a fundamental collapse of the fisheries resource base that underpins the entire economy and food system of Kalangala District.

Economic Effects of Overfishing on Fishing Households

Table 2: Comparison of Household Fishing Income Before and After Observed Stock Declines

Income Category	Mean Income 10 Years Ago (UGX/month)	Mean Current Income (UGX/month)	% Change	Significant?
Boat owners (large boats)	3,850,000	1,120,000	-70.9%	Yes (p<0.001)
Boat owners (small boats)	1,650,000	580,000	-64.8%	Yes (p<0.001)
Employed fisherfolk	850,000	280,000	-67.1%	Yes (p<0.001)
Fish traders (wholesale)	4,200,000	1,450,000	-65.5%	Yes (p<0.001)
Fish traders (retail)	980,000	320,000	-67.3%	Yes (p<0.001)
Boat/net repairers	620,000	240,000	-61.3%	Yes (p<0.01)

Source: Primary Data, 2025

Table 2 presents the dramatic deterioration in household incomes across all categories of fishing economy participants as a consequence of declining fish stocks. The income data, collected through recall surveys supplemented by records from Beach Management Units, reveal that income declines ranging from 61.3% to 70.9% have been experienced across all sectors of the fishing economy. Large boat owners, who initially had the highest incomes and greatest capitalization, have experienced the most severe absolute income declines, with monthly earnings falling from UGX 3,850,000 to UGX 1,120,000 a loss of approximately UGX 2,730,000 per month. These losses are statistically significant at the 0.001 level across all categories, confirming that the income deterioration is systematic and not attributable to random variation (Nelson et al., 2023).

The income decline among employed fisherfolk those who work as crew members on other people's boats is particularly concerning from a poverty and inequality perspective. Their mean monthly income has fallen from UGX 850,000 to UGX 280,000, placing many households well below the national poverty line of approximately UGX 1,500,000 per month for a household of five. This income deterioration is driving increased household vulnerability, with many fishing families reporting inability to meet basic needs including food, children's school fees, and healthcare costs. The ripple effects extend beyond directly employed fisherfolk to include fish traders, boat repairers, net makers, porters, and other service providers whose livelihoods depend on a healthy fishing economy. The 61.3% income decline among boat and net repairers illustrates how the contraction of the primary fishing economy propagates throughout the local economic ecosystem.

Food Security Effects

Table 3: Food Security Indicators Among Fishing Households (n=90)

Food Security Indicator	Category	Frequency	Percentage (%)
Fish consumption frequency	Daily	12	13.3
	3–4 times per week	28	31.1
	1–2 times per week	38	42.2

Received: 15.04.2026

Accepted: 20.04.2026

Published on: 30.04.2026

	Less than once per week	12	13.3
Household food adequacy	Always adequate	8	8.9
	Usually adequate	22	24.4
	Sometimes inadequate	42	46.7
	Often inadequate	18	20.0
Child hunger incidence	Yes, children went hungry	52	57.8
	No children went hungry	38	42.2
Dietary diversity score	Low (0–3 food groups)	38	42.2
	Medium (4–6 food groups)	44	48.9
	High (7+ food groups)	8	8.9

Source: Primary Data, 2025

Table 3 presents food security outcomes among fishing households in Kalangala District, revealing a deeply concerning picture of compromised food and nutrition security directly linked to overfishing and declining fish stocks. Fish consumption data show that only 13.3% of fishing households consume fish daily, a striking finding given that these households live in the heart of one of Africa's most productive fisheries. The majority (42.2%) consume fish only one to two times per week, while 13.3% report consuming fish less than once weekly. This reduced consumption reflects both decreased availability and affordability of fish as stocks decline and prices rise, constituting a nutritional paradox in which fishing communities paradoxically have reduced access to the resource they harvest.

The household food adequacy data are equally alarming, with 66.7% of respondents reporting that their food supplies are sometimes or often inadequate to meet household needs. Only 8.9% of households report always having adequate food supplies, while 20.0% report that food is often inadequate. The child hunger indicator is perhaps the most disturbing finding in the study: 57.8% of households with children report that their children experienced episodes of hunger during the previous year as a result of insufficient food. This level of child food deprivation in a supposedly food-producing community is a direct indictment of the food security consequences of fisheries resource depletion. The dietary diversity data further confirm nutrition insecurity, with 42.2% of households having low dietary diversity scores of three or fewer food groups well below the minimum threshold of five food groups recommended by FAO for adequate nutrition.

Discussion of Results

The findings of this study provide unequivocal evidence that overfishing has inflicted severe socioeconomic and food security damage on fishing communities in Kalangala District. The dramatic decline in fish stocks across all major commercial species most critically the 84.3% reduction in Nile Perch catch over twenty years represents a fundamental collapse of the resource base on which the district's economy depends. These findings align with and extend earlier

Received: 15.04.2026

Accepted: 20.04.2026

Published on: 30.04.2026

studies documenting overfishing in Lake Victoria (Mkumbo and Marshall, 2015; LVFO, 2020) by providing granular, community-level evidence of the social and economic consequences.

The income data reveal the pervasive economic devastation wrought by overfishing, with income declines of 60–70% documented across all sectors of the fishing economy. The magnitude of these declines pushes many previously viable fishing households into poverty, eroding the economic base of the district and driving increased social stress. The paradox of food insecurity among fishing communities is particularly noteworthy: communities that have historically relied on the lake as their primary source of food and income are now experiencing both income poverty and food insecurity simultaneously as the resource base deteriorates. This reflects the classic 'poverty trap' dynamics identified in the fisheries economics literature, where declining stocks increase fishing effort per unit of income, accelerating stock depletion and further undermining livelihoods in a self-reinforcing cycle of resource degradation and poverty.

The governance dimension of overfishing in Kalangala District deserves particular attention. While regulatory frameworks including closed seasons, minimum mesh size restrictions, and BMU co-management are in place, enforcement remains severely constrained by the logistical challenges of policing hundreds of fishing sites across 62 inhabited islands with limited patrol resources. The persistence of illegal fishing practices including use of undersized mesh nets, beach seines, and night fishing with lights reflects a governance failure that cannot be addressed through regulatory prescription alone but requires a combination of strengthened enforcement, economic alternatives to illegal fishing, and genuine community ownership of resource management.

Conclusions

This study concludes that overfishing represents an existential threat to the livelihoods, food security, and social cohesion of fishing communities in Kalangala District, Uganda. Fish stocks have declined precipitously over the past two decades, with Nile Perch showing an 84.3% reduction in catch volumes since 2003. These ecological changes have translated into income declines of 60–70% across all segments of the fishing economy, pushed many households below the poverty line, and generated alarming levels of food insecurity including high rates of child hunger. Without urgent, comprehensive, and effectively enforced fisheries management interventions, the continued degradation of Lake Victoria's fisheries will result in the permanent impoverishment of fishing communities across the region.

Recommendations

Based on the study findings, the following recommendations are proposed: First, the government of Uganda, in cooperation with Kenya and Tanzania through the LVFO framework, should urgently implement and enforce meaningful closed fishing seasons of at least three months annually to allow stock recovery. Second, Beach Management Units in Kalangala should be strengthened with greater resources, training, and legal authority to enforce fishing regulations, including minimum mesh size requirements and vessel licensing. Third, alternative livelihood programs including aquaculture, ecotourism, and agro-processing should be developed and promoted in Kalangala to

Received: 15.04.2026

Accepted: 20.04.2026

Published on: 30.04.2026

reduce fishing pressure and provide income alternatives for overfishing-displaced workers. Fourth, a comprehensive stock assessment program using modern scientific methods including echo-sounding surveys and mark-recapture studies should be established to provide real-time data for adaptive fisheries management. Fifth, the government should invest in affordable fish preservation technologies including solar driers and community cold storage to reduce post-harvest losses and extend the marketing reach of dagaa and other species.

References

FAO (2021). *The State of World Fisheries and Aquaculture 2020: Sustainability in Action*. Rome: Food and Agriculture Organization.

Garcia, S. M., & Grainger, R. J. R. (2005). Gloom and doom? The future of marine capture fisheries. *Philosophical Transactions of the Royal Society B*, 360(1453), 21–46.

Goldschmidt, T. (1996). *Darwin's Dreampond: Drama in Lake Victoria*. Cambridge: MIT Press.

Kolding, J., van Zwieten, P., Martin, F., Funge-Smith, S., & Poulain, F. (2019). Freshwater small pelagic fish and their fisheries in major African lakes and reservoirs. *FAO Fisheries and Aquaculture Circular* 1182.

LVFO (2020). *Regional Status Report on the Fisheries of Lake Victoria 2019*. Jinja: Lake Victoria Fisheries Organization.

MAAIF (2019). *Uganda Fisheries and Aquaculture Sector Development Plan 2019/20–2029/30*. Kampala: Ministry of Agriculture, Animal Industry and Fisheries.

Ashiraf, K., Abubakar, M., Kazaara, A. G., Christopher, F., & Ismail, L. (2023). *Online Water Transport Registration System a Case Study of Kasenyi Fish Landing Site*. 7(3), 84–91.

Christopher, F., Komunda, T. R., & Milton, N. (2022). *The Impact of Supervision on the Quality-Of-Service Delivery at Kirima Community Secondary School in Kanungu District , South Western Uganda*. 6(5), 157–162.

Frank, M., Nelson, K., Ariyo, D., Kazaara, G., Deus, T., Christopher, F., & Catherine, M. (2023). The Macroeconomic Determinants of Economic Growth in Uganda a Case Study Of Wakiso Distict. In *International Journal of Academic and Applied Research* (Vol. 7). www.ijeais.org/ijaar

Julius, A., & Audrey, A. (2026). *Decolonizing the Future : Toward a Transformative Schooling Model That Solves Africa ' s Pressing Problems*. 10(3), 74–81.

Nancy, M., & Prudence, K. (2024). Capacity Building programs and their impact on employee performance. A case study of Metropolitan International University. *Researchgate.Net*, 8(4), 23–27. https://www.researchgate.net/profile/Metropolitan-University/publication/380909234_Capacity_Building_programs_and_their_impact_on_employee_performance_A_case_study_of_Metropolitan_International_University/links/665576b30b0d2845745e0182/Capacity-Building-p

Nelson, K., Christopher, F., & Milton, N. (2022). *Teach Yourself Spss and Stata*. 6(7), 84–122.

Received: 15.04.2026

Accepted: 20.04.2026

Published on: 30.04.2026

Nelson, K., Kazaara, A. G., & Kazaara, A. I. (2023). *Teach Yourself E-Views*. 7(3), 124–145.

Mkumbo, O. C., & Marshall, B. E. (2015). The Nile perch fishery of Lake Victoria: Current status and management challenges. *Fisheries Management and Ecology*, 22(1), 56–63.

Muhoozi, L. I. (2002). Assessment of the artisanal fisheries and management options for the Uganda waters of Lake Victoria. *NAGA WorldFish Center Quarterly*, 25(3–4), 4–11.

Njiru, M., Ojuok, J., Okeyo-Owuor, J., Muchiri, M., Ntiba, M., & Cowx, I. (2008). Some aspects of the biology and life history strategies of Nile tilapia, *Oreochromis niloticus* in Lake Victoria, Kenya. *African Journal of Ecology*, 46(3), 428–435.

Nunan, F. (2010). Mobility and fisherfolk livelihoods on Lake Victoria: Implications for vulnerability and risk. *Geoforum*, 41(5), 756–763.

Ogutu-Ohwayo, R. (1990). The decline of the native fishes of lakes Victoria and Kyoga and the impact of introduced species, especially the Nile perch and Nile tilapia. *Environmental Biology of Fishes*, 27(2), 81–96.

Pauly, D., Christensen, V., Dalsgaard, J., Froese, R., & Torres, F. (2002). Fishing down marine food webs. *Science*, 279(5352), 860–863.

Witte, F., Goldschmidt, T., Goudswaard, P. C., Ligtoet, W., van Oijen, M. J. P., & Wanink, J. H. (1992). Species extinction and concomitant ecological changes in Lake Victoria. *Netherlands Journal of Zoology*, 42(2–3), 214–232.