



Food Security of Region around Nyangezi in Eastern Congo and Lake Bunyonyi in Uganda¹

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Abstract:

Thinking of food security and food supply in a region, the first factors that come to mind are its natural features, geographical location and climate, as these are all factors that fundamentally determine the agricultural potential of a given region. However, a number of other factors (e.g. infrastructure development) also influence the ability of a region to exploit its natural potential and to provide stable food security. The aim of this study is to explore, question and make recommendations on the causes of disparities and food security problems in two Central African regions, namely Nyangezi in South Kivu, DRC, and the Lake Bunyonyi region in Uganda. These two regions are very similar in terms of geography, climate and agriculture, but they differ significantly in terms of food security. The Democratic Republic of Congo is the 16th most populous country in the world, 60% of its territory is covered by forests, it is rich in mineral resources (especially copper, cobalt, coltan, gold and diamonds), but the standard of living of its population is not high (Palkovics, 2021), and it is the eighth poorest country in the world. 90% of its exports come from minerals, and it relies heavily on imports for food (both wheat and maize), which are insufficient to meet its needs. Agriculture accounted for 20.6% of GDP in 2015. Based on these indicators, it is relevant to examine the background of low food security. In this study, we address the food security characteristics of the Lake Bunyonyi area in Uganda, which is to be compared with the Nyangezi region of Congo. Although undernutrition is also observed here, food security is more stable compared to the Nyangezi region in Congo.

Keywords:

Agriculture, Democratic Republic of Congo, education, food security, Lake Bunyonyi, Nyangezi region

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1. Introduction

“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, World Food Summit, 1996).

Access to food was not part of the concept of food security until the 1980s. However, in connection with the investigation of global food problems that emerged in 1970, the FAO concluded that the issues in some regions were caused by insufficient access to food. This phenomenon mainly affects developing countries (Juhász, 2007, pp. 37-52.).

In addition to the lack of information about food production and agricultural cultivation, in many cases, the nature of adequate nutrition needs to be clarified to the population. However, the real root of the problems can mostly be traced back to political and economic reasons. How can a country rich in mineral resources and agricultural lands, like the Democratic Republic of the Congo, have food problems? The country has 80 million hectares of arable land and is extremely rich in rivers, yet it needs to import food, and a large part of the population is malnourished or starving (International Trade Administration, 2022).

The International Trade Administration report on Uganda states that the country's agricultural potential is among the best in Africa. It has fertile soils, low temperature fluctuations, and two rainy seasons in much of the country, which ensure multiple harvests each year. According to the UN Food and Agriculture Organization, Uganda's fertile agricultural land is capable of feeding 200 million people (International Trade Administration, 2022). Uganda is an important food exporter globally. How are malnutrition and hunger possibly still present in Uganda?

In this study, we are looking for answers to these questions by presenting the situation of two regions that show significant similarities regarding their climatic and agricultural properties.

2. The examined regions: Bunyonyi Lake in Uganda and Nyangezi Region in South-Kivu Province, Democratic Republic of Congo

The two Central African regions were examined in the context of more than 15 years of development work in Nyangezi. Authors were involved in a school development project in the Lake Bunyonyi area in Uganda in 2022. The fieldwork revealed differences in food security between both the Nyangezi region and the Lake Bunyonyi area, despite the two areas having significant similarities in terms of natural resources.

These areas are compared because of their geographical location, similar climatic features and agro potential. Geographically, they are located in almost the same area:

slightly south of the Equator, in Central Africa. Lake Bunyonyi and the Nyangezi region are only approximately 360-370 km from each other by car.

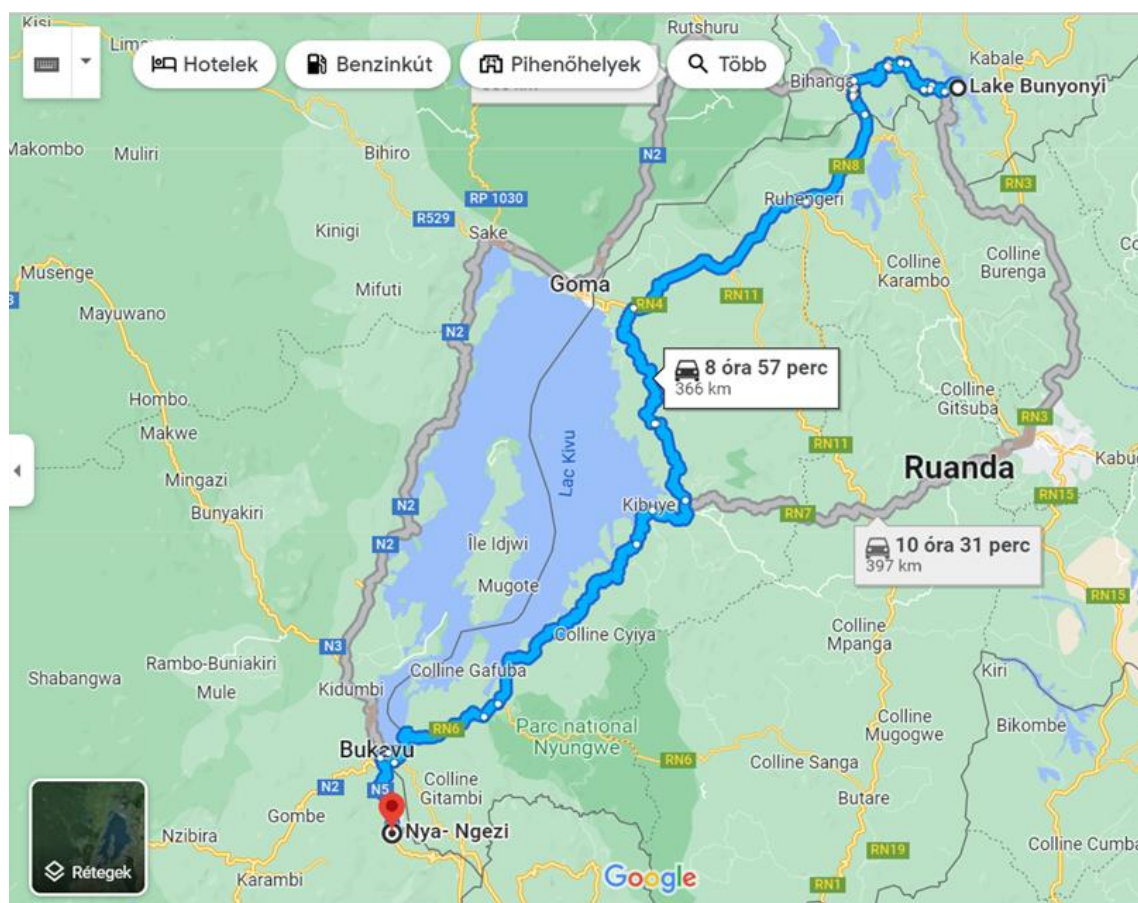


Figure 1, Distance between Lake Bunyonyi in Uganda and Nyangezi Region in DRC (source: Google Maps, 2022), edited by authors.

2.1. The Topographic and Climate Features of Nyangezi Region and Lake Bunyonyi Region Nyangezi Region

The Nyangezi Region included in the investigation is a settlement in South Kivu province of the Democratic Republic of Congo, approximately 20-25 km by car from Bukavu, the capital of South Kivu. Mountains surround the region, but Nyangezi lies on an extensive plain approximately at an altitude of 1,500 above sea level. It has a humid tropical climate, with rainy seasons from September to May and a three-month dry season from June to August. The average annual temperature is 22.6°C, the relative humidity is 68-75%, and the annual precipitation amount is 1500 mm. Based on the climatic factors, the area is suitable for agricultural activities. (Mondo et al., 2021, p.3.).

2.2. Lake Bunyonyi Region

Lake Bunyonyi is located in the southwestern tip of Uganda between Kisoro and Kabale near the border with Rwanda. The surface of Lake Bunyonyi is 56 square kilometres (Saturday, 2023), its greatest length is 25 km, its width is 7 km, and its average depth is 39 m. Lake Bunyonyi is located in an area surrounded by mountains, which makes the area difficult to access. Due to its location, the climate of Lake Bunyonyi is tropical. The annual rainfall is 1000-1500 mm, the average annual temperature is 26°C, the daily and annual fluctuations are small, around 5°C (De Haan, 2016).

Comparing the topographical and climatic conditions around Nyangezi in South Kivu to the Lake Bunyonyi in Uganda, it would be expected that the agricultural production (and consequently food security) of the two regions would show similar characteristics, however, there are differences. In the following, we compare the agricultural and food security characteristics of the two investigated regions.

3. Agricultural Characteristics and Food Security of Region around Nyangezi, South-Kivu province, Democratic Republic of Congo

3.1. Agriculture and food security of the country (DRC)

The Democratic Republic of the Congo is the largest country in the sub-Saharan region, with exceptional natural resources, high water potential, vast arable land, and the second largest tropical forest in the world. The country has 80 million hectares of arable land and 4 million hectares of irrigated land. With these features, they could ensure the opportunity to become one of the world's leading agricultural powers. The agricultural sector employs more than 60 percent of Congolese, but it accounts for only 19.7 percent of the GDP. Agriculture cannot maintain food security and does not generate enough income for the population. The main cash products are tea, coffee, cocoa, cotton, palm oil, sugar and southern fruits. We can mention cocoa and coffee as export products, but the ratio of them is very low – except for southern fruits. The bigger problem is that food import is very high. The Democratic Republic of Congo essentially depends on food import (International Trade Administration, 2022). Other food crops produced include cassava, plantains, maize, groundnuts and rice. The level of commercial agricultural production is low, and the majority of the population is self-sufficient (International Trade Administration, 2021).

The country possesses 50% of Africa's forests and a river system that could provide hydroelectric power to the entire continent – according to United Nations surveys (FAO, 2018). This is particularly important because the income from energy production would contribute significantly to improving agricultural technologies, thereby increasing food security.

3.2. Mining

The Democratic Republic of Congo is the world's largest producer of cobalt and a significant producer of copper and industrial diamonds. The DRC has 70% of the world's coltan and more than 30% of the world's diamond reserves (Juhász, 2017, pp. 37-40). Cobalt is one of the key metals for the production of electric vehicles, and coltan is an essential raw material for mobile phones and other electronic devices, which places the Democratic Republic of Congo in a strategic position. In 2020, the Democratic Republic of the Congo was the world's largest cobalt miner. With its production of 95,000 tons, it accounted for nearly 41% of the world's cobalt production. In 2020, the DRC was the sixth largest industrial diamond producer with a production of 3.7 million carats (International Trade Administration, 2022).

In one of his studies, Juhász (2017) draws attention to the fact that mining and mineral production in the Democratic Republic of the Congo is not sufficiently organized, which has led to armed conflicts in the country several times – affecting food insecurity (Juhász, 2017, pp. 37-40).

4. Agriculture and Food Security of Nyangezi Region

Nyangezi is located in South Kivu province's eastern part of the Democratic Republic of Congo.

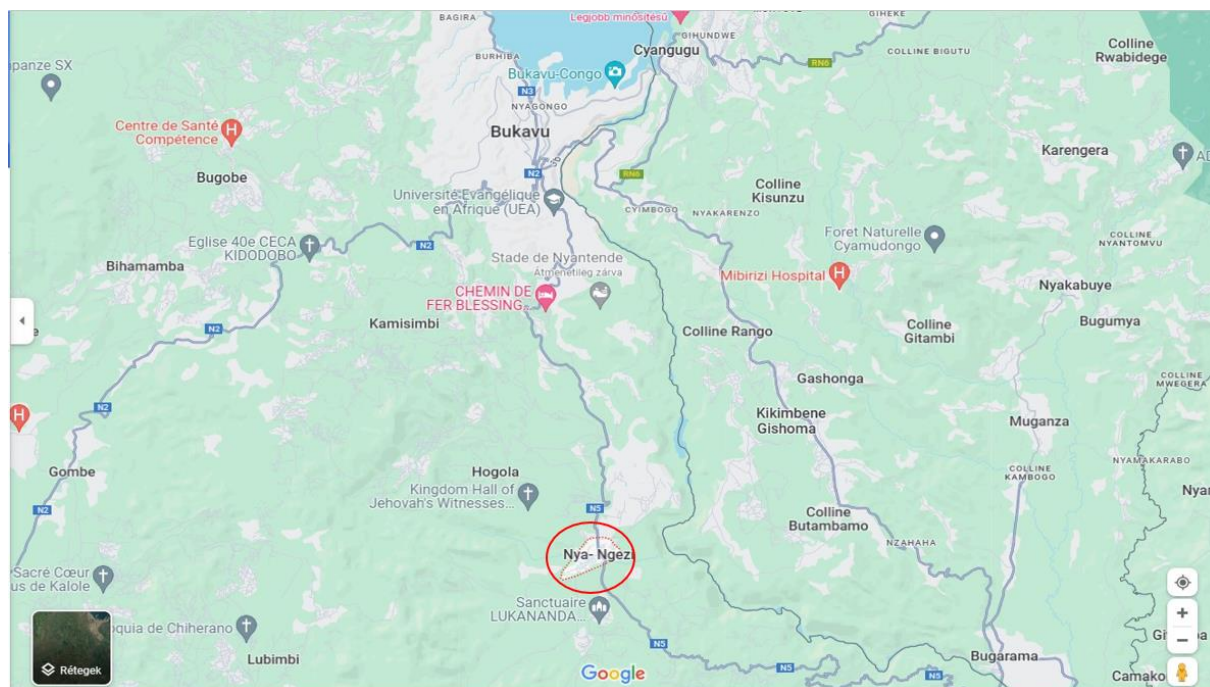


Figure 2, Nyangezi Region, South Kivu Province, DRC (source: Google Maps, 2022), edited by authors.

In Nyangezi, as in other rural areas of the DRC, the main livelihood activities are subsistence farming. The main crops grown include cassava, bananas and maize. The predominance of cassava cultivation is justified by the undemanding nature of the crop, which can grow even on exhausted soil. In addition to cassava, beans are the main source of protein (Ciza et al., 2022, p. 15). A significant proportion of households raise cattle (Ferdinand et al., 2016, pp. 30-31), and poultry is also common. In the last two decades, starvation has appeared in the region, and malnutrition is widespread. This is due to unilateral nutrition (Juhász, 2017, pp. 37-40).

The region is characterised by low levels of productivity due to a number of endogenous factors. The uncertainty of the weather due to climate change is a clear problem. The unpredictable weather conditions have led many farmers to stop farming, resulting in food shortages (Ciza et al., 2022, p. 4). At the same time as farmers have stopped farming, they have also been forced to move to other areas to find work. Migration from the countryside to the cities is exacerbating food insecurity, as farmers who had at least been able to support themselves and their families are now forced to buy food imported from abroad - if they manage to earn any income at all. In addition to the low technical level of agriculture, the main reasons include the region's inadequate agricultural education and the fact that farmers are not well informed about modern agricultural technologies. There is a lack of quality inputs for production, such as high-quality seeds and tools for cultivation (Ciza et al., 2022, p. 4). There is also a lack of knowledge about the various diseases and pests of the crops grown and, of course, about how to control them. In addition to all this, the most critical threat is the armed conflicts that are almost constant in the region. In the province of South Kivu, armed clashes have on several occasions completely destroyed agricultural production, which fundamentally determines the food security of the region, including food production, processing and transport (Juhász, 2017, pp. 37-40).

Since 1994, the history of the Democratic Republic of Congo has been one of continuous armed conflict between different ethnic groups. The bloody conflict of 1998 was followed by another one two years later. Government troops fought with the help of Angola, Namibia and Zimbabwe against rebel troops supported by Uganda and Rwanda. To this day, "minor" clashes continue in the region, posing a constant threat to the lives of millions of people. The reasons of the armed conflicts are mainly political and economic; they are related to the mining of mineral resources (Juhász, 2017, pp. 37-40). Many studies and reports have been published on the crises affecting the DRC, but the number of refugees and deaths caused by the crisis varies considerably from study to study. This poses serious difficulties in addressing the food crisis, as it is difficult to determine whether a region is experiencing temporary food shortages or persistent, chronic food shortages. An armed conflict can prevent the availability of the human and social infrastructure and economic conditions necessary for food production and supply (Gibárti, 2019, pp. 153-166). Food insecurity is high, hunger, malnutrition and migration are common in the eastern regions of the DRC, as families often migrate from areas



affected by armed conflict to urban areas in search of a better life. Urbanisation further increases food insecurity, as migration from rural to urban areas means the end of agricultural production. The fleeing masses often settle in refugee camps, where they fall into the trap of aid dependency (Juhász, 2017, pp. 37-40). In addition, the maintenance of refugee camps is a major challenge for society. Armed conflicts cause desperation and hopelessness among the population, especially those who remain in conflict-affected areas, as destroyed infrastructure and the absence of family members make a new start hopeless. Unfortunately, there are still occasional outbreaks of violence in the region, which cause even greater devastation and result in more refugees. The introduction of income-generating projects for the production and processing of food and food products is essential for the people of the region to the restart.

5. An Implemented Income-generating Project: Pig Farm in Nyangezi

As a result of the conflicts, livestock in the area has been reduced to a minimum. The rebel groups have been raided, executed or taken away. The few remaining animals died of disease. Prices of imported animal products are extremely high and unaffordable for locals. Local NGOs are trying to combat the situation by promoting small animal husbandry. Households mainly raise poultry. Demand for eggs and meat is extremely high, with better-off families willing to buy at prices several times higher. Both local and foreign organisations and companies are working to promote large-scale livestock farming. Cattle purchased from Rwanda have not been successfully kept or bred in the region for unknown reasons (Juhász, 2017, pp. 37-40).

The Nyangezi Region has been running an income-generating project called "pig farm" since 2008. The programme was set up, coordinated and financed by *Projet des vivres et études pour Orphelins VETO*, a company registered in the Democratic Republic of Congo, and the *Planetrise Association for Culture and Environmental Protection* in Hungary.

The purpose of the project was generating income and and reintroduce pork consumption in the region. The method of the project was: a total of 187 households were involved in the project, with a total of 611 pigs distributed on the condition that the reproduction was sold to their neighbours not involved in the project and the so-called surplus sold on the local market. The method has proved successful, as the pig population in the area has increased significantly in recent years. The exact number of pigs is currently being assessed, but even without accurate data, it is clear that the majority of households in the area are still keeping pigs (source: own research). The project is being maintained by the local *VETO* organisation and *Planetrise* in Hungary, in cooperation with church and NGO organisations in South Kivu.

This successful project is proof that food security can be achieved through income-generating projects in agriculture. This means that the organisation of

comprehensive and integrated income-generating agricultural projects in other food-insecure areas outside the Nyangezi Region could also be a solution. However, it is imperative to organise vocational and higher education in agriculture, to make agricultural production more resilient to climate stress and to develop infrastructure. A comprehensive and coherent programme clearly requires, of course, the involvement of cooperating partners, including governments, international and local research institutes and universities, for-profit companies and non-profit organisations, local farmers and communities. Development requires the collection, processing and interpretation of basic data in the region.

6. Agricultural Characteristics and Food Security of Region around Nyangezi, South-Kivu province, Democratic Republic of Congo

6.1. Agriculture of Uganda

Uganda's economy is primarily an agricultural economy. Agriculture contributes about 24.7% to the country's economy and accounts for 54% of total national GDP and 54% of the country's export earnings. Within agriculture, the crop sub-sector is the most dominant, accounting for 13.8% of GDP. The livestock sector contributes 4.3% of GDP, forestry 3.9% and fisheries 1.6%. The agricultural sector employs around 75% of the population, with almost 78% of the population living in rural areas where agriculture is the main economic activity. In addition, 60% of the manufacturing sector in Uganda processes agricultural products (Magunda, 2020, p. 32).

An abundance of fertile soil and rainfall is evenly distributed in Uganda. According to surveys, 80 % of Uganda's territory is arable, but only 35 % is cultivated (International Trade Administration, 2021). Major agricultural products produced by Uganda are coffee (Uganda is the world's 10th largest producer of coffee), plantain (the 4th largest producer after Cameroon, Congo and Ghana) and sweet potatoes (the 7th largest producer in the world). Other crops grown include maize, cassava, tropical fruits, tobacco, tea and cotton. On average, 75 % of the sold goods are purchased domestically and 25 % abroad. The main exports are coffee, leather, vanilla, vegetables, fruits, cut flowers and fish. The role of cotton, tea and tobacco is also increasing in exports. Agriculture is intertwined with Uganda's various industries, as they are primarily based on processing locally produced agricultural products. Primary industries: sugar processing, brewing, tobacco, cotton textiles (FAO, 2014).

There are many sources of production risks and constraints for Uganda's agriculture. Risks can arise from climate-related factors such as weather variability. Strong windstorms, droughts and floods are becoming more frequent. The situation of agricultural production is further complicated by the lack of, or limited access to, agricultural inputs. The seed sector is particularly underdeveloped. The total demand



for cereal seed is estimated at 110 000 tonnes, while total sales from the official seed market amount to only 12 000 tonnes. The shortage of supply is leading to the appearance on the market of poor quality, so-called counterfeit seeds, which greatly reduce yields. Other risks to agricultural production are the emergence of diseases caused by plant pests and animal viruses and bacteria, the effects of which are exacerbated by climate change.

There are also difficulties in storing and transporting the agricultural products produced. There is a lack of adequate storage capacity, which means that pests and other diseases can cause major losses to crops if not managed properly. Inadequate refrigeration poses a risk to eggs, dairy and fish products (Magunda, 2020, pp. 10-13).

6.2. Agriculture and Food Security of Lake Bunyonyi Region

According to studies, the population around Lake Bunyonyi lives in relative food security (De Haan, 2016). Kwikiriza's (2016) study on Lake Bunyonyi highlights the potential for aquaculture in Uganda's lakes (notably Lake Bunyonyi). The study suggests that cage culture may be a suitable alternative for landless fish farmers. Cage culture of Nile Tilapia (*Oreochromis niloticus*) in small ponds in southwestern Uganda has recently become widespread (Kwikiriza, 2016, pp. 42-48). Productivity can be greatly improved by this form of fish farming, which can be an income generating activity for farmers - contributing significantly to food security in the region. The main agricultural products around the lake are beans, sweet potatoes and corn. On average, most people eat the same thing twice a day, every day: it's beans and sweet potatoes, and kids eat corn at school. Although this food contains many nutrients, it is not enough (De Haan, 2016). This leads to one-sided nutrition.

The people of the Lake District have the opportunity to eat a more varied diet and produce more food, but the effects of climate change are severely limiting their options. For example, soil erosion caused by heavy rainfall, sudden storms and damage to infrastructure are serious problems (Mehdi, 2021, p.16). Heavy rainfall makes roads impassable, making access to markets impossible. Farmers (who are mainly women) produce on subsistence smallholdings, with an average of 0.5-2 hectares. However, farmers who would also produce for the market in addition to supplying the household are unable to market their quality products. Farmers do not have access to quality seeds, and their knowledge of modern agricultural technologies is severely lacking. Agricultural development projects in sub-Saharan Africa are therefore focused on disseminating advanced agricultural technologies.

These projects include improved crop varieties, good land management and efficient agronomic practices (Ainembabazi, 2014, pp. 666-679). Although the population of the Bunyonyi Lake area lives in relatively stable food conditions, the health problems resulting from a one-sided diet and the vulnerability of agricultural

production require the development of development programmes, which can only be implemented with the involvement of local farmers, traders, educational institutions and NGOs.

7. Conclusion

Summarising the data, the research concludes that Lake Bunyonyi in Uganda and the Nyangezi Region in South Kivu Province, Eastern Congo, face many of the same problems, such as climate change challenges and infrastructure underdevelopment. In the Nyangezi Region in South Kivu, political instability makes it difficult to achieve food security. Armed conflict is both a cause and an obstacle to achieving food security. In Uganda's Lake Bunyonyi region, the main threats to the current relative stability of food security are poor infrastructure, the use of outdated agricultural technologies and climate change vulnerability. However, continuous monitoring is needed in both regions, and the current food situation and opportunities for improvement need to be continuously assessed. In comparing the two regions under study, the identification of factors that have a negative impact on food security shows that the food security of a region does not depend solely on the availability of agricultural resources. A favourable climate and good soil conditions alone do not in themselves mean food security for a given region. Education, the skills needed for agricultural production, the level of development of agricultural technologies, the infrastructure needed for food trade and other economic and political factors all have a significant impact on the food supply and food security of a region. To build up a comprehensive picture of the food security situation in a region, it is essential to collect primary data and to carry out an in-depth analysis of the economic and political situation in the region. Both in the Nyangezi region and in the region around Lake Bunyonyi, incomplete and contradictory data are currently available. To remedy this, it is necessary to involve local and international civil organizations and institutions, governments, for-profit companies, local and international educational institutes, local farmers and communities, and it is necessary to start collecting current data.

Conflict of Interest

The authors hereby declare that they have no financial interest in this manuscript.

Notes on Contributor

Dr. Péter Gergő Juhász obtained his degree in agricultural engineering from the College of Nyíregyháza (now University of Nyíregyháza) in 2002, and his degree in environmental agricultural engineering from the Szent István University of Gödöllő



(now Hungarian University of Agricultural and Life Sciences) in 2006. Since 2007 he has been engaged in import-export activities in the field of food and other products. He has worked as a development consultant in Malawi, Mozambique, Swaziland, South Africa, Namibia and Zambia. His research and publications focus mainly on food security in developing countries. As the President of the Planetrise Association for Culture and Environmental Protection, he is active in civil society, mainly in the field of sustainability and international development. He is the head of the "Sustainable Africa Research Group" at the Africa Research Institute of the University of Óbuda. His work has focused on the development and operation of humanitarian, environmental and agricultural projects, mainly in the Democratic Republic of Congo, Kenya, Uganda, Rwanda, Zambia, South Africa and Malawi.

Csaba Szeremley graduated from the Pannon University in 2002 with a degree in economics, majoring in tourism. He spent eighteen months of his internship in the United States at Brookdale Living Inc. In 2009 he obtained an MA in Educational Planning, Economics and International Development from the Institute of Education, University College London. Prior to moving to Malawi in 2012, he worked for Humana People to People UK, a development aid organisation, as general manager. In Malawi, he set up his own audiovisual production company and worked for several prominent NGOs and companies, in addition to running the Hungarian Trade and Cultural Centre. In 2016, he returned to Hungary, but as an entrepreneur, he is still connected to Malawi: he has participated in 10 medical missions as a coordinator and as a member of the Planetrise Association for Culture and Environmental Protection, he coordinates development projects.

Szilvia Juhászné Veress graduated in 2006 from the Faculty of Technology and Agriculture of Nyíregyháza College (now University of Nyíregyháza) with a degree in Agricultural Engineering, specializing in Environmental Management. Afterwards, she graduated from the Faculty of Agriculture, Food Science and Environmental Management of the University of Debrecen with a degree in Agricultural Engineering and an MSc in Conservation Engineering. She is a founding member of the Planetrise Association for Culture and Environmental Protection, where she coordinates the organisation's programmes. Her professional work covers nature conservation, environmental management and environmental education. She carries out data analysis and textual evaluation and prepares studies based on data collection for the association's international and national development programmes. She works as an environmental educator, edits educational booklets and publications in the subject of environmental education. She started her studies at the Doctoral School on Safety and Security Sciences at the University of Óbuda in September 2022. Her research topic is the protection of specific elements of critical infrastructure (food supply chain) under specific conditions.

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