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DEVELOPMENT OF SIERRA LEONE NATIONAL IRRIGATION MASTER PLAN

July 2023

SDGs:



Country: Sierra Leone

Project Code: TCP/SIL/3801

FAO Contribution: USD 235 000

Duration: 1 September 2021-31 December 2022

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Implementing Partner

Ministry of Agriculture and Forestry (MAF).

Beneficiaries

Smallholder farmers and stakeholders of the agri-food sector.

Country Programming Framework (CPF) Outputs

CPF Outcome 1: Sustainable Agriculture, Food and Nutrition Security, and Climate Resilience.

CPF Output 3: To ensure an enabling environment for sustainable agriculture, food and nutrition (regulatory, institutional, research and policy framework) is in place.



BACKGROUND

Sierra Leone possesses several agroecological zones that are well-suited for agricultural activities, extending over a total arable area of 5 400 000 ha, showcasing high potential for production and productivity. The agricultural sector currently contributes to over 45 percent of the national gross domestic product (GDP), generating self-employment opportunities for a significant portion of the rural population, 75 percent of whom rely on subsistence farming.

In spite of the availability of arable land and water resources, irrigation is employed on less than 0.05 percent of the nation's arable land. As a result, crop production throughout the country heavily depends on rain, leading to a primarily primitive agricultural system that lacks significant implementation of good agricultural practices. Farmers, especially smallholder farmers, are engaged in agricultural activities with minimal output compared to other countries.

During the 1970s, Sierra Leone thrived as a food exporter, particularly rice, supplying neighbouring countries such as Guinea and Liberia. However, the current situation has shifted dramatically, and the country has transitioned into a significant importer of food commodities, including its staple food, rice. The annual importation of rice alone exceeds USD 200 million.

The inefficiency of the slash and burn farming model, coupled with the absence of quality seeds, fertilizers and irrigation systems, contributes to low productivity. As a result, crop yields have consistently remained below par across all value chains over the years, resulting in a lack of competitiveness for farmers compared to other countries. The situation is worsened by inadequate capital investment in the agricultural sector, including a lack of support for fourth-generation agricultural research technology. Insufficient funding also hampers the provision of effective extension services, discourages the widespread adoption of irrigation practices and contributes to the absence of sustainable irrigation facilities.

The Government of Sierra Leone is committed to creating a favourable environment that will promote the diversified production of food crops, particularly staple foods. Its goal is to transform Sierra Leone into a self-sufficient nation in terms of food production. To achieve this, significant emphasis has been placed on both strengthening existing irrigation schemes and establishing new ones, encompassing small-, medium- and large-scale projects. The establishment of the national agricultural transformation (NAT 2023) programme within the Ministry of Agriculture and Forestry (MAF) aims to address the challenges faced by Sierra Leone's agricultural sector. Key strategies within this programme include promoting private sector investment and achieving sustainable agricultural irrigation and mechanization. These approaches are particularly crucial in the pursuit of commercial-level rice production.

The implementation of a national irrigation master plan has the potential to enhance food crop production and productivity significantly. By providing essential information on agricultural resources, it will guide farmers and investors in selecting appropriate irrigation systems for different zones. The resulting increase in production will enable farmers to sell surplus crops, generating income to address socio-economic challenges and improve living standards, healthcare and education outcomes for their families.



The current project led by the Food and Agriculture Organization of the United Nations (FAO) focused on evaluating the existing utilization of water resources and identifying enhanced approaches for their efficient and sustainable uses. Its objective was to develop an irrigation master plan aligned with the priorities identified through this assessment process. Notably, this irrigation master plan aims to support and contribute to the following national priorities:

- the national sustainable agricultural development plan (NSADP 2010-2030);
- the national agricultural transformation programme 2023;
- the smallholder commercialization programme (SCP);
- the national rice development strategy;
- the public private partnership strategy.

IMPACT

The project made a significant contribution to the introduction of sustainable irrigation technologies to promote sustainable agriculture, improved food and nutrition security and increased resilience of smallholder farmers to climate change and other shocks. These efforts will ultimately contribute to ending hunger, achieving sustainable agriculture and improving food and nutrition security in Sierra Leone.

By ensuring farmers have access to irrigation technologies and solutions to enhance productive livelihoods and sustain food production, the project contributed to Sustainable Development Goal (SDG) 2, which aims at ending hunger. By ensuring the national capacities are strengthened to sustainably manage water resources and arable lands, this project contributes to SDG 12, which aims to ensure good use of resources for responsible consumption and production, and SDG 6, which promotes sustainable water use and efficient irrigation.

ACHIEVEMENT OF RESULTS

Thanks to the project, extensive consultations were carried out by the MAF and FAO, engaging stakeholders at national and regional levels, to assess the state of irrigation practices in Sierra Leone. The assessment included a comprehensive desk review, consultations with key stakeholders and the drafting of an economic study to determine the profitability of utilizing agricultural irrigation equipment. Recommendations were made regarding suitable irrigation areas, types of systems and diverse agro-industry value chains. The diagnostic study report that was subsequently developed was validated by a wide range of stakeholders, including the private sector, civil society organizations, government entities, non-governmental organizations (NGOs), farmers, youth groups and relevant ministries and departments.

Subsequently, a comprehensive irrigation master plan was developed to guide an integrated development and use of water resources in Sierra Leone, focusing on irrigation and other uses. The formulation of this plan was supported by inputs from desk reviews, regional consultations with multiple stakeholders, field missions, meetings with various government departments and agencies and technical working documents prepared by FAO-hired consultants. It underwent validation during a workshop attended by stakeholders from the private sector, civil society organizations, NGOs, irrigation equipment traders, government officials, farmer organizations, youth groups and cooperatives. Furthermore, an investment strategy was developed to allow for resource mobilization for the implementation of the irrigation master plan, through a consultative process involving collaboration with these stakeholders. Overall, the irrigation master plan will serve as a valuable resource for the government, private sector and smallholder farmers, enabling them to achieve the following objectives:

- enhance rural infrastructure and strengthen agricultural support services to lower expenses, increase profitability and expand the availability and demand for machinery, mechanization services, input supply and output marketing services;
- provide direct assistance to companies engaged in the supply and rental of irrigation equipment through technical guidance and business advisory services;
- minimize transaction and information costs associated with providing irrigation services to small-scale farmers;
- address legal and regulatory barriers to equipment leasing and establish effective procedures for asset supply and, if necessary, repossession; and
- foster collaboration at the cross-border subregional, and regional levels to facilitate the movement of equipment and provision of irrigation services, ultimately increasing the annual utilization rates of irrigation equipment.

The implementation of the irrigation master plan in Sierra Leone will contribute significantly to sustainable agriculture, improved food and nutrition security, and enhanced resilience to climate change and other shocks. Moreover, the plan's outcomes will not only boost the agri-food sector but also fulfil its primary objective of providing safe and nutritious food in a sustainable manner, thereby safeguarding the livelihoods of women, men, and youth dependent on the sector for their incomes. Additionally, this plan will support measures aimed at ensuring access to food for the most vulnerable segments of the population who face challenges in accessing irrigation facilities.

IMPLEMENTATION OF WORK PLAN AND BUDGET

The project experienced a delayed start due to various obstacles, including the prolonged recruitment process for national consultants caused by the measures implemented to tackle the spread of COVID-19. Furthermore, the implementation of the project was hindered by restrictions on gatherings and movements, leading to a predominantly remote approach where the international consultant and lead technical officer had to support the project from outside Sierra Leone. This challenge significantly affected the project's timely completion.

The COVID-19 pandemic and the associated restrictions on the movement of goods and services also posed a significant challenge in procuring the necessary equipment to support the project's implementation.

In response to these challenges, the project underwent an extension and a reallocation of funds to address them effectively. Nevertheless, all activities were successfully executed within the designated timeframe, and the entire budget allocated for the project was fully utilized.

Risk management was regarded as a crucial element in the project's implementation, with identified risks that could potentially impact its progress being thoroughly reviewed and addressed. These risks encompassed factors, such as stakeholder participation in consultative meetings and the accessibility of information from relevant government agencies during the desk review process.

FOLLOW-UP FOR GOVERNMENT ATTENTION

The MAF's engineering department is fully equipped to independently carry out the implementation of the irrigation master plan without requiring additional technical support, while the stakeholders and beneficiaries involved in its formulation possess the capacity to effectively promote the implementation process of the irrigation programmes in Sierra Leone. To ensure the continuous availability of irrigation services in Sierra Leone, it is crucial for the MAF and agricultural extension services to collaborate closely with service providers of agricultural irrigation equipment during the implementation of the irrigation master plan. Additional efforts are needed to mobilize resources to ensure the successful execution of the irrigation master plan.



In addition, to ensure the implementation of the irrigation master plan, it is recommended to develop policies and legislation that aim at:

- establishing a supportive environment for private sector investment in irrigation through the enactment of suitable laws pertaining to banking, contracts and leasing regulations;
- reducing or eliminating import and sales taxes on agricultural irrigation equipment; and
- removing legal and regulatory barriers to equipment leasing and implementing effective procedures for asset supply and, if necessary, asset repossession.

Finally, to ensure the long-term sustainability of the irrigation strategy in Sierra Leone, the following measures should be undertaken:

- enhance research and development capabilities at the national level;
- establish and implement an agricultural extension and advisory program specifically focused on the proper use of agricultural irrigation equipment and machinery;
- strengthen educational and training institutions engaged in agricultural irrigation programs;
- develop a credit system tailored to the needs of producers for acquiring agricultural irrigation equipment, taking into account past unsuccessful experiences;
- establish a subsidy system that encourages producers to invest in agricultural irrigation machinery and equipment;
- promote collaboration with service providers by developing new business models;
- encourage the adoption of farmer group service provider models for the utilization of motorized agricultural irrigation equipment;
- develop a legal framework to ensure the quality assurance of agricultural irrigation equipment; and
- promote local manufacturing of agricultural irrigation equipment.

Financial institutions, particularly banks, have a critical role in supporting agricultural irrigation systems in Sierra Leone, but farmers face challenges in securing loans due to a lack of collateral and difficulties in loan repayment stemming from factors like crop failure or limited profit generation. Such challenge shall be addressed through additional institutional actions that will create flexible policies and laws to support farmers in securing loans for agricultural activities.

SUSTAINABILITY

1. Capacity development

The MAF's engineering department received support in the form of video conferencing equipment, which enabled it to effectively coordinate with resource partners and relevant stakeholders in promoting irrigation technology across the country.

2. Gender equality

Youth took on prominent roles in discussions and recommendations during stakeholder meetings, trainings and workshops, and in recognition of the crucial roles played by women in national development, efforts were made to ensure their representation accounted for 30 percent of the total participation in such events.

Studies conducted in Sierra Leone and several other countries in sub-Saharan Africa reveal that women encounter numerous challenges when it comes to accessing agricultural inputs, utilizing technology and machinery. This is especially prominent among women smallholder farmers who face limited availability of high-quality inputs, equipment, technology, technical guidance, hired labour and knowledge regarding modern farming practices. Rural youth encounter significant difficulties in earning a living, primarily due to their limited access to financial support and essential resources for starting agricultural businesses. These challenges, coupled with the absence of basic education and infrastructure in farming communities, discourage youth from remaining or migrating to such areas, resulting in rural-urban migration and hindering agricultural development in Sierra Leone.

The implementation of the irrigation master plan will have significant advantages for farmers, particularly women, youth and other vulnerable groups, including single mothers, people living with HIV and people living with disabilities. It will ensure equitable access to irrigation facilities, leading to enhanced agricultural production and productivity across the country. Women and youth will be trained as operators to operate a range of gender-friendly irrigation equipment. Moreover, the establishment of sustainable irrigation infrastructure can empower smallholder farmers to increase their household income by boosting food crop production.

The implementation of the irrigation master plan will create favourable conditions for the private sector as well, offering opportunities to identify areas of investment that can yield improved economic returns.

3. Environmental sustainability

An environmental and social impact assessment (ESIA) was incorporated throughout the project to proactively evaluate and measure the effects of implementing irrigation programs in Sierra Leone. The purpose was to identify, avoid, minimize and mitigate any significant adverse environmental and social impacts. This assessment enabled a comparison between the expected environmental and social conditions with the implementation of the irrigation master plan and the conditions without it. During both the implementation and operational phases of the project, potential risks to the environment and society, such as soil erosion and degradation, were identified. In response, specific measures were outlined to address these risks, ensuring that contractors involved in any irrigation programme are committed to adhering to these mitigation measures.

4. Human Rights-based Approach (HRBA) – in particular Right to Food and Decent Work

The implementation of the irrigation master plan in Sierra Leone will alleviate certain burdens faced by farmers, resulting in enhanced working conditions and contributing to the promotion of decent work.

5. Technological sustainability

By implementing the irrigation master plan, efforts will be made to encourage the development of local manufacturing facilities dedicated to agricultural irrigation equipment. This is of utmost importance to ensure the long-term viability of agricultural irrigation initiatives, particularly in supporting smallholder farmers. Emphasizing the enhancement of local small and medium-scale manufacturers will be a key aspect of the irrigation master plan's implementation.



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6. Economic sustainability

Agricultural irrigation equipment service providers play a crucial role in improving farmers' access to and utilization of irrigation services. However, the number of private sector service providers engaged in activities like equipment rental is limited. An enabling environment should be created for private sector service providers engaged in irrigation equipment rental in Sierra Leone, which would allow them to operate with reduced taxation. An import waiver should also be implemented for all importers of irrigation equipment in the country to help reduce the rental cost for such equipment. Lastly, a subsidy should be provided for the hire service scheme, enabling both commercial and small-scale farmers to access agricultural irrigation services.



DOCUMENTS AND OUTREACH PRODUCTS

- ❑ **Ministry of Agriculture.** May 2023. *Draft irrigation master plan for Sierra Leone.* 195 pp.
- ❑ **Ministry of Agriculture.** January 2023. Freetown. *Final validation workshop report.* 8 pp.
- ❑ **Ministry of Agriculture.** November 2022. Freetown. *Diagnostic validation workshop report.* 35 pp.
- ❑ **Ministry of Agriculture.** July 2022. Freetown. *Regional multi-stakeholders consultation report.* 15 pp.
- ❑ **Ministry of Agriculture.** September 2021. Freetown. *Project inception workshop report.* 6 pp.

ACHIEVEMENT OF RESULTS - LOGICAL FRAMEWORK

Expected Impact	Effort to end hunger, achieved sustainable agriculture, improved food and nutrition security in Sierra Leone actualized		
Outcome	By 2023, Sierra Leone benefited from a more sustainable irrigation technologies to promote sustainable agriculture, improved food and nutrition security, and increased resilience to climate change and other shocks realized		
	Indicator	Number of smallholder farmers and private sectors practicing sustainable irrigation technologies.	
	Baseline	0	
	End Target	More than 3 500.	
Comments and follow-up action to be taken	<ul style="list-style-type: none"> – The MAF, in collaboration with FAO, validated the Irrigation master plan for Sierra Leone on 27 September 2022 during a workshop at the FAO Country Office in Freetown. Prior to this validation workshop, an inception workshop was held on 14 September 2021 to present the purpose of the project, highlight the procedures to be taken, and gather relevant information for the project. The inception workshop was followed by a diagnostic report validation workshop held on 7 June 2022 to discuss issues related to the past, present and future challenges of irrigation alongside the proven successes of irrigation projects in the country. During these workshops, relevant stakeholders and actors from public institutions, private sector, civil society groups, farmer organizations, donor agencies, participated. The result of the various validation workshops led to the publication a draft Irrigation Master Plan for Sierra Leone which was later adopted by key stakeholders in the country. – The irrigation master plan for Sierra Leone is timely and important as it can strengthen the agriculture sector by boosting food production, especially the staple food rice. This document will lead to a boost of the agri-food sector, and its prime intended purpose to deliver safe, nutritious food in a sustainable manner to the populations, protect the livelihoods of women, men and youth who depend on the agri-food sector for income. 		
Output 1	Diagnostic study conducted to properly identified the potential and opportunities for integrated development of water resources in all agroecological zones		
	Indicators	Target	Achieved
	Number of diagnostic studies conducted.	1	Yes
Baseline	0		
Comments	<ul style="list-style-type: none"> – The MAF and FAO conducted extensive consultations with stakeholders at both national and regional levels, totalling more than ten rounds. These consultations aimed to evaluate the current, past and future state of agricultural irrigation in Sierra Leone. The results of these consultations played a crucial role in the development of the irrigation master plan. – Six national consultants, each with expertise in soil science, crop production, irrigation and rural infrastructure engineering, environmental and social impact assessment, aquaculture and animal husbandry, were employed to conduct research in support of the formulation of Sierra Leone's irrigation master plan. – Over 450 farmers took part in the regional consultations that facilitated the formulation of the document, with women farmers accounting for 30 percent of the participants. 		
Activity 1.1	Review relevant documents in respect of land and water development, management and utilization		
	Achieved	Yes	
Comments	The FAO-hired national consultants undertook a comprehensive desk review of relevant literature at national and regional levels, examining the historical and current state of agricultural irrigation in Sierra Leone. They gathered information from various ministries, agencies and departments to support their analysis. To ensure effective coordination and consolidation of the work conducted by the national consultants, an international consultant was hired.		
Activity 1.2	Meeting with relevant institutions (governmental and non-governmental) which have an element of water resource utilization and management in their programmes		
	Achieved	Yes	
Comments	Consultations were held with ministries, agencies, departments and agricultural universities in Sierra Leone to gather their perspectives on the implementation of agricultural irrigation systems, resulting in an economic study led by an agriculture economist to assess the profitability of using irrigation equipment in the country.		

Activity 1.3	Assessment of the baseline situation and enabling environment	
	Achieved	Yes
	Comments	The irrigation engineer undertook a comprehensive study to explore the characteristics of irrigation in Sierra Leone, identify agricultural technologies suitable for youth and women farmers, examine the supporting environment for such technologies, assess the suitability and variety of agricultural irrigation technologies and equipment present in Sierra Leone and ultimately offer recommendations for the most appropriate agricultural irrigation practices for both smallholders and commercial farmers in the country.
Activity 1.4	Assess available water resources in terms of quality and quantity to determine irrigation typology in the various agroecological zones	
	Achieved	Yes
	Comments	To assess the water resources and identify suitable irrigation approaches in different agroecological zones, an irrigation and rural infrastructure engineer was employed. The study revealed that Sierra Leone possesses ample water resources, both in terms of quality and quantity, capable of supporting the implementation of diverse irrigation methods across various agroecological zones.
Activity 1.5	Conduct meetings with community stakeholders to obtain first-hand information on irrigation facilities	
	Achieved	Yes
	Comments	An engineer specializing in irrigation and rural infrastructure conducted on-site interviews with the relevant stakeholders within the irrigation sector. These interviews aimed to collect data regarding the irrigation facilities accessible at both the regional and district levels.
Activity 1.6	Conduct meetings (technical and administrative) with relevant ministries, departments, and agencies, especially universities, and discussions, suggestions/ recommendations are documented in the form of reports	
	Achieved	Yes
	Comments	Ten meetings were organized with ministries, national agencies and departments, as well as agricultural universities, to grasp their perspectives on the agricultural irrigation systems implemented in Sierra Leone. The outcomes and insights gathered from these discussions prompted an economic study to enhance the comprehension of the profitability associated with utilizing agricultural equipment in the country. The study was conducted by an agricultural economics consultant.
Activity 1.7	Relevant technical and socio-economic working documents produced by different experts for inclusion into the draft report	
	Achieved	Yes
	Comments	Six consultants were hired to conduct field missions in the 14 districts of the country to gather information from regional ministries, agencies and departments. The missions focused on engaging discussions with a range of stakeholders, including the MAF, dealers of agricultural irrigation equipment, suppliers of spare parts, after-sales service providers, private sector entities, farmer-based organizations, national and international NGOs and government irrigation project sites. The insight gathered from these missions played a pivotal role in facilitating a number of research studies to inform the national irrigation master plan.
Activity 1.8	Potential areas for irrigation and type(s) of irrigation system(s) to be implemented identified and crop diversification proposed	
	Achieved	Yes
	Comments	Based on the findings of the study conducted by the irrigation and rural infrastructure engineer, recommendations were made regarding suitable areas for irrigation and the appropriate types of irrigation systems to be employed for various crop diversification purposes.
Activity 1.9	Different potential agricultural and agro-industry value chains proposed into a consolidated report	
	Achieved	Yes
	Comments	The crop production specialist conducted a comprehensive study on potential agricultural and agro-industry value chains corresponding to different irrigation typologies. The study provided recommendations for diverse agro-industry value chains that align with specific types of irrigation systems.
Activity 1.10	Deliverables 1.1, 1.2, 1.3, 1.4 and 1.5 compiled into one diagnosis study report	
	Achieved	Yes
	Comments	The outcomes of Activities 1.1, 1.2, 1.3, 1.4 and 1.5 were consolidated into a diagnostic report, which was then presented to various stakeholders for validation during a workshop organized by the MAF.

Activity 1.11	Diagnostic Study report validated in a multi-stakeholder workshop		
	Achieved	Yes	
	Comments	Stakeholders from the private sector, civil society organizations, government entities, national and international NGOs, farmers, youth groups and the relevant ministries, agencies and departments participated in the validation of the diagnostic study report.	
Output 2	Master plan for the integrated development of water resources centred on irrigation and other uses developed		
	Indicators	Target	Achieved
	Number of master plan developed.	1	Yes
Baseline	0		
Comments	<ul style="list-style-type: none"> – The MAF is working towards the goal of attaining sustainable household and national food security, which can only be achieved by utilizing effective and efficient sustainable irrigation systems. Hence, the publication of this policy holds great significance and timeliness for Sierra Leone and the entire farming community. – Following its validation and adoption by key stakeholders in the country, the irrigation master plan for Sierra Leone will be officially launched and subsequently implemented to provide support to smallholder and commercial farmers. 		
Activity 2.1	Irrigation planning to be achieved by harmonizing available resources; soil, crops, water and environment		
	Achieved	Yes	
	Comments	In order to conduct studies on topics such as appropriate soil types, crop diversification, suitable water sources and environmental impact, national experts specializing in soils, crops, water and environment were recruited.	
Activity 2.2	Intervention design and preparation of a roadmap for the development of climate adaptive irrigation systems and irrigated agriculture in the country		
	Achieved	Yes	
	Comments	The development of climate adaptive irrigation systems and irrigated agriculture in the country was guided by an intervention plan and a clear roadmap formulated by an irrigation and rural infrastructure engineer.	
Activity 2.3	Prepare an investment plan through consultation with stakeholders		
	Achieved	Yes	
	Comments	An agricultural economist was hired to create an investment plan, which was developed in collaboration with stakeholders through a consultation process. The formulation of the investment plan was informed and supported by the results obtained from the stakeholder consultation.	
Activity 2.4	A Master Plan for the integrated development of water resources centred on irrigation and other uses (draft national irrigation master plan developed) from different technical working documents		
	Achieved	Yes	
	Comments	The formulation of the irrigation master plan was supported by the results obtained from the desk review, regional multi-stakeholder consultation, field missions and meetings with ministries, agencies and departments, as well as the technical working documents derived from various studies conducted by national consultants.	
Activity 2.5	Proposed investment plan and action plan for the implementation of master plan		
	Achieved	Yes	
	Comments	An investment plan and an action plan were developed by the agricultural economist to support the implementation of the irrigation master plan.	
Activity 2.6	Stakeholder meeting to validate the master plan		
	Achieved	Yes	
	Comments	During a validation workshop, the draft irrigation master plan was validated by relevant stakeholders from the private sector, civil society organizations, national and international NGOs, traders of irrigation equipment, government officials, ministries, agencies and department, farmer organizations, youth groups and cooperatives.	
Activity 2.7	Study report (irrigation master plan document) finalization		
	Achieved	Yes	
	Comments	Once stakeholders approved the document, it was completed and given to the MAF for the signature of the minister. The signed master plan was printed and shared with different government bodies for implementation.	

Partnerships and Outreach

For more information, please contact: Reporting@fao.org

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