# Flood-proofing Africa's vulnerable rice farmers' livelihoods

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# Technical Project Proposal title:

Increasing farm income and enhancing resilience of rice farmers to climate change in Sub-Saharan Africa (SSA) by disseminating flood-tolerant varieties





# **The Challenge**

Africa is said to be highly vulnerable to climate change (IPCC, 2014). Rice farmers are particularly vulnerable.

In Africa, the rainfed lowland ecosystem occupies 40% of the total rice area - the highest amongst all rice growing ecosystems. Flooding is a major and frequent abiotic stress affecting rice productivity in these areas in the past decade and is expected to increase in the coming decades (Aich et al., 2016).

Most African countries have an ambitious plan to be self-sufficient in rice and, potentially, become the new rice bowl of Asia. Flooding poses a threat to these ambitions.



Residents use a boat to evacuate with their animals from the floodwaters after River Nzoia burst its banks and due to the backflow from Lake Victoria, in Buyuku village, Busia County, Kenya [Thomas Mukoya/Reuters]

### What the numbers say

# 35%

of **Nigeria's** rice area is prone to flooding during the wet season. From 2012 to 2020, each year flooding affected thousands of hectares of rice farms leading to shifts for rice cultivation to dry season in several states like Sokoto and Nasarawa. Severe flooding during 2012 and 2020 led to reduced production by about 22% and 25%, respectively.

# 71%

of farmers in **Madagascar** are smallholders and are affected by extreme flooding due to cyclones. A 15% drop in rice production was experienced by the country in 2000 due to a major flooding effect which affected about 1 million hectares of rice area (FAO/WFP, 2000).

# 80%

380,492

of rice in East Africa is produced in **Tanzania**. Globally, Tanzania is among the 13 countries to be most affected by climate change with severe risks of increase in both frequency and severity of fresh or saline water floods.

hectares will be affected by floods in **Mozambique** in 2022 (Boletim da republica, 2020).

# **Our Solution**

# Flood-proof Africa's vulnerable rice farmers' livelihoods

Scaling the development and distribution of improved flood-tolerant varieties



# What is SUB1?

Using modern breeding technologies, we have developed new flood-tolerant rice varieties with the **SUBI gene** that can allow rice varieties to **survive for over two weeks under complete submergence,** usually caused by flash floods. These varieties can generate up to **2 tons/ha yield advantage** over current farmers' varieties that die after one week of submergence.

The effectiveness of Sub1 depends on genotype, water temperature, turbidity and age of the crop at the time of flooding. Survival percent of Sub1 varieties can vary between 56 to 90% depending on these conditions and genetic background of recurrent parent (Sarkar and Bhattacharjee, 2011; Septiningsih et al. 2009).



Early field test comparison between SUBI variety versus farmer variety

# SUB1+SUB2

The goal is to increase this yield advantage further by adding a **complementary gene called SUB2**, which could extend the survival rate of these varieties under longer flooding durations.

#### Benefits:

- Extend survival rate of varieties
  to 90 percent versus complete
  crop loss with non flood-tolerant
  varieties
- Natural **crop shield/insurance** against extreme **flooding**
- Cost-benefit ratio of at least 1:43



# **Our Ask**

Funding to expand testing, distribution, and release activities of improved (SUB1+SUB2) flood-tolerant varieties in Sub-Saharan Africa (SSA)



### What we have achieved with so far

# **FARO 66 and 77**

submergent tolerant varieties developed

# NIGERIA

>30,000 >5,000

tons of seeds have been produced

farmers reached

MADAGASCAR

5

submergence-tolerant varieties developed and awaiting official government release; dissemination to immediately follow

#### Varieties developed and released in Nigeria and Madagascar will be tested in other countries

MOZAMBIQUE

# SIERRA LEONE

BENIN

### **GUINEA CONAKRY**

TANZANIA

# Why SSA?

- SSA produces 16 million tonnes of milled rice per year but consumes nearly double that amount. This is a huge burden on the economy, costing about USD 6 billion of imports annually.
- Rice in SSA countries is mostly grown under rainfed ecosystems that are affected by several environmental stresses; substantially impacting the farm productivity and income, especially for smallholder farmers
- Until recently, no flood-tolerant rice varieties existed in Africa and farmers suffer from enormous losses due to floods. Nigeria, Tanzania, Mozambique, and Madagascar are among the most flood affected countries in SSA.



Residents wade through the waters that flooded their home in Budalangi in western Kenya on May 9, 2021. Heavy rainfall was compounded by backflow from Lake Victoria. THOMAS MUKOYA/REUTERS

# **Our partner and stakeholder network**



We are including private seed producers, millers and rice traders, farmer cooperatives, and community-based organizations, in a consultative process of **co-designing and co-development** of distribution schemes for target farmers in pre-identified target market segments.

# **Our expansion/distribution model**



Private seed producers can generate revenue from seed distribution, farmers are protected from climate change risks, and governments are supported in their rice self-sufficiency goals.

Ultimately giving more African consumers access to quality and affordable locally-produced rice.

Partnerships with NARES, NGOs, Farmers Cooperatives, CBOs, and private companies

### **Our stakeholders**



They are the ones that stand to financially benefit from the seeds being generated through this project.

## **Two scenarios**

# Without funding

Slow access to seeds might delay immediate positive impacts in some countries due to the weak seed systems.

# With funding

Positive results from field condition tests would lead to immediate deployment of SUB2 into the existing SUB1 varieties followed by multi-location testing, official release, dissemination and scaling up of adoption pathways.

The seeds dissemination in the target countries will be accelerated and more African rice farmers' incomes will be protected from extreme flooding.

# **Our joint expertise**



The International Rice Research Institute (IRRI) and AfricaRice are research organizations that share a network of partners and stakeholders in the rice value chain. Our scientists and experts work hand in hand on product design, development, testing, and dissemination activities for rice. We capture market needs in the form of 'Product Concepts' for the target markets through our global network of partners. We rely upon regional and country-level partners such as National Agricultural Research and Extension Systems (NARES), including the private sector, to test the suitability and competitiveness of our research products. Further, we leverage these partnerships to deliver demand-driven solutions and meaningful impact to the lives of smallholder rice farmers and consumers in Africa and Asia.

# Let's collaborate!

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# **The Team**

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