**NAMAs Proposal – NAMA Seeking Support for Preparation[[1]](#footnote-1)**

**1. Title of Mitigation Action**

Promoting cultivation of high-yielding upland rice in Uganda

Sector – Agriculture

Technology – transplanting, leveling/puddling, drains, fertilizers, and improved upland varieties

Type of Action –Policy and Programme Internationally Supported NAMA

Greenhouse gases covered by the mitigation action - methane (CH4),

**2. Description of the Mitigation Action**

This NAMA seeks to increase rice production in Uganda for both domestic and export markets by promoting the cultivation of high-yielding upland rice, as opposed to lowland paddy rice, in various parts of the country, especially where rice is a major crop. The NAMA will also work to streamline the rice value chain in Uganda, by facilitating rice farmers through various activities such as training sessions, fertilizer subsidies, processing equipment, and access to markets. The NAMA will also explore appropriate and sustainable methods of producing paddy rice that have lower methane emissions in Uganda in cases where upland rice does not yield.

**How the NAMA is transformational:** Rice growing is recognized as one of the strategic enterprises that will enhance attainment of the objectives of the agriculture sector development plan. This is because rice i) has a very high multiplier effect due to its long value chain that employs many players, (ii) has ability to develop other sub-sectors; like feeds for the livestock industry, (iii) has high returns on investment, (iv) has high potential in the future and (v) has demonstrated a high ability to reduce poverty.[[2]](#footnote-2) The current plans to increase production include using both paddy rice and upland rice. However, declining paddy yields have been reported in many areas of the country (Wandulu, 1999; Ego, 2001), which implies that in future, it could become a less important strategy for reducing poverty in rural households in Uganda. The NAMA will replace paddy rice with high-yielding upland rice that does not produce significant quantities of methane, helping the Government of Uganda achieve its objective of increased rice production with much lower GHG emissions. Rice is recognized as a crop with very high potential future impact on poverty reduction and food security

**GHG emissions and sources addressed by the NAMA**

The NAMA will address methane emissions from rice cultivation. Methane emissions from rice cultivation in 1994 were estimated at 23.54 gigagrammes.[[3]](#footnote-3) Recent estimates put methane emission from rice at about 204.24 gigagrammes in 2010.[[4]](#footnote-4) The increase in methane emissions is a result of an increased area under paddy rice cultivation, estimated to be 48,406ha in 2008.[[5]](#footnote-5) Methane emissions from paddy rice are variable, ranging between 0.25 to 0.82 g/m2//day, depending on the growth stage of the rice and the level of flooding.[[6]](#footnote-6) Activities associated with rice cultivation that indirectly affect emissions in the agricultural sector include productivity of paddy and upland rice, clearing of forests and woodlands to open up new land for cultivation, and use of inorganic and/or organic fertilizers to improve yields. In addition, paddy rice cultivation is associated with clearing of all trees in the land because these are thought to attract birds that eventually feed on the rice.

**Emission data sets /emissions information**

Information about methane emissions from rice cultivation and overall emissions from the agricultural sector in Uganda are available from the First National Communication that includes 1994 emissions information. (The second national communication is expected in 2014.) The FAO statistical yearbook 2013 provides emissions estimates for 2010. GHG emissions can also be estimated using information about hectares of rice cultivation provided in the NRDS of 2010.

Information not readily available:

* Emission reductions associated with different paddy rice management schemes.
* Emissions associated with upland rice cultivation/ clearing of forests and woodland, and from cutting of scattered trees from the landscape to get rid of birds from rice fields.

Emission factors for rice cultivation specific to Uganda

**Proposed activities of the NAMA**

Local level activities will target at least three districts per region and work in close collaboration with the zonal agricultural research centres across the country. This NAMA will involve various activities for the rice value chain in the major rice producing districts of Uganda.

1. Commission studies to estimate greenhouse gas – The first step will be to estimate GHG emissions associated with cultivation of upland and paddy rice in Uganda. This will provide a baseline and a reference case of business as usual (BAU) emissions and help form the basis for monitoring of emissions from upland and paddy rice cultivation.
2. Promote NERICA in new emerging rice producing areas, particularly in northern Uganda, aiming to expand rice cultivation in areas that can support upland rice varieties. Provide assistance to the National Agricultural Advisory Services (NAADS) to improve their capacity to promote upland rice.
3. Explore the most appropriate farming techniques that result in reduced GHG emissions from cultivation of paddy rice in Uganda. Work will be done by the National Agricultural Research Organisation (NARO) working with international agriculture research centres and development partners), to identify improved rice varieties and better rice cultivation techniques. This activity will generate information on the appropriate drainage methods for paddy rice for methane emissions reductions. This will also involve developing appropriate technologies for rice cultivation, storage and processing.
4. Work with the zonal agricultural research and development institutes to establish demonstration plots to showcase practices and techniques that reduce GHG emissions from upland and paddy rice cultivation. This activity will directly benefit rice farmers and extension workers.
5. Provide subsidies to farmers groups for inputs, particularly fertilizers. These will ensure that farmers can cultivate upland on the same piece of land without the need to open up more land that could be under fallow, woodland or forest.
6. Work with NAADS to share information about improved rice cultivation for reduced GHGs emissions in the pilot districts and in the rest of the country.

**3. National Implementing Agency**

Overall coordination of the NAMA will be the responsibility of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) – particularly the Crop Resources Directorate, whose role is to support sustainable, market oriented crop production, pest and disease control, quality and safety of plants/plant products; for improved food security and household income.

MAAIF has several other agencies that would be key in the promotion of upland rice cultivation.

1. National Agricultural Research Organisation (NARO), National Crops Resources Research Institute NACRRI, for trials and selection of appropriate upland rice varieties.
2. National Agricultural Advisory Services (NAADS) for promoting adoption of improved varieties of crops and some other yield-enhancing technologies and in promoting improved soil fertility management.

The Climate Change Unit (CCU) in the Ministry of Water and Environment (MWE) will provide overall oversight on emissions monitoring and reporting and verification (MRV).

**4. Expected Time Frame for the Preparation of the Mitigation Action**

12 months

**5. Estimated Full Costs of Preparation**

Background and feasibility studies ($70,000)

1. Studies to estimate GHG emissions associated with cultivation of upland and paddy rice in Uganda. This information will provide a baseline and a reference case of business as usual (BAU) emissions and help form the basis for monitoring of emissions from upland and paddy rice cultivation ($40,000).
2. Assessment of upland rice growing in Uganda, including activities associated with research and promoting the crop work by MAAIF and other stakeholders, challenges, opportunities lessons learnt etc. Assessment study to take one month and to be conducted by MAAIF at $10,000.

Description of major upland rice growing areas in Uganda, description of the research work being carried on upland rice, information on the major players and stakeholders in the rice subsector, the challenges faced and opportunities for expansion of rice cultivation.

1. Selecting intervention areas, and then performing biophysical and socio-economic assessment in the selected intervention districts ($20,000).

Detailed biophysical and socio-economic description of intervention areas for promoting rice cultivation.

Technical assessments and designs ($80,000)

1. Evaluating the rice value chain, identifying gaps and potential intervention points (seed supply, processing and storage, packaging and marketing) ($10,000). Information on the performance of the rice value chain. This activity will benefit from ongoing work in MAAIF such as the recent report on the rice value chain in Uganda[[7]](#endnote-1).
2. Suitability of various rice varieties to the different agro-ecological zones in Uganda. Study to take two months at $30,000. Field trials will be performed for the purpose of matching varieties to varied socioeconomic and biophysical conditions in the different agro-ecological zones.
3. Technical assessment of most appropriate farming methods, pilot studies to estimate reduced emissions associated with cultivation of upland rice ($30,000). On farm assessment of appropriate farming methods and techniques for upland rice cultivation in the different regions of Uganda, including evaluation of the appropriate methods of fertilizer use for optimizing yield.
4. Creating extension packages in collaboration with NAADS, Exploring ways of facilitating the provision of support for inputs (improved seed, fertilizers, processing plants): $10,000

Consultations with stakeholders ($30,000);

Three consultative meetings with stakeholders, each lasting one day ($ 10,000 each, 30 participants each=$30,000). This will also involve establishing links with Zonal Agricultural Research and Development Institutes as well as NAADS. Cost includes hiring of venue, teas, lunch and a modest transport refund to those coming from out of town. Meetings expected in month 3, month 6 and month 12 to approve the final NAMA document. Participants to these meetings will include; representatives from MAAIF, NARO, NAADS, NEW, selected ZARDIs, JICA, Private sector, and farmers.

Workplans, including specific activities and elements ($10,000): Other cross-cutting activities; stakeholder mapping and role sharing. Two 1-day planning meetings ($ 5000 15 participants each =$10,000). Cost includes hiring of venue, teas, lunch and a modest transport refund to those coming from out of town. Planning meeting will bring a core team of stakeholders to finalize NAMA document. Meetings expected to take place in month 2, and 10.

Developing a Measurement, Reporting and Verification (MRV) framework ($30,000): Following the development of a draft workplan, a team of consultants will be contracted to develop a detailed MRV framework for the NAMA.

**5. Support Required to Prepare the Mitigation Action**

***5.1 Financial Support***

Grant funds required: $250,000

***5.2 Capacity Building Support***

Three technical expert/consultants, (One international and two local) to gather all required information and to write full upland rice NAMA proposal at US$ 30,000

**6. Outcomes of NAMAs**

Estimated emission reductions – Estimated of area under low-lying paddy rice was 48,406 ha and under upland rice was 26,780 ha in 2008. This produced an estimated 204 gigagrammes of methane. Calculating emission reduction from activities under this NAMA would involve estimations of BAU methane emissions per unit areas, then comparing this to reduced emissions by activity employed. There are no reliable estimates of GHG emissions associated with upland cultivation. It is anticipated that this NAMA will result in reduced emissions associated with rice cultivation. In addition, estimates will need to take into consideration maintenance of tree cover in upland rice growing area.

Other indicators of implementation – for example, policy or regulation enacted, standard developed.

* Improved/increased production of upland rice
* Increased engagement in Farmer groups/cooperative on rice
* Improved Rice value chain:
* Better farming methods for paddy farms to minimize methane emissions

Constraints to agriculture that this NAMA will try to help overcome with respect to upland rice cultivation: improper farming methods, inadequate information, poor quality seeds, lack of credit facilities, limits farmers use of inputs such irrigation, seed, herbicides, pesticides, etc.

**Co-benefits for local sustainable development**

Economic Impacts

• Foreign exchange savings –Increased rice production saved Uganda over US$ 30 million in foreign exchange each year between 2005 and 2008 due to reduced imports of rice.

• Poverty Alleviation – Rice cultivation is associated with increased incomes for farmers. Rice comprises more than half of total crop income for the most vulnerable households and up to a third of crop income of the least vulnerable households in major rice producing districts of Uganda.

* Most varieties are resistant to pests and diseases, hence more economical for farmers

• Increased exports – Uganda has the potential to be a major source of rice grains and seed for East and Central Africa in the future.

Social Impacts

• Improved food security – Reduction in number of people that are food insecure.

• Technology transfer – improved inputs, such as irrigation equipment, can benefit cultivation of other crops.

* Easier to cultivate and is not associated with many health problems such as Bilharzias, which is reported to be on the increase (Wandulu, 1999; Ego, 2001)

Environmental Impacts

• Trees maintained in the landscape in the areas of upland rice.

• Preservation of wetland areas – by encouraging cultivation of upland rice in non-wetland areas

* Upland rice requires comparatively less water and it could save the wetlands from further degradation

Climate Resilience:

• Improved resilience to droughts – NERICA varieties generally have better tolerance to drought stresses, The NERICA-4 variety is appreciated for its hardiness, high yields, and shorter maturation time (110-120 days vs. 120-140 days) compared with traditional rice varieties.

**7. Links to National Policies and Other NAMAs**

**7.1 Relevant National Policies**

* The Uganda National Rice Development strategy (NRDS) lays out Uganda’s strategy for promotion of rice production between 2009/10 - 2017/18 with the aim of increasing household food security and reducing household poverty through increased production of high quality rice. <http://www.jica.go.jp/english/our_work/thematic_issues/agricultural/pdf/uganda_en.pdf>
* Uganda Agriculture Sector Development and Investment Strategy 2010-2018. [www.caadp.net/pdf/Investment%20Plan-uganda.pdf](http://www.caadp.net/pdf/Investment%20Plan-uganda.pdf)
* Uganda National Development Plan: <http://www.opm.go.ug/assets/media/resources/30/National%20Development%20Plan%202010:11%20-%202014:15.pdf>
* Draft National climate Change Policy, aims at reducing emissions and enhancing GHG sinks in the agriculture sector.

**7.2 Monitoring Reporting and Verification**

The data to undertake MRV will be gathered in the initial phase of the project because there is limited baseline data. The objectives and information requirements for MRV are included in the table below.

The information requirements include:

* Total acreage under paddy rice, and under upland rice
* Acreage figures associated with the planned increased rice production of 680,000MT of rice by 2018 (e.g., upland vs. paddy)
* Methane emissions mg/m2 BAU, and % reductions associated with the different interventions
* Approximate total area of wetlands
* Rice producing districts

The reduction in GHG emissions due to the NAMA would be determined by using a CO2e emission factor for paddy rice; applying default values from Chapter 4, 2006 IPCC Guidelines for Greenhouse Gas Inventories to calculate the CO2 equivalent emissions from CO2, methane and nitrous oxides.

If the NAMA is able to introduce improved paddy rice cultivation techniques that lower emissions, these emissions reductions would need to be calculate. Accurate baseline information to make this assessment should be gathered through the NAMA. NGos will participate in dissemination of the information

Farmers will need to be encouraged to keep accurate records about activities, inputs, yield and revenue. Working with farmer groups has been shown to work better than working with individual farmers. Farmer groups normally keep better records of different activities than individual farmers**.** Table 1 shows the proposed MRV framework.

Table 2 Proposed MRV Framework for Promotion of Cultivation of High-yielding Upland Rice in Uganda

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Indicators** | **Emissions factors/Activity data** | **Data Owners** | **Information** | **Institution Responsible for collecting Information** | **Procedure** | **Reporting** | **Verification** | **Leadership** |
| Amount of rice produced  Average conversion from lowland to upland | Distribution of rice type per acre;  capacity of tractor per area;  type of fuel | MAAIF | Develop database  Data collection, supervision, funding | MAAIF  Local Governments |  | MAAIF  UBOS | QA by MAAIF | MAAIF |
|  |  |  | Legal drafting of bills  Publicity/awareness  Funding  Coordination of sectoral players  Regulation of the system  Standards development  Supervision  Information dissemination, coordination of farming  Ensure compliance | MAAIF  MAAIF/NGOs  MAAIF  UCDA  UFFE  UFEA  NFA  Farmers Associations (UFEA/UFFE)  CCU |  |
|  | | | | | | | | |
| **Resources, capacities, staff** | | | From private sector, MFPED, public service, development partners, civil society | | | | | |

7.3 Links to Other Mitigation Actions

Not Applicable

# 8. Additional Information

### Feasibility studies and/or background documentation

Studies on rice:

1. Masao Kikuchi, Kunihiro Tokida et al., 2013. Rice in Uganda: Viewed from various market channels, a survey report. PRiDe project, Kampala. [www.riceforafrica.org/new/images/stories/PDF/rice%20in%20uganda.pdf](http://www.riceforafrica.org/new/images/stories/PDF/rice%20in%20uganda.pdf)
2. Haneishi,Y., A.Maruyama, G. Asea, S.E. Okello, T.Tsuboi, M.Takagaki and M.Kikuchi. 2013c. Exploration of rainfed rice farming in Uganda based on a nationwide survey: Regionality, varieties and yield. African Journal of Agricultural Research8(29):. 4038-4048. <http://www.academicjournals.org/article/article1380882154_Haneishi%20et%20al.pdf>
3. Miyamoto, K., Maruyama, A. et al 2012. NERICA Cultivation and its Yield Determinants: The Case of Upland Rice Farmers in Namulonge, Central Uganda. Journal of Agricultural Science; Vol. 4, No. 6;
4. Uganda National Rice Development Strategy-UNRDS 2008-2018.
5. IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual. Chapter 4, Agriculture. IPCC, Gland.
6. WFP, 2013. Comprehensive Food security and Vulnerability Analysis (CFSVA) Uganda. Documents.wfp.org/stellent/groups/public/documents/ena/wfp256989.pdf.
7. Kraybill and Kidoido, M. 2009. Analysis of relative profitability of key Ugandan agricultural enterprises by agricultural production zone. IFPRI - Uganda Strategy Support Program (USSP) Background Paper no. USSP 04. [www.ifpri.org/sites/default/files/publications/usspbp04.pdf](http://www.ifpri.org/sites/default/files/publications/usspbp04.pdf)
8. Geoffrey Okoboi, G. and Mildred Barungi, M. 2012. Constraints to Fertilizer Use in Uganda: Insights from Uganda Census of Agriculture 2008/9. Journal of Sustainable Development; Vol. 5, No. 10; 2012.
9. Benson, T. , Lubega, P., Bayite-Kasule, S., Mogues, T. and Nyachwo, J. 2012. The Supply of Inorganic Fertilizers to Smallholder Farmers in Uganda. Evidence for Fertilizer Policy Development. IFPRI Discussion Paper 01228. IPFRI, Washington.
10. Uganda Bureau of Statistics/MAAIF. 2010. UGANDA CENSUS OF AGRICULTURE, 2008/2009

### Design documents and technical specifications

### Stakeholders who have contributed to this proposal

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**Stakeholders in Uganda’s rice sector**

* JICA – Research in Variety development, processing, Small Scale Irrigation, NERICA Dissemination, Support the Rice Industry Secretariat and Institutional development & capacity building,
* FAO – NERICA Dissemination
* WFP- Market for rice produce
* AfDB – rural infrastructure development
* IFAD – Basket funding to NAADS & CSO’s funding

1. The information provided in this template is taken from the Draft Manual of the NAMA registry (Version of 21 November 2012) developed for the UNFCCC. The full manual can be accessed at: [http://unfccc.int/files/cooperation\_support/nama/application/pdf/registry\_ manual\_25\_oct.pdf](http://unfccc.int/files/cooperation_support/nama/application/pdf/registry_%20manual_25_oct.pdf). The information is also information by the IISD NAMAs practitioner’s guide and the UNDP guide. [↑](#footnote-ref-1)
2. Government of Uganda, 2012. *Uganda National Rice Development Strategy*. Kampala: MAAIF. [↑](#footnote-ref-2)
3. Ministry of Environment (2002), *First National Communication of Uganda to the Conference of the Parties to the United Nations Framework Convention on Climate Change*. [↑](#footnote-ref-3)
4. FAO (2013). FAO Statistical Yearbook 2013: World food and agriculture. Rome: FAO. Page 254. [↑](#footnote-ref-4)
5. Government of Uganda, 2012. *Uganda National Rice Development Strategy*, page 129. [↑](#footnote-ref-5)
6. Ministry of Natural Resources, 1996, *Sources and Sinks of Greenhouse Gases in Uganda*, Kampala: Ministry of Natural Resources, page 55. Accessed at: http://www.gcrio.org/CSP/pdf/uganda\_inven.pdf [↑](#footnote-ref-6)
7. http://www.riceforafrica.org/new/images/stories/PDF/rice%20in%20uganda.pdf [↑](#endnote-ref-1)