

**GLOBAL ENVIRONMENT FACILITY
SMALL GRANT PROGRAM IN VIETNAM
(UNDP – GEF CBA)**

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Community-Based Adaptation Project (CBA)

Project title and number: Developing a community-based model on conservation and sustainable use of drought and salinity tolerant rice varieties to adapt to climate change impact in Phuoc Long Commune, Phuoc Long District, Bac Lieu Province (CBA/VN/SPA/08/001)

Name of proposing organisation: Bac Lieu Farmers' Associations

Mailing address: Nguyen Tat Thanh St, Quarter 1, Bac Lieu Township, Bac Lieu Province

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Representative of proposing organization: Ho Huu Duc, Chairman

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Expected starting date: 1.10.2009

Expected ending date: 30.4.2012

Project budget:

Total project cost: 1,437,000,000 VND

Amount requested from CBA: 898,000,000 VND

Contributions from other sources: 539,000,000 VND

CBA Approval

Proposing organisation

Nguyen Thi Kim Anh
GEF SGP Coordinator

PROPOSAL SUMMARY

1. Background information

1. Project title: Developing a community-based model on conservation and sustainable use of drought and salinity tolerant rice varieties to adapt to climate change impact in Phuoc Long Commune, Phuoc Long District, Bac Lieu Province (CBA/VN/SPA/08/001)

2. Name of country: Vietnam

3. Project site: Phuoc Long Commune, Phuoc Long District, Bac Lieu Province

4. Proponent:

- Bac Lieu Farmers' Associations

- Mailing address: Nguyen Tat Thanh St, Quarter 1, Bac Lieu Township, Bac Lieu Province

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- Phone: 0781 3824 794; Fax: 0781 3823 880

- Proponent contact person: Ho Huu Duc, Chair

Project objective

General objective:

Contributing to the **mitigation** of climate change impact of droughts and salt water intrusion by promoting conservation and sustainable use of drought and salinity tolerant rice varieties in Mekong River Delta.

Specific objectives

Objective 1. To promote the awareness and understanding of the local government authorities and inhabitants on the impacts of climate change on local sustainable development.

Objective 2. Contribute to conservation and sustainable use of local rice varieties which are drought and salinity tolerant

5. Authorized Representative:

- Mr Ho Huu Duc, Chairman

6. Cooperating Organizations:

- People's Committee of Phuoc Long commune
- People's Committee and relevant agencies of Phuoc Long District
- Cuu Long Rice Research Institute (CLRRI)

7. Start-up Date: 1/10/2009

8. Project Period: 30 months, Oct 2009 – Apr 2012

9. Total Project Cost:

Total project cost: 1,437,000,000 VND

10. Amount requested: 898,000,000 VND

11. Brief Project Description

The project ‘Developing a community-based model on conservation and sustainable use of drought and salinity tolerant rice varieties to adapt to climate change impact in Phuoc Long Commune, Phuoc Long District, Bac Lieu Province’ aims to contribute to minimizing vulnerability and strengthening local adaptive capacity in order to reduce the impacts from droughts and salt water intrusion in rice production at Phuoc Long Commune, Phuoc Long District, Bac Lieu Province. The project has two specific objectives (1) To enhance the awareness and understanding of the local authorities and people on the impacts of climate change on socio-economic development and (2) To build a model for applying technological advances in conservation and sustainable use of local rice varieties which are tolerant to droughts and salinity. This is in line with the strategic directions in terms of restructuring in agriculture production for the socio-economic development of the People's Committee of Phuoc Long district. The project will be undertaken in 3 villages of Phuoc Long commune with a focus on the model building while awareness raising activities will be conducted widely in the whole commune.

The project main activities include the followings.

1. Organizing awareness raising activities to enhance understanding and knowledge on CC and its impacts, and adaptation measures
2. Building a model of 100-105 ha of 2-3 drought and salinity tolerant rice varieties

3. Establishing 2-3 groups of farmers to meet the demand of the commune and other neighboring communes in drought and salinity tolerant rice seed production
4. Organizing 10 technical training workshops and one study tour for the participating farmers

The key results of the project are to enhance the capacity of rice farmers to cope better with the droughts and salt water intrusion as impacts of climate change. Income of rice farmers will be secured and increased by 10-12%. The drought and salinity tolerant rice varieties which are tested successfully will be promoted for wide application in the commune and other areas through the dissemination of the project technical document and availability of provision of seeds.

1.0 RATIONALE

1.1 Community/Ecosystem Context

1.1.1 Community:

Phước Long commune of Phước Long district, Bạc Liêu province is a purely agricultural commune to the East of Phước Long district, about 10 km away from the district center, located at 9° 23'30 E and 105° 23'30 N. The commune adjoins Ninh Thạnh commune to the north, Phước Long town to the south, Tân Thạnh to the East, and Vĩnh Phú Tây to the West.

The total natural area of the commune is 7,432 ha, including 4,130 ha of agricultural land, in which there is 3,700 ha of production land in the model of 02 crops of shrimp + 01 crop of rice. In this area, rice cannot grow on 430 ha, so the model of production taken is combined culture of giant tiger shrimp – crab – fish. The non-agricultural area and area of special use make up 3,302 ha.

The commune's total population (2008 survey) is 14,401 with 3,178 households, in which females account for 51.9%; 8,785 are within working age, making up 61% of the population. There are 159 households of Khmer origin with 569; there are 102 poor households with an income of VND 200,000/person/month, accounting for 3.2 %.

Administrative structure:

Phước Long commune has 9 hamlets, with the communal center located in Phước Thọ hamlet.

Per capita income of Phước Long commune: about VND 10.4 million a year (2008);

Average food production 2008 (converted into paddy): 770kg/person/year (lowest in the Mekong Delta);

The inhabitants of Phước Long commune earn their living mainly by aquaculture (giant tiger shrimp-crop rice) which account for nearly 60% of their income, the remaining 40% from other jobs and services (paddy, vegetables, fruits, services...). Natural conditions present the commune difficulties with salinity intrusion, mainly because the commune is surrounded by many canals,

enabling saltwater to intrude far into inner fields such as 2000, 3000, 4000, 3 Mẹo, Xã Toàn, canal route 500; canal route 5000; canal route 6000; Bà Bảy Hữ; canal route Phó Sinh... The system of interlaced canals is much convenient for transporting passengers and commodities on waterways. Phước Long's agricultural activities also face with difficulties due to impacts of droughts, salinity intrusion, shortage of freshwater for plants, resulting in producers' unstable income.

1.1.2 Ecosystem:

i) Natural ecosystem

- Land resources: The total natural area of the province is 258,247 ha, divided into many groups: salinated soil making up 32.6% of the land; alum soil: 59.9%; sandy soil: 0.18%; alluvial ground and other groups of soil: 4.4%; rivers and canals: 2.9%. Of these, agricultural land occupies 98,309 ha; aquaculture land and salinated land: 120,714 ha; forest land: 4,832 ha; land of specialized use: 11,323 ha; residential land: 4,176 ha; the remaining is unused land. The land area potentially apt to grow rice, perennial trees, food crops and industrial trees is 98,295 ha/year; the land area apt for forest planting, shrimp breeding, and salt production: 125,546 ha.

- Forest resources: Forests and forest land make up 1.87% of natural land, mainly protective forests. Bạc Liêu's forests and alum mangrove forests are of high biological output and great protective and environmental value. The tree colony consists mainly of cajuput and mangrove.

- Marine resources: With 56 km of coastline and an area of 40,000 km² of waters, the yearly catch may reach over 10,000 tons. The reserve of demersal and pelagic fishes is more than 100,000 tons a year.

ii) Agricultural ecosystem

* **Shrimp culture system:** On an area of 811 ha, the shrimp crops at a number of breeding households in Phước Long commune are scheduled at different points of time with all-year-round breeding, which might affect sustainable breeding. Owing to continuous culture, harmful shrimp diseases take place continually and carry over from one crop to another. Therefore, outbursts of diseases often occur in these areas in shrimp ponds, resulting in total losses or income drops.

* **Fish culture system:** As rice cannot grow on the 106ha area owing to high salinity of the soil, the farmers have to breed barramundi, goby and some other fishes with limited income and an average output of about 200-250 kg/ha. This is an extensive culture system, with fishes released into the fields and feeding by themselves. Large amounts of algae and planktons make up an important source of feed for marine shrimp and fish.

* **Shrimp-shrimp-fish culture system:** The farmers can breed two crops of shrimp and one crop of fish, or one shrimp crop-one fish crop. This is also an extensive culture system, but with unstable culture on 76 ha and the frequent occurrence of shrimp and fish diseases, the farmers have suffered much from losses.

* **Shrimp-crab culture system:** With an area of 28 ha, this culture system proves to be economically effective, thanks to constant high price of crabs. However, due to fairly complicated management and techniques, this culture area is not likely to be developed into larger areas.

* **Shrimp-rice culture system:** Rice crops would start in August-September and harvests take place in December. Shrimp breeding would be between January and July (possibly 2 crops of shrimp and 1 crop of rice). However, during culture the rice crops at a number of households may be scheduled 01 month earlier or later than others in the area. Hence, the shrimp-breeding schedule may be 01 month earlier or later.

The culture area of shrimp – rice (2008) increased very quickly, by 138% as planned (819 ha) over 2007, totaling 3,319 ha (2008) thanks to very high economic profits. Shrimp productivity may reach 120-150 kg/ha through an extensive breeding method, with no feeding or very little feeding. Rice productivity may reach 3.5-4.5 tons/ha. In addition, during the crop the farmers also carry out an alternate culture of rice-black tiger shrimp, with a possible output of 150 kg of shrimp per hectare.

* **Barramundi-rice culture system:** This system can bring about high profits but is not likely to be developed over larger areas, as barramundi require higher salinity than giant tiger shrimp, apart from higher breeding techniques, better care and needed feeding. The culture area is about 66 ha, with a barramundi productivity of 80-100 kg/ha, and a rice output of about 3.85-4.20 tons/ha.

Describing the relation of the community to the target ecosystem and ecosystem services: The coastal ecosystem, affected by droughts in the dry season and salinity, has a structure of rice-shrimp, rice-fish, shrimp, and fish – a mutual sustenance relationship. Short-term high grain quality rice is no more likely to be grown with high output as in other areas owing to impacts from salinity intrusion and droughts in the dry season. It is therefore only possible to grow local varieties with long growth duration (4 months) and low productivity, or varieties presently under degradation with decreased productivity.

1.2 Climate context

Bạc Liêu is located on Cà Mau peninsula – southernmost of Vietnam – in an area with a subequatorial tropical monsoon climate, with a high temperature baseline: mean yearly temperature: 26.8⁰C, highest: 36⁰C (April and May), lowest: 22.5⁰C (January); abundant radiation reaching 160-170 kcal/cm² on the average; High total amount of sunny hours: ± 2,745 hours per year; mean yearly rainfall: 1,600–2,300mm, in which the rainfall in the dry season makes up only 5.5- 7.4% of the yearly rainfall. Bạc Liêu's climate, therefore, is very suitable for the development of many plants and domestic animals. Yet, at the same time the hot and humid weather also gives rise to pests, diseases and fungi, and helps them to develop all year round. There are 2 seasons a year in Bạc Liêu: the dry season starts in late November and early December and lasts until late April and early May next year, and the rainy season begins in May and lasts until November. Lying close by the sea, Bạc Liêu is not affected by floods, and is less prone to storms. It is mainly affected by cyclones which often take place between June and August. Frequent droughts, resulting in shortage of freshwater for the community's daily use and cultivation, usually start in late February and early March and last until late April and early May.

Signs of climate change and its recent impacts on living

In recent years, many kinds of disasters have taken place in Bạc Liêu, the most serious of which are droughts and salinity intrusion.

1.2.1 Rain and droughts: Like other localities in the Southern plains, the prominent feature of Bạc Liêu's climate and weather is a very small rainfall during the dry season (from December until next April), with several months without rain or with inconsiderable rain. At the meteorological station of Bạc Liêu, the average rainfall measured during the dry season is only 111 mm, accounting for 6.5% of the total annual rainfall, while evaporation is very great, up to 743 mm, i.e. 6.7 times the rainfall of the same period. A high temperature baseline (absolute highest air temperature: 35-36°C and absolute highest surface temperature: 62-67°C), small rainfall, and great evaporation have made local droughts extremely harsh, especially during April and May every year.

In the rainy season (May-November), despite a rainfall of 153-280 mm, "Bà Chấn" drought still occurs in July and mid-August. In each rainy season, normally occur 2-4 drought sessions, lasting 7-14 days and causing many disadvantages to rice production in the summer-autumn crop owing to freshwater shortage and salinity intrusion into inner fields, reducing plant productivity, especially in elevated places.

1.2.2 Salinity intrusion: At the same period of shallow water in Hậu river during the dry season, "wicked winds" ("gió chướng") with the same east-southeast direction as the main flow of the rivers combined with tides, especially high tides, send saltwater from the sea farther into inner fields with an average intrusion distance of about 50-60 km. During the early months of 2009, a salinity of 4‰ intruded up to 67 km, causing productivity drop and total loss in thousands of hectares of paddy owing to freshwater shortage and salinity of over 10-20‰.

Phước Long's topographic terrain is relatively flat, sloping from the seashore down to inner fields, mainly at an elevation of less than 0.8 m above sea level, with the remaining mainly being sand dunes and some hollow areas inundated and flooded all year round. Surrounding the commune is a system of interlaced canals. All the above traits have helped salinity intrude far into inner fields, seriously affecting the natural ecosystem.

Besides affecting the provision of freshwater for daily use and production, salinity intrusion also contributes considerably to land degradation.

1.2.3 Impacts of climate change: Extreme weather phenomena in Bạc Liêu tend to increase in both frequency and intensity due to climate change besides human impacts (farmers destroying forests to gain shrimp-breeding land and bringing down marine dikes to obtain saltwater for breeding shrimp and fish). In the past 38 years in Bạc Liêu, the temperatures have tended to increase gradually between 1970 (26.9°C) and 2008 (27.4°C), with an annual average increase of 0.5°C; rainfall tends to decrease gradually between 1970 (2,366 mm) and 2008 (2,017 mm), with an average decrease of 349 mm. The land has been more and more seriously intruded by salinity in recent years, with salinity reaching up to 20-40‰ at some periods of time.

Droughts and salinity intrusion are considered the 2 most frequent and most threatening disasters in Bạc Liêu. According to Mr. Lương Ngọc Lâm, Vice-Director the provincial Department of Agriculture and Rural Development, it is much likely that over 2,000 ha of third-crop paddy bordering Sóc Trăng province will suffer from reduced productivity or total loss due to large-scale threat from saltwater. High tides and seawater rise have been causing slides of the seashore and river banks; squalls and cyclones have been more frequent. The big typhoon Linda landing in Bạc Liêu in early December 1997 – the year of the record El Nino – is an unprecedented event in a century and has caused very serious damage to properties and human casualties in Bạc Liêu. Damaged properties were estimated at over VND 500 billion. In Phước Long commune alone, apart from 3 persons injured in collapsing houses, property losses totaled over VND 5 billion, including damages and losses of houses, boats, orchards, food crops, vegetables and aquaculture. Such disasters often last, affecting later crops owing to serious salinity of the soil.

The above mentioned extreme weather phenomena are likely to occur in higher frequency and greater intensity, especially salinity intrusion and droughts will be harsher, owing to global warming and future rise of the sea level.

According the climate change scenario in the Southern delta, with high emission rates, the average annual temperatures are likely to increase by 1.6°C (in 2050) and 3.7°C (in 2100). Rainfall of December-May will decrease, with the greatest drop in March-May: from 8% (in 2050) down to 19.6% (in 2100). Conversely, during Jun-November, rainfall will increase, with the highest rate during September-November, by 10.6% (in 2050) and up to 26.0% (in 2100). The sea level will rise by 330mm (in 2050) and 621mm (in 2100). With the present rate of temperature rise and melting of eternal glaciers in the North and South Poles, the sea level in Vietnam is much likely to rise by 1 m and more. Extreme weather phenomena in Bạc Liêu tend to take place more frequently and intensely, especially salinity intrusion and drought during the dry season. With a general terrain elevation of less than 1.2 m, even ± 0.8 m in Phước Long above sea level, Bạc Liêu will suffer from serious adverse impacts from high tides, sea level rise, slides of the seashore and river banks and salinity intrusion on a large scale. At the same time, impacts from storms, thunderstorms, cyclones, and squalls will be more intense.

- Number of disaster events:

Number of disasters events	1980	1990	2000	2005	2006	2007	2008
Storms	-	-	-	-	-	-	-
Flash floods	-	-	-	-	-	-	-
Cyclones	18	22	-	24	37	81	49

1.3 Impacts

Rice is the main crop plant in the Mekong Delta on 2 million ha (2 crops/year i.e. equivalent to 4 million ha/year) accounting for 53% of rice-planting area nationwide. Rice is the main income-earning source of the local people. However, these 0.7 million ha of wet paddy are affected by salinity, especially during the dry season. Every year, intruding saltwater has caused serious losses to agricultural production (Bũu & Lang, 2004). According to one recent survey carried out by the Ministry of Agriculture and Rural Development (MARD), economic losses due to salinity intrusion in 2005 was USD 45 million, equivalent to 1.5% of annual rice productivity of the Mekong Delta (MARD, 2005). With the application of short-term rice varieties and of other flood-avoiding strategies, losses owing salinity intrusion is presently more serious than those owing to flood and inundation in rice production in the Mekong Delta (Bũu & Lang, 2004); hence, rice-planting land is facing with strong degradation.

Causes of degradation of rice-planting land

1.3.1 Non-climatic causes

- *Salinity intrusion:* At the same period of shallow water in Hậu river during the dry season, “wicked winds” (“gió chũuớng”) with the same east-southeast direction as the main flow of the rivers combined with tides, especially high tides, send saltwater from the sea farther into inner fields, with salinity up to 4‰ in some years with an intrusion distance of 67 km (2009). Besides affecting the supply of freshwater for daily use and production, salinity intrusion also contributes considerably to degrading the soil, affecting directly rice output or accumulating salt in the soil, hence threatening later crops.
- + Droughts due to shortages of freshwater during the dry season in non-irrigation areas of the Mekong Delta are estimated to account for about 30% of the area of rice production.
- + Building hydropower plants in upstream countries (MRC, 2002) is also a cause contributing to reducing seriously the level of Mekong River in the dry season.
- + The building of a saltwater-preventing system from east to west along National Highway No. I in coastal Mekong Delta accompanied by the application of short-term rice varieties and of other flood-avoiding strategies has made the present losses owing to salinity more serious those owing to floods in rice production in the Mekong Delta (Bũu & Lang, 2004). This has much affected the local farmers’ income and living conditions.
- + Much warning about disasters has been given to farmers who changed their cultivation methods for immediate profits such as transforming the cultivation area of 2 crops (summer-autumn crop + seasonal crop) or 2 rice crops-1 food crop to the cultivation of 3 rice crops/year during high rise of rice prices in May-June 2008, or to farmers who recently destroyed protective forests for obtaining shrimp-breeding land (February 2009).

+ The farmers also face with difficulties owing to using unsuitable cultivation techniques, while using a considerable amount of agricultural chemicals.

1.3.2 Impacts of climate change

Extreme weather phenomena in Bạc Liêu tend to increase in both frequency and intensity, due to both human impacts and climate change. Droughts and salinity intrusion are considered the 2 most frequent and most threatening disasters in Bạc Liêu. According to Mr. Lương Ngọc Lân, Vice-Director the provincial Department of Agriculture and Rural Development, it is much likely that over 2,000 ha of third-crop paddy bordering Sóc Trăng province will suffer from reduced productivity or total loss due to large-scale threat from saltwater. High tides and seawater rise have been causing slides of the seashore and river banks; squalls and cyclones have been more frequent. The big typhoon Linda landing in Bạc Liêu in early December 1997 – the year of the record El Nino – is an unprecedented event in a century and has caused very serious damage to properties and human casualties in Bạc Liêu. Damaged properties were estimated at over VND 500 billion. Such disasters often last, affecting later crops owing to serious salinity of the soil.

These extreme weather phenomena are likely to occur in higher frequency and greater intensity, especially salinity intrusion and droughts will be harsher, owing to global warming and future rise of the sea level. The impacts of the greenhouse effect and global warming will give rise to an increase of seawater level in Southeast Asia by 2 mm/year (Tuồng, 2001).

Before the water management systems and salinity-preventing systems were built, traditional rice varieties had been widely grown as they adapt well to the prevailing salinity in the area. However, these varieties could be planted in one crop per year in the crop structure of shrimp-seasonal rice or summer-autumn rice-seasonal rice as they are photosensitive (blossoming between November and December in short terms). Traditional rice varieties have a growth duration of 6 months, with potential low output (3 tons/ha). However, among the local rice varieties which have been being grown, some adapt well with salinity and yield very good quality rice, much more superior than other new short-stem varieties as Đốc Đỏ, Đốc Phụng, Nàng Co Đỏ, Tài Nguyên, Tép Hành, Một Bụi, etc. (Bửu *et al.*, 2000). Therefore, to meet biodiversity requirements and preserve this valuable gene source in developing sustainable the cultivation systems in coastal Mekong Delta, the establishment of measures for conserving local drought-resistant and salinity-resistant rice varieties must become a top priority, together with a strategy of integrated measures to develop and transfer the application to local farmers in a more effective manner.

In addition, in the future salinity intrusion will be even more serious due to the shortage of irrigation water in the dry season in both Vietnam and other upstream countries (White *et al.*, 1996). The drop of the flow of Mekong River during the dry season will be more intense due to the building of hydropower plants in upstream countries (MRC, 2002) as well as from the impacts of the greenhouse effect which – with the accompaniment of global warming – has led to a forecast of sea level rise by 2mm/year in Southeast Asia (Tuồng, 2001). Therefore, the shortage of freshwater during the dry season in non-irrigation of the Mekong Delta is estimated as about 30% of the rice-planting area (Bửu & Lang, 2004). In these areas, the paddy can grow only in the rainy season and

depends much on the rainfall. In general, freshwater will be lacking for irrigation by the start or the close of the rainy season, when saltwater (with NaCl contents of about 0.3%, approximately 5 dS/m) can intrude the paddy fields and directly affects rice output or accumulate salt in the soil, bringing about losses and damages to later crops.

1.4 Project approach

The project objective is to enhance adaptive capacity of the local community to address the issue of salt water intrusion through:

1. Enhancing knowledge and awareness about the importance of and the adaptive capacity of the community to climate change;
2. Testing and demonstrating technologies to strengthen the conservation and sustainable use of land and biodiversity resources in order to mitigate adverse effects of droughts and salinisation on rice production.

The project of conserving, developing and transferring drought-resistant and salinity-resistant rice varieties in the culture models of seasonal crop-shrimp, or summer-autumn rice--seasonal rice which would bring about high and stable income, suit the ecosystem, create a sustainable development environment. This will help raise the awareness and will motivate the local people in applying the models. In addition, together with adaptive strategies which integrate several measures as less use of chemical fertilizer, especially limiting potassium fertilizer and increasing lime (for salinated soil), reduced use of chemical pesticides, more use of organic fertilizer to increase the fertility of soil in a context of prolonged salinity, increase of environmental adaptability, increase of rice quality.... Moreover, State support to the local people through proper policies would exert positive influence on the project success.

In Bạc Liêu it is no more likely to grow high-yield short-term rice varieties with high productivity as other localities owing to salinity intrusion in the dry season. It is possible therefore to grow local varieties with long growth duration (4 months) and low productivity, or varieties currently under degradation with decreased output. Thus, the project will adopt the following approach:

1.4.1 Designing fields demonstrating the diversity of rice varieties to evaluate adaptability, output, quality and economic productive efficiency of drought-tolerant and salinity-tolerant rice varieties in the local popular culture systems such as 01 seasonal rice-01 shrimp crop, 01 seasonal rice-01 fish crop, or 02 rice crops (summer-autumn rice—seasonal rice).

Rationale: Experimenting the very varieties created on the farmers' field by Vietnamese variety selectors is the most effective and quickest measure for farmers' selection, shortening experiment time corresponding to droughts and salinity intrusion.

Solution: Surveying and doing research on drought-resistant and salinity-resistant rice varieties selected and created by the Rice Institute of the Mekong Delta, and on local rice varieties to determine the set of varieties suitable for the arrangement of demonstration fields to evaluate adaptability (the five projected varieties including: Đốc Phụng, Một Bụi Đỏ, AS 996, IR 42, and Hàm Trâu-OM 576

which are drought-resistant, salinity-resistant, alum-resistant, with wide adaptability); determining the appropriate demonstration site (drought, salinity intrusion); arranging experiments together with demonstrating the diversity of the culture system of paddy-shrimp to evaluate adaptability, productivity, quality and productive efficiency of drought-resistant and salinity-resistant in the popular culture models in the locality such as 01 seasonal rice crop-01 shrimp crop, 01 seasonal rice crop-01 fish crop, or two rice crops (summer-autumn rice – seasonal rice); opening field conferences for farmers to evaluate themselves and select the appropriate set of rice varieties.

Expected outcome: The project is expected to select 2-3 drought-resistant rice varieties successfully hybridized by Vietnamese agricultural experts and likely to adapt well in Phước Long.

1.4.2 Determining and restoring 1-2 traditional rice varieties adapting well to droughts and salinity with good quality, quite superior to new short-stem varieties but already degraded owing to a long history without being restored, hence low in yield such as: Đốc Đỏ, Đốc Phụng, and Một Bụi Đỏ.

Local traditional rice varieties have been now degraded due to the following causes:

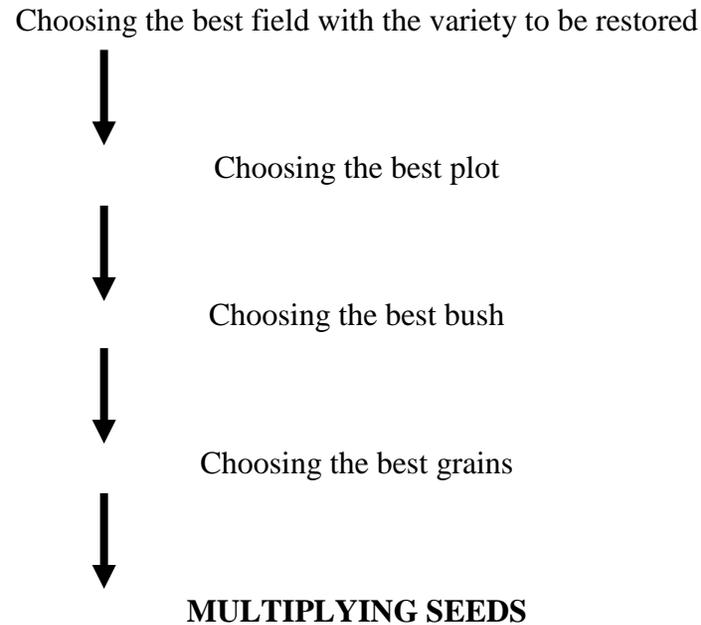
- Intermingled directly with other foreign matter in the fields; intermingled with foreign matter within plucking machines, on the drying ground, in the storehouses and in bags of rice seeds;
- Self-pollinating rice varieties cross-bred within own populations and with wild paddy;
- Disease carrier seeds transmitting diseases later crops, for example empty seeds;
- Due to the use of weak seeds, the rice cannot perform thoroughly its genetic nature.

Rationale:

Before the water management systems and salinity-preventing systems were built, traditional rice varieties had been widely grown as they adapt well to the prevailing salinity in the area. However, among the local rice varieties which have been being grown, some adapt well with salinity and yield very good quality rice, much more superior than other new short-stem varieties as Đốc Đỏ, Đốc Phụng, Nàng Cơ Đỏ, Tài Nguyên, Tép Hành, Một Bụi, etc. now degraded with low yield (Bửu *et al.*, 2000). Therefore, it is necessary to restore these to meet biodiversity requirements and preserve this valuable gene source in developing sustainable the cultivation systems in coastal Mekong Delta.

Solution: Determining samples of original seeds through describing the morphology and other features provided by local farmers; doing research on restoring on the basis of traditional methods: selecting individuals and populations, and evaluating adaptability at the same time; multiplying seeds; and distributing the seeds back to production.

Method of restoring rice varieties



Expected outcome: 1-2 local seeds from the restored seed sources of Đốc Đỏ, Đốc Phụng, Một Bụi, Tép Hành.

1.4.3 Building the model for applying such integrated cultivation measures with the best drought-tolerant and salinity-tolerant rice varieties as limiting potassium fertilizer, increasing lime (to treat salinated soil), reducing the amounts of plant protection chemicals, additional use of organic fertilizer, using plant protection biochemicals ... to transfer experience to local rice farmers.

Rationale

The structure of rice seeds and appropriate cultivation measures will be determined for paddy fields affected by droughts and salinity intrusion.

It is planned that 2-3 drought-resistant rice varieties will be chosen (with local varieties as priorities) and through selection prove to suit for experimenting a number of integrated technical measures to raise the productivity and resistance in Phước Long.

Measures:

Experimenting the model of intensive cultivation of 2 drought-resistant and salinity-resistant varieties:

2-3 flood-tolerant and salinity-tolerant rice seeds of high yield and quality will be selected for demonstration on the farmers' fields. It is the farmers who carry out these models with technical assistance from the Rice Institute of the Mekong Delta on an area of 35 ha/crop (about 70 farmers' households/crop), to be carried out in 3 crops. The model results will be multiplied into larger areas with brochures, field conferences, and visits to demonstration models. These results will lead to the making out of the scientific-technological orientation to develop rice cultivation techniques during droughts and salinity intrusion into inner fields, and to select suitable rice varieties when droughts and salinity intrusion increase and high-yield varieties cannot resist droughts and increase salt contents in water and land.

Cultivation methods:

Alternate methods will be applied: 1 seasonal rice crop – 1 shrimp crop; 1 seasonal rice crop – 1 fish crop; or 2 rice crops (summer-autumn-seasonal crop).

Reasonable fertilizing:

Based on the process of integrated extensive cultivation, fertilizing will be carried out according to the table of comparing rice leaves, by applying a productive process of “**3 reductions + 3 increases**” set out by the Rice Institute of the Mekong Delta approved by the Scientific Board under the Ministry of Agriculture scientific-technological advance applicable to demonstration models of fertilizing paddy with lime. The farmers will be trained this technical measure and apply it to their fields, and those who are untrained and have not performed the demonstration models will go on study tours, attend field conferences and receive documents provided by the project.

Integrated pest management:

Pest-avoiding sowing will be carried out, applying IPM measures (Integrated Pest Management) to the demonstration models through workshops and under the instructions of technical workers.

Expected outcome: The models will apply integrated culture measures on 100-105 ha with the best drought-resistant and salinity-resistant rice varieties on degraded land, to increase the income of the farmers in the project area by 10-12%.

1.4.4 Lessons learned from the models will be documented and proposed to the locality, creating habits among the farmers of coastal Mekong Delta and raising a proper awareness of using, conserving and developing traditional rice varieties which adapt well to rice cultivation conditions affected by salinity intrusion.

The possibility of multiplying the models is highly feasible once 2-3 drought-resistant and salinity-resistant rice varieties selected in adverse conditions prove to be highly adaptable to climate change and grown with suitable techniques. This is bound to increase the output by 10-20% compared with previous methods, contributing to improving the income of farmers in the project area. The inhabitants in other communes in Bạc Liêu province will certainly respond positively to the propaganda and during study trips to learn from the project models. Through model multiplication, the two local rice varieties -- Một Bụi Đỏ and Đốc Phụng – will be used, conserved and developed sustainably.

1.4.5 Approaching the system in order to back up diversity of living, contributing to minimizing risks from climate change: The new 3M method (multi-sector, multi-profession and multi-domain) will be carried out to coordinate the project activities in the locality. The method of approaching the system will be applied to build an action plan, transfer and evaluate economic efficiency, and multiply the demonstration models. Community ownership and participation will also be boosted in all project activities. Community participation is a principle of sustainability to perform all project operations. To do this, core farmers' groups will be set up (in conformity with selection criteria) and involved in the models.

2.0 COMMUNITY OWNERSHIP

The project is a community-based project which pays special attention to community ownership and participation in the project development, implementation, and monitoring and evaluation. In order to ensure full involvement and strong participation of the local, the project has and will pay attention to the followings.

- Community can access to project information on the project objectives, outcomes and outputs
- Giving the community the opportunities to join in all project activities.
- Selection of participating households are made in an transparent way.
- the project management team and participating households will sign a contract for model building.
- Traditional knowledge of the local communities is collected and combined with scientific measures in model building.
- Ensure community participation in project monitoring and evaluation.

The project gives priority in promoting project sustainability after the project ends. The community will continue and maintain the project results if they are aware of the climate change issue and gain benefit from cultivation of rice varieties tested by the project. This also depends on the technical capacity of rice farmers in using these varieties and cultivation measures. Therefore, the project will focus on the technical trainings and invest resources to the model building activity to ensure a success for the project model to show the suitability of these rice varieties in the increasing conditions of drought and salt water intrusion as well as the economic value of the model.

The project will pay attention to cooperate with local relevant agencies by integrating project activities with programmes/project of similar purposes managed by local relevant agencies. Thanks to this, the project has the potential for replication through government funding channel. The distribution of the project results and technical documents also help to replicate the project models.

3.0 PROPONENT DESCRIPTION

3.1 Organization's background and capacity

General organization information:

- Bac Lieu Farmers' Associations
- Mailing address: Nguyen Tat Thanh St, Quarter 1, Bac Lieu Township, Bac Lieu Province
- Email: hohuuduchnd@gmail.com

Bac Lieu Farmers' Associations was founded following the birth of the Communist Party of Vietnam (3/2/1930). Members of the association include: President, 3 Vice Presidents, 11 permanent members and 35 members of the Executive Committee.

Experiences: building solidarity, free, public and transparent discussions, focusing on farmers' needs.

Participated in projects such as "Poverty reduction", "Effective production and operation of small business for farmers", "Collaboration in production", "Solidarity and interdependence", building the Fund for farmer assistance and Fund for the poor...

Total budget of the Association is estimated at 2.5 billion VND. Main sponsors include the Government, the province's People's Committee, Ministry of Agriculture and Rural Development, Department of Agriculture, the province's Center for Agricultural Development, companies...

Organization and personnel of Bac Lieu Farmers' Associations

- Each province, district, commune, and village has its own executive committee which manages the project between 2 consecutive general assemblies. Each village has multiple farmer groups, clubs, and occupational groups.

Currently the province has: 01 province executive committee, 35 members; 07 district executive committees, 140 members; 60 commune executive committees, 785 members; 501 village executive committees, 3287 members; 67.700 household members in total, including 32.000 with high productivity.

Project management capacity:

- Utilized assistance from the National Association and other authorities to collaborate on and implement many projects involving budget assistance, varieties, technological transfers, training, model construction... to switch from outdated cultivating methods to higher yield ones.

- Succeeded in projects such as: providing the poor with guidance on how to operate their own businesses, encouraging agricultural and aquaculture development through national poverty reduction programs with activities such as raising livestock, herd building and technical training, guidance on high-productivity grass growing, clean and hygienic vegetables project under the UNICEF-sponsored SIDA program.

- The Association's Executive Committee and the Socioeconomic Committee frequently collaborate with other organizations to guarantee success of its projects.

Banking information – bank's name and bank transfer information

- Account name:

- Account holder: Mr Ho Huu Duc

- Account No. 020.180.0196.261, Vietcombank – Bac Lieu Branch, Nguyen Cong Tru Street, Bac Lieu Township.

4.0 PROJECT DESCRIPTION

4.1. Objective, Outcomes, Planned Outputs:

General objective: Contributing to the mitigation of climate change impact of droughts and salt water intrusion by promoting conservation and sustainable use of drought and salinity tolerant rice varieties in Mekong River Delta.

Specific objectives, outcomes, and planned outputs

Objective 1. To promote the awareness and understanding of the local government authorities and inhabitants on the impacts of climate change on local sustainable development.

Outcome 1.1

The awareness and understanding of related partners on the impacts of climate change and adaptation measures enhanced

Output 1.1.1:

A leaflet introducing the project contents, 6 posters on the project model devised and publicized so as to raise the awareness of impacts from climate impacts.

Output 1.1.2:

Three talks and dialogues on the impacts of climate change and appropriate measures involving the leaders of local government authorities, sectors and communities in the project area

Contents on impacts of climate change and appropriate measures integrated in meetings and activities of mass organizations in the project area.

Objective 2. Contribute to conservation and sustainable use of local rice varieties which are drought and salinity tolerant

Outcome 2.1 Demonstration models are designed for evaluating adaptability, productivity, quality and economic efficiency of 5 drought and salinity-resistant rice varieties (Đốc Phụng, Một Bụi đỏ, AS 996, IR 42, Hàm Trâu- OM 576) using popular local cultivation structures such as seasonal rice crop –shrimp, seasonal rice crop – fisheries and Summer Autumn rice crop- seasonal crop

Output 2.1.1

3 demonstration fields showing the diversity of drought and salinity-resistant rice varieties (5 varieties) in 3 vilages of Phuoc Long commune are evaluated on the site.

Outcome 2.2. Successfully restore 1-2 local rice droughts and salinity tolerant varieties, including Đốc Phụng, Một Bụi đỏ, Đốc Đỏ.

Output 2.2.1

1-2 local drought and salinity-tolerant rice varieties (Độc Phụng, Một Bụi đỏ) restored (with an increase by 10-15% in productivity).

Objective 3: Building an intensive cultivation model of drought and salinity-resistant rice varieties using combined cultivating techniques to reduce soil degradation due to droughts and salinity penetration.

Outcome 3.1 An intensive cultivation model of 2-3 drought and salinity-resistant rice varieties using adaptation measures is tested with strong community participation.

Output 3.1.1

100-105 ha, 2-3 drought and salinity-resistant rice varieties are grown using combined cultivating techniques, increasing income for participating farmers by 10 - 12%.

Output 3.1.2

10 training workshops on cultivation techniques of drought and salinity-tolerant rice varieties are organized for 400 participants. A study visit to the climate change adaptation project and activities is organized for 30-35 participants.

Outcome 3.2 Technical documents on the conservation and sustainable use of drought and salinity-tolerant rice varieties are compiled based on the results and lessons learned gained through the implementation of demonstration models, and to be disseminated to help promote the application of these varieties.

Output 3.2.1

Community meetings, conferences, and workshops on results and experiences in design and implementation of the project models.

Output 3.2.2

Technical documents on the conservation and sustainable use of drought and salinity-tolerant rice varieties are compiled, evaluated and disseminated.

Output 3.2.3

2-3 groups of farmers producing seeds of drought and salinity-resistant rice varieties established and operated.

4.4 **Timetable (see Annex 2)**

4.5 **Risks and Barriers**

The project has various risks and barriers during its implementation. The natural disasters, such as storms, flooding, especially droughts which happen very often in recent years will adversely affect rice production. Due to the changes in the weather, there are pests and diseases in rice production in particular and in agriculture development in general. Salt water intrusion is increasing and a big threat to the production and community life. Information on natural disasters and salt water intrusion needs to be provided in time to the community for preparedness and taking preventive measures. The project experts and field workers need to closely monitor the project model and to undertake the measures to address the problems arisen during the model building.

The project will work in the agriculture area which is heavily dependent on the weather and cropping. Therefore, workplanning is very crucial to ensure the project to be progressive.

The lack of participation of community and local farmers will definitely affect the project result as the project is community-based. There is the potential of conflicts among rice farmers in terms of project benefit. The project will leave the community the right to make the decision on the selection of farmers participating in the project. Community meetings will be organized through the implementation of the project where the project team will provide full information about the project. The project team will discuss and reach an agreement with the community on the duties and responsibilities, and community contribution as well as the benefit participating in the project at the inception stage of the project.

The delay in transferring funding to the project from CBA Viet Nam will be a difficulty for the project. In order to avoid this, the project team will pay attention to project management (workplanning, budgeting, reporting) and attend all training workshops organized by CBA and learn from other CBA partners so as to meet the requirement of CBA Viet Nam in terms of funding disbursement.

4.6 **Monitoring and Evaluation Plan**

Vulnerability Reduction Assessment Reporting Form	
Indicator 1	7.75

Indicator 2	7.90
Indicator 3	5.90
Indicator 4	5.30
Indicator 5	7.70
Indicator 6	7.65
Indicator 7	7.20
VRA Score	7.45

The Vulnerability Reduction Assessment (VRA) will be measured at the planning stage of the project, at the mid-point, and at the end of project. Given that the VRA is qualitative and is based on the community perceptions, the first VRA was conducted to establish a baseline during the Project planning phase. A second VRA will be done at mid project after all the project activities to build the model has been completed. A final VRA will be done at the end of the project to assess the overall impact of the project on the community adaptive capacity.

The VRA questions that will be used are as follows:-

1. Rate the impact of droughts, salt water intrusion, and land degradation on your livelihood
2. Rate your ability to cope with the negative impacts of droughts, salt water intrusion, and land degradation
3. Rate the impact on your livelihood if droughts, salt water intrusion, and land degradation doubles
4. Rate how effectively you would be able to cope with the doubling of droughts, salt water intrusion, and land degradation
5. Rate how effective you think this project will be in reducing your risks from increasing droughts, salt water intrusion, and land degradation.
6. Rate your confidence that the project will continue to reduce droughts, salt water intrusion, and land degradation risks after the project ends.
7. Rate your own ability to cope with increasing droughts, salt water intrusion, and land degradation and other climate changes after this project ends.

GLOBAL ENVIRONMENTAL BENEFITS (GEB):

The Impact Assessment System (IAS) indicator will be measured at the end of the project using the following components:

- (1) The number of hectares of land protected from degradation due to droughts and salt water intrusion
- (2) The number of innovations developed/applied under the project
- (3) The number of policy recommendations proposed in land and agro biodiversity management

The targets for the above are as follows:

- (1) 35 hectares will be sustainably managed by the project
- (2) The project will apply 3 technologies (namely, drought and salinity tolerant varieties cultivation, restoration of local rice varieties, and production of rice seeds)
- (3) Three to four recommendations on policies in land and agro biodiversity management will be proposed to local authorities

UNDP ADAPTATION INDICATORS:

The project will contribute to the UNDP adaptation indicators adopted by the Viet Nam CBA country programme strategy, namely:

1. The number of measures that address the additional risks posed by climate change deployed as part of sustainable resource management activities;
2. Percentage of area concerned in which climate change risk management activities, in the context of sustainable resource management are implemented; and
3. Number of local and national level policy recommendations proposed as a result of lessons from CBA projects

The targets for the UNDP Adaptation indicators are outlined below:

- (1) Three measures will be deployed as part of the activities for sustainable farming in the project area.
- (2) 30% percent of project area will be engaged in climate-resilient farming activities.
- (3) Three to four policy recommendations proposed as a result of lessons from the project.