

**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 community-based models to minimize impacts of flooding and salt water intrusion caused by sea level rise, adapting to climate change and contributing to sustainable agricultural production and food security at Phuoc Hoa Commune, Tuy Phuoc District, Binh Dinh Province (CBA/VN/SPA/09/005)

Name of proposing organisation: Union of Science and Technology Associations of Binh Dinh Province

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Representative of proposing organization: Mr. Trần Ngoan, Chairman

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Expected starting date: 1.10.2009

Expected ending date: 30.4.2012

Project budget:

Total project cost: 1.525.000.000 VND

Amount requested from CBA: 896.000.000 VND

Contributions from other sources: 629.000.000 VND

CBA Approval

Proposing organisation

Nguyen Thi Kim Anh
CBA Coordinator

Tran Ngoan
Chairman

UNDP-GEF-CBA

A. PROJECT SUMMARY

Background information

1. **Project Name:** Developing community-based models to minimize impacts of flooding and salt water intrusion caused by sea level rise, adapting to climate change and contributing to sustainable agricultural production and food security at Phuoc Hoa Commune, Tuy Phuoc District, Binh Dinh Province (CBA/VN/SPA/09/005)
2. **Project Site:** Phuoc Hoa commune, Tuy Phuoc district, Binh Dinh province, Vietnam.
3. **Proponent:** Union of Science and Technology Associations of Binh Dinh Province
 - **Address:** 472 Trần Hưng Đạo, Thành phố Quy Nhơn, Tỉnh Bình Định
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4. Project Objective:

General objective:

To develop community-based sustainable agricultural production models to minimize impacts of flooding and salt water intrusion caused by sea level rise, adapting to climate change and contributing to food security and stable incomes for the farmers at Phuoc Hoa Commune, Tuy Phuoc District, Binh Dinh Province.

Immediate objectives

Objective 1 : To build demonstration models of sustainable rice production, adaptable to flooding and salt water intrusion in Phước Hòa commune, Tuy Phước district.

Objective 2: To strengthen awareness and local capacity to adapt to climate change to contribute to the local sustainable development in general and agriculture in particular.

5. Authorized Representative:

Mr. Trần Ngọc, Chairman, Union of Science and Technology Associations of Binh Dinh Province

6. Project Partners:

- Project Partners: Agricultural and Rural Development Department of Binh Dinh Province and Tuy Phuoc District.
- Research Institute of Agriculture
- People Committee of Phuoc Hoa Commune

7. **Day of Starting:** 01/10/2009

8. **Project Duration:** 30 months (10/2009 – 4/2012)

9. **Amount Requested:** 896.000.000 VND

10. Brief project description

The project of “Developing community-based models to minimize impacts of flooding and salt water intrusion caused by sea level rise, adapting to climate change and contributing to sustainable agricultural production and food security at Phuoc Hoa Commune, Tuy Phuoc District, Binh Dinh Province” aims to contribute to minimizing losses and reinforcing adaptation to flooding and salt water intrusion in Phước Hòa commune, Tuy Phước district, Bình Định province through technology applications in plant varieties and comprehensive cultivation measures, with a focus on producing rice as the main crop of income and decisive plant of the commune’s food security . The two *specific objectives* of the project include: (1) To build demonstration models of sustainable rice production, adaptable to flooding and salt water intrusion in Phước Hòa commune, Tuy Phước district; and (2) To raise the awareness and capability of local government authorities and local people in adapting to climate changes for local sustainable development in general and agricultural production in particular.

The project will be carried out at Phước Hòa commune, Tuy Phước district, Bình Định province, a totally agricultural commune with a total natural area of 2,001 ha, in which agricultural land makes up 662 ha of mainly paddy land (*annual area of rice cultivation: 994 ha*) and 350 ha of extensive aquaculture ponds (*2007 statistics*). The commune’s population is 13,613. Monoculture of rice, backed up by no auxiliary jobs, has resulted in a low and unstable per capita income of less than VND 500,000 a month. Poor households in the commune account for over 10% (mean ratio of poor households in Tuy Phước district in 2008: 5.7 %).

* *The main project activities* include: i) To establish and carry out propaganda activities in order to raise the awareness of the impacts of climate change through mass media in the community; ii) To design and develop a model of applying agricultural technology advances to minimize effects of flooding and salt water intrusion in the locality; iii) To monitor, evaluate and disseminate experience learned from the model for replication and expansion in Phước Hòa commune and other neighboring localities with similar conditions in Tuy Phước and Phù Cát districts.

* *Technologies applied in the project include:* changing the structure of flood-and salinity-resistant varieties on rice-planting land, with a focus on experimented varieties with proven suitability, applying cultivation measures in the use of land, fertilizer, pesticides, and managing water sources to prevent land degradation and enhance the economic efficiency of rice production; on the basis of the model outcomes combined with targeted research, building the plan for applying the project model to the whole area of flooded and salinised paddy land of Phước Hòa commune as well as carrying out propaganda work, and training the techniques in localities with similar conditions for learning and application.

* *The project outputs are as follows:* Formulating and publicizing training and propaganda information and materials on the impacts of climate change to introduce adaptive measures and modern suitable techniques; 8-10 workshops and 5-6 conferences will be organised for farmers of Phước Hòa commune and neighboring localities. The model of changing flood- and salinity-resistant rice varieties will be designed and tested in rice fields before being summarized and proposed for application at suitable locations of Phước Hòa commune as well as neighboring localities. Seed production group will be developed to help actively provide rice seedlings to local farmers. About 60 households

of Phước Hòa commune are expected to benefit from the project, with a prospective stable income increasing 15 – 20% compared with that before the existence of the project. Information on the model will be widely disseminated and the model results will be replicated and expanded to other neighboring localities with technical assistance in project transfer.

1.0 RATIONALE

1.1. Community/ecosystem context

1.1.1. Community context

Bình Định is a coastal province of southern Central Vietnam, with a total natural area of 6,025 km², including 117,392 ha of agricultural land, and a population of over 1.5 million, with 70 % living in rural areas. At present, rice is still the principal food crop of the province with a cultivation area of 120,000 ha/year, from which the production of rice has a specially significant role in securing food security and agricultural production of the province. Bình Định is within a monsoon tropical area with two distinct seasons: the dry season lasting between January and August, and the rainy season from September to December. The province's agricultural production has been facing with much difficulty in recent years due to unexpected changes in flood and rainy seasons: torrential rains coupled with storms (at a frequency of 1 great flood every 2 –3 years and 0.6 storms each year), normally in October or November, have brought about flooding and flooding in extended areas, which requires reasonable scheduling of crop harvests before the advent of flooding. Heavy rains often take place in October, causing floods hence great damages and economic losses as well as environmental pollution. In late 2007 in Bình Định, there were 5 consecutive floods, 2 of which were big floods that destroyed thousands of hectares of land with alluvium and water, dilapidated a number of dams, reservoirs, canals, and dikes, and brought about the loss of thousands of tons of rice seeds. In late January 2008, an unscheduled session of rains and flood combined with high tide caused serious flooding resulted in the damage of more than 2,000 ha of rice in low fields along the Eastern dikes of Tuy Phước, An Nhơn, and Phù Cát districts. Adverse impacts from unscheduled flooding have presented the inhabitants of coastal plains with much difficulty in their living conditions.

Tuy Phước is a major rice-producing district of the province with a rice cultivation area of 15,867 ha/year and 1,034 ha of aquaculture. As a historical municipality, the district has a population of 188,211 with a density of 867.3 /km², the second most thickly-populated area of the province after Quy Nhơn City (2007 statistics). Tuy Phước district obtains a fairly special position, located far downstream at the confluence of the systems of Côn river and Hà Thanh river pouring into Quy Nhơn estuary, hence witnessing frequent flooding and flooding in large areas during the rainy season of October-November. In recent years, Tuy Phước district has been facing with such problems related to the impacts from climate change on the environment and agricultural production as: unscheduled flooding, prolonged flooding over large areas, high and prolonged tides, and increased salt water intrusion intrusion. In 2008 alone there were 6 great floods causing colossal damages. In one sole flood between November 17, 2008 and November 24, 2008, 126 houses collapsed 63 ha of rice fields were destroyed by water and alluvium, 1,590 m of river dikes and 400m of seashore dikes were broken, 55

m of communication roads were destroyed, totaling a damage of up to VND 17 billion. The Meteo-hydrologic Station of Southern Central Vietnam has defined the communes along Kôn – Hà Thanh rivers as major flooding-prone areas of Tuy Phước district: Phước Quang, Phước Thắng, Phước Hoà, Phước Sơn, Phước Thuận, Phước Hưng, and Phước Nghĩa. Among these, Phước Hòa commune – far downstream close to the estuary – is most affected by flooding.

Phước Hòa is an entirely agricultural commune with a total natural area of 2,001 ha, consisting of 662 ha of agricultural land, mainly rice-planting land (*with a rice-cultivating area of 994 ha/year*) and 350 ha of aquaculture ponds (*2007statistics*). Phước Hòa commune has 9 hamlets: Kim Xuyên, Tùng Giản, Tân Giản, Huỳnh Giản, Kim Đông, Kim Tây, Hữu Thành, Tân Mỹ, and Bình Lâm. The total population of the commune is 13,613. Due to rice monoculture and a lack of auxiliary jobs, the per capita income of the local people is low and unstable at less than VND 500,000/month. job-training aiming at re-allocating a number of laborers to other industrial sectors is still lagging behind, without any clear-cut orientation. Environmental pollution has affected aquaculture in the hamlets of Huỳnh Giản, Kim Đông, Kim Tây... Many breeding ponds have been abandoned due to salt water intrusion or put under extensive breeding with low productivity. The commune suffers from a high rate of poor households of over 10% (compared with 5.7 % of Tuy Phước district).

1.1.2. Ecosystem context

Phước Hòa is a coastal plain commune with no natural forest area nor protective coastal mangrove forest. This has been due to exploitation to pave the way for aquaculture which started several years ago, leaving no trace of the once-existing mangrove forests. The whole commune obtains only 75 ha of economic forest with mainly dispersed acacia and eucalyptus.

Owing to low-lying land, flooding, salt water intrusion and alum infection, most of the commune's land area is not suitable for planting shallow-planted plants, vegetables and food crops. The main crop in the commune is rice. Phước Hòa is a purely agricultural commune, with the greatest majority of the rice-cultivation area lying in lowlands, farthest downstream and close by the sea. The split-up land and hollow fields have contributed to frequent flooding, salt water intrusion and alum infection along the dikes. Droughts, flooding, alluvium deposits, and destruction from water have been long taking place on over large areas in the hamlets of Tùng Giản, Tân Giản, Kim Tây, and Kim Đông (which are farthest downstream Kôn river connected to the estuary). Out of the total area of 662 ha of agricultural land, only 150 ha located on Section N1-1 of northern Đập Cát and southern Nha Phu can benefit from irrigation and drainage, while most of the remaining land area along the two lower sections of Kôn river up to the dike of the East area is frequently inundated during the winter-spring crop, deeply inundated with early floods in the 3rd crop, runs out of water and is infected by salt water intrusion and alum during the autumn crop. All this has permitted only 2 crops of rice each year. In addition, there are also a number of other short-term plants such as corn, groundnuts, soybeans, vegetables, and forest trees yet on a limited area.

Aquaculture has been a principal income-earning activity of the locals with an area of 350 ha of aquaculture ponds for raising shrimp, crabs, and fishes with extensive and semi-intensive methods. The main aquaculture area is divided into 2:

- Area 1: Lakes and ponds inside the area of Đông dike (Kim Đông: 25 ha, Tân Giản: 2 ha) for intensive ỏ semi-intensive shrimp breeding thanks to the possibility of reforming ponds;

- Area 2: about 60ha lying outside the dike within Thị Nại lagoon (sea estuary) of the hamlets of Tùng Giản, Tân Giản, Huỳnh Giản, and Kim Đông, mainly for extensive breeding of shrimps, crabs, and fishes. In general, due to environmental pollution, breeding activities obtain very low outcomes and the inhabitants are still depending on rice as the main crop to meet the local demand for food. The main production activities of the 9 hamlets of Phước Hòa commune are as follows:

- Kim Xuyên: rice
- Tùng Giản: rice; breeding shrimps, crabs, fishes
- Tân Giản: rice; breeding shrimps, crabs, fishes
- Kim Đông: rice
- Kim Tây: rice, vegetables
- Hữu Thành: rice, vegetables, auxiliary crops
- Tân Mỹ: rice, vegetables, auxiliary crops
- Bình Lâm: rice, vegetables, auxiliary crops
- Huỳnh Giản: rice; breeding shrimps, crabs, fishes

Among these, the hamlets with largest rice-cultivation land (2 crops/year) in the commune are: Kim Đông: 152 ha, Kim Tây: 212 ha, Tùng Giản: 200ha, and Tân Giản: 144 ha. Lying along the eastern dike, these hamlets are frequently inundated during the winter-spring and infected with alum during the autumn crop. In the winter-spring crop of 2008 – 2009, more than 280 ha of newly sown rice of the 4 above-mentioned hamlets were damaged by the floods in late December 2008 – early January 2009 with the seeds being washed away, and the provincial authorities had to supply these 4 hamlets with 46 tons of rice seeds for sowing the whole area. Among these 4, the rice production of the 2 hamlets of Kim Đông and Tân Giản – next to Thị Nại lagoon – has been seriously affected by flooding during the winter-spring crop, chiefly when the floods are coupled with high tides.

The people of the 4 hamlets of Kim Đông, Tân Giản, Kim Tây, and Tùng Giản are therefore in urgent needs for support to raise their productive capacity, enabling the farmers to maintain the efficiency of rice production as the main crop, to meet the food demand and earn the main income for stabilizing the local farmers' living conditions.

1.2. Climate context

The climate of Phước Hòa commune in particular and Bình Định province in general is of a monsoon tropical climatic regime, with two distinct seasons: the dry season (January – August) and the rainy season (September – December); high temperature base:

mean annual temperature of 26.2-26.4 °C, average of the hottest months of 29 - 30 °C (July and August) and average of the coldest months of 22.7 – 23.4 °C (January and December); with the absolute highest temperatures of 39.5 – 40.7 °C and absolute lowest temperatures of 13.4 – 15.5 °C; total annual temperatures between 9,563 and 9,892°C; high solar radiation with a yearly total reaching 144-145 Kcal/cm²; large amount of sunny hours: 2,350-2,500; rain regime with highest humidity in southern Central Vietnam; mean yearly rainfall of the province: 1,600- 2,000 mm, with Phước Hòa as the focal point of lowest rainfall of the province reaching just about 1,600 mm; rainfall of the 8 dry months accounting for only 21-24% of the total yearly rainfall; number of rainy days: 75-130; mean relative humidity: 79-83%.

On the other hand, Phước Hòa commune is located in a coastal province in southern Central Vietnam to the East of the Trường Sơn range, adjoining Thị Nại lagoon to the East, with a complex topographic terrain of short and sloping rivers. The commune frequently suffers from combined or separate impacts from major climatic systems such as storms, tropical lows, tropical convergences, hot westerlies, north-eastern monsoons... which bring about strong winds, heavy rains, big floods, blow-offs of sea dikes and river dikes, salt water intrusion intrusion, scorching sun and droughts, inflicting the locality with many losses in lives and properties.

Dry and hot westerlies often operate from mid-May until late August, with a yearly average of 16 - 40 days with these winds, with intense sessions lasting 3-9 days, reducing humidity at an absolute lowest value of 31-34%.

In addition, Phước Hòa's fairly special position – farthest downstream Kôn river system pouring into Thị Nại lagoon – has contributed frequent flooding during the rainy season over large areas, especially in October and November. In these 2 months alone, the rainfall may account for 50 - 55% of the total annual rainfall, with each rainy session possibly reaching 300 – 500mm. The flow depth is 1,000 – 1,400mm, with an average of 1,170mm for the whole area. The flow during the flood season makes up 71-73% of the annual flow; flow coefficient: 0.60 – 0.65; maximal flood amplitude: 4.5 - 5m with maximal flood intensity of about 1.00 – 1.50m/hour.

Owing to these topographic and climatic, flooding and drought have been frequent and continual occurrences. Especially in recent years, due to impacts from human activities and climate change, flooding has been prolonged over large areas, combined with prolonged high tides, and more serious increase of salt water intrusion intrusion. In late 2007 there were 5 consecutive flood sessions, in which 2 of strong intensity destroyed thousands of hectares of productive land with alluvium and water, damaged a number of reservoirs, dams, canals, and dikes, and caused the loss of thousands of tons of rice seeds. In 2008 there were 6 great flood sessions bringing about heavy losses and damages. In late January 2008, an unexpected session of rain and flood combined with high tides caused flooding and damaged to 2,000 ha of rice in low fields along the Eastern dikes in the districts Tuy Phước, An Nhơn, and Phù Cát. The flood session between November 17, 2008 and November 24, 2008 alone brought down 126 houses, destroyed 63 ha of fields with water and alluvium, and broke 1,590 m of river dike and 400m of sea dike, devastated 55 m of communication road, totaling VND 17 billion in damage. The rain and flood session from late November 2008 until early January 2009 damaged 520ha of rice and 317 aquaculture ponds with flooding; besides, 2,350 houses

were flooded, 70 houses collapsed completely, leaving 1,600 households in need of aid and irrigation canals, dikes, dams, and roads badly damaged in Phước Hòa.

The Meteo-hydrologic Station of Southern Central Vietnam has defined the 7 communes along Kôn – Hà Thanh rivers as major flooding-prone areas of Tuy Phước district. Among these, Phước Hòa commune – far downstream close to the estuary – is most affected by flooding.

Phước Hòa is an entirely agricultural commune and most of its rice-cultivating fields and land has a split-up surface with low-lying fields along the dikes, frequently inundated and infected by salt water intrusion and alum. All the 9 hamlets of the commune are at sea level and below sea level during high tides, resulting in up to 4 months of flood flooding in a year with waterlogging over large areas (more than 80% of the commune's area) and – with the impact from high tides – causing salt water intrusion seriously affecting cultivation and aquaculture. As the flow from Kôn river gets more and more torrential, the increased rainfall enlarges the deeply-inundated land more and more, together with high rising seawater, assisting salt water intrusion in intruding farther into the mainland, affecting adversely agricultural production and the people's living conditions.

Monoculture of rice without auxiliary jobs, aquaculture affected by environmental pollution, many breeding lakes and ponds abandoned due to salt water intrusion or low productivity owing to extensive breeding, low and unstable per capita income of less than VND 500,000 a month: all these have made up a high rate of the commune's poor households of more than 10%, almost twice the average rate of poor households of 5.7% of Tuy Phước district (2008).

Phước Hòa is now void of natural forest area as well as coastal protective mangrove forests due to clearance of the area for aquaculture which started several years ago. Owing to hollow land, flood and flooding, salt water intrusion and alum infection, most of the commune's land area is not suitable for planting shallow-planted plants, vegetables and food crops. Despite a number of short-term plants such as corn, groundnut, soybeans, vegetables and economic forest trees as acacia and eucalyptus but on an inconsiderable area. The main crop plant of the commune is rice.

1.3. Impact context:

As analyzed above, owing to its topography and geography, Phước Hòa is a locality susceptible to many kinds of disasters. Previous impacts from human activities and the present climate change have been causing a lot of harmful effects on the local socio-economic setting and promise more adverse impacts in the coming years.

According to the climate scenario of southern Central Vietnam for the 21st century, it is possible to obtain a number of preliminary changes in temperatures, rainfall and increased seawater level in the future as follows:

- *Temperatures:* Corresponding to high, medium and low emission scenarios, through the decades of the 21st century, the temperatures will all increase as compared with those of 1990, especially during the last 5 decades. It is noteworthy during the period between December and May, the temperatures will increase remarkably, up to 3.6 – 4.5°C (for

high emission), 2.4 – 3.0 °C (for medium emission) and 2.0 – 2.5°C (for low emission) in the last decade of the century.

- *Rainfall*: Corresponding to all the emission scenarios through the decades of the 21st century, the rainfall during December – May will all decrease as compared with those of 1990, down to 21 - 23% (high emission), 14.2 – 15.6% (medium emission) and 11.7-12.8 % (low emission). Conversely, during September-November, the rainfall will increase up to 30.3% (high emission), 20.4% (medium emission) and 16.7% (low emission) in the last decade of the century.

- *Sea level increase*: By mid-21st century, the sea level may rise by 30 cm and 75 cm by the end of the century compared with the 1980-1999 period. With the rate of temperature rise and the high rate of glacier melting in the north and South Poles as presently witnessed , the sea level in Vietnam is much likely to rise by 1m and more.

These analyses may help reach a warning: droughts, salt water intrusion intrusion, heavy rains and floods likely to cause erosion, landslides, and breaches of river and sea dikes in Phước Hòa are likely to increase at a harsher rate.

1. The period of clear-cut temperature increase coinciding with the period of decreased rainfall (December-May) will lead to scorching sunshine, water shortage, increased droughts, and salt water intrusion farther into the mainland causing land degradation.

2. In the period of September-November – the rain and flood season in Phước Hòa – the rainfall is forecast to increase by 30.3% (high emission) and 20.4% (medium emission) making the present flood-causing heavy rains even more complicated and more serious, leading to breaches of river and sea dikes, losses and even total losses of crops.

At present, flooding combined with high tides has paved the way for seawater to intrude into the fields, hence increasing salinity in most of rice fields, especially when most of Phước Hòa's rice fields have a low elevation of 0.5 – 1m above sea level while the sea level during high tides is up to 1.6 m. All the sessions of high tides concentrate during the rain and flood season (between October and January). According to the relevant scenario, ,when the sea level increases by 30 cm in mid-21st century and 75cm at the end of the 21st century, even up to a further 1m, all the rice-cultivating area of Phước Hòa commune will be seriously affected, and may be nearly eradicated without reasonable protective measures. A part of rice land area, especially that along the lagoon in Phước Hòa, is likely to be abandoned, when salt water intrusion is much more aggravated by high tides, leading to land degradation with barrenness and uncultivable with the presence of salt. Hence, food security will be seriously affected.

1.4. Project approach

In the context described above, the community of Phước Hòa needs to have a proper adaptive strategy and plan towards climate change to secure their life, especially to stabilize rice production and ensure food security and income. On the basis of the above analyses as well as forecasts on climate change scenarios in Central Vietnam for the coming years, it is necessary to experiment on transformation in rice cultivation so as to limit the harmful effects of flooding and salt water intrusion– the two immediate and

long-term threats directly affecting rice production, the key income of Phước Hòa's inhabitants. This is decisive to the commune's food security .

Experience drawn from experiments serve as a basis for the locality to plan development over a larger area in order to apply the same to appropriate rice areas and carry on looking for other adaptive measures that need developing to cope with immediate and long-term impacts from climate change. The model developed in Phước Hòa also needs to be propagated so that other neighboring communes could learn and apply in their localities when appropriate. In Bình Định province, the communes in the eastern dike area of Tuy Phước district (Phước Thắng, Phước Thuận, Phước Sơn, and Phước Nghĩa) and Phù Cát districts (Cát Chánh, Cát Tiên, Cát Tài, Cát Thắng) are those with topographic conditions similar to those in Phước Hòa, with an elevation of 0.5 – 1.2m above sea level. These are also coastal communes, presently facing with salt water intrusion and frequent flooding during flood and rain seasons. Their main crop plant is also rice with 2 crops a year. According to assessment made by relevant agencies, these communes will be prone to serious flooding and salt water intrusion due to sea level rise.

The project approach to strengthen the local adaptive capacity in rice production:

1. Raise awareness and understanding of the local governments and community about climate change, its impacts and adaptation strategies.
2. Test demonstration models for solutions to adapt to increasingly severely flooding and salt intrusion at the locality due to global climate change impacts. Results of the models are expected to prevent land degradation, increase land use efficiency, increase income, create more jobs and ensure food security. Issues related to the demonstration models that need to be taken into account are as follows:
 - Give priority to crop recombination models that have immediate and long term impacts of climate change on national and local agriculture and water and land resources.
 - The models developed should be based on scientific information, which utilize results of previous research results and suit the local conditions.

To support efforts to ensure food security and adapt to potential flooding threats caused by climate change to plain areas in Asian countries JICA has funded the IRRI to develop a research programme to select and create high yielding flood tolerant rice varieties. The research programme has been carried out at IRRI in cooperation with national research institutes from Bangladesh, India, Viet Nam, Laos, Thailand, Philippines, Indonesia and Cambodia. In Viet Nam both Institute for Mekong River Delta Rice Research Institute and South and Central Coast Agriculture Science and Technology Institute are participating organizations to the programme. The programme basically collects genetic pool, carry out research, select and create flood tolerant rice varieties, and propose measures to manage flooded rice production and develop a methodology of participatory varieties selection (PVS) for testing in the field.

Another activity associated with the programme will be participating nations and localities working together to develop models, based on the research results of IRRI and the participating national institutes, to help the farmers to actively participate in the process of rice variety selection for testing in the rice paddies, in order to rapidly apply the flood tolerant varieties that suit local conditions. These actions are ultimately aimed at secure self food supply when the land available for rice production has been flooded due to climate change.

The objective of the project to be implemented at Phuoc Hoa Commune is to develop models applying flood tolerant rice varieties (4-5 varieties) that have been studied by IRRI in cooperation with the Binh Dinh-based South and Central Coastal Agriculture Science and Technology Institute (ASISOV). The demonstration models will be carried out utilizing the local farmers' experiences in coping with flooding and after-flooding conditions. The models will use suitable rice varieties including 24SS, SH2, BM207, PC6, H43, H30 based on the results of province-level scientific research results implemented by the ASIVO during 2007-2009 in Binh Dinh Province.

3. On the basis of the results of the models, the project will distill lessons learnt and make recommendations for local governments on the suitable models to be applied and replicated.

- Priority will be given to strengthen farmers's technical capacity in restructuring rice production to adapt to the increasingly seriously flooding and salt intrusion conditions at the locality. This is expected to benefit the objective of replicating project models.
- Local farmers' traditional knowledge in natural resources use and cultivation techniques to cope with flooding and salt intrusion conditions are important considerations.
- The project will arrange the seed supply to promote replication of the project models.
- Lessons learnt from the models will serve as inputs for the local decision-makers to plan for upscaling them in bigger areas of rice cultivated land and to continue to seek other adaptation measures to address immediate and longer climate change impacts. Information on the models at Phuoc Hoa should be also made available to other neighboring communes with similar conditions for learning and possible replication (such as Phuoc Thang, Phuoc Thuan, Phuoc Son and Phuoc Nghia communes in Tuy Phuoc District) and Cat Chanh, Cat ien, Cat Tai, Cat Thang communes in Phu Cat District).

2.0 COMMUNITY OWNERSHIP

Community participation in the project:

The project gives top priority to the participation by the community and farmers in the project area. During the project design stage, opinions are collected among the community on priority issues to be resolved in people's living. During project

implementation, priority will be given to the community in taking effective part in carrying out the models, transferring information, and publicizing the efficiency.

The community is the main participant of project activities: training, conferencing, model building. Traditional knowledge and experience of adaptation to adverse conditions are focused on, summarized and flexibly applied in developing the project models. The community is the project principal, receiving the project achievements, and participating in preliminary wrap-up and round-up activities. During the development of the project models, participating households will be chosen based on technical standards, and the selection by the community will definitely be fair and transparent. Women's participation receives due attention and priority during project development. Information is transferred to the community through local mass media, meetings, conferences, workshops, and project printed materials.

Project development is based on the principle of openness, clarity and community ownership. To ensure sustainability and boost project repliication, the project will consider the chance to adopt the revolving loan programme to be managed by the community. Participating households will be elected based on criteria set out by the project, and will receive technical and financial assistance to carry out the models in accordance with the project loan mechanism.

3.0 PROPONENT DESCRIPTION

3.1. Organization's background and capacity

- *Project grantee organization:* The Union of Science & Technology Associations of Bình Định

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-*Representative:* Trần Ngoan, engineer – President of the Union of Scientific & Technological Societies of Bình Định

The Union of Science & Technology Associations of Bình Định (the Union) is a socio-political organization of Bình Định's intellects working in such domains as science, technology and environment. The Union comprises sectoral scientific and technological associations at provincial, district and city levels (member societies) joining in the Union on a voluntary basis.

The Union's functions and duties

** Functions*

- To gather and unite the province's scientific-technological intellects; coordinate the activities of member societies and create favorable conditions for the societies, the intellectuals in the province and in other localities to develop their intellectual potential to serve national industrialization and modernization;

- To act as link among member societies, Party / State agencies, the provincial Vietnam Fatherlands' Front, and other organizations to help deal with common issues in the Union's activities;

- To act as representative, assisting in protecting legal rights and interests of the members, the member societies, and the provincial scientific-technological intellectuals.

** Duties and rights:*

- To consolidate and develop the organization, and boost the member societies' activities;

- To participate in socializing scientific-technological and educational-training activities, care for the people's health, develop the community, eradicate hunger and reduce poverty, raise the professional competence among Union staff, organize consultancy-criticism activities and social survey, set up scientific research, develop technologies and transfer scientific-technological advances, take part in educational-training activities, and participate in community developing operations;

- To mobilize scientific-technological intellectuals;

- To act as a board member of the provincial Vietnam Fatherland Front and develop common operations to enhance the comprehensive force and build the great national unity;

- To promote cooperation with other provinces and with other organizations, unions, and associations;

- To gain assistance, both material and spiritual, from the Central government and international organizations for social development, contributing to developing the province.

Personnel and project management capacity:

- The Union has a responsible staff of 6 and an executive committee of 35 (3 associate professors, 3 doctors), 24 member societies, 4 affiliate units, and a scientific-technological staff of over 500 university graduates and post-graduates.

- Budget allocated by the State: VND 500 million in 2008.

- The Union manages other sources of capital such as research projects at provincial level.

- The Union is developing 3 GEF/SGP projects.

- The Union President has more than 40 years' experience in the field of agriculture and rural development, and is former Director of the Department of Agriculture and Rural Development of Bình Định province, Vice-President of the People's Committee of Bình Định province.

*** Bank account :**

- Account name: Liên hiệp các Hội Khoa học và Kỹ thuật Bình Định

- Account holder: Trần Ngoạn

- Account No.: 58010000374095

4.0 PROJECT DESCRIPTION

General objective:

To develop community-based sustainable agricultural production models to minimize impacts of flooding and salt water intrusion caused by sea level rise, adapting to climate change and contributing to food security and stable incomes for the farmers at Phuoc Hoa Commune, Tuy Phuoc District, Binh Dinh Province.

4.1 Specific objectives, expected outcomes and outputs

Objective 1 : To demonstrate sustainable rice production to adapt to climate change-induced flooding and salt water intrusion conditions at Phuoc Hoa Commune, Tuy Phuoc District.

Outcome 1.1. Flood and salinity-resistant rice varieties are selected and adopted by the community for model development.

Output 1.1.1

Flood-resistant (5-10) and salinity-resistant (5-10) rice varieties gathered.

Output 1.1.2

1- 2 flood resistant varieties and 1-2 salinity resistant ones with high productivity and quality are selected and adopted by the community to cultivate on their rice paddies (using participatory varieties selection method (PVS)).

Outcome 1.2. Design of a sustainable model of intensive cultivation of flood and salinity-resistant rice varieties with the participation of the community.

Output 1.2.1

The community-based model includes:

- Use the flood and salinity-resistant rice varieties adopted by the community (outcome 1.1)

- Intensive cultivation techniques are based on traditional knowledge with combating flooding and salinisation.

- Cost/benefit analysis.

Output 1.2.2

60 households are selected for participating in the project based on a set of criteria developed by the project management team.

Outcome 1.3: The model is demonstrated at 60 participating households with an area of 40 ha.

Output 1.3.1

6 technical trainings with 300 participants are organized with the main content as follows:

- Climate change, its impact on agricultural production, and adaptation measures.
- Techniques in cultivating flood and salinity-resistant rice varieties tested under the project.

Output 1.3.2

- 60 households are provided with technical and financial assistance to implement the model.
- 2-3 groups of 10 households are established and trained to produce flood and salinity-resilient seeds so as to supply to farmers within and beyond the project area.
- 4 conferences on evaluation and sharing experiences in model implementation within the project are organized and targeted at Phuoc Hoa commune's participating households and farmers.

Output 1.3.3

Model results are monitored, evaluated and reported; lessons learned are documented.

Objective 2: To strengthen awareness and local capacity to adapt to climate change to contribute to the local sustainable development in general and agriculture in particular.

Outcome 2.1: Improve awareness and knowledge of relevant agencies and communities of Phuoc Hoa commune of the impact of climate change and adaptation measures.

Output 2.1.1:

1 flyer on the project content (300 copies) and 4 panels on project models are created and disseminated to improve community awareness of the impact of climate change.

Output 2.1.2:

3 talks and dialogues about the impact of climate change and adaptation measures with the participation of local authorities and communities in Phuoc Hoa commune (total turnout of 150)

Output 2.1.3:

Organize a study tour for 35-40 participants to visit rice production models which are adaptable to climate change.

Outcome 2.2: The project model is expanded within the Phuoc Hoa commune.

Output 2.2.1: A plan of expanding the model to all flood and salinity-affected rice-growing area in Phuoc Hoa commune is developed and approved.

Output 2.2.2: Impact of climate change, adaptation measures as well as information on project models are integrated into local community meetings.

Outcome 2.3 Information on the model is widely disseminated to facilitate expansion to communes with similar conditions as Phuoc Hoa.

Output 2.3.1

Organize workshops and study tours to introduce adaptation measures in general and project models in particular to communes with similar conditions as Phuoc Hoa.

Output 2.3.2

Technical documents on project models are compiled, approved, and disseminated.

4.2. Project timeframe

	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F		
Outcome 1.1.																															
Output 1.1.1	■	■	■																												
Output 1.1.2				■	■	■	■	■																							
Outcome 1.2																															
Output 1.2.1			■	■	■																										
Output 1.2.2			■	■	■																										
Outcome 1.3																															

change has given rise to harmful pests and insects in the fields beyond rules summarized through the years, which leaves farmers helpless. According the provincial Sub-Department of Plant Protection, harmful pests and insects do not appear into clear-cut broods but with overlapping broods with high density of harmful pests, and with prolonged development en and with several pest age groups in a same period of time..., especially brown-backed hopper and yellow-stem borer. Many new harmful pests and diseases appear in rice fields such as the panicle rice mite, black bug, ustilaginoidae virens... The fight against these pests requires the participation of plant protection experts and the close coordination of grass-roots agricultural staff to help monitor the development process of harmful pests and to provide guidance to farmers for timely and effective control.

- The risks of lacking in imperfect outcomes from demonstration models come from farmers' uneven educational background, a general situation in carrying out the models in the locality. To cope with this, we have proposed a plan for establishing farmers' groups, with key farmers as their core – excellent and prestigious cultivators in the community -- to mobilize and guide the farmers within the group to follow exactly technical procedures. To solve the problem of failing in obtaining information on climate change faced by farmers and some grass-roots staff, it is necessary to apply lively methods of imparting and instructing information used by instructors at workshops and conferences. In addition, it is possible to integrate this into communication programs launched by the grass-roots government and organizations.

Measures of coping with risks will not be effective without the synchronized coordination among the local government, the project executive board, the grass-roots government and especially the farmers in the project area with their participation. However, subjective difficulties such as: the disapproval by local government authorities and sectors of the project models; the unevenness of educational background among participating farmers; untimely financial allocation from capital sources; technical risks... can all be overcome in Tuy Phước in general. The government authorities and people of Phước Hòa commune are eager in learning and anxious to apply scientific-technological advances into production. Such agencies as the Sub-Department of Plant Protection, the Center for Agricultural Promotion, the Institute of Agricultural Science & Technologies of Coastal Southern Central Vietnam are all very active in transferring scientific-technological advances and participating in providing guidance and instructions in productive activities. Objective risks come from the weather and plant diseases will also be reduced with the application of active measures and with synchronized coordination among relevant partners.

Possible risks may be from project management: untimely budget allocation from sponsoring sources (CBA Vietnam and the People's Committee of Bình Định) may affect the project implementation schedule. The project models are of a seasonal nature, which means untimely financial allocation will adversely influence the schedule and the achievement of the objectives set out by the project. The project management principle set out by CBA Vietnam and the People's Committee of Bình Định province must be observed so that planning, formulating estimates, and reporting meet the requirements and stick to the planned schedule. Priority will be given to mobilizing the commitment on

resources made by Bình Định People’s Committee immediately after the project has been signed and activated.

4.4 Monitoring and evaluation Plan

4.4.1 Initial Vulnerability Reduction Assessment analysis

Vulnerability Reduction Assessment Reporting Form	
Index 1	8,25
Index 2	5,60
Index 3	7,50
Index 4	7,85
Index 5	6,50
Index 6	7,25
Index 7	7,50
Total VRA	7,50

Adaptive capacity

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

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 flooding and salinisation
- (2) The number of innovations developed/applied under the project
- (3) The number of policy recommendations proposed in land management and agriculture production

The targets for the above are as follows:

- (1) Fourty (40) hectares will be sustainably managed by the project
- (2) The project will apply 1 technology (namely, salinity and flooding resistant rice varieties cultivation)
- (3) Three to four recommendation on policies in land and agriculture production 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 concern 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) One measure will be deployed as part of the activities for sustainable agriculture production in the project area.
- (2) Ten (10%) 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.

4.5. The project implementation arrangement

The Project Management Team:

- Binh Dinh Union of Science & Technology Associations is the grantee organization and is accountable for the project.

- In order to manage the project, Binh Dinh Union of Science & Technology Associations establishes a Project Management Team which directly guides and supervises the right implementation of the project's activities in line with the management principles set by CBA, guaranteeing the achievement of the goals set up in the project's documents approved by CBA. The Project Management Team undertakes activities following the democrati and transparent principles. It also holds a monthly meeting to discuss the issues regarding the project. An extraordinary meeting will be held once requested by the Team leader of the Project Management Team to resolve in time all the project's important issues. Members of the Project Management Team, besides the meetings, will exchange information and seek agreement in implementing the project through various communication channels.

+ The Project Management Team comprises 6 members:

- 3 members (Project Management Team leadre, Secretary and Accountant) from Binh Dinh Union of Science & Technology Associations

- 3 Representatives from Binh Dinh Department of Agriculture and Rurak Development, Tuy Phuoc District and Phuoc Hoa Commune.

The project management team has the following functions:

- Develop project workplans and budget for the project's activities
- Organize activities according to the approved workplans and budget.
- Monitor, evaluate, report on the project's implementation progress and use of resources for CBA, the local authority and local's stakeholders.
- Select and sing the subcontract with the project's expert group and oversight the deployment of the technical advice contract done by those experts.
 - Establish relations with local authorities and relevant agencies to seek their supports and mobilize resources for the project.
- Manage the project's resources financed by CBA
- Mobilize and oversight co-financing given by organizations and community, report the results achieved by using this resource.
- Make announcement and discussion with CBA to find solutions and adjustments to the problems encountered during the implementation of the project
- Keep archives of the project

The project's sub-contracts

The project will have a sub-contract which provides equipment and materials for the project's demonstration models. The Project Management Team will sign the sub contract with suppliers in Binh Dinh for purchasing equipment and materials for the project's demonstration models.

The project's sub-contractor of technical assistance

A contract of technical experts will be signed to supply the project's technical assistance services. The Project Management Team in consultations with CBA to recruit the expert group to carry out the technical activities of the project. The main responsibilities of the expert group are:

- Provide technical assistance in implementing the project: provide training and technical support for community to deploy the technical measures of the project.
- Supervise, evaluate the results of the project, draw lessons and make recommendations on policies for stakeholders.
- Develop project technical documents.

The expert group includes:

3 qualified experts (from research institutions and universities) with specialization and experience in the fields of climate change and agriculture.

3-4 local technical staff who have specialization and experience in agriculture and community-based projects, responsible for the implementation of activities on the ground under the experts' guidance.

- The consultant services fall under the supervision of The Project Management Team, based on the contract of technical support signed by the Project Management Team and the expert group. The latter makes plans, cost estimate and reports in accordance with to the principles set in the contract. It also has an internal working mechanism agreed by the Project Management Team. During the implementation of the project, the expert group collaborates closely with the Project Management Team to hold a meeting every six months to evaluate the project's progress, draw lessons and suggest necessary adjustments.

2. Monitoring, supervising and evaluating projects

Project monitoring, supervision and evaluation of the Project Management Team

The project management team is responsible for monitoring, supervising and evaluating projects in accordance with principles of CBA. The project management team will support CBA in its monitoring and evaluation.

In project monitoring and evaluation, the project management team's responsibilities are defined as follow:

Monitoring and supervising the projects

The project management team is responsible for monitoring projects in terms of technology and finance in order to gather required information for project management. Besides monthly meetings, the project management team will hold 10 site visits (every 3 months) with aims to:

- Examine the practical situation, checking the rate of projects' activities.
- Solve potential problems during the projects' execution/implementation.
- Gathering information for building action plan, cost estimates and making reports.

- draw lessons learnt from the project implementation.

The project management team held a meeting every 6 month with the expert group to monitor and evaluate the expert group results.

Project evaluation

Project midterm and final evaluation is conducted in the middle and by the end of the project. The purpose of the evaluation is aimed at:

- Evaluating the progress and extent of achieving the project outputs and outcomes and objectives
- Evaluating the potential for project expansion and replication, making the recommendation about project sustainability and expansion and replication based on the project's results.
- Revising the project if necessary so as to best achieve the project objectives.
- Drawing experience and lessons learned in project management and project models.
- Evaluating the effectiveness of projects design and efficiency and effectiveness of using the project resources.

The content for evaluation is based on the objectives, outcomes and outputs, and success indicators stated in the project document. Participatory methods will be adopted on project monitoring and evaluation. To have information for project monitoring and evaluation, baseline data will be collected during the project inceptions.

4.5.2. Relationship and Responsibilities of Proponent and Project Partners

The project focuses on the participation of the Farmers' Association, and the Women's Association in the process of developing the project at grassroots level, in mobilizing public participation, in implementing the project lending policy, in transferring information, in propagating and replicating the models.

The project also emphasizes the participation and coordination of local government authorities in the project area, of the Department of Agriculture and Rural Development, the Department of Science & Technology, and the Department of Natural Resources & Environment to ensure the success of the project as well as the possibility of multiplying the models, to maintain and develop the project outcomes after project completion as well as integrating them with other programmes and projects with similar objectives in the locality to enhance the achieved objectives of the project. Another focus of the project is also to coordinate with other relevant agencies/organizations to evaluate and summarize the outcomes, to compile and publicize technical documents, to summarize and publicize experience lessons of demonstration models for multiplying the models in the locality..

Beneficiaries

- The local community, especially project participating households, have the chance to gain knowledge in applying new rice varieties which are resilient to flooding and salt water intrusion, ensuring their stable income and food security.

- local relevant agencies, authorities and communities in the project are provided with an opportunity to test adaptation measures in rice production. The results of the model will serve as a basis for expansion and development, contributing to improving the local economic setting.

- Local agencies, through project development, enjoy conditions to enhance their management skills through carrying out community-based projects as well as enhancing their awareness of climate change and sustainable agricultural production measures.

- The project participating organizations have the chance to establish their working partnership with CBA.

