



**BRIEF**

# **Resilience Building and Climate Change Adaptation for Coastal Communities**

(Model building for small municipalities in the Philippines)

2015-2018 OUTCOMES

The vulnerability of the Philippines to natural hazards is closely linked to poverty and environmental degradation. It is mostly the poor living in disaster-prone and environmentally fragile areas who are affected. Natural hazards create a vicious cycle of poverty, environmental degradation, and vulnerability to natural disasters. Poverty in the Philippines has always been a rural phenomenon. Its rural poverty incidence was 41.5 percent in 2006, compared to 14.1 percent in urban areas, which accounts to nearly 75 percent of total poverty in the country. Most of the rural poor are dependent on agriculture and natural resources for their livelihood and are, thus, the most vulnerable to climate change. Risks from global climate change are expected to further exacerbate the country's, vulnerability to natural hazards. Coastal communities are among the poorest and invariably the hardest hit by the impacts of climate change. Though most of the poor in these coastal areas do not have their own land, they have access to homestead patches of underutilized space. The soil in coastal areas is poor due to the proximity to the sea (sandy and saline nature of the soils). Coastal Agriculture ecosystems restoration can help enhance the productive and ecosystems functions of coastal areas.

Due to its archipelagic nature and exposed position in the Pacific Ocean, the Philippines is considered to be one of the most vulnerable countries to natural disasters such as typhoons and earthquakes. This condition is aggravated by the adverse impacts of climate change such as sea level rise, increased typhoon intensity and frequency, droughts, and floods. In addition to the damages brought about by these events, climate change also threatens the country's agricultural, coastal, and marine resources, which directly affect the livelihood of the people who depend on them.

(Source : Fact sheet by Conservational International and USAID Philippines)



# Coastal areas in Guinayangan Quezon

**T**he coastal areas of Guinayangan are part of the Ragay Gulf, straddling the provinces of Quezon and Camarines Sur. Its municipal waters are known for commercial fish species, thus the preponderance of commercial fishing in the municipality. The degradation of mangroves along Guinayangan's coast persists since the late 1980's. Due to conversion to aquaculture ponds and harvesting of timber for charcoal (this has however significantly decreased in recent years). Recently, an increasing number of informal settlers converted the mangrove areas into residential areas, making them vulnerable to storm surge and typhoons.

Fifteen of the municipality's 54 barangays sit along the coast of Ragay Gulf. Fisheries remain a significant part of the coastal economy. At least 14 species of fish and six species of crustaceans/bivalves are regularly caught year round to be sold commercially to areas as far as Batangas, Cavite, and Manila. Fisher associations have been established though only few of them are active. The municipality's fisheries sector remains a significant contributor to local livelihoods and economy despite the generally degraded conditions of the coastal ecosystems. Fish processing (smoked and dried) is also a significant source of livelihood. Ways of diversifying the livelihood base through innovative approaches that include coastal agriculture (an otherwise greatly underdeveloped area of work in the Philippines) are needed. Action research to identify a portfolio of technology options and associated



social learning approaches are needed. Fishery Associations need to be re-vitalized and activated through the strengthening of their organizations and leadership. Targetted capacity development has a role to play.

The coastal areas of Guinayangan are not only degrading but are increasingly vulnerable to natural disasters. This is where the poorest people in the municipality live and with climate change, these coastal communities are further put at risk. They need special and continued assistance to manage coastal resources more than the occasional tree planting campaigns and trainings that are short term and often tokenistic in nature (eg. crab fattening). What is needed is focus and sustained action. The occasional (cash availability driven) annual campaign type of mangrove reforestation and bantay-dagat patrolling aimed at reducing illegal fishing are short term measures with limited lasting impacts. The municipality's coastal resources (corals, mangroves and sea grass ecosystems) are already classified as degraded and in need of urgent intervention. Interventions that support the management of natural resources, in a manner that increase their productivity and protect the ecosystems need to be developed. Environmental education can promote wider awareness of the communities' ecosystems and the need for restoration and conservation. People's lives, livelihoods, and environment need urgent, systemic, and sustained attention.

## Social and institutional infrastructure of coastal barangays

In Guinayangan, there are 50 different organizations with 30 to 80 members from 15 coastal barangays. They are engaged in fishing and coconut farming. Almost 60% of the households do not own land. They rely on daily fishing for income for daily expenses. These sectors have the minimal support from government. There are 512 members and only 25 of them have received materials support (fishnets, gears, boats).





# Highlights of CCAFS Small Grant Support in Guinayangan, Quezon

CCAFS supported the International Institute of Rural Reconstruction (IIRR) and the local government unit (LGU) of Guinayangan to test and develop an initial set of coastal interventions.

## A. Mangrove Nursery establishment

Two nurseries were established, in barangays Aloneros and Dancalan Caimawan in 2015. The nurseries were established there because target mangrove stand species still remain, making them a strategic source of seedlings for reforestation activities. These nurseries were targeted to raise least 44,000 seedlings. Collection of wildlings was done in both barangays during the month of June and early days of August 2015. These wildlings were then hardened in the nurseries and eventually brought to the reforestation sites.

## B. Reforestation and Restoration of Mangroves

Eight coastal villages with 161 households participated in this reforestation and restoration initiative. A total of 35,900 mangrove seedlings (averaging not less than 3,500 mangrove seedlings per coastal village) were planted.



Photos taken in Dancalan Caimawan

The total area currently planted was estimated at 17,595.60 sq. m (1.76 hectares). Species were identified in consultation with Dr. Jurgenne Primavera (a renowned mangrove expert and IUCN) and these were namely: Pagatpat (*Sonneratia alba*), Apiapi (*Avicennia sp.*), Bungalon (*Avicennia sp.*), and Saging-Saging (*Aegiceras sp.*). A small percentage of Bakawan (*Rhizophora sp.*) and Talisay (*Terminalia catappa*) in beach areas were also planted. The restoration of mangroves was the first-step in establishing bioshields to protect the local community from storm surges, sea water intrusion, and wind action.

Three months after transplanting, the survival rate was calculated. Results were at 24% survival rate. Among the 8 villages, Barangay Himbubulo Este had the highest survival rate at 49%. The least was at Dancalan Central with only 4% survival rate due to coastal erosion in the area and affects of strong waves during the typhoon season season, particularly during Typhoon Lando (international name: Koppu). Discussions with well-known mangrove experts suggest that achieving 25% survival rates in the first round of planting is acceptable.

**Coastal agriculture.** Fishers can also be engaged in homestead agriculture relying on saline tolerant crops (eg. bananas, root and tuber crops, jackfruit, peanuts, cashew, etc.). Crops like sweet potato, eggplant, pigeon pea, arrowroot, and peanut are moderately tolerant of saline conditions.



## Mangroves as Coastal Bioshields

**Mangroves serve as breakwaters for strong waves to reduce damage to properties, livelihoods, and homes. In the past, coastal communities did not fully appreciate the value of mangroves. They used it as firewood, indiscriminately cutting mangroves for their daily needs. After experiencing a series of strong typhoons, the situation is changing: fisher folks have realized the value of mangroves in protecting their coastal village. A village ordinance was implemented to preserve and protect mangroves from logging. Other villages experiencing coastal erosion continue to plant different species hoping to restore the eroded coastal areas. Reforestation and enrichment planting would help protect coastal villages against storm surge. Every typhoon season, the mangroves serve as protection for houses and shelter for fishing boats. Solid waste carried by waves are filtered by mangroves, thus minimizing damage. Having a concrete sea wall was not an enough protection during storm surges in some villages. Mangroves are still the best natural barrier and it cost less.**

### **Participatory crop trials were undertaken.**

One village with 11 households tested different crops (banana, yam, peanuts, arrow roots, and sweet potato) to assess their tolerance to soil conditions in the areas. For example, peanut performed well in the sandy and mild salinity (in rainy season) of the soil.

### **Four coastal villages were provided native pigs.**

The project started with five farmers that grew to 91 pig raisers. Pigs perform well in coastal areas and are considered climate smart species. Native pigs provide local communities with an additional livelihood activity especially for women. Typically, the male head of the family relies on coconut farming and fishing while women have no income sources. Pigs are emerging as a new economic activity for women in coastal areas.

## **Multiple functions of fruit trees in coastal areas**

In 2018, with the support of CCAFS, the ideas of Coastal Agroforestry was initiated. The introduction of fruit bearing trees to coastal communities started in four villages, where 62 households were given 30 to 200 seedlings of targeted flagship trees: cashew and jackfruit. These were intercropped in coconut stands creating multi-storied coastal bioshields that help mitigate the effects of winds. Trees in the coastal communities provide additional income for households and serve as bioshields or wind breakers in times of a typhoon.



**This CCAFs small grant project demonstrated how a little money can help bring an agenda for action to the forefront in a short period (eight months). The potential for quick impact from short cycle projects has been demonstrated with visible results on the ground and, more importantly, a renewed community interest in coastal protection and restoration.**



## How CCAFS support mangroves and coastal agriculture: Lessons learned and short-term outcomes

The short cycle (small grant) project supported by CCAFs helped bring the coastal reforestation back to the agenda of the local government. Valuable lessons were learned from this first phase that can be applied to a subsequent phase. A valuable infrastructure of local institutions and human resources are already in place and after some organizational strengthening, can be relied on in a future undertakings. The work on mangrove reforestation has to be continued and further intensification of the current planting in the eight villages has be prioritized. This initial mangrove reforestation experience can be used to broaden the scope of climate smart agriculture (CSA) and natural resource options in coastal areas.

Thoug CCAFS' support in the IIRR-LGU work was limited only to a few villages to create zones of demonstrable impact, the experience has generated optimism for resilience building approaches, which effectively integrate disaster risk reduction and climate smart agriculture (crop-tree-livestock) systems amongst fishers and fishing communities. The immediate sustainability of the initiated work will be ensured through informal follow up by the fisher folk's federation, the local government units (especially the MDRRMO), and IIRR.



*"Agriculture is feasible in coastal areas"*





## Jackfruit: A food for the future?

Source: <https://zestandherbs.wordpress.com/2015/05/31/green-jackfruit-food-future/>

With a changing climate, rising sea levels and a growing population, worldwide there's a growing consensus (or perhaps fear) that our eating habits will have to change. Discussion has often focussed on protein sources, and media attention has been lavished on the idea of replacing conventional meats with insect protein or lab-grown alternatives instead to meet the demand. But, unpredictable wheat and rice harvests in recent years have shown that staple crops are at risk too. Green jackfruit from the tropics is cited as a potential solution.

Largely unheard of beyond its natural, tropical home, the jackfruit is the largest tree-borne fruit around. Spiky, knobby and smelly, they weigh in at up to 35-45 kg (almost as much as person!) and thrive in the tropical climates of India and Southeast Asia, as well as parts of Africa and South America. In fact, they grow so well that where they've been naturalized into parts of Brazil, the jackfruit tree is considered an invasive species. Inside its rugged exterior, the fruit's thick white pith and latex-like sap protect the edible flesh that forms in capsules around almond-sized seeds.



In Guinayangan Quezon, IIRR with the help of Office of the Municipal Agriculturist and CCAFS distributed 1,030 seedlings to 4 coastal barangays: Arbismen, Capuluan Central, Capuluan Tulon and Dancalan Caimawan.

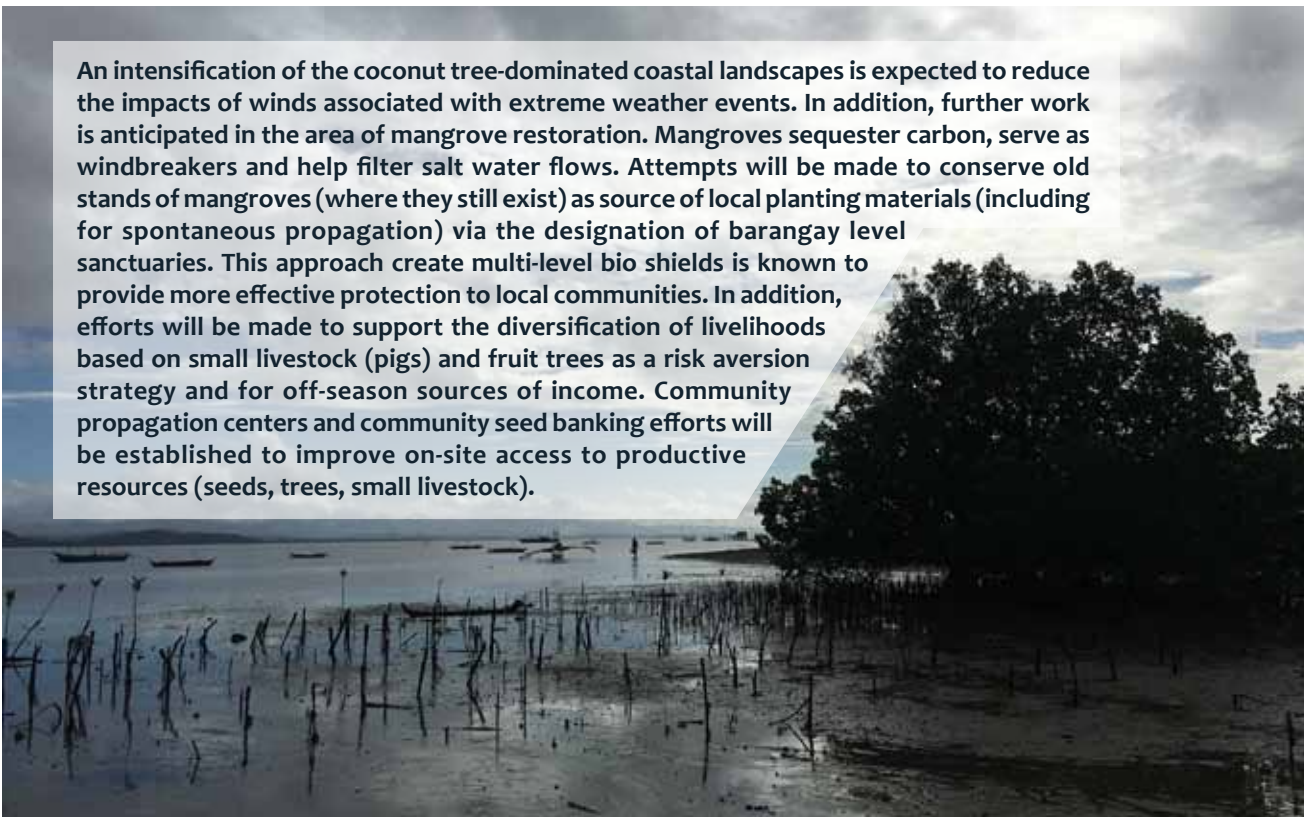




## Cashew

In 2018, IIRR distributed different fruit trees seedlings to farmers in the coastal barangays: Dancalan Caimawan, Capuluan Central, Capuluan Tulon and Arbismen. The fruit tree seedlings include: santol, mangosten, mango, jackfruit, rambutan, and guyabano. Cashew received special attention as a flagship tree for coastal areas where 1,825 cashew seedlings were distributed. Cashew trees were first brought to Asia by the Portuguese to conserve coastal erosion and to serve as windbreaks. This role still remains relevant.

An intensification of the coconut tree-dominated coastal landscapes is expected to reduce the impacts of winds associated with extreme weather events. In addition, further work is anticipated in the area of mangrove restoration. Mangroves sequester carbon, serve as windbreakers and help filter salt water flows. Attempts will be made to conserve old stands of mangroves (where they still exist) as source of local planting materials (including for spontaneous propagation) via the designation of barangay level sanctuaries. This approach create multi-level bio shields is known to provide more effective protection to local communities. In addition, efforts will be made to support the diversification of livelihoods based on small livestock (pigs) and fruit trees as a risk aversion strategy and for off-season sources of income. Community propagation centers and community seed banking efforts will be established to improve on-site access to productive resources (seeds, trees, small livestock).






## Future Plans

A future project could be more oriented towards coastal resources management where climate change adaptation and disaster risk reduction objectives would be linked within a broader community resilience framework. Meanwhile, for the short and medium term, the focus will be on enriching the conservation of present stands of mangrove mother trees and continuing with urgency the mapping/designation of sanctuaries. The inclusion of climate change topics into school based education (in schools within the coastal belt) might also be considered using the initial eight villages as focal points for learning. Testing the viability of selected coastal agriculture technologies and innovations at the farm and household levels are needed in each target village. Multipurpose agroforestry models that meet the needs of the families (households) for food and feed while also providing protection to winds (bio shields and windbreaks) are needed.

## Plan of Activities for the Future

IIRR and the LGU have noted the value of finding better ways to direct CSA approaches towards coastal area development. As a result of its modest engagement over 3 years, a more ambitious and holistic is envisaged targetting at least eight of the 15 coastal barangays in Guinayangan. IIRR intends to continue and expand this coastal agriculture project with the following components:

1. **Strengthening of Fisher Associations** through organizational strengthening, leadership development, and capacity development on Disaster Risk Reduction (DRR), Climate Change Adaptation (CCA), Ecosystem Management, and CSA for Coastal Areas.
2. **Vulnerability analysis and development of adaptation plans** for each of eight barangays.
3. **Strengthen the Municipal Leadership's understanding of Coastal Resources Management** in light of impending climate change and the need for disaster reduction preparedness.
4. **Bioshields development.** Whenever feasible in a given fisher-farming setting, the bio-shields concepts will be demonstrated starting with mangroves from the shoreline and food crops within 1-2 kilometers inland. Homestead with trees and shrubs under coconut trees serve as shelter belts. Bioshields serves as cushion from strong winds that destroy crops, livestock, and other assets of fisher-farmer families and communities. Multiple level canopies and strata are usually more effective bioshields.
5. **Enhancement of coconut area ecosystem.** Guinayangan is predominantly a coconut growing municipality. This project would facilitate the enhancement of coastal farm productivity through the inter-planting of jackfruit, casoy, and banana. When coconut price is low, farmers would have other sources of food and cash income.

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6. **Legumes, peanuts, pigeon pea, and mungbean.** Legumes are protein-rich food sources for humans and livestock and are excellent soil fertility enhancers. Peanut is also a good source of plant-based proteins for the fishing family. Peanut is an ingredients for home-based industry – peanut butter for women’s business. Mungbean, pigeon pea, winged beans will be introduced as soil nutrient enhancers together with cover crops. These legumes are not just food sources but also serve as feeds for livestock. Powdered beans are excellent sources of important nutrients for tilapia and livestock feeds. Some legumes like pigeon peas and peanuts tolerate coastal salinity during rainy seasons.
  7. **Seed banking.** A community- and fisher/farmer-based seed banking will be implemented so farmers will have a steady supply of planting materials. They will be taught how to preserve seeds the indigenous ways. Community support system for the nursery (mangrove, bio-shields, saline lowland crops, and rice varieties) will be set up. Commercially available seeds do not perform well in coastal areas with higher soil salinity levels so varieties will be secured from the coastal areas.
  8. **Root, tubers, and banana.** Roots, tuber crops, and banana are sources of food for the family. Bananas improves micro-climate in the vicinity by reducing heat on sunny days and provide potassium to humans. They are also additional feed sources for livestock. Surplus can be sold for additional income. Cassava will be part of the food crops that will be promoted. Cassava is a human food and also a good feed source for livestock. It is also an ingredient for small-scale home-based food industry for women.
  9. **Pig/duck systems.** Small livestock is an important component of coastal agriculture. Livestock is not just another protein source for the family. Animal manures and forage residues facilitate and accelerate fertility of the soil, reducing soil acidity and salinity levels. Livestock also empower women by engaging them in economic activities. Livestock serves as insurance and easy cash resource for children’s education and family emergencies.
  10. **Rearing local breeds of chicken in semi-confined activity.** Backyard raising of chicken has long been a component of a small fishing-farming family for food and cash needs. Traditional farmers reported that they observed chicken to be a good plant pest control. The project will re-introduce the rearing of chicken using the local breeds that are known to have high resistance to pests and diseases. Chicken eggs can augment the daily nutritional needs of school children. It can be easily sold and provide for the daily cash. Meat of native chickens are also much favored for the well-known Filipino favorite chicken stew (tinola) for its tasty flavor and as healthy option over that of a commercially raised broiler. Chickens are a low-methane emission livestock production option.
  11. **Saline variety rice enhancement.** Fisher-farmers having a space for cultivating rice will be encouraged to test saline traditional and modern rice varieties in their farms. These small coastal paddies will also serve as saline rice variety multiplier farms and source of saline rice planting seeds for others.
  12. **Tilapia in saline water system.** As saline water intrusion is expected to be more pronounced, the project will coordinate with the BFAR inland fisheries sector to promote saline tilapia culture. This will reduce the fisherfolk’s total dependence on traditional fishing practices.



13. **Establishment of market outlet for fisherfolks.** An arrangement will be worked out with the municipal LGU for fisher-farmers to have a place in the municipal market for their products (vegetables, fish, banana, etc). This will encourage them to produce more as market outlet is being created for their products.
14. **Farmer-scholar program.** Farmer-champions that would demonstrate the best coastal agriculture will be promoted into a farmer scholar. S/he will share the technology with others fisher-farmers and will also serve as technology extensionist.
15. **Cross visit to other coastal areas.** Fisher-farmers who have high potential to adopt and practice the improved and more diversified coastal agriculture will be invited to visit coastal agriculture practicing farms within the locality and in some other places.



IIRR and the LGU are now looking for investors and partners to support future work in the Coastal Agriculture Program in Guinayangan Quezon, Philippines in 2019-2022.

# stories from

## Coastal agriculture easing burden of the sea



**“Napakalaking tulong sa aming kabuhayan ang mga tanim na ito,”** (These plants are of big help to our livelihood) shares Nenita Libantino, 61, as she shows off the different crops planted in and around her hut at the shoreline of Dancalan Caimawan, a village in Guinayangan, Quezon. She proudly shared that during the last cropping season, she earned Php2,000 from the sale of root crops alone, not including the cash value of their daily consumptions and those shared with neighbors.

Nenita have all the reasons to be happy. She grows different crops under the usual coconut. She grows sweet potato, spring onion, taro or San Fernando, okra, papaya, banana, eggplant, string beans, malungay, pepper, patani, and peanut.

**“Nakapagtanim-tanim kami ng asawa ko habang may ulan at hindi sya nangingisda”** (My husband and I were able to plant while there was still rain and he cannot go fishing.)

Together with three of their six children and more than a dozen of their grandchildren, they live in the same area owned by their daughter’s parents-in-law. The family’s main source of livelihood is fishing.

**“Ito lang talaga ang kabuhayan namin – manghuli ng alimasag. Hindi naman kasi kami nakapagalar,”** (Catching crabs is our only source of livelihood because we didn’t go to school) she shyly pronounced. The couple were both elementary dropouts back at their original place in Masbate, an island province about 12 hours away from Guinayangan. Many of their children did not also have the opportunity to pursue higher education that may have offered them more livelihood options.

In January 2017, IIRR, through CCAFS’ support, piloted a coastal agriculture initiative in Barangay Dancalan Caimawan. Along with the trainings on coastal farming and its relevance to climate change, planting materials of different food crops (banana, cassava, uraro, ube, sweet potato, corn, peanut, pigeon pea, black pepper) were distributed to seven farmers. Fishing families were also given native pigs as part of the coastal agriculture program



# the field

where they realized that they can also raise land-based food for their families. Earlier, IIRR piloted a coastal bio-shields project where in 35,900 mangrove seedlings were outplanted. It also helped bring in coastal reforestation issues back to the agenda of the local government.

Just like Nenita, women have become more active food providers. Food from home-based sources are now more available and accessible to family members. This eases the dependence of fisherfolks on fishing alone. In December 2018, five more fisher-farmers were added to the original seven through the pass-on scheme. To date, there are 81 farming families that benefited from the project.



Determined to improve on the initial gains, IIRR in 2018 distributed different seedlings of fruit trees to farmers in the coastal villages of Dancalan Caimawan, Capuluan Central, Capuluan Tulon, and Arbismen. The seedlings distributed were santol, mangosteen, mango, jackfruit, rambutan, guyabano. Some 1,825 casoy and 1,030 jackfruit seedlings were also distributed to 30 farmers.

Asked for her future plans with her coastal farm, Nenita shared, ***“I am determined, me and my family will expand our farming here,”*** pointing to her growing crops. ***“This way, we can eat different foods anytime we want to, especially these naughty apos”***, pointing her grandchildren.

If many of Nenita’s neighbors will engage in coastal agriculture, it will significantly unload the burden on marine resources. If she can do it, others can do it as well.

### The Project Team

Belina O. Rosales  
Rico V. Locaba  
Carlo M. Palima  
Arnel M. Puno  
Darlyn R. Angeles  
Joel B. Fabricante

### Technical Advisers

Julian F. Gonsalves  
Emilita M. Oro  
Rene R. Vidallo  
Magnolia R. Rosimo

### Editor

Giulia M. Soria

### Publication Design/Layout

Celso Amutan



INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION

Philippine Country Program  
Regional Center for Asia  
International Institute of Rural Reconstruction  
Y.C. James Yen Center, Silang, Cavite, Philippines 4118  
Tel/Fax: (63-46) 430-0016

Website: [www.iirr.org](http://www.iirr.org)

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