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Enabling hands in Changing Climate

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about the cover

The fight against the impacts of climate change on agriculture cannot be done by one institution. The enabling hands show that the world is now coming together to protect not only our staple food but also, ultimately, our planet - Mother Earth.

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EDITOR'S NOTE

Shared Space

Unusual times require unusual collaboration, unprecedented action, and superbly intelligent choices. And when none of these seems to fit, people find deep consolation in imploring the aid of the divine providence and believing that it is on its way.

While climate change has been massively changing the agricultural landscape, and in many respects negatively, based on reports it appears that this is also the time when the world has seen an indescribable level of cooperation globally, down to the littlest communities.

Recently, 195 countries, including the Philippines, wrote history in COP 21 in France when they committed to reduce their greenhouse gas emissions. It was laudable a document they signed. It was the whole world as one in cushioning the escalating impacts of climate change.

But long before the historic moment in France, little and gigantic steps have already been taking place in various parts of the world. We know of efforts from agricultural research communities and civil society groups, oftentimes unheard of as they may be too baby a step or less controversial to merit a space in our public sphere.

In this issue of the PhilRice magazine, we would like to inspire the major rice stakeholders by featuring stories that show highly innovative thinking in tackling issues relating to climate change. As it stands, climate change creates a fertile ground for cooperation and partnership not just from people and institutions within the rice agriculture sector but practically from anyone who has a stake on Earth. Climate change cuts across sectors and geographical and intellectual boundaries. Even the Holy Father reminds his flock and everyone else that the environment is God's creation. Abusing it, he preaches, fuels climate change.

Here, we present how taking care of the forests equates to taking care of the rice farms. Here, we invite minds who are thinking of disaster management to also highlight keeping an eye on agricultural losses. Here, we scrutinize how we can have a shared space in dealing with climate change as it relates to rice and the larger rice-farming communities.

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Mr. Roger F. Barroga

Dr. Flordeliza H. Bordey

Dr. Eduardo Jimmy P. Quilang

PhilRice has new deputies

Dr. Calixto M. Protacio, executive director of PhilRice, has designated three acting deputy executive directors (DED), effective January to December 2016.

Roger F. Barroga for administrative services and finance, while Dr. Eduardo Jimmy P. Quilang and Dr. Flordeliza H. Bordey are respectively for research and for development.

Barroga concurrently leads FutureRice, a program that explores ways to increase current rice output using 21st century and practical cutting-edge technologies. He was the director of the Open Academy for Philippine Agriculture (OpAPA), a consortium of stakeholders that enabled local agriculture to benefit from ICT. OpAPA received the 2010 International Prize for Pioneering Human Development Projects awarded by the Arab Gulf Programme for Development (AGFUND).

Barroga holds a Master's degree in Development Communication from UP Los Baños.

Quilang was PhilRice's acting DED for Development from 2011 to 2015. Under his watch, several advocacy campaigns and special projects were launched such as the *Palayabangan*: The 10-5 Challenge; *PalaYamaNayon:* The Rural Transformation Movement; Be Riceponsible Campaign; *Gusto Namin Milyonaryo Kayo* Campaign; Best Station Contest; and Rice Science Museum.

The new DED for research holds a PhD degree in Agricultural Sciences specializing in Bioproduction Environmental Science from Kyushu University in Japan under the Monbukagakusho Scholarship.

Meanwhile, Bordey, an economist, was former head of PhilRice's Socioeconomics Division. She leads the DA-FSSP-funded project *Benchmarking the Philippine Rice Economy Relative to Major Rice-Producing Countries in Asia*. In 2010, she led the Impact evaluation, policy research, and advocacy program of the Institute.

She obtained her PhD degree in Agricultural Economics at the University of Illinois in 2010 under the Fulbright – Philippine Agriculture Scholarship Program.

Bordey has been with PhilRice for more than 15 years and has published papers on food policy, trade liberalization, production economics, impact assessment, and climate change.

The new acting DEDs are expected to oversee the preparation and implementation of various trans-disciplinary R&D programs of the Institute.•

PhilRice now uses LAMP

The simplified method to detect viruses and insect vectors in rice using the loop-mediated isothermal amplification (LAMP) technique is at work at PhilRice.

LAMP assay helps detect viruses in animals and humans, said Dr. Emmanuel Tiongco. His team, composed of Dr. Xuan Hoai Truong, Ma. Johna Duque, and CLSU's Dr. Rubigilda Paraguison-Alili, extended the application of this method to rice viruses.

The method detects the rice tungro *bacilliform virus* (RTBV) in plants even before common symptoms become noticeable.

"Through this application, major rice virus diseases and insect vectors can be diagnosed in a fast, efficient, and accurate method," Tiongco said.

Using the method, RTBV can be detected one day after infection. The widely used enzyme-linked immunosorbent assay (ELISA) detects RTBV three days after infection.

Tiongco said that LAMP assay detects the rice ragged stunt virus (RRSV) and the rice dwarf virus (RDV) not only in rice plants but also in their respective brown planthopper and green leafhopper vectors. This way, the impending virus spread is known even before rice crop establishment.

Existing virus detection tools are arduous and time-consuming. Easy-to-follow procedures, cheaper equipment required, high level of specificity, and simple result determination by merely looking at the change in color of the test solution are among the advantages of LAMP.

Tiongco and his team have conducted training programs for agricultural technologists, rice researchers, and extension workers about this new method at PhilRice in Nueva Ecija, Isabela, Negros, and North Cotabato.

This early virus-detection tool, said Tiongco, is useful for pest control officers. The reliable and prompt results it provides can lead to proactive solutions, and hence, prevent viral disease epidemics.•

Direct seeding reduces labor cost - experts

Direct seeding, a crop establishment method where pre-germinated seeds are sown directly onto the soil surface, can help address high labor cost in rice farming.

PhilRice agronomist Myrna Malabayabas said that the method can be done either by dry or wet seeding, and even eliminates seedbed preparation and pulling of seedlings.

"The dry direct seeding method is more commonly used in rainfed and upland areas. It involves sowing of dry seeds on dry soil surface, and incorporating the seeds either by plowing or harrowing. Wet direct seeding is done in both seasons in irrigated and rainfed areas either through broadcasting or drilling pre-germinated seeds with the use of a drum-seeder on a wet, well-leveled paddy," Malabayabas explained.

Drum-seeder in action.

Direct-seeded rice matures earlier than transplanted rice. Hence, labor requirements and expenses for crop establishment and the time spent on crop management are reduced.

The PhilRice study titled *Benchmarking the Philippine rice economy relative to major rice-producing countries in Asia*, says that P4.42 is spent on labor cost for every kilogram of transplanted rice; only P3.28 if direct-seeded, where two man-days/ha are needed. Some 25 persons can transplant a hectare in a day.

In a recent seminar titled *Direct-Seeded Rice: Progress, Prospects, and Challenges* at PhilRice, Dr. Vethaiya Balasubramanian said that managing weeds is one of the challenges in the direct seeding method.

The former IRRI agronomist explained that weeds germinate simultaneously with rice due to the absence of water that suppresses their growth. Nevertheless, options are available to address the problem.

"Among the ways to manage weeds include narrow spacing and uniform plant population, appropriate water depth and timing, use of weed-competitive varieties, and herbicide rotation and combination," Balasubramanian enumerated.

Malabayabas added that savings from the labor cost can offset the expenses in weed and pest control.

"When the Integrated Crop Management (ICM) approach is followed properly, direct-seeded yield is comparable to that of the transplanted method," she said.

NSIC Rc272, Rc346, and Rc348 are recommended varieties for the direct seeding method. These varieties are early-maturing, drought-tolerant, and can yield 6 t/ha. •

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LCA helps farmers cope with climate change

A Japanese university professor and a PhilRice engineer have jointly recommended the Life Cycle Assessment (LCA) tool to rice researchers in helping farmers cope with climate change.

LCA, according to Masanori Saito, enables researchers and decision makers to identify the resource flows (water and energy inputs), and environmental impacts (GHG emissions) associated with the provision of products and services.

"Nowadays, farming uses resources such as water and energy as inputs. The common misconception is that we tend to focus on the first and last parts of the whole farming system, without knowing that a large chunk of carbon dioxide (CO_2) and greenhouse gas (GHG) emissions occur in the production stage. Using LCA as a tool, we can evaluate the environmental effects of a product throughout its life cycle, from cradle to grave," Saito said during a lecture at PhilRice, 17 Feb.

"When you do LCA, you will know each step in the rice production process. You can identify which step produces the most emissions. From there, we plan our actions," Elmer Bautista said.

"Lamentably, LCA is not yet widely used in the country because people are not informed about it."

Aside from LCA's environmental benefits, Saito said it also contributed to the improvement of rice production in Japan. His team discovered that most CO_2 and GHG emissions occur in the middle of the production and drying stages. Their rice industry responded by shifting from the conventional to the reduced tillage system where such emissions are relatively low.

"Using LCA is now a necessity as it helps businesses and industries better understand the environmental impacts of their practices. It aids in making informed decisions in process improvement as they reduce production costs, while also mitigating adverse impacts on the environment," Saito added.

Saito and Bautista encouraged more Filipino researchers to use LCA like what Japan and Australia have done to reduce the harmful gas emissions during production.

"Climate change is now affecting all industries, not only in the agricultural sector. This is a call for everyone to be responsible in their practices. Since climate change is inevitable, the least we can do is not to contribute to its effects," Saito concluded. •

PhilRice scholars top at DAP

The Development Academy of the Philippines (DAP) honored two PhilRice researchers during the graduation of its Middle Managers' Class 8 of the Public Management Development Program (PMDP) in Tagaytay City, 29 January.

Senior Researcher Rhemilyn Z. Relado, 34, from Balingasag, Misamis Oriental, led the graduates as class valedictorian and received the Most Relevant Re-Entry Project (ReP) Award. The initiative *Binhi para sa Magsasaka: Enhancing Delivery of and Farmers' Access to High-Quality Rice Seeds* was recognized for "promoting the institutionalization of an internal system to increase availability and accessibility of high-quality rice seeds by improving the complementary processes of rice breeding, seed production, promotion and commercialization, and evaluation."

Relado is the head of the Institute's Socioeconomics Division and a recipient of the Fulbright-Philippine Agriculture Scholarship in 2006-2008. She finished MS in Agricultural and Extension Education, at Pennsylvania State University in the US.

Chief Science Research Specialist Dr. Sailila E. Abdula received the Best Re-Entry Project Award named *Improvement of rice-based farming technology through training of religious leaders in Maguindanao, ARMM: A pilot test of Madrasah sa Basak*. His project was cited for "implementing a new modality in empowering farmers in a Muslim community with peculiar cultural and social practices."

Abdula is PhilRice Midsayap's acting branch director and finished his PhD in Agriculture at Chungbuk National University, South Korea. He is 43, a son of Matalam, North Cotabato.

Relado and Abdula earned Master in Development Management (MDM) degrees through this extensive program that hones senior executives and middle managers in the public sector to be development-oriented, competent, dedicated, and honest leaders.

Democrito B. Rebong and Albert Christian S. Suner (MDM) and Acting Deputy Executive Director for Research Dr. Eduardo Jimmy P. Quilang (Diploma in DM) have likewise studied at DAP-Tagaytay in 2014-2015.

Arnold S. Juliano and Myline A. Dilla also finished PhD in Agricultural Engineering and MS in Agribusiness Management, respectively, at CLSU this year. •

PhilRice magazine staffer wins video award

A staff writer/photographer of this magazine has won in the Asia-wide International Monetary Fund (IMF) video competition themed *Advancing Asia: Investing for the Future*.

Jayson C. Berto, 23, also multi-tasks as videographer of the Infomediary Campaign being waged by the Institute's Development Communication (DevComm) Division.

Berto's 2-minute entry "Rice Hull is not Waste" was about a campaign site in Davao Oriental. He documented how the training of a school teacher who participates in the campaign resulted in quite a number of impressive results. The teacher taught her students choice climate-smart rice production technologies, which made the students take the lessons to the next level by producing carbonized rice hull (CRH) and selling it to the farmers in their community.

"I bought CRH from the students as I saw that it yielded good results in their plants," said a farmer-parent in the video.

Berto videographed how the campaign-participating school engaged farmers in the community by leading an agricultural extension activity. Through the campaign, the school became a hub of agri-information in the locality.

Berto, a son of Tublay, Benguet and DevComm graduate of Benguet State University, received his award during the Advancing Asia Conference in India, 11 March. He joined PhilRice in 2013.

"The time and effort were more than worth it," said a jubilant Jayson. "I even got a chance to ask a few questions to Ma'am Melinda of the Gates Foundation and UNDP Administrator Helen Elizabeth Clark."

Berto with IMF Managing Director Christine Lagarde during the awarding ceremony at the Taj Palace Hotel in New Delhi. (IMF Staff Photo/Stephen Jaffe)

For a young videographer like Berto, winning an international competition was "overwhelming."

"It was really overwhelming for me meeting the judges and dignitaries such as IMF Managing Director Lagarde, and India Prime Minister Narendra Modi. Philippine Ambassador to India Ma. Teresita C. Daza congratulated me and when they called my name and the place where I come from, I felt that I was no longer just representing PhilRice but also our country," Berto said.

PhilRice's Infomediary Campaign is an initiative on youth engagement in agriculture. It mobilizes young people to serve as information providers or infomediaries in the rice-farming communities.

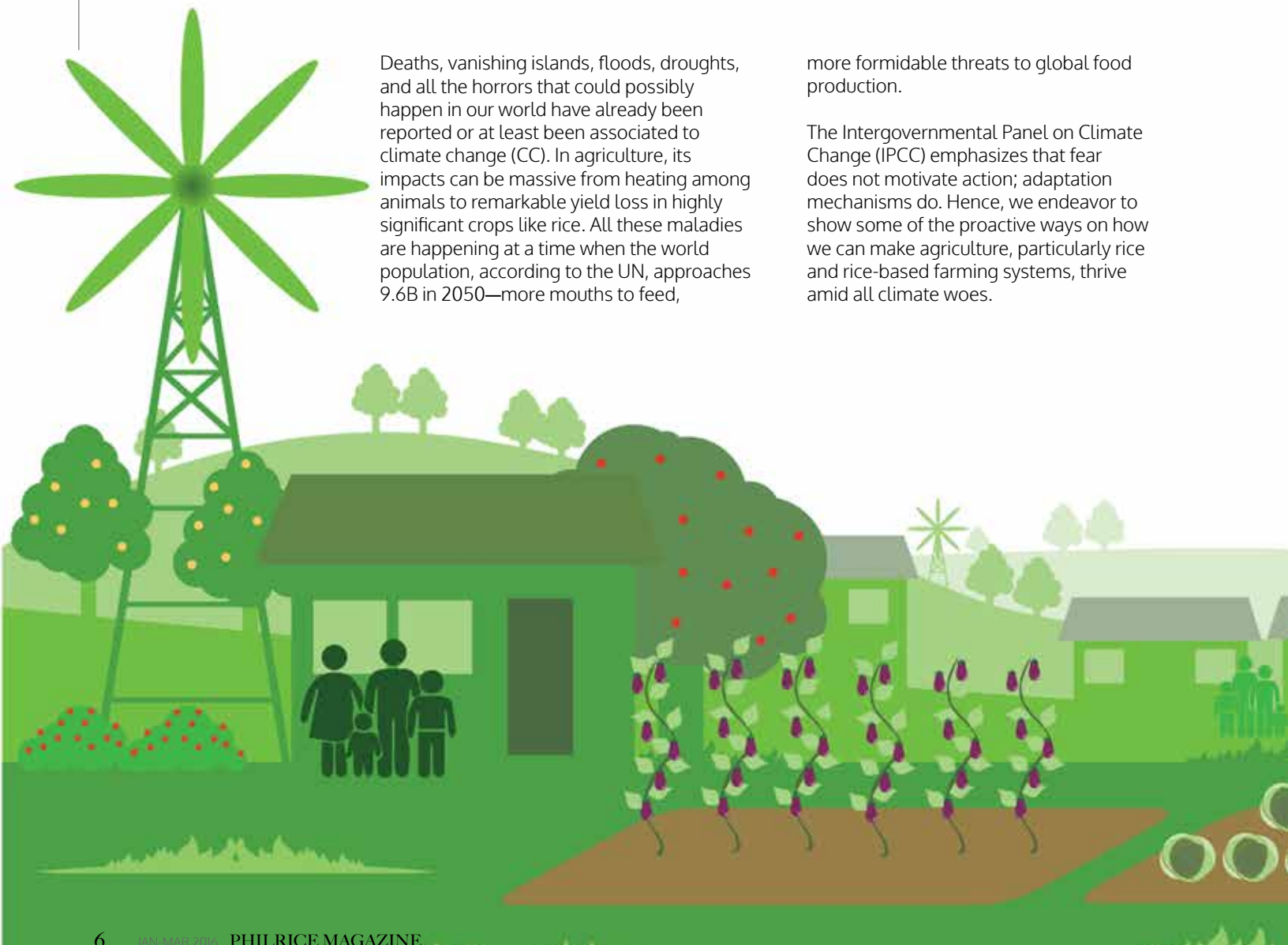
The campaign operates in 108 high schools nationwide in collaboration with the Department of Education and the Consultative Group on International Agricultural Research on Climate Change, Agriculture, and Food Security. •

Crops in unusual times

▶ JAIME A. MANALO IV AND MARY GRACE M. NIDOY
(ANDREI B. LANUZA, illustrations)

Deaths, vanishing islands, floods, droughts, and all the horrors that could possibly happen in our world have already been reported or at least been associated to climate change (CC). In agriculture, its impacts can be massive from heating among animals to remarkable yield loss in highly significant crops like rice. All these maladies are happening at a time when the world population, according to the UN, approaches 9.6B in 2050—more mouths to feed, more formidable threats to global food production.

The Intergovernmental Panel on Climate Change (IPCC) emphasizes that fear does not motivate action; adaptation mechanisms do. Hence, we endeavor to show some of the proactive ways on how we can make agriculture, particularly rice and rice-based farming systems, thrive amid all climate woes.



> In a warming planet that cradles a ballooning population, nations are now taking actions and working hand-in-hand to make sure that food will always be available and accessible.

International agreements

Before the 2015 Conference of Parties (COP 21) in Paris, countries reported their Intended Nationally Determined Contributions (INDCs) to reduce greenhouse gas emissions. While majority included agriculture in their mitigation targets (80%) and adaptation strategies (60%), the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) emphasizes that climate finance will need to address agriculture for countries to meet their goals.

In December 2015, COP made history as 195 nations adopted a legally binding agreement to reduce emissions to slow global warming.

A breakthrough in agriculture and CC policies, FAO Director-General José Graziano da Silva recognized the landmark deal and said, "For the first time ever, food security features in a global climate change accord."

"This is a game changer for the 800 million people still suffering from chronic hunger and the 80% of the world's poor who live in rural areas and earn their income – and feed their families – via the agriculture sector. By including food security, the international community fully acknowledges that urgent attention is needed to preserve the well-being and future of those who are on the front line of climate change threats."

While agriculture was given a moment of attention in COP 21, initiatives in different scales have already been employed. Some institutions have been walking the talk long before the talk started, so to speak.

Technologies and strategies

Globally, there are quite a number of studies on how to adapt to the impacts of climate change in agriculture. International research institutions such as the International Water Management Institute (IWMI) in Sri Lanka and the Philippine-based IRRI are at the forefront of these initiatives.

IWMI pushes for water storage facilities due to the rather erratic rainfall. Water harvesting in Sri Lanka, for instance, is being practiced where water is directed to dry areas.

Rainfed areas account for "more than 95% of farmed land in sub-Saharan Africa, 90% in Latin America, 75% in the Near East and North Africa, 65% in East Asia, and 60% in South Asia," according to IWMI.

IRRI has worked on alternate wetting and drying (AWD). The concept is to irrigate the ricefields only when it is needed to avoid wasteful use of water. AWD is now being practiced in the Philippines, Vietnam, and other rice-producing countries.

The System of Rice Intensification (SRI), which originated from Cornell University in the US, is being practiced in China, India, Indonesia, and Vietnam. Among SRI's key advantages are fewer seed (about 80-90%) and less water requirements by up to 50%.

Meanwhile, index insurance has been reported by the Consultative Group on International Agricultural Research (CGIAR) as among the keys in enhancing adaptive capacities of farmers. It is a form of insurance based on certain indices, for instance, rainfall index, not on actual loss. Under this scheme, insurance companies do the payout once rainfall registers below the expected range. They then no longer have to visit individual farmers. Reports of implementation are traced to India.

A new crop insurance product called weather index-based insurance (WIBI) has also been developed by the International Labor Organization (ILO) and Philippine Crop Insurance Corporation (PCIC), in partnership with PhilRice.

Under WIBI, clients don't need to file for claims since it does not require field assessment of damages. Instead, the insurance company sets indices for weather parameters, which will be the basis for payment instead of the usual crop damage incurred.

IRRI scientists have pushed for an integrated approach in tackling climate change impacts on rice. This means the issue must be approached on all fronts: "breeding, genetics, and integrating resource management to increase rice yield and reduce water demand for rice production and some cutting-edge research."

Communication strategies

Most countries have already invested highly on warning systems to deter the impacts of climate change specifically for floods, droughts, and wild fires. The Philippine investment in its forecasting system was lauded by the UN as it has significantly reduced death tolls in the country brought about by natural disasters.

Likewise, the World Summit Award 2014 recognized ARKO, Project NOAH's (Nationwide Operational Assessment of Hazards) mobile app, which provides location-specific flood hazard maps, as among the world's innovative IT applications. ARKO bested 450 other apps from around the globe.

FAO, in 2010, through the Communication for Sustainable Development Initiative, piloted communication for development strategies and methods in communicating climate change. It basically capitalized on participatory communication as it involves various stakeholders of the community. They piloted it in Bolivia, Bangladesh, DR Congo, and the Caribbean.

In general, there is clamor to use non-technical language in communicating climate change and in banking on risk communication strategies to ensure that messages are duly absorbed by the intended recipients. A good example of this is the primer by CCAFS in collaboration with the International Institute for Rural Reconstruction. It is a highly illustrated primer on communicating climate change and its impact on agriculture to policymakers.

Sustainable communities

Non-profit organizations have established climate interventions anchored on the climate-smart agriculture (CSA) framework to turn vulnerable areas into sustainable communities.

CCAFS has set up climate-smart villages (CSV), where key players in development (researchers, development partners, and farmers) convene to test CSA interventions.

CSV helps farmers who live in places identified as being high-risk to the effects of climate change, to learn mitigation and adaptation methods and eventually become resilient. It also hopes to reduce human-generated greenhouse gas emissions in agriculture making the solutions sustainable.

The villages have been set up in West and East Africa, and in South Asia. These CSVs are hoped to motivate other vulnerable countries to replicate the program.

In a warming planet that cradles a ballooning population, nations are now taking actions and working hand-in-hand to make sure that food will always be available and accessible. •

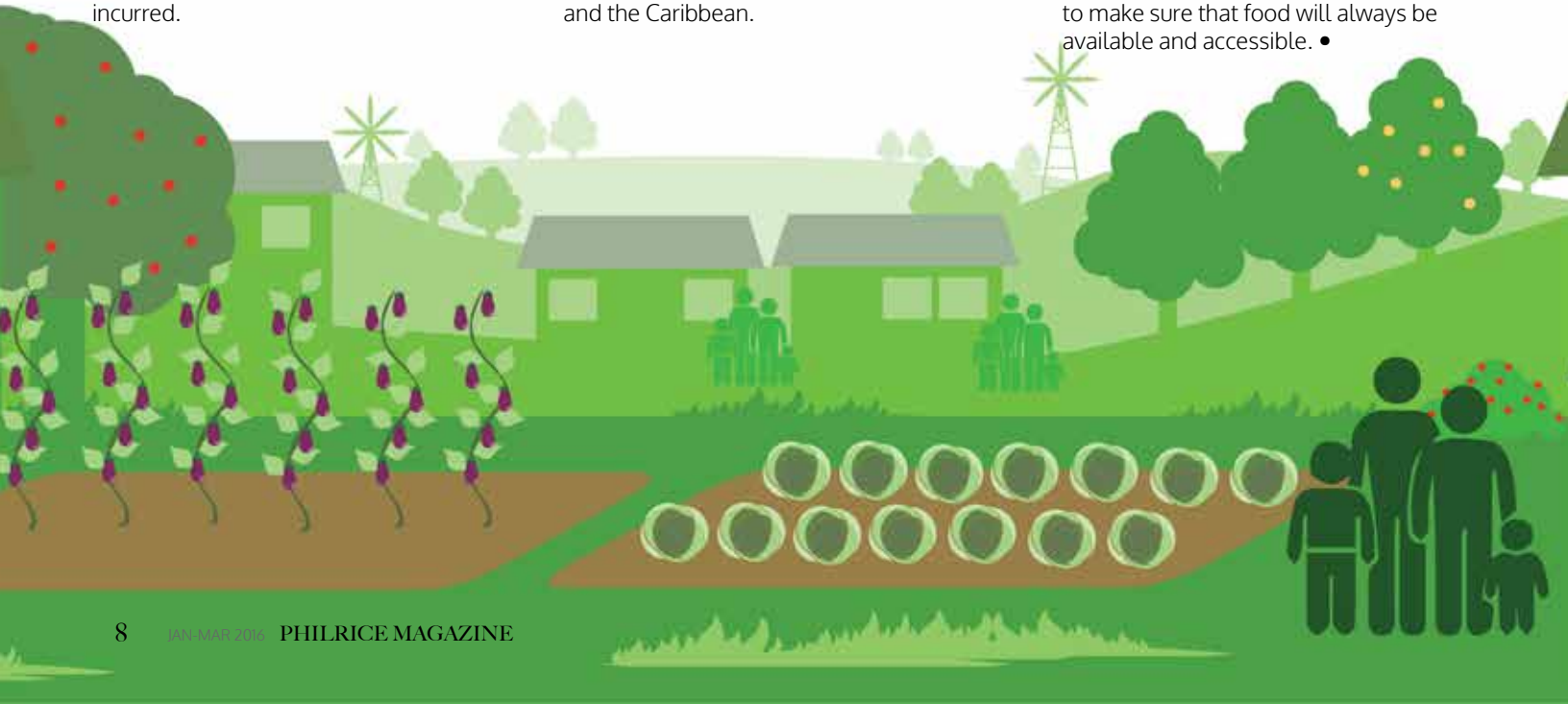


Photo: Carlo G. Dacumos

Perfecting foresights that matter

▶ MYRIAM G. LAYAOEN

In a world of doubts and uncertainties, anticipating risks can lead to readiness – a ticket to survival. The current situation of the agriculture sector on climate change mitigation and adaptation necessitates preparedness. Knowing what is to come in the production-and-consumption equation helps ensure enough food for the people despite resurgent challenges in the given growing environment.

Efforts are in place to capacitate institutions to aptly inform policymakers on climate change and agriculture. The International Food Policy Research Institute (IFPRI), for instance, works with the National Economic and Development Authority (NEDA) to develop and promote economic models that will quantify the impacts of climate change on Philippine agriculture.

Modelling to predict impact

Their research project, "*Addressing the Impacts of Climate Change in the Philippine Agriculture Sector*" puts into local setting the global perspective on climate change impact scenarios.

"If we are going to look at the effects of climate change in the world, the Philippines

> We need help from different stakeholders, especially the Department of Agriculture, to go down to the community level. We are thankful that policymakers from various agencies showed interest on the model. They acknowledge the need for evidence-based policies to support decision-making on climate change and agriculture. - Dr. Mercedita Sombilla

is just a price taker. The impact would seem very minimal. With the tools that we develop, we would be able to see realistic foresights in the different sectors" said Dr. Mercedita Sombilla, director of the Agriculture, Natural Resources, and Environment Staff of NEDA.

The project primarily guides policymakers in designing strategies and prioritizing investments to develop climate-resilient interventions in agriculture. The model will provide the users with better understanding of the current status and potential impacts of climate change, adaptation strategies and sustainability, investments, and supporting policies to cushion the adverse consequences.

As an initial output, the team has generated a production supply trade model that simulates policy scenarios. "It is actually a supply and demand model. If climate change puts a shock on either end, it will affect the prices and corresponding demand for commodities. The decrease in demand means lower consumption, which will eventually affect the nutrition of people. Prices will also affect income not only of the producers but also consumers of goods. It has a rippling effect," Sombilla explained.

For the model to work, it will need inputs from stakeholders in the agriculture sector. Recommendations on means to respond to climate change will be drawn from the resulting analysis.

"We embark on a holistic approach to make sure our assumptions are valid and founded. Recommendations range from general adaptation measures to specific technologies that farmers may use and type of information to be disseminated," added Sombilla.

Crop production at the forefront

While government focuses on improving productivity to keep prices of goods affordable to everyone, climate change is a major deterrent to such vision. The impact model puts premium on recommending strategic interventions to cushion the effects of climate change on crop production.

"Future scenario indicates a rising temperature that may devastate agricultural crops, rice in particular. The model allows us to see how that temperature will impact production and, eventually, prices. And the spillover effect goes on," said Sombilla.

She said that knowing these pertinent information will create an outlook of what will happen both in production and consumption. The study will then suggest appropriate actions such as strengthening the R&D sector to enhance climate resiliency, and focusing government expenditures on such interventions.

"We need help from different stakeholders, especially the Department of Agriculture, to go down to the community level. We are thankful that policymakers from various agencies showed interest on the model. They acknowledge the need for evidence-based policies to support decision-making on climate change and agriculture," said Sombilla.

The research program on Climate Change, Agriculture, and Food Security (CCAFS) co-funded the 2014-2016 project.

Resource-sharing for enhanced capacity

The CCAFS program in Southeast Asia enhances the capabilities of the public and private sectors in implementing climate change adaptation measures.

Photo: Carlo G. Dacumos


Photo: Carlo G. Dacumos

The desired outcome is a more resilient agriculture in the region for stable food supply. Consumers, particularly low-income rural and urban people, should have adequate access to and use of quality nutritious food commodities

- Dr. Leocadio S. Sebastian

"The desired outcome is a more resilient agriculture in the region for stable food supply. Consumers, particularly low-income rural and urban people, should have adequate access to and use of quality nutritious food commodities," said Dr. Leocadio S. Sebastian, former PhilRice Executive Director and now CCAFS program director for Southeast Asia.

The program involves research for development activities that are participatory in nature. It focuses on areas representing extreme climate challenges, agroecosystems, and landscapes. Working with national and non-government organizations, the program intends to upscale climate-smart agriculture in the local communities.

"Our smallholder landscape approach or Climate-Smart Villages facilitates more effective collective action on the impact of climate change and in mitigating its ill effects on agriculture, thus ensuring the dissemination of outputs to farmers and communities," added Sebastian.

The scenarios that have yet to unfurl in the rice farming environment will certainly bring apprehension among farmers and other stakeholders. Yet, there exist support systems for them to successfully tread the road toward climate change mitigation and adaptation. Regardless of their respective places in the long ladder of agricultural development, sound options are set to help them get through it. •

When super rice Outsmarts super Amang

▶ SONNY P. PASIONA

In broad-daylight January 2015, the weather was stunningly fine, the air was soothingly fresh, and the mountains exuded a breath-taking sight as he was transplanting his delicate, young rice seedlings on his field.

A week after, however, dark clouds slowly shrouded the mountains, heavy rains poured, and strong winds battered his recovering plants. Typhoon *Amang* came and harassed his hope for a bountiful harvest.

"Nalumural ako" (I felt devastated), farmer Rodrigo Jose Aspe, 55, of Magarao, Camarines Sur sighed upon seeing his rice field ravaged and severely flooded.

Many other agricultural areas in the province were underwater for two weeks at that time. Surprisingly, from seemingly lifeless, Aspe's tillering rice plants survived as if nothing happened.

Super rice

Mang Rodrigo used Green Super Rice (GSR) 5, a multi-trait rice cultivar that can withstand adverse growing conditions, such as drought, flooding, and saline intrusion.

In the wake of the typhoon, Anicia Mancita of the Municipal Agriculture Office advised him not to take any action, just observe what would happen. To Mang Rodrigo's surprise, his one-hectare rice crop recovered and gave him a handsome yield of over a hundred sacks after three months.

GSR 5, 11, and 22 are lines mostly used in the municipality. "GSR 22 looks like a hybrid variety. It is taller, has broader leaves, and yields up to 5.66 t/ha," Mancita said.

> Like a bamboo, if a community is armed with DRM plans, it can bounce back from disaster.
>
> - Dr. Cely Binoya

Albeit still under field-testing and not yet commercially available, "these GSR lines exhibit resilience to adversities as proven by our farmers," Mancita added.

Livelihood resiliency

Mang Rodrigo was among the farmer-cooperators of the project "*Consolidating Capacities for Disaster Risk Reduction in Agriculture and Fisheries*." Taking off from the Bicol region, the project expanded to Caraga and Davao regions, and was exported to Cambodia, Laos, and North Korea.

Livelihood resiliency was the project's ultimate goal. At its third phase of implementation, the project integrated best practices from the two preceding projects that enhanced capacities of the local government units (LGU) in disaster risk management (DRM) as applied to agriculture.

"Like a bamboo, if a community is armed with DRM plans, it can bounce back from disaster," said Dr. Cely Binoya, project leader.

Under the project, climate-smart technologies, such as the use of GSR, were intensively promoted to small-scale farmers including Mang Rodrigo. The project also introduced the Post-Disaster Needs Assessment, a computer and web-based tool that collects data, assesses damage, and determines location-specific needs after a disaster occurs.

The project was co-implemented by the Food and Agriculture Organization (FAO) and the DA in the Bicol region. It was funded by FAO and the European Commission Humanitarian Aid Department-Disaster Preparedness (DIPECHO).

Photo: Carlo G. Dacumos

Climate patterns may be changing but Bicolanos are adapting by building a climate of hope and resilience.

LGUs in the spotlight

Before the start of the project, DRM plans in agriculture by the LGUs were "anemic."

"Unlike in infrastructures, people can't easily see results when you invest in agriculture which is a soft sector of development," Binoya pointed out.

The project therefore puts agriculture and fisheries in the limelight and pushes LGUs to institutionalize DRM in these sectors.

"It's not just about saving lives, it's also about saving their livelihood," Binoya added.

Local officials and farmers from 12 municipalities in Bicol, including Magarao, undertook disaster risk assessments with emphasis on hazards, vulnerabilities, and capacities as bases in developing a plan of action for DRM in the agri-fisheries sector.

Hands-on mentorship and technical assistance were provided by Bicol University, Central Bicol State University of Agriculture (CBSUA), DA-RFO 5 and PAGASA. Training programs, lectures, and consultation workshops connected to the community-based DRM plans were likewise facilitated.

Keeping the ball rolling

Trained LGU personnel educate other force multipliers. Having been conferred with a Seal of Good Governance in Disaster Management, the Magarao-LGU is now a leading advocate in this initiative.

This year, they are set to engage all of their barangay officials and farmers in their campaigns.

They also have an Automated Weather Station (AWS) with a five-day forecast made accessible to the farmers. Through the internet, barangay officials access information and post important weather advisories on their respective bulletin boards.

"We have a proposal to make weather forecasts SMS-based by which the information goes directly to the farmers through SMS," said Dante Agorita, municipal disaster risk reduction and management (MDRRM) officer.

The Magarao spirit

Mang Rodrigo, a retired Navy officer, knows basic weather forecasting and monitoring. He actively works with their LGU and helps advise the community on approaching typhoons.

"Farmers in our region are more open to new technologies and they share scientific-based information to us," said Emily Bordado, chief information officer of DA-RFO 5.

Shared learning and innovation is a significant ingredient in building resiliency among Bicolanos. It builds for them a spirit of hope and faith that weather adversities can be hurdled with robust collaboration.

"It's a big step that local chief executives are progressive-minded, and that various sectors are inclined and supportive to agriculture," Bordado reiterated.

Climate patterns may be changing but Bicolanos are adapting by building a climate of hope and resilience. When a typhoon hits their place again, Mang Rodrigo and Magarao farmers are confident that they would outsmart it. •

The school before the storm

▶ MARY GRACE M. NIDOY

Nestor Deala's rice farm has been battered by some of the most extreme impacts of climate change in agriculture – searing droughts, torrential rains, and floods.

At the tail-end of Iloilo province lies the coastal town of Dumangas where Nestor lives. El Niño and super typhoons such as *Frank* and *Yolanda* top the challenges that resource-poor farmers like him have to live with.

Climate change (CC) used to be a strange and complex term Nestor hardly understood and thought about.

The 56-year-old rice farmer confided that he first encountered the term when he became part of the Climate Field School (CFS) in 2012.

And his story tells it all.

Right time and quantity

The community-based CC initiative started in 2007 led by the local government unit of Dumangas. It was conceived through the help of the Asian Disaster Preparedness Center (ADPC). Nestor was among 26 farmers who participated in the fifth batch of CFS.

CFS was first adopted in Indramayu, Indonesia followed by Dumangas. "CFS aims to enhance the capacity of our farmers and extension workers to understand climate change mitigation and adaptation processes in agriculture to improve their farming practices and be able to cope with adverse conditions," said Eugenio D. Decastillo, Jr., municipal agriculturist of Dumangas.

With some technical assistance from science and government institutions, Decastillo and his team developed modules on the following: integrated crop management; climate, pests and diseases, crop growth and development; cropping systems and climate-related risks; understanding weather and climate parameters; climate information products and forecast generation, interpretation, and communication; incorporating climate forecasts in decision-making; and establishing cropping calendars.

Classes were held once a week for three months through lectures, workshops, and field demos.

Barangay chief Rosemarie Arado describes CFS as "*mabusisi*" (thorough), having learned the nitty-gritty of integrated crop management platforms such as the *PalayCheck* and *Palayamanan* systems.

"We found out that it's not all about the quantity of seeds; 15kg can be enough for 1ha)," Arado said.

The Dumangas farmers also highlighted their learnings on seed selection, soil analysis, proper land preparation, and pest identification and management. From 80-90 sacks of rice/ha, they now get 150-160 sacks, thanks to CFS, according to an LGU evaluation.

From weather forecasts to higher yields

Among the important components of CFS is its own weather station in Dumangas established in 2002 as a pilot project of PAGASA and ADPC.

Every day, the Dumangas Agro-Meteorological (Agro-Met) Station sends farm weather forecasts to farmers and extension workers with tips and advisories on how to manage their farms through different media platforms.

"We collect the weather data and send them to PAGASA for interpretation, with which we develop the farm weather

Photo: Carlo G. Dacumos

Photo: Jenine F. Gamil


Photo: Jenine F. Gamil


Photo: Jenine F. Gamil

forecast of the day and include tips and advisories in the local language," said Ricky Dador, resident weather observer at the Agro-Met Station.

"Weather forecast is very important as the farmers are able to plan what crops to plant and schedule their farming operations," Dador added.

CFS has taught farmers in Dumangas how to interpret weather data and integrate climate information in crop management and planning, thereby helping them in their decision-making.

"Before we listened not to PAGASA, but to our elders who are more experienced than us," Nestor revealed.

Model of good governance

Since 2007, the program has trained over 700 farmers in Dumangas and was awarded the *Gawad Kalasag* for best community-based disaster risk reduction management by the NDRRMC. It has also made Dumangas as the second top rice producer and highest yielder per hectare in Iloilo Province.

"Because of the program's success, LGUs from different parts of the country constantly visit us. They want to learn how we implement CFS so they can replicate it in their hometown," Dador said.

CFS has taught farmers in Dumangas how to interpret weather data and integrate climate information in crop management and planning, thereby helping them in their decision-making.

Debunking a myth

It is unusual to hear a farmer explain climate-anchored processes such as mitigation and adaptation. But Nestor was consistently certain of the terms, speaking with conviction at times when he needed to explain them.

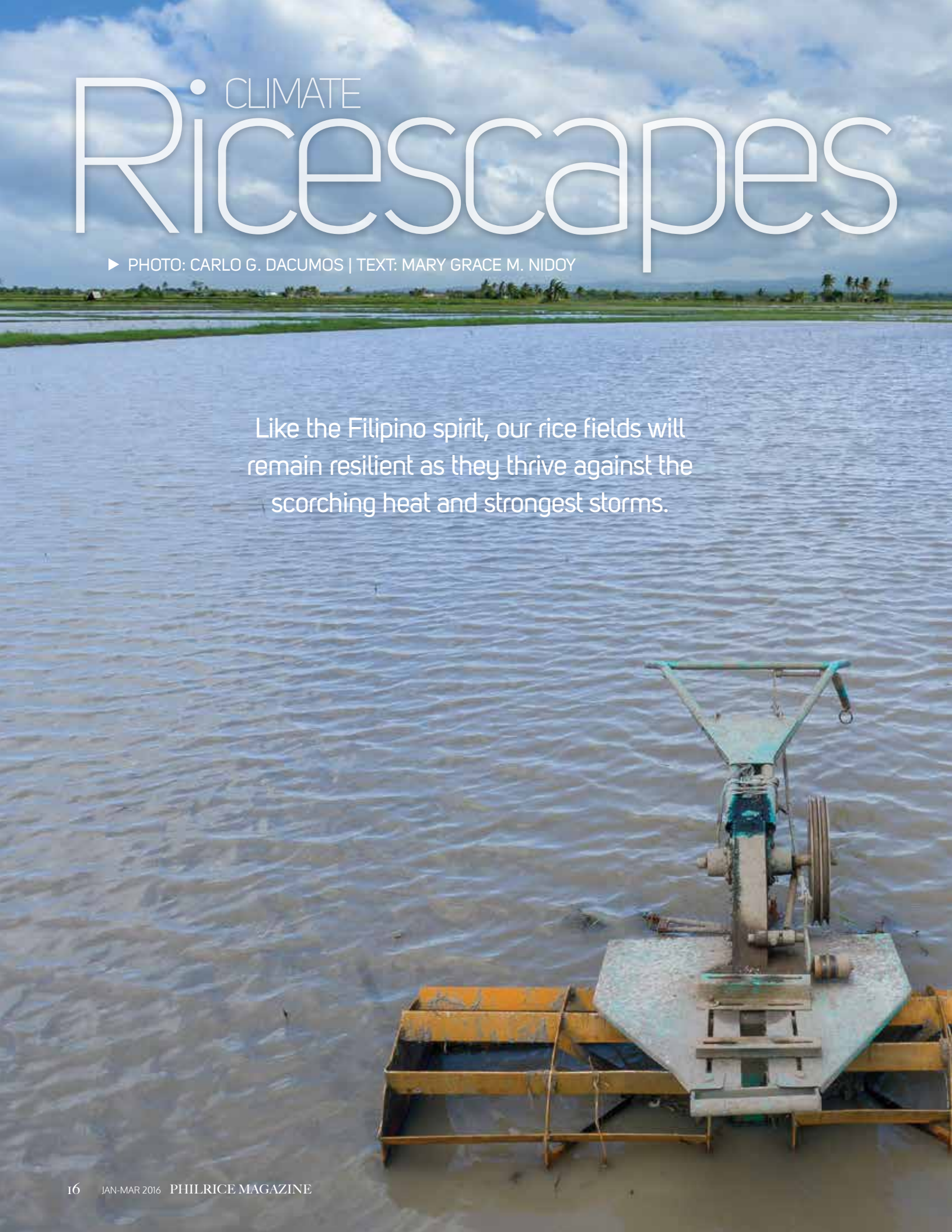
While searing droughts have been longer and floods more frequent, climate change for Dumangas farmers is definitely not a myth.

Nestor stressed, "*Totoo talaga* (It is real)." •

CLIMATE Ricescapes

▶ PHOTO: CARLO G. DACUMOS | TEXT: MARY GRACE M. NIDOY

Like the Filipino spirit, our rice fields will remain resilient as they thrive against the scorching heat and strongest storms.



> CFV taught me how to integrate my farm. That's why I have a wide upland farm.
>
> - Leonardo Tolentino

Vanguards of sloping land resources

▶ JAYSON C. BERTO

Photo: Jayson C. Berto

Symbiosis is when two entities are able to feed or at least rely on each other. In agriculture, a farmer cannot just do anything in the name of producing more. The immediate environment must be considered well, lest decreasing production becomes an irreversible consequence.

Such is the case among farmers in Nasungan, La Libertad, Negros Oriental.

"We were prisoners of our own lands. We had limited knowledge on how to protect them from erosion and other damages, and on what to plant to adapt to the changing climate," said Andres Pacunla Jr., 52.

Monocropping coupled with heavy synthetic pesticide application were being practiced widely in the area until the farmers were engaged in the Conservation Farming Village (CFV) project launched in 2009.

CFV is spearheaded by UP Los Baños through its project leader, Dr. Rex Victor O. Cruz, together with Silliman University, La Libertad local government unit (LGU), and other local partners. The key aim is integrated farming toward environmental and agricultural development, and improved well-being of the people This is pursued primarily through the transformation of traditional tendencies into sustainable upland development-oriented skills and mindsets of farmers, local community leaders, and LGUs.

Vanguards at work

The project engages local farmers to become vanguards of their land. They are taught to show utmost care for this resource so the promise of higher yield can be realized and sustained in the future.

Cruz says the participatory approach is optimized in selecting the most appropriate technologies for each farm. "This

approach helps them further develop their conservation farming skills."

Where appropriate, farmers are trained on producing organic fertilizers, planting erosion-resistant trees and fruit-trees, diversifying crops, and reducing pesticide use, all in the context of a land-use system known as agroforestry.

Farmers are now practicing the alley-cropping agroforestry system, which includes the hedgerow planting of fast-growing nitrogen-fixing shrubs like flemingia, and trees such as indigofera, and calliandra.

Pacunla says these shrubs and trees can grow in different soil types. "They simply hold the top soil stabilizing the tiers and providing space for us to plant vegetables."

During wet season, high-value crops such as carrots, Chinese cabbage, tomatoes, and beans are planted in alleys between hedgerows to optimize space and nutrients from the trees.

Cruz said the practice of alley cropping has reduced soil erosion through the piled composted pruned leaves of the hedgerows on alleys, hence preventing the escape of top soil.

Jovy Bongcawil, 41, president of the Talaon Community Best Agricultural Groups in Talaon, La Libertad, points out that they have already systematized their planting schemes by identifying appropriate crops for the dry and wet seasons.

He says the project taught them that several highland and lowland vegetables could actually be grown in their barangay. Planting these vegetables at the right time will help much in ensuring their higher income.

Another Nasungan farmer, Leonardo Tolentino, 46, has been practicing integrated farming in his 2-ha farm.

"I need to have at least five high-value crops plus livestock to increase my income. I have already planted corn, *ampalaya*, *okra*, and eggplant during the dry season," Tolentino said.

Tolentino attributed his winning the Regional Siyentistang Magsasaka Award in 2012 to his CFV involvement. "CFV taught me how to integrate my farm. That's why I have a wide upland farm," he added.


Photo: Jayson C. Berto

Vegetable seedlings in trays.

> We were prisoners of our own lands. We had limited knowledge on how to protect them from erosion and other damages, and on what to plant to adapt to the changing climate.
>
> - Andres Pacunla Jr.

Garlic, onion, and watermelon are among the favored crops for the dry season. Tolentino said there's always a seminar or training before they can get and try new crops like these.

The project leader observed that the shift from monocropping to diversified and scheduled planting has resulted in plentiful products available for their communities, making them more food-sufficient.

Farmers in Nasungan also noted that rice hectarage is gradually expanding in their area. They look forward to benefiting from interventions against rice pests and diseases.

Vanguards' constant partner

Some 10 years back, La Libertad farmers were contented at producing enough food for their families' consumption.

"We could not produce much then. Seeds were inadequate, and vehicles were quite rare for transport," they recalled.

Through the CFV project, support from the LGU on how to transport their crops to the market came in. Since 2009, the "*Libre Sakay sa Paunay sa La Libertad*" has provided 3 to 4 trucks to bring produce to the commercial center.

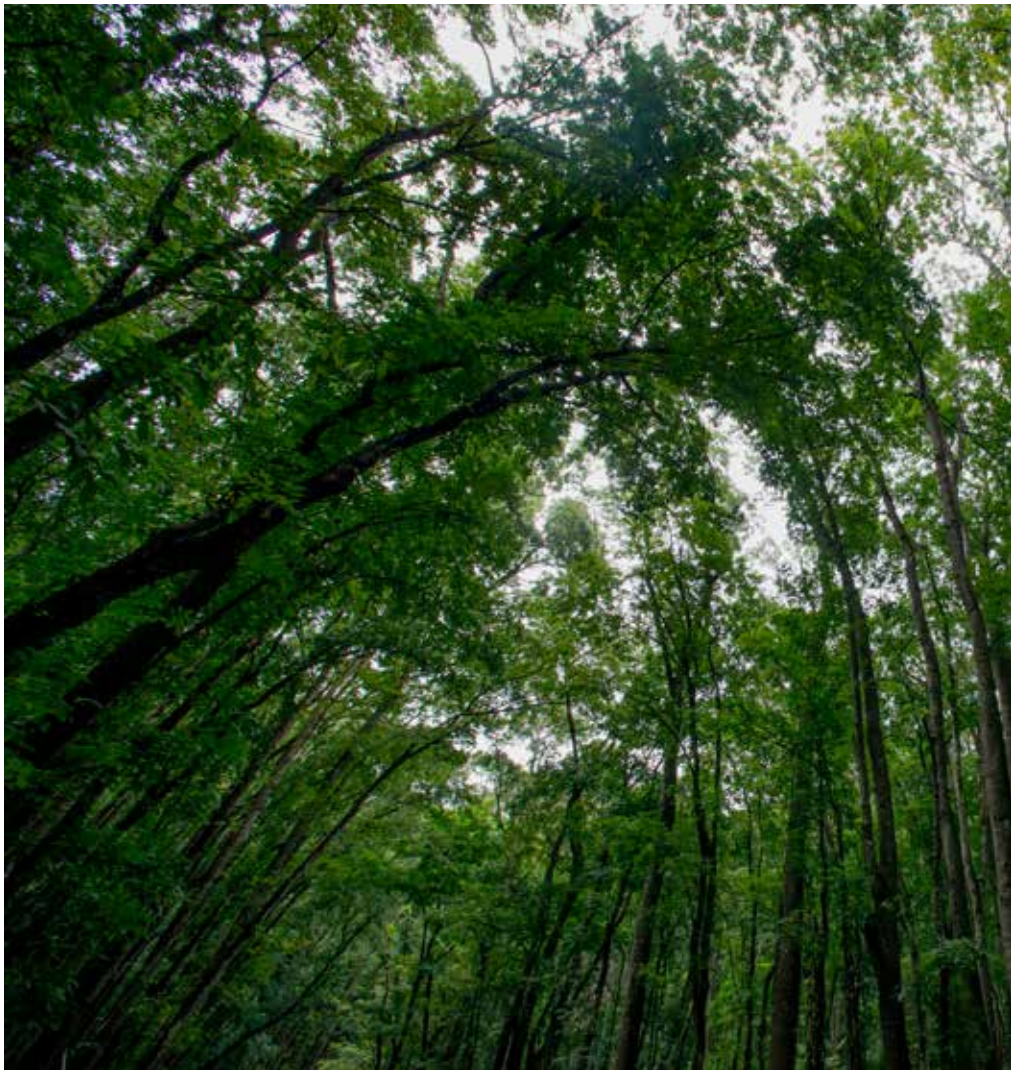
Albert Gutierrez, municipal planning and development coordinator of La Libertad and OIC municipal agriculturist, said that farmers are now able to produce rice not just for their own consumption.

The CFV is now being implemented in 13 barangays and will be upscaled to more than 20 barrios in La Libertad this year.

Gutierrez is gratified that the 454 hectares in La Libertad are now models of reforestation, enrichment planting, and agroforestry.

"This project will continue as the LGU's banner program," Gutierrez said.

Currently, the project receives funding from a German government-owned development bank. This translates to producing more vanguards of resources in the uplands. •



The science behind trees

▶ CHRISTINA A. FREDILES

What could be more challenging than farming at the top of a mountain?

Some farms in Claveria, Misamis Oriental do just that. Farmers here tend plants in steep slopes with erosion-prone and acidic soils while rainfall serves as main source of water.

But these obstacles do not bother them. Their ally? The trees – which are beneficial to rice and other crops.

Myth about trees

Some farmers think that planting trees near rice is not a good practice. There would be less grains as trees would block light from the sun. This could be linked to the concept of photosynthesis wherein plants convert light energy into chemical energy that fuels the plants' growth.

Dr. Agustin Mercado Jr, research manager of the World Agroforestry Center-Philippines, said trees and crops can complement each other toward mutual advantage. "In planting trees with rice, farmers should consider its economic, environmental, and social benefits."

Mercado advised farmers to plant trees 20-25 meters apart between rows and 3 meters apart between trees to avoid light energy competition with crops.

"Trees maintain soil organic matter such as decayed leaves and roots. They improve vegetative productivity by reducing windspeed and increasing relative humidity and soil moisture at the surface," Mercado added.

Trees also help prevent soil erosion through their deep roots that serve as contour hedges.

In a 2005 report to the World Bank, Dr. Roehlano M. Briones of the Philippine Institute for Development Studies pointed out that the country has over 12.2 million ha of sloping land, 17% of which are very steep and 66% are steep slopes making them prone to erosion. This condition causes loss of nutrients in land, and inability to hold water that can lead to flooding downhill.

Landslides can also be minimized with trees. Most of the upland areas fetch more than 2,500 mm of rainfall per year. Mercado encourages farmers to plant trees that can also be sold for additional income.

Crops plus trees and other organisms

In a study of Mercado's team, the integration of rubber tree and upland rice normally yields the best result. While rubber trees prevent soil

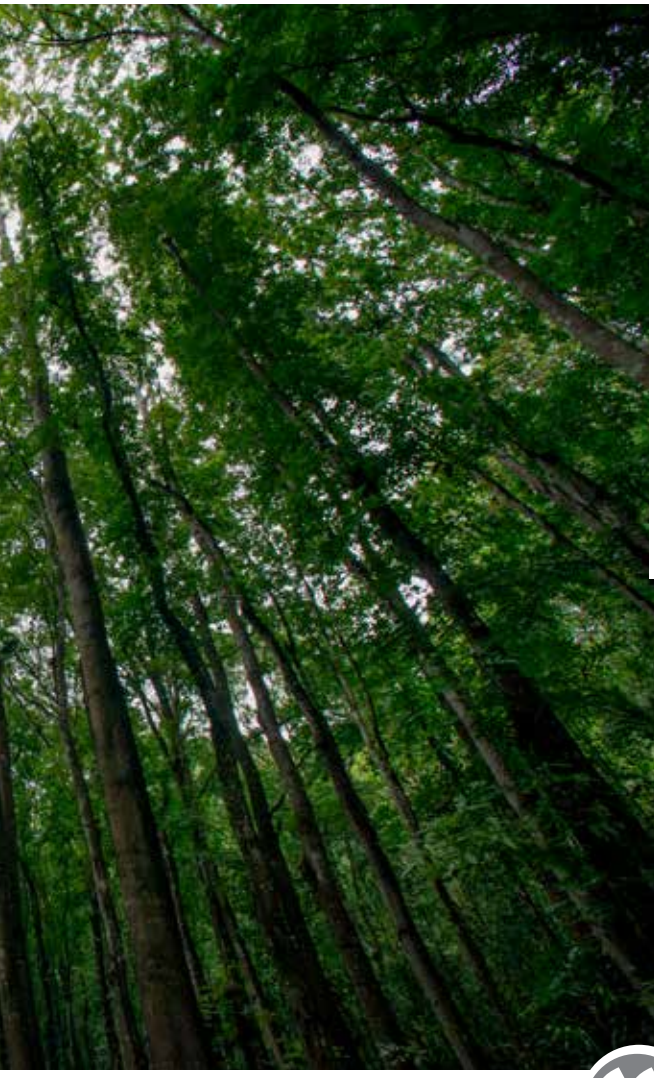


Photo: Carlo G. Dacumos

Photo: Myriam G. Layaoen

Photo: Myriam G. Layaoen

> Trees maintain soil organic matter such as decayed leaves and roots. They improve vegetative productivity by reducing windspeed and increasing relative humidity and soil moisture at the surface.
>
> - Dr. Agustin Mercado Jr.

erosion, upland rice is aerobic and does not emit methane gas unlike flooded rice. Methane contributes to global warming and climate change.

Planting trees and vegetables in the upland diversifies beneficial organisms. This concept is called "ecological engineering" which is grounded on cultural techniques to increase the population of such organisms that feed and live on trees and vegetables. In return, beneficial insects such as spiders, coccinilids, damselflies, and others attack 90% of pests in rice.

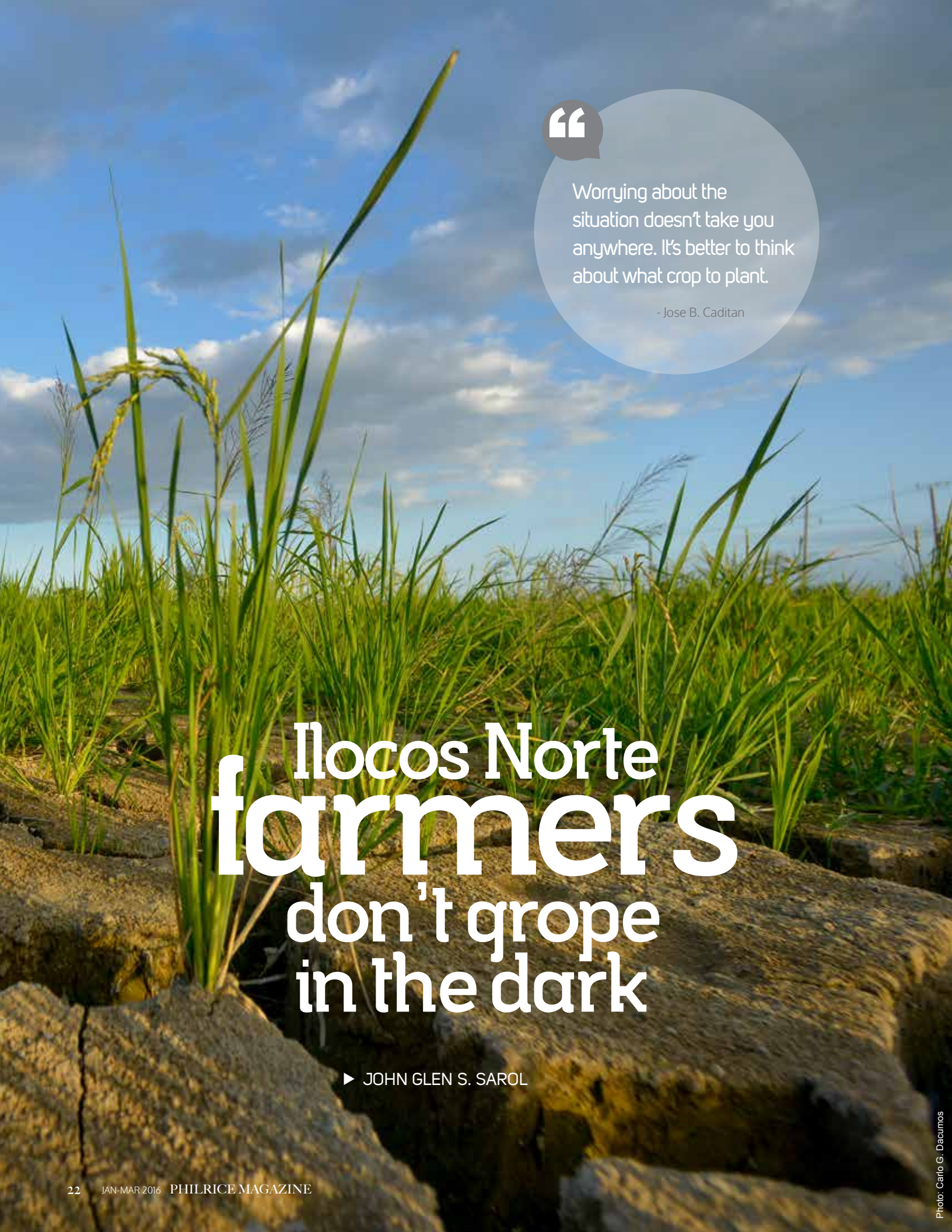
"Integration of rice and rubber tree is a good option to increase rice production, food, and economic security of the country while mitigating climate change," Mercado said.

The shrub *Arachis pintoi* (mani-mani) planted under the trees is used as live mulch in the uplands, which maintains the moisture of the soil. The plant suppresses weeds and controls erosion as well. Pigs, cattles, and goats eat the shrub, too. Mercado has worked for several decades with the Center, an international leader in agroforestry R&D. It aims to grow more food and lessen gas emissions by converting degraded grasslands into highly productive farmlands and sequestering more carbon in trees.

Rainwater harvest

Rainwater is the only source of irrigation in the hilly farming areas of Claveria. Mercado's team put up ponds that store water. The biggest pond has 20m x 14m x 4m dimensions. "With these ponds, we need not worry during dry spells within the rainy season, or whenever it is time to water the plants in the absence of expected rain. We also culture fish that farmers eat and sell. Fish also adds nutrients in the water, making it beneficial to the growth of the crops it irrigates," Mercado explained.

Undoubtedly, climate change aggravates the challenge that upland farming brings to farmers. But with trees proving their worth to climate change adaptation and mitigation, agroforestry practices should be adopted to complement the needs of crops and animals. After all, farmers are expected to produce food while standing resilient despite the changing climate. •



> Worrying about the situation doesn't take you anywhere. It's better to think about what crop to plant.
>
> - Jose B. Caditan

Ilocos Norte farmers don't grope in the dark

▶ JOHN GLEN S. SAROL

Photo: Carlo G. Dacumos

Droughts and floods strike like darkness, often leaving farmers empty-handed and almost helpless.

In May 2015, the National Disaster Risk Reduction and Management Council reported P18.8M worth of drought-damaged rice crops in the Ilocos Region.

Drought has been a major pain. Not only does it squeeze irrigation canals but also slowly deplete alternate water sources like tube wells.

The region had also suffered from floods due to typhoons in previous years.

"There is no doubt that the region has been hit hard by climate change. For the past years, its effects have been severe," said Dr. Nathaniel R. Alibuyog, vice president for research and extension of the Mariano Marcos State University in Batac City.

This concern makes the university's Climate-Resilient Agriculture Center deserve to be the region's research and training center for climate change. It provides sight to farmers who are still "groping in the dark" when it comes to climate change mitigation and adaptation.

The lifeline

"I don't think farming is hard, it just demands hard work especially in the midst of a changing weather pattern," said Jose B. Caditan, a farmer for 20 years from Paoay.

Even in his 60's, he is still enthusiastic to learn new things not only in his own farm but also from others, thus, he participated in trainings conducted by the Center.

The Center conducts 2-day training programs 3 times a year catering to farmers across the region. As it partners with different research institutes, it introduces and demonstrates technologies for climate change mitigation and adaptation, and provides certified crop seeds for each participant.

Caditan said, "Worrying about the situation doesn't take you anywhere. It's better to think about what crop to plant."

Caditan contends that conserving resources is a must. "We don't have abundant water supply but we have enough to produce good yield. Our lessons on controlled irrigation have given me insights on how to cope with the scarcity of water in our area," he said.

Photo: Ashlee P. Canilang

We don't have abundant water supply but we have enough to produce good yield. Our lessons on controlled irrigation have given me insights on how to cope with the scarcity of water in our area.

- Jose B. Caditan

For Samuel A. Macatbag Sr., who has been farming for 5 decades, his training with the Center for the past 3 years has been a revelation.

Macatbag learned the nitty-gritty of conducting the agro-ecosystem analysis (AESA), alternate wetting and drying, and other notable crop-based technologies.

"I believe that the amount of time you spend in your farm is equivalent to the amount of your harvest," Macatbag said.

Weather patterns

Also, the Center provides weather probability patterns for a year, which are collected from nine weather stations from Pagudpud down to Batac.

Center Chief Alibuyog explains the weather patterns serve as advisories for farmers guiding them on proper timing and appropriate crops to plant.

"If we are facing drought, we avoid water-loving crops in favor of drought-tolerant varieties," added Macatbag.

For the past 3 years, Caditan and Macatbag have been planting NSIC Rc192, a drought-tolerant rice variety, which was recommended by the Center.

"From 2-3 t/ha before, we are now harvesting an average of 6.3 t/ha from hybrid and 4-5 t/ha from inbred rice varieties," they said.

"After rice, we plant garlic, corn, mungbean, or peanut. Then, we wait for the Center's weather pattern data to help us plan for our next planting schedule."

Farmers might have stumbled and got bruised even with the services of the Center. But the good thing about it is that they are not anymore groping in the dark. The Center is hoped to also serve as lighthouse for hardworking farmers who bravely face the reality of having to live with the changing climate. •

CaBioKid and its system of farming

▶ ASHLEE P. CANILANG

After bearing with the disadvantages of monocropping in their 5.5-ha land in Sta. Rita, Cabiao, Nueva Ecija, a group of five ecological farming-motivated individuals started establishing the CaBioKid Foundation in 2002.

Angelito Agustin, the current area manager; Luzviminda Lopez, agriculture trainer and technician; Narciso Gumangan, permaculture trainer; Belgian Bert Peeters, founder and permaculture designer; and Maricar Reverente, financial consultant, decided to show the local community that sustainable farming is not a myth but an achievable endeavor.

The foundation's name was derived from "Cabiao," "bio," which means life, and "kid," from the word "*bukid*."

Blueprints and designs

"The entire farmland used to be monocropped with rice and the heavy use of chemical fertilizers and insecticides was a common practice. We decided to change that. We realized that permaculture was a more appropriate framework for our ideals," Lopez narrated.

Permaculture is a closed-loop agricultural and social system that utilizes the patterns of natural ecosystems for its design. Its scope includes ecological and environmental designs, ecological engineering, and integrated water resources management, all creating a regenerative and self-sustaining environment.

To start, they reduced the farm's dependence on water supplied by the local irrigation, which was irregular in the first place. Lopez said they decided to make small ponds, with 5m x 8m x 10m dimensions, all over the landscape to serve as rainwater catchments.

Vegetable gardens were established using the subsoil from the excavated ponds. Rice farming still continued. But as they diversified to other crops, the rice area shrank to 2.5 ha. Nonetheless, they were still able to harvest over 80 cavans of rice per hectare from their first planting season.

Short and long-term sustainability

Guided by a sustainable outline, they started growing various vegetable crops and fishes as immediate sources of income. Bamboos, palm trees, and fruit-bearing trees were next. Legumes were also planted for the nutrient management of the farm. They adopted the system of rice intensification (SRI) that improved harvest by almost 20%.

The SRI method allows planting of a single seedling per hill. It prescribes enriching the soil with organic matter to improve its water-holding capacity and structure. As to its water management, the alternate wetting and drying (AWD) approach is applied.

Currently, CaBioKid maintains a training center and guest houses, all built using local materials from the farm itself. Deers, wild pigs, and other endemic animals also inhabit the farm completing the holistic ecosystem. Lopez explains that every element added on the farm helps create a balance between food crops and natural resources, and will serve as inputs for potential livelihood opportunities.

> We hope that our system will serve as an example for farmers in Nueva Ecija, and that they replicate it, because as evident on our farm, sustainable agriculture with reduced dependence on commercial inputs is possible.
>
> - Luzviminda Lopez

Knowledge-sharing

Not unexpectedly, neighbors became curious about the system and the creative farming solutions employed by CaBioKid. According to Lopez, people often visit the farm to borrow ideas and probably copy the structures built using local materials.

In 2012, CaBioKid started conducting the Basic Permaculture Design Certificate Course, a 7-day training program that teaches farmers the basic permaculture principles, ethics, methods, and design. The course also tackles bamboo craftsmanship, resource management, basic agriculture strategies, and natural food processing.

The Foundation also trains youth volunteers from Bouworde, a Flemish organization in Belgium that raises awareness on worldwide poverty problems among the youth. Being one of the organization's partners, CaBioKid teaches the basics of permaculture to the volunteers before being dispatched all over the Philippines.

"The participants were immersed in CaBioKid's ecosystem and were taught to learn from nature; enhancing its productivity and stability while gaining from it," Lopez said.

Additional credentials under its belt include stakeholdership of the Sustainable Technologies and Entrepreneurial Permaculture (STEP) in Isabela, a six-year program that teams up with CaBioKid and Antwerp, Belgium.

Back in 2007, CaBioKid became a premise for wildlife protection when it agreed with Nueva Ecija's Provincial Environment and Natural Resources Office (PENRO) to jointly protect and breed wildlife. The DENR-Region 3 also approved its Wildlife permit.

"We hope that our system will serve as an example for farmers in Nueva Ecija, and that they replicate it, because as evident on our farm, sustainable agriculture with reduced dependence on commercial inputs is possible," Lopez declares with oozing optimism.

Sustainable agriculture

Hugo Valin, researcher at the Austria-based International Institute for Applied System Analysis (IIASA), which conducts policy-oriented research into problems of global nature, contends that the most efficient way to ensure sustainable crop intensification is to adopt practices and technologies that are not fertilizer-demanding, such as new varieties, improved rotations, integrated crop-livestock practices, and precision farming.

With all the challenges Filipino farmers are currently facing due to climate change, a change of attitude toward sustainable agriculture must begin. It does not only address agricultural resource constraints, it will also provide additional livelihood and income to small-scale farmers. •

With an annual average of 20 typhoons gate-crashing the PH area of responsibility, a few of which are destructive, massive yield loss to rice and other crops cannot be ignored. Typhoon Lando in 2015 left an estimated P9 B damage to crops, making the Philippines rank third in the World Risk Index. With all of these misfortunes and more, how do we ensure enough food for all of us?

Things must add UP

▶ SONNY P. PASIONA

How we go about it

With our experiences in massive disasters, we are in the best position to draw up a framework on disaster management that may well work for us.

The Climate-Smart Disaster Risk Management (CSDRM) is a framework that integrates climate change adaptation, disaster risk reduction, and development. It was developed by over 500 disaster management practitioners under *Strengthening Climate Resilience*, an international program that aims to capacitate governments and civil society groups in building the resilience of communities to disasters and climate change.

This approach is built on three action-oriented pillars: understanding the risks and hazards, enhancing adaptive capacities, and addressing the root causes of poverty. These pillars require the science community, the academe, and the government to act together, with support from other sectors.


Photo: Carlo G. Dacumos

At PhilRice, drought, saline, and submergence-tolerant rice varieties are being advanced. Diversified farming and other adaptation techniques to the changing climate patterns are also being promoted.

NGOs in action

One of the advocates of CSDRM is Christian Aid, a non-government organization based in the United Kingdom that partners with local NGOs in crafting projects for disaster-resilient communities.

In understanding the risks and hazards, Christian Aid works with scientists and policymakers. Together with local communities, they build a learning platform that chooses the best approaches and strategies on disaster and climate risks.

In 2008, the Social Action Ministry of Ipil, Zamboanga Sibugay partnered with PhilRice to provide technical assistance to farmers who are in flood-prone areas. This enabled communities to adopt flood-tolerant rice varieties. A rice-based farming system featuring a "floating garden" was also established.

Enhancing adaptive capacities

"Our vulnerability is high because we lack coping and adaptive capacities," said Jessica D. Bercilla, senior policy and advocacy officer for Asia and the Middle East of Christian Aid.

At PhilRice, drought, saline, and submergence-tolerant rice varieties are being advanced. Diversified farming and other adaptation techniques to the changing climate patterns are also being promoted.

For Bercilla, similar interventions with incremental adaptation will lead to building resilience of communities to greater hazards in the future. "That's climate-smart," she added.

Bercilla also noted that work on enhancing adaptive capacities does have its highs and lows, which means that continuing research and development is needed. In rice and rice-based farming, this calls for unleashing innovations and finding the best matches among farming systems that will earn decent incomes particularly for smallholder farmers. It's anybody's ball game, so to speak.

Insure and ensure

According to Imelda A. Arida, PhilRice socio-economist, there is an urgent need to make crop insurance well-known and accessible to farmers. Their study on agricultural insurance programs reveals that "information dissemination should be improved and strengthened to reduce crop failure in rice production."

For instance, certain reports had featured a farmer from Maguindanao who took his own life when his crops were damaged due to El Niño. Had he been provided with crop insurance, he could have forgiven himself.

Bercilla notes, however, that while crop insurance insures, it does not always lead to enhancing the adaptive capacity of farmers. In fact, Arida and her team's study reported that "farmers who insured their rice crop were 14% less likely to regularly monitor their fields, indicating evidence of moral hazard."

Farmers need to remember to not bet all their hopes in being insured.

Community resiliency

The third pillar of the CSDRM approach links climate change adaptation and poverty reduction.

In Sorsogon, Christian Aid worked with Coastal Core, a local NGO, in developing a mobile garden, handicrafts from shells and screw pine cones, and soil conditioners from seagrass and household wastes.

These efforts mobilized coastal and agricultural communities and chalked up a sustainable livelihood with resilience to weather and climate-related hazards such as heavy rainfall and drought.

Putting life into the framework

Certainly, the CSDRM is not the only framework that will help us to better adapt to the impacts of climate change. For sure, many climate change workshops, agriculture-related or otherwise, have already taken place across the country convened either by private, public, or non-government organizations.

The big questions at the moment are: where do we stand right now? How can we calibrate our technologies that can adapt to the future perils of our climate? Are our current technologies smart enough to outsmart typhoons? If not, how can our climate-smart interventions be smarter? •

Taking on the challenges of climate change in agribusiness

▶ JENINE F. GAMIL

> Climate change has been part of our lives ever since I can remember. It was awfully felt in 2006 when *Milenyo* struck the farm, when our trees were twisted and seedlings soaked in water. It took years to grow trees again, so while waiting for newly planted fruit trees to be productive, we decided to venture in vegetable production.
>
> -Brian Amante Belen

Photo: Jenine F. Gamil

Hardly predictable and extreme weather changes can often spell disaster for the uninformed and unprepared. This holds particularly true for Filipino farmers and agriculture-based enterprises where losses due to long periods of drought, violent typhoons, or major shifts in weather condition can be devastating to an entity's supply chain, livelihoods, and the country's food security.

Molding climate change-conscious agriculture entrepreneurs

Taking notice of the impact of climate change on agribusiness, the College of Economics and Management (CEM) of UP Los Baños (UPLB) has recently started to incorporate climate change adaptation in its curricular offerings. Dr. Dinah Pura T. Depositario, chair of the CEM's Department of Agribusiness Management and Entrepreneurship says they are encouraging B.S. in Agribusiness Management majors to conduct research on the effects of climate change on agri-enterprises as well as their adaptation strategies.

Its Department of Economics has also proposed to integrate a course on the economics of climate change and adaptation into its revised curriculum expected to be implemented by 2018.

CEM further plans to actively advocate for the adoption of climate change adaptation strategies through its UP Center for Agribusiness Entrepreneurship (UP ACE), which aims to "develop a new generation of farmers and agri-entrepreneurs to accelerate their integration in the market-driven economy and enhance their competitiveness in the Asia-Pacific region". UP ACE is to capacitate farmers and agri-entrepreneurs in terms of improved technical and management skills and become more climate change-resilient, through trainings and other forms of assistance.

Opportunity in adversity

Depositario found in her 2015 research that first-hand experience with climate change adversities drives agri-enterprises to be innovative in their adaptation strategies. Ato Belen's Farm located in San Pablo City, Laguna attests to this finding.

Brian Amante Belen, co-owner of the Farm and a B.S. in Agribusiness Management graduate of CEM explains, "Climate change has been part of our lives ever since I can remember. It was awfully felt in 2006 when *Milenyo* struck the farm, when our trees were twisted and seedlings soaked in water. It took years to grow trees again, so while waiting for newly planted fruit trees to be productive, we decided to venture in vegetable production."


Photo: Jenine F. Gamil


Photo: Jenine F. Gamil

Typhoon *Glenda* in 2014, which damaged 90% of the farm worth about P3 M, also taught them hard lessons. Their farm's adaptation strategies now include the installation of low tunnels (also known as net hoops or shade tunnels) and concrete dividers inside the greenhouses, the use of the multiple-root-stock grafting technique that makes seedlings sturdier during typhoons, and the adoption of heat-tolerant varieties.

Brian also put up a small piggery and poultry to back them up while fruits and vegetables were off-season. They produced their own farming inputs such as vermicompost, Effective Microorganisms (EM), and Fish Emulsion Concentrate. They processed foods such as pickled *papayas* and chili paste.

Welcoming partnerships

Belen, who is a faculty member in Management and Development Studies at the UP Open University, trains resource-poor farmers in the San Pablo area. Small to medium-scale enterprises practicing ecologically sound farming like Ato Belen's Farm have employed practical climate change adaptation strategies, which the whole agribusiness sector can eventually learn lessons from.

"I see the need for small to even large enterprises to consciously incorporate climate change in their overall business strategies. Present adaptation is concentrated on their operations aspects such as weather protection systems and production practices and adjustments. They can try financial management strategies (e.g., crop or livestock insurance) and technological developments (adoption of drought- and pest-resilient varieties). The responses of enterprises to climate change impacts on their business operations must not remain merely reactive," Depositario stresses.

Depositario also assured that the academe still has a lot to offer. As the ill effects of climate change in our country escalate, the technical skills of future agripreneurs need to be honed through training to make them innovative all the more. •

Reso of

After typhoon *Mario* battered Ilocos Norte in 2014, Laoag City farmer Ricarte Corpuz was convinced that climate change is real.

"We were quite worried as we were not used to long hours of intense rain. Mario inflicted a P76-million damage on our province," the 65-year-old citizen recalled. With his stormy experience, Corpuz is now part of the 2015 data from Pew Research Center showing that seven in ten Filipinos consider climate change a "very serious problem."

Mike Davis, writer, urban theorist, and historian, says "our world, our old world that we have inhabited for the last 12,000 years, has ended, even if no newspaper in North America or Europe has yet printed its scientific obituary."

Climate change has so impacted the globe that by 2030, some 1.4 million Filipinos will be facing a higher risk of hunger due to lower agricultural production, while 690 million children worldwide will be living in areas most exposed to such change.

Catching values in museums

With the undeniable urgency in addressing climate change, scholar David Turnbull contends that "new values must be planted and nurtured to inspire people to become citizens and act on climate change." Such values can be grown in museums.

To execute COP21 agreements by broadening public engagement with climate issues, the Climate Museum in New York City was created and is hoped to be established in six years. Miranda Massie, its executive director, said they rely on the transformative power of museums, which has been documented in studies.

"Reduced misconceptions, improved knowledge, strengthened critical thinking, deepened tolerance and empathy, and elevated interest and engagement are [just few of the influences] on the museum visitors," she said.

Working on behavior change

Certain farmers, according to Corpuz, at times picture an apocalyptic view of the world with water scarcity, perfect storms, and extended dry spells mostly threatening their survival.

To help farmers adapt to climate change, the Rice Science Museum of PhilRice will present climate-smart solutions in its upcoming fourth exhibit titled, "*Transformations in Progress*." To be launched in April, the museum will highlight climate-ready rice varieties, ecological engineering, and diversified farming.

"These technologies will be presented through dioramas to be complemented with audio aids. When things are seen and heard, farmers tend to more easily

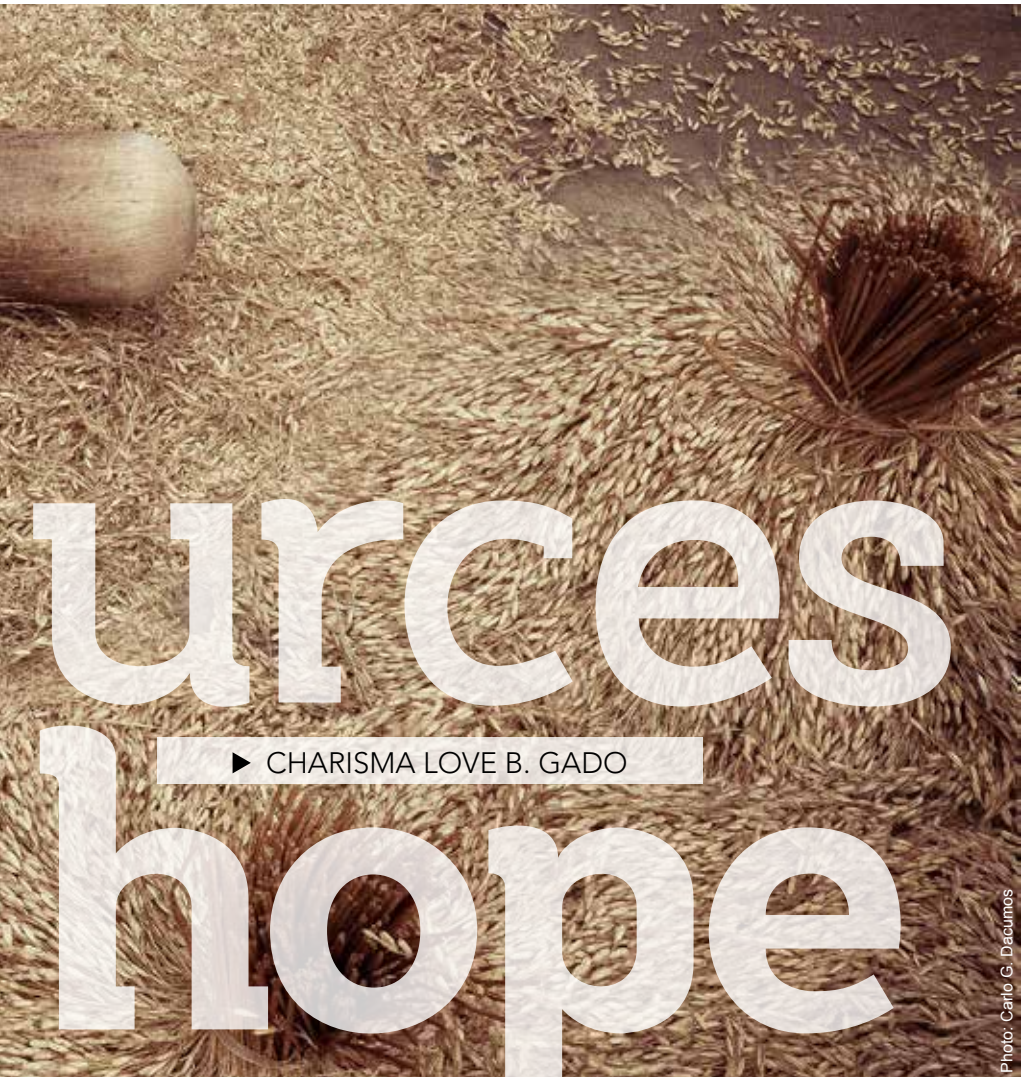


Photo: Carlo G. Dacumos

urces hope

▶ CHARISMA LOVE B. GADO

> Museums do not only transfer new information but also transmit climate change action.
>
> - Juan Francisco Salazar

apply the technologies," Floper Gershwin Manuel, museum curator, said.

The National Museum, through the initiative of Sen. Loren Legarda, also launched in 2013 the "*Biodiversity, Rice, and Climate Change*" exhibit to highlight the need to address biodiversity loss and climate change in relation to rice production.

"Filipinos are rice-loving citizens... The sad fact, however, is that our rice production is greatly affected by the warming climate. If we want to continue enjoying eating rice with our dishes, we have to do something to address the risks brought about by climate change and the threat of further rise in global temperature," Legarda said.

Moreover, the *Museo Pambata* is raising the awareness of children aged 2-12 years old on their role in creating a better environment. The interactive museum based in Manila involves children in lessening the effects of climate change by setting up the Environment and Kalikasan Room, annually hosting the Earth Day, and leading the 2011 Children's Museum Conference, which focused on addressing climate change.

"*Museo Pambata*, as a leading advocate for children, takes a stand that we must act for the benefit of our children. But much more so, for children to be actively involved in taking care of our planet," executive director Maricel Montero said.

In designing the contents of the theme rooms, focused group discussions are conducted with public school pupils, usually those in their 4th grade, and ask them on the environment-related topics they wish to know or concepts they hardly understand. In previous exhibits, the concepts of greenhouse effect, El Niño, or La Niña; rice and the environment; and harmful and beneficial insects were featured.

"We aim for the theme room to change children's behaviors. For example, the displays about the insects will enable children to realize that even the smallest creatures help in keeping the balance of our environment. This also empowers children who, as small and young as they are, can also help care for Mother Earth," Montero said.

Citizens' media

Juan Francisco Salazar in his paper titled, "*The Mediations of Climate Change: Museums as Citizens' Media*," said that museums play a significant role in climate change literacies by fostering learning on climate change science, justice, and action.

Museums, he said, do not only transfer new information but also transmit climate change action. Think of Corpuz who is excited to learn about the climate-ready varieties when he visits the Rice Science Museum, or the parents who have informed the *Museo Pambata* that after going to the museum, their children had begun practicing the simple habits of using water in a glass while tooth-brushing and writing on paper back-to-back. Indeed, "museums are resources of hope as they encourage individuals to rethink their engagement with their natural and human environments." •

KURU-SAKA

JAYVEE P. MASILANG

Lamang ang laging handa

[Kwento ni Teodoro Lomod, 54, taga Carmen, Bohol]

Photo: Carlo G. Dacumos

Pabagu-bago man ang panahon ay hindi mababago ang araw-araw na trabaho ko bilang magsasaka dito sa Bohol. Umaraw man o umulan ay may mga angkop na pamamaraan na dapat gamitin upang kumita sa pagbubukid.

Nitong nakaraang taniman lang ay dinanas namin ito dahil walang ulan na dumating kung kailan karaniwan kami ay dapat nagtatanim. Mabuti na lamang at mayroon akong bomba ng tubig na aking nagamit mula sa paghahanda ng lupa hanggang sa pagpapatanim.

Mula sa malayong kanal ng *National Irrigation Administration* (NIA) sa Carmen ay doon ko inilagay ang aking bomba ng tubig na dinugtungan ko ng mga *hose*. Dahil dito, naitanim ko nang maayos ang aking palay. Laking pasasalamat ko na rin na nagsimula nang umulan nitong nagdaang linggo. Gumawa rin kami ng mga *mini-dam* na pinagkukunan ng tubig para sa palayan at isdang-tabang.

ang pang-araw-araw namin na gastos at pampaaral ng aking mga anak.

Nakatutulong din na may koneksyon ang aking mga tanim, kasama na rin ang aking paghahayupan. Ang dayami at ipa mula sa aking palayan ay nagagamit kong pataba sa aking mga gulay. Ang mga gulay naman na hindi na naibebenta ay siyang isinasama ko sa pagkain ng hayop. At sa huli, ang mga dumi ng hayop ay ginagamit na pataba sa palayan. Dahil dito, walang nasasayang sa aking bukid at nababawasan ang aking gastos sa organikong pamamaraan.

Nagagamit ko ang organikong pamamaraan maging sa pamamahala ng peste sa bukid. Naghahanda ako ng 1 maliit na supot na sabon, 10 pirasong sili, dinikdik na tabako at kakawate (*madre de cacao*) na pinaghahalo sa isang tangke na may 16 na litro upang magamit na pantaboy ng *green leafhoppers*, *rice black bug*, maya, at daga na madalas makita dito sa mga palayan ng Bohol. Nakatutulong din na may tanim

lang ang interes ng pautang nito kapag kulang kami sa puhunan.

Dito sa amin ay mabibili ang tuyong palay ng 20 piso kada kilo kapag hindi organiko ang pamamaraan. Dahil organiko ang aking tanim ay naibebenta ko sa 27 piso kada kilo, na may dagdag na piso pa dahil sa koop. Karaniwan akong umaani ng 220 kaban sa isang ektarya na may 40 kilo kada kaban. Sumatotal ay nakakabenta ako ng mahigit P240,000 kada ektarya sa isang taniman. Hindi neto ito, syempre.

Ang mahalaga talaga ay may plano ka sa iyong bukid. Dapat bago mo pa lang itanim ang iyong produkto ay alam mo na kung saan mo ito dadalhin at kung ano ang mga prosesong pagdadaanan nito para umani ng maganda. Maaari rin sumubok muna sa maliit na bahagi bago magtanim ng marami upang masiguro na maganda ang aanihin.


Photo: Carlo G. Dacumos


Photo: Carlo G. Dacumos

Palay at iba pa

Kapag ganitong nagbabago ang panahon ay maaaring mahuli ang kita ng magsasaka dahil sa pag-*aadjust* ng panahon ng pagtatanim. Nagtatanim ako ngayon ng iba't-ibang halaman tulad ng *cacao*, saging, mais, *cassava*, gulay, at mga halamang bulaklak tulad ng *orchids*, santan, *anthurium*, *bougainvillea*, senyorita, maharlika, banda, at *daisy*. Sa tulong ng mga ito, marami akong pagkakakitaan at hindi mapuputol ang aking produksyon. Dito ko kinukuha

akong mga bulaklak na nakakaakit ng kaibigang insekto na likas na lumalaban sa mga peste.

Koop ang kukupkop

Isa pa sa mga nakatulong sa akin ay ang pag-anib sa Carmen Samahang Nayon Multipurpose Cooperative. Mula sa pag-utang ng puhunan hanggang sa pagbebenta ng aking mga naani ay natutulungan kami ng kooperatiba. May dagdag na piso kada kilo ang aming palay kapag sa koop ito ibinenta at mababa

Nang magpakasal kami ng aking asawa noong 1987 ay nagsimula na akong magsaka dito sa Carmen. Kalahating ektarya ang aming bukid noon at palay pa lang ang aming itinatanim. Sa ngayon, napalawak na namin ito sa tatlong ektarya na pinaghuhugutan ng iba't ibang produkto.

Lahat naman ng suliranin ay may kaakibat na lunas. Hindi iba rito ang pagsasaka kung kaya't mga angkop na teknolohiya at pamamaraan ang ginagamit natin. Ikaw, ano ang diskarte mo? •

To access

El Niño

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