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Building Resilient Community Through Plant Back Better Initiative – Guiding Principles and Best Practices

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Abstract. The 2019 UN report on Sustainable Development Goals (SDGs) revealed the impact on climate-related disaster. From 1998 to 2017, seventy seven percent of the estimated direct economic losses (US\$3 trillion) are from disasters. It is about a 1.5 time rise compared to the one from 1978 to 1997. Estimated 1.3 million death toll for climate related and geophysical disasters. Asia-Pacific Economic Cooperation (APEC) recognized the urgent need of resilient infrastructure, early warning systems, emergency-actionable plans and countermeasures for better preparedness and recovery to tackle constant threat of extreme events, earthquakes, floods and natural disasters. Thus, APEC called for climate adaptation countermeasures. “Plant Back Better” (PBB) initiative emerged to functioned on the countermeasure of food security over climate extremes to boost microeconomic momentum. The PBB project aimed at mitigating vulnerability and facilitating self-sufficiency through disaster-resilient plantation of vegetable and flowers. This research explored the feasible and applicable approaches on engaging key stakeholders to map out a pathway of sustainable and resilient developments through capacity building activities and risk communication tools. This paper incorporated: 1) the best practices, 2) holistic and extensive policies on natural disasters and climate extremes for enhancing emergency preparedness and resilience, 3) cross-fora collaboration under APEC for sustainable development and inclusive growth. To conclude the PBB project, five principles are available to navigate APEC Resilience Community (ARC) over climate extremes and facilitate Livelihood Continuity Planning (LCP) before or after disasters.

Keywords: United Nation (UN), Sustainable Development Goals (SDGs), Asia-Pacific Economic Cooperation (APEC), Plant Back Better (PBB), Food Security, Resilience.

1 The Force Majeure

On September 9, 2018, nine active storms; Hurricane Florence, Helene, Isaac, Olivia, Tropical Storm Paul, Typhoon Mangkhut and etc.; appeared simultaneously in the Atlantic Ocean and the Pacific Ocean. [1] In 2018, at least 1,000 earthquakes hit the APEC

region with magnitudes 5.0 and above. [2] The “new normal” shows its tremendous challenges to project timeline and threat the project deliverables. Environmental risk/natural disasters with its increasing frequency and intensive struck APEC region in the year of 2018 brought along with floods, earthquakes, wildfires, and etc. We are facing the significant increasing risk of natural disaster threats ranked higher than average for both likelihood and impact for the upcoming 10 years.

On the other hand the 2019 UN report on Sustainable Development Goals (SDGs) [3] indicated that “Extreme poverty today is concentrated and overwhelmingly affects rural populations. Increasingly, it is exacerbated by violent conflicts and climate change. The toll of climate-related disasters is rising, with the poorer countries most affected.” Climate-related disaster accounted for 77% of the estimated total of \$3 trillion direct economic losses from disasters from 1998 to 2017. It is about a 1.5 time rise compared to the direct economic losses from 1978 to 1997. For live losses, climate related and geophysical disasters claimed an estimated 1.3 million death toll. Over 90 percent of the disasters were floods, storms, droughts, heatwaves and climate extremes. The recent synchronous adoption of landmark UN agreements the Sendai Framework for Disaster Risk Reduction (SFDRR) [4], Sustainable Development Goals (SDGs), The 2015 United Nations Climate Change Conference (COP21’s) Paris Climate Conference [5], World Humanitarian Summit [6] and Habitat III [7] for climate change and human wellbeing urge the global society to picture the blueprint for building coherence across different but overlapping policy areas. On a near complete resilience agenda as building resilience, it requires action spanning development, humanitarian, climate and disaster risk reduction areas. This coherence will serve to strengthen existing risk vulnerability and resilience frameworks for multi-hazard assessments, and aim to develop a dynamic, local, proactive, and adaptive urban governance system at the global, national, and local levels.

Economic development and sustainability can be severely impacted by natural disasters through extensive interruptions impact daily livelihood, lifeline systems, critical infrastructure or supply chain resilience. At facing impacts brought by natural disasters or climate change, food security is directly linked to emergency preparedness and economic livelihood, especially in affected agricultural communities. According to the 2016 Piura Declaration on APEC Food Security endorsed by the Fourth APEC Ministerial Meeting on Food Security, sixty percent or more food will be needed if the anticipated global population increase to 9.7 billion by 2050. Moreover, take the example of 2019, we suffer from the prolonged drought following by heavy rainfall and typhoons struck while implementing the 1st and 2nd phases of PBB project. The urgent needs emerged for us to look at the impacts brought by both population in hunger and in disasters while emergency happens. We soon utilized the art of change management [8] to intensified efforts to mitigate impacts of drought, flood and climate-related disasters on food production and food security to demonstrate the APEC successful story on PBB initiatives. We expand the scope and scale of the PBB project from flood solution to all hazard solutions to incorporate real scenarios for implementation. The capacity building program and “Home Garden” toolkits designed in terms of sharing local knowledge and synergizing regional resources for resilient community against disasters and cascading impact. In this context, the project received warm welcome and

support from the APEC family. Thus, the PBB project initiated to deliver the goals of zero hunger or end hunger, achieve food security and improved nutrition to promote sustainable agriculture – growing your vegetables for dining in your garden.

1.1 Take Climate Action to Partnership for the Goal

From scientific to action, the APEC Emergency Preparedness Capacity Building Center (EPCC) called for cross-fora synergies among the APEC Emergency Preparedness Working Group (EPWG), Policy Partnership for Science, Technology and Innovation (PPSTI), Policy Partnership on Food Security (PPFS) and the National Science and Technology Center for Disaster Reduction (NCDR) to complete this research project on the “Plant Back Better” (PBB) initiatives. It fully elaborate APEC agenda on human security and gender balance with vision, creativity, local knowledge and practical experiences across the border. The in-depth strong research and implementation guiding support resources from the World Vegetable Center (WV) and the Known-You (KY) contributed to the APEC community with fruitful outputs.

Meanwhile, APEC emphasized on smallholders since they are the majority of food producers in agricultural communities in most of the developing APEC member economies. These communities could be vulnerable to either natural disasters or climate extremes such as typhoons, floods or droughts. Considering the dynamics and diverse impacts of natural disasters, we promote the continuous investment on science, technology and innovation for “**APEC Resilient City**” based on “**APEC Resilient Community**” for better adaptation countermeasures in APEC region to echo the SDGs.

1.2 Exploring the Strategic Approaches in Support to Disaster Risk Governance for Public and Private Partnership (PPP)

PBB project engaged government officials, experts, practitioners, Non-profit Organization (NPOs) and Non-Governmental Organization (NGOs) to brainstorm the feasible collaborations mechanism. In the three-phase intensive efforts, we appreciate the contributions from APEC member economies to the APEC PBB initiatives with sharing of best practices across the border for quality and resilient society against natural disasters. With significant outputs from the APEC member economies, the guiding principle developed to tackle climate extremes and natural disasters and provide rapidly growing global population with economic access to sufficient, safe, nutritious and quality food as well as better livelihoods of millions of rural people, mainly small farmers, particularly women on vegetable plantation. While implementation, female-oriented opinions highlighted from experts and speakers to ensure gender balance of preparedness, sourcing and accessibility to PBB and DRR information on user friendly aspects.

Resources of Expertise

The APEC Emergency Preparedness Capacity Building Center (EPCC) [9] - With conviction to build a platform for APEC EPWG to strengthen innovation and capacity building for emergency preparedness to meet the demanding needs of APEC member economies, EPCC aims at all-hazards approaches for emergency preparedness

in support of disaster risk reduction and emergency preparedness under APEC through hosting of well-structured capacity-building activities: to develop sustainable programs to promote disaster risk reduction and emergency preparedness in accordance with EPWG's mandate and guidance as well as the proposals and priorities of APEC member economies;

- Establishing knowledge database: collecting best experiences, science and technology to support policy and decision making;
- Enhancing public-private-people partnerships in disaster risk management by actively introducing new technology and concepts as well as highlighting contributions from experts and professionals of governments, academia and practitioners, where appropriate;

The World Vegetable Center (WV) [10], an international nonprofit research and development institute, is committed to alleviating poverty and malnutrition in the developing world through the increased production and consumption of nutritious and health-promoting vegetables. The Center mobilizes resources from the public and private sectors to disseminate improved varieties and production methods in developing countries. We help farmers increase vegetable harvests, raise incomes in poor rural and urban households, create jobs, and provide healthier, more nutritious diets for families and communities.

Known You Seed Co., Ltd. (KY) [11], a professional seed company engaging in breeding, production, and marketing of F1 hybrid vegetable varieties for more than 40 years. The main crops include cucurbit, solanaceae, and crucifer. Many of varieties are highly valued by global customers and have won the international prizes such as All-America Selections.

The National Science and Technology Center for Disaster Reduction (NCDR) [12], as the think-tank of EPCC in disaster risk management at the Cabinet level, NCDR coordinates and collaborates with public and private sectors to deliver the emergency preparedness synergies from science to action for decision making, policy reshuffle and R&D innovation under the Ministry of Science and Technology.

1.3 Partnerships Across the Border – Public Private Partnership Operational Model [13]

APEC Enhances Livelihoods through Planting Seeds, Planting Hope, Planting
Friendship, Planting Linkage
– Connecting People for Resilience and Better Livelihood

How to provide rapid growing global population with economic access to sufficient, safe, nutritious and quality food as well as better livelihoods of millions of rural people, mainly small farmers, particularly women on vegetable plantation? We call upon the APEC member economies to stand shoulder to shoulder with us to implement the climate extremes adaptation countermeasures for sustainable and inclusive growth through PBB initiatives.

PBB engaged community-based capacity building and preparedness for quick recovery of microeconomic activities through public private partnership before or after disasters hit. The project incorporates the on-site implementation of the best practices and toolkits with sharing local knowledge and regional resources to facilitate Livelihood Continuity Plan (LCP) before or after disasters. To elaborate the climate adaptation countermeasures for food security, it is critical to promote PBB initiatives and call for actions on mitigating vulnerability to enhance self-sufficiency through disaster-resilient vegetables and flowers plantation to foster sustainable and inclusive growth under APEC.

The PBB project developed capacity building by adopting smarter and disaster-resistant plantation of flowers and vegetables. It also mainstreamed DRR for building up resilient city and community with respect to local knowledge over the local social networking.

The targeted goal is to revitalized local microeconomic activities efficiently and effectively as a learning organization [14]. The PBB pilot project in Iloilo City fully engaged the stakeholders in public and private sectors to build a good partnership networking for being resource partners. Base on “the Barangay Disaster Risk Reduction and Management Plan of Barangay Lanit, Jaro, Iloilo City for 2018-2020.” (REPUBLIC OF THE PHILIPPINES, OFFICE OF THE PUNONG BARANGAY, BARANGAY LANIT), the project team leads the Public Private Partnership (PPP) dialogue to network with the school, the church and the Barangay office via discussion to customized the workplan based on the local needs. From local governments, the agriculture department and the disaster risk reduction and management office in Iloilo City Government contributed to harmonize the law and regulation for resource allocation and infrastructure sustainability that paved the concrete foundation for project implementation. Local technical supports in agriculture from the Know-You Seed Philippines (KYP) and the World Vegetable Center (WV) for providing advanced skill-set and technology in smart agriculture is another key to succeed. The EPCC called for NCDR and Christian Aid Philippines to deliver the community-based capacity building efforts as the advocators for PBB project with concept of DRR towards SDGs.

1.4 Pilot project kick-off for PBB

To implement the PBB, EPCC has been working with the Philippines on public private partnership to conduct a pilot project-the Best Practice at Barangay Lanit, Jaro Iloilo City, the Philippines.

The ATI, the original inhabitants, suffered from severe disasters including drought in 2007, floods in decades since 2008 Typhoon Frank, drought in 2019 and annual monsoon from May or August to October. In Barangay Lanit, the resettlement site, the population reached 5,484 (1.22% of Iloilo city's) in 2015 and total of about 1,600 households as of April 2019 (40% are farmers).

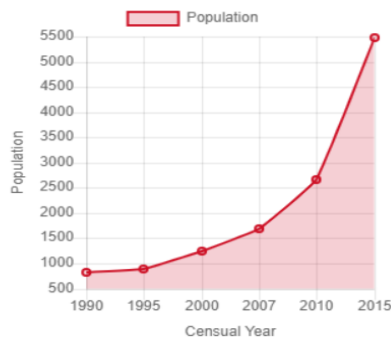
The PBB initiatives in the Iloilo City aimed at community-based capacity building and preparedness for quick recovery of microeconomic activities through public private partnership to tackle climate extremes and natural disasters. Vegetables are cash crops

with offering quality nutrition. Besides, flowers, sunflower chosen for the school gardening, are one of the direct sales and marketing business models for activating the MSMEs’ and Small and Medium Enterprise (SMEs)’ business cycle. With stories, the PBB pilot site caught attention of the general public and attracting tourist paying visits on-site. In this context, we promote the disaster resilient farming with economic returns on flowers and tickets sold as financial resources for sustainable plantation. PBB initiatives incorporate the implementation of the best practices and toolkits with sharing local knowledge and regional resources to facilitate Livelihood Continuity Planning before or after disasters.



Fig. 1. Location of the pilot project at Barangay Lanit, Jaro Iloilo City, the Philippines [15]

Census date	Population	Growth rate
1990 May 1	823	–
1995 Sep 1	883	1.33% ▲
2000 May 1	1,251	7.76% ▲
2007 Aug 1	1,698	4.30% ▲
2010 May 1	2,658	17.72% ▲
2015 Aug 1	5,484	14.78% ▲



Data Source: <https://www.philatlas.com/visayas/r06/iloilo-city/lanit.html>

Fig. 2. Statistics of the pilot project at Barangay Lanit, Jaro Iloilo City, the Philippines [16]

To achieve the commitments of the APEC Food Security Road Map, we targeted the following agenda while delivering PBB in the Illoilo City:

- Enhancing self-sufficient food supply for low social status communities,
- Sharing the best practices and knowledge for APEC Resilient Community,
- Facilitating smart vegetable and flower plantation to mitigate disaster impacts and maximize sustainable economic benefits;
- Promoting on demands capacity building programs at community level;
- Empowering women leadership at all phases of implementation;
- Synergizing regional and local resources for coordinated planning and implementation,
- Conducting follow-up actions to sustain the project.

The above-mentioned project: 1) shared the best practices for APEC Resilient Community, 2) shared smart vegetable plantation; 3) promoted on demands capacity building program; 4) showcased female's contributions on Plant back better initiatives; 5) synergized regional resources for delivering assistance.

1.5 The PBB Workplan

The workplan as described below including developing Disaster Resilient Seed Kits and guiding principles focused on assisting the most vulnerable members at community level for formulating Livelihood Continuity Plan (LCP) and enhancing resilience over climate extremes and natural disaster for a sustainable food supply chain.

Home Garden Seed Kits for SMEs/MSMEs

WV promotes home gardening in sub-Saharan Africa and South Asia with healthy diet gardening kits designed to improve family nutrition. The PBB project utilized the existing mechanism of the kits to deliver capacity building activities in the PBB pilot community to promote home gardening. Of a particular note, local food preferences and agronomic conditions are taken into account when seed is selected for the kits to ensure enough seeds to plant a home garden and provide a healthy diet for a family. For example, in South Asia, several different kits containing seed of 7-26 vegetables have been used in Bangladesh and the Indian states of Punjab, Jharkhand, Odisha, and Assam. Most kits provide sufficient seed to plant a 6 x 6 meter home garden to supply nutritious leafy vegetables year round. The more complex garden designs can produce more than 250 kg of vegetables per year and provide more than adequate vitamin A and vitamin C requirements for a family of four as well as supplementary protein and iron. Seed for kits is produced by partners who assemble home garden seed packs for local needs.

Disaster Resilient Seed Kits for PBB

For more than 20 years WV has researched and developed vegetable production seed kits for farmer training programs. Meanwhile, **Disaster Relief Seed Kits** also serve an additional purpose: When natural disasters destroy food production systems, vegetables

can help rebuild local food supplies and provide essential nutrition for survivors. Since 2000, WV has distributed more than 65,000 disaster seed kits through humanitarian agencies to the victims of major disasters in Africa and Asia. The kits include seed of locally adapted varieties of nutrient-rich, fast-growing vegetables, and technical information in local languages on vegetable production, food preparation and preservation methods. For facing the future challenge of climate extreme and natural disaster in the APEC region, EPCC works with WV to promote the value of PBB and develop **Disaster Resilient Seed Kits for PBB**. Vegetables selected for the kits are commonly grown in many tropical and subtropical areas with characteristics of nutritious, hardy, fast-growing with low input requirements, relatively free of pests and diseases. Each kit provides enough seed for one household to grow vegetables on 100 square meters of land to provide a balanced supply of protein and micronutrients during the initial months after a disaster. **Disaster Resilient Seed Kits for PBB** will be distributed mainly to farmers in potential--disaster-affected areas in conjunction with EPCC capacity building activity on PPP basis.

EPCC Deliver changes in TCT School & the ATI Community

EPCC delivered the PBB capacity building in the TCT Foundation Integrated School (TCT) as the Capacity Building Center, which is planned for PBB implementation and the flood-prone community including a church (the residential landownership) and 20 households (urban poverty immigration). Of particular note, the pilot project community suffered from drought while implementing the PBB project in May of 2019. This climate extreme reminded all the involved partners that the climatic impact is hampered the plantation in a great deal.

With EPCC's conviction and WV/KY's sustainable & organic agriculture skill-set, the project exercised gender balance planning with extremely limited resources. Under the good leadership of TCT principal, the PBB project blossom on people's courage, pupil and school faculty's passion, community practitioners' enthusiasm, experts' innovation and government's recognition. From the press briefing of Major's office in the Iloilo City, the PBB initiatives contribute to further promote the value of PPP collaboration on building "the City of Flowers" in the Iloilo City. The following photo showed the scope of work after the 1st and 2nd phases PBB capacity building activities as outputs:

The implementation of the PBB project followed a model similar to that developed by WV in Asia for household gardens aimed at nutrition but with contests of disaster resilience. The differences between two are: household gardens focused on fast growing highly nutritious vegetables combined with a limited selection of hardy perennial vegetables which are likely to survive and regrow quickly after the disaster.

For 1st phase of project implementation, the following activities prior to the proposed on-site assessment visit to Barangay Lanit, the City of Iloilo, the Philippines in April and August 2019 are to:



Fig. 3. Workplan on the Map of School Project at Barangay Lanit, Jaro Iloilo City, the Philippines

1. **Select appropriate households and a pilot community.** It is important to note that rural households tend to be more vulnerable than urban households due to less access to societal resources, emergency or community services. It is important that the selected households joining the project must satisfy prerequisites and likewise for the local government. With the fully understanding, planning and assessment, the good start with the PBB plantation can be assured. The PBB initiative conducted as following plan turns out to be efficiently and effectively:

- Select households according to the following criteria:
 - Vulnerable households: such as woman-led households; poor households with young children; elderly households with limited means in which to recover from a disaster
 - Households generating the major income through rural activities either from production on small farming or labour on farming
 - Households have a small land available for gardening, or just tenants.
 - Households are willing to or actively participate in the capacity building activity for outputs and outcomes.
- Limit the number of households to a maximum of 20 within the Lanit Community
 - The reasonable size for short lead time for introducing concepts of implementation.
 - The households fit the appropriate selection criteria outlined above

- A local technical support availability Known-You Philippines (KYP) and The Office of Civil Defense, The Philippines (OCD) in Iloilo City for implementing capacity building and resource allocation.

2. Definition of appropriate vegetables:

- WV and KY identify a list of vegetable species that would be suitable for Barangay Lanit, the City of Iloilo region. Through consultation and discussion with local proposed demands and needs, WV and KY assist project participants to identify what are the main fast-growing vegetables they consume on a regular basis and also explore the flowers chosen for better off the landscape and economic benefits.
- KY functions as a local source of seed supply for the proposed number of households. WV recommends the following vegetables for implementing in this project:
 - Fast growing annuals for nutrition and cash crop purposes that have a crop duration between 20 – 40 days
 - Fast growing perennials that have been identified as highly nutritious and tolerant of both dry conditions and short-term flooding. Some possible inclusions are:

3. WV coordinate the local seed company, KYP, to facilitate a technical person with knowledge of vegetables and flowers to be involved in the capacity building activities

- EPCC provided a capacity building package based on knowledge and skill-set of WV and KYP's household garden programs to implemented with rural households
- During the site visit in April, an assessment team conducted assessment on-site and discussed plans for implementing EPCC capacity building activity. The capacity building activity targeted the School, the Church, the Community households and government officials on succeeding the PBB plantation and conducted policy dialogue to team up EPCC, WV, KYP experts and pilot project involved partners including the school, the church and the households.
- Single Window of Contact – Networking the information for emergency preparedness and decision-making support through discussion amongst project partners.

The COMMUNITY Varieties

With consulting the local demand, the selection of the 1st batch for plantation are Lettuce- red & grand rapid, Sweet corn (bright jean), Cucumber (richmond & vantage), Squash (fairy) and Melon (jill). The 2nd batch are Okra-peter pan, Eggplant-fond may, Sweetcorn - Bright jean, Sitao-Green pod kaoshiong, Lettuce-grand & red rapid, Hot pepper- KY sinigang, Cucumber- vantage, Tomato- Nina.

During implementation, the target plantation overcame the challenges of drought, severe storm and floods in 2019 which are the frequent or reoccurrence situation for the small scale agriculture nowadays. From three phase's implementation, we contribute the sharing on DRR and climate change adaptation to develop tools for smallholders and building APEC Resilient Community. We further engaged stakeholders' to brain-

storming the guiding principles after on-site field assessment, implementation and capacity building activities. For real-time information flow of sharing, applied science and technology for actions in this project help formulating disaster-resilient plantation and ensure the quality harvests.










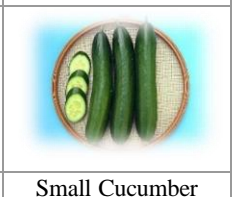
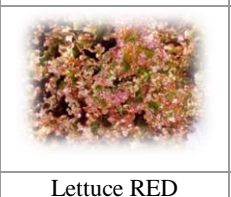
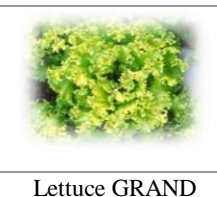
			
Tomato- Nina	Cucumber Vantage	Hot pepper KY SINIGANG	Bean GREEN POD KAOHSIUNG
			
Okra PETTER PAN	Squash FAIRY	Oriental melon JILL	Eggplant Fond May
			
Sweetcorn BRIGHT JEAN	Small Cucumber RICHMOND	Lettuce RED RAPID	Lettuce GRAND RAPID

Fig. 4. Vegetable Selection for plantation at the pilot community in Barangay Lanit, Jaro Iloilo City, the Philippines

2 Capacity Building

2.1 School Garden – Business Continuity Planning and Management

Enhancing Disaster Resilience through Effectiveness of PPP Model, EPCC is leading the development of PBB Gardening tool kits and Guiding Principles for APEC Resilient Community on PBB Initiatives. To facilitate the implementation of the APEC PBB, EPCC will continue to promote food supply projects over climate extremes and natural disasters and identify challenges for providing capacity building programs through cross-fora collaboration on cross-cutting issues. From science to action, EPCC adopted smart ICTs approaches for PBB initiatives to connect APEC resilient community to improve food supply reliability in supporting the sustainability and competitiveness of

business in the APEC region. EPCC promoted PBB initiatives for APEC resilient community through smart ICTs approach for real-time information connectivity.

Adopting Appropriate Public Private Partnership [17] on the Sustainable Development Goals (SDGs)

Human-centered, culture-orientated planning is the key approach to succeed the implementation of the PBB project. Self-sufficient, local demand first is the core value to sustain the project outcomes and deliverables in the long run. Partnership at global, regional and national level across the border must be engaged in the primary stage to synchronize the inconsistency and differential in the perspective of recognition, demand, deliverables, culture, resources and infrastructure availability.

The coherence of legal framework and harmony of the social networking, make it easy to achieve the goal of building confidence and moral when team up. Sun-flower is the symbolic strategic choice in the PBB pilot project. A high cash crop in the Philippines and can survived from the prolong draught occurred in the year of 2019 at the pilot community. Strengthen the means of implementation and revitalize the global partnership for sustainable development through the smart Information and Communication Technology (ICTs) GIS approach to sync with sustainable developments and to mitigate the language barrier. For reaching the consensus for short-term goals. Practical project tends to request flexibility of implementation under the force majeure event especially while dealing with natural disasters. Always maintain flexibility for change management - the emergent school garden expo. The flexibility to accommodate changes and unexpected situation ensured success in a greater deal.

The target goal is to help the flood-affect community to grow vegetables for self-sufficient and sell to the market if excessive as a responsible consumption and production for quick recovery of the Micro-economic activity for MSEMS and SMEs. However, the flood is no long a case but couple with prolong drought in the beginning of the year 2019. Hence, we take the advice from the agriculture expertise to formulate an emergent strategy to grow a popular cash crop, the sun flower at school in the pilot community. It turns out successfully to build a garden at school which attract visitors. An emergent idea of 20 pesos for visit and 25 pesos along with a sunflower home campaign sustain a miniature seeds purchasing funding to uphold the vegetable plantation following the raining season. After the sunflower harvest, it became a feasible PBB business continuity planning role model for circular economy. The emergent strategy adopted the core value of change management demonstrated the importance of flexibility while facing the uncertainty of climate extremes or natural disasters.

2.2 Empower Women and Community for Food Security on PBB Initiative

Women suffered the most at the community from the constant threat of extreme events, earthquakes, floods and natural disasters if the food supply chain interruption. The majority workforce in the rural/vulnerable areas are also women. They are critical human resource in community and the rural economy for keeping the family functioned and

livelihood continuity. Facing the constraints of disaster and climate extremes that impact their productivity, we empowered women in disaster at community to develop easy 'PBB toolkits' to plant cash crops as self-sufficient nutritious foods on table and the excessive harvest trade in the market place for living. The direct beneficiaries of our outcomes include women and households at community level of developing economies.

2.3 Cultural diversity and disaster resilience for selection of seeds for sawing

Be a small-scale food producers and empowering gender capacity for equality to participate fully in development is critical to improving food security and solve the world hunger. Open the barrier of the limited access to the markets and services, empowering the family farmers and small-scale of production can help quick recovery after a disaster strike. Vegetables are quick harvest cash crop with nutrition. To strengthen the resilience and adaptive capacity of small-scale producers, it is important to help the disaster affected area to improve their agricultural productivity on natural resources sustainability perspective again climate extremes.

In order to strengthen the effectiveness of disaster risk reduction and resiliency of the whole society, this project will serve as a platform for sharing the best practices of PBB initiatives. For the medium-term impact, EPCC continued 1) supporting capacity building activity through smart ICTs approach to succeed a sustainable model on appropriate PPP, 2) learning the lesson for sharing on PBB project implementation as one of the best practices under APEC, 3) updating the living document "guiding principle for PBB" and 4) visiting pilot community on smart plantation for SME/MSMEs.

2.4 The key ingredients for the successful story in the Iloilo City

- **Strong Leadership** - conviction to lead for effective coordinated team efforts on the local needs and opinions. Needs driven mission can motivate the local practitioners and households as self-starters. It is critical to synergize the efforts among the stakeholders creatively while implementation in terms of engaging the whole community/society's participation in the process target on the common interests and goals.
- **Active Participation** - passion to take action to change for a better livelihood at community. The inclusive growth value is critical from sharing. Helping hands can make the world a better place. The coordinated efforts on-site contribute fruitful outputs and outcomes if constantly take turns to look out the whole process. With team efforts, we share work loading and knowledge for better harvests while implementation.
- **Determined Public Private Partnership** – collaboration on land ownerships neighborhood for vulnerable community from policy to strategy for action. Harmonized legislation for common practices at community is essential. For sustainable farming and livelihood continuity planning (LCP), it is a must to involved legal assistance from the local government to identify the farmlands and resources availability while implementation.
- **Risk Awareness** – a multi-disciplinary approach for mitigation. For tackle climate extremes and natural disasters such as typhoon, flood and earthquakes, it is necessary

to draw appropriate attention on multiple disciplines for solutions based on a new understanding of complex situations. For upgrade the local plantation skill-set on sharing dynamic disaster risk exposures, information dissemination through the information intelligence platform on smart agriculture helps risk communication.

- **Human Capacity Building** – building a learning organization for sustainable growth. Agriculture activities are labour intensive. For sustainable development toward the future, human capacity building for smart agriculture and disaster risk management through structure capacity building programs are critically important to maintain labour capacity with skill-set to gear towards the goals for LCP among the stakeholders.
- **Local Investment** – local knowledge and capacity benefit the in-time local needs and development in culture aspects. Both tangible (such as local funding and grants) and intangible (such as local knowledge and culture) are key to sustaining the long term development for PBB implementation. Reducing food miles and selling agriculture products to a more local rather than regional demography are environmental friendly approaches. Local investment from the stakeholders or business activities provide long-term community benefits in terms of satisfying in-time local needs. Local investment came from local consumer behavior (buying and selling) can self-sufficient the grass-root implementation of PBB and revitalize the local economic activities.

Meanwhile, the PBB Toolkit developed to provide for a single and easy-to-access gateway to various materials for a cross-border public private partnership to engage expertise among the EPCC, NCDR, WV, KY and APEC economies to offer best practices, guidance, capacity building, training materials and practitioners and other stakeholders in the areas of appropriate: 1) Emergency Preparedness Practices for PBB, 2) Agriculture Practices, 3) Community-based Capacity Building Practices, 4) Smart ICTs Practices and Digital Resilience, 5) Business Continuity Planning (BCP) Practices for Micro Small and Medium Enterprise (MSMEs) and Small and Medium Enterprise (SMEs), 5) LCP Practices for MSMEs, 6) Surveillance and Monitoring for In-time Support, and 7) Single Windows of Contact-Focal Point of Contact Mechanism.

3 ICTs on PBB

Synergized capacity among expertise from agriculture technician, disaster manager, community practitioners and government officials for PPP on Science and Technology Sharing

Nowadays, almost everyone lives within scope of mobile-cellular networks. Coverage of mobile-cellular signals and mobile-broadband Internet has expanded rapidly. In 2018, 96 percent of the world population covered by third generation (3G) or higher-quality network [18]. For the disadvantaged and at-risk population groups, it is a handy device to access innovative GIS information for risk communication through social media to take urgent action to combat climate extremes, disasters and its impacts. Smart

ICTs approach help to facilitate the information intelligence networking on quality situation assessment for emergency on global synergy and partnership.

Local-based knowledge for support, grass-root community-based experience sharing for scenario-based strategy and decision-making process over resilience community.

While implementing the PBB initiative, EPCC engaged PPP policy dialogue among stakeholder of the Philippines and the expertise. The cross-border PPP built among the ATI community, the City of Iloilo, the Manila Observatory and the National Resilience Council, shortened the lead time of PBB implementation and information intelligence support for fruitful outputs and outcomes. Adopt appropriate technology approach is effective and efficient to lower the barrier of DRR scientific technology application on cost effective for easy access and maintain via the ICTs risk communications for climate/weather information. Centralized the situation assessment in EPCC and utilized the social media for situation feedback is the approach for synergy the capacity from High Developed Countries (HDCs) to Low Developed Countries (LDCs) to reduce the inequalities of development for sustainable cities and communities. It is a healthy flow to share the scientific outputs and outcomes to benefit learning organization at the pilot community for the good health and wellbeing on inclusive growth. The daily checkup and support from international expertise to the agriculture sector online became possible. The synergized capacity among expertise among agriculture technician, disaster manager, community practitioners and government officials for PPP on science and technology sharing is in operation daily to connect domestic and foreign sources to further sustain the deliverables in a long-term basis. Surfing the website to consistently look out the pilot community through social media for real time situation and feedback are critical to ensure the in-time situation assessment if needed for proactive emergency preparedness and recovery.

4 Guiding Principles for APEC Resilient Community on PBB Initiative

During implementation, we suffered from drought, severe storm and floods that required teamwork between expertise and local involvements to deliver emergency response to the dynamic situations especially for the prolong drought in 2019. In this context, the PPP is a corner stone of the PBB pilot project on team efforts as an excellent example deal with the emergencies first for sustainable growth. Thus, the project elaborated the value of EPWG's contribution in the long run. Overcome the impacts from the Mother Nature, the ATI community harvested flowers, melons and vegetables for a living for future sustainable reoccurring plantation. PPP has been highly valued and recognized by the local community and government. The plantation starts with the assistance of the Iloilo City Government and EPCC will expand in the near future for long term development.

The PBB Initiative extends grassroots support to those whose livelihoods depend on the agricultural sector and exposed to extreme weather and disasters at an economic

and social level. When extreme events, typhoons or other natural disasters strike, the farmers are always hit hardest. The PBB initiative focused on “Enhancing agriculture’s ability to adjust and mitigate the impact of climate change” to recover the SMEs/MSMEs’ economic activities with nutrition concept. The guiding principle aimed at providing guidance to tackle climate extremes and natural disasters and provide rapid growing global population with economic access to sufficient, safe, nutritious and quality food as well as better livelihoods of millions of rural people, mainly small farmers, particularly women on vegetable plantation.

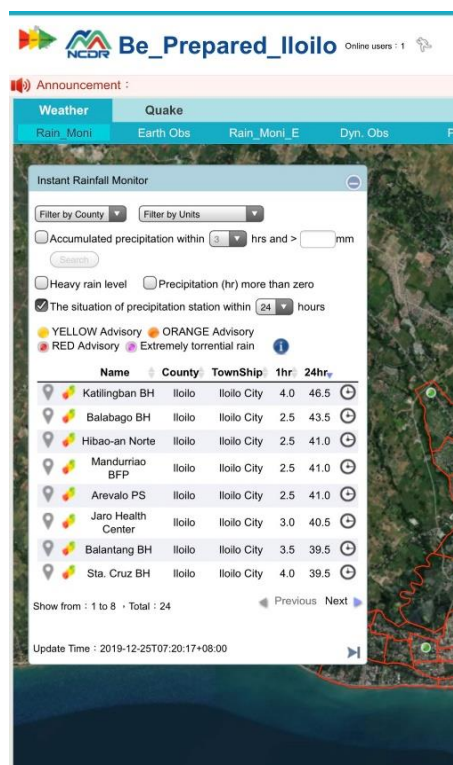


Fig. 5. Smart ICTs support on Early Warning of Weather Related Disasters [19]

4.1 Strengthening Rural Development as a Place of Opportunities

To face impacts brought by natural disasters or climate extremes or food security at the community level, the PBB initiatives seek smart solutions for sustainability, inclusiveness and resilience in line with the spirit of the APEC Food Security Roadmap Towards 2020 and the UN 2030 Agenda for Sustainable Development for enhancing society’s wellbeing and aims at community-based capacity building and preparedness for quick recovery of microeconomic activities through public private partnership if disasters hit. Echo to APEC Chile 2019 theme of “Connecting People, Building the Future” [20] on Sustainable Growth, Digital Society, Integration 4.0 and Women, SMEs and Inclusive

Growth as well as APEC Ministers of Agriculture Joint Statement of “Towards Integrated Smart and Sustainable Food Systems“ (Puerto Varas, Chile 24 August 2019 Issued by the 5th APEC Food Security Ministerial Meetings) [21] in the areas of fostering sustainable food systems and embracing emerging technologies, we seek to cooperate on strengthening PBB initiative and widely implementing better policies towards integrated, smart and sustainable food systems, public-private partnership for building APEC Resilient Community/City on the following Five Principles for APEC Resilient Community [22]:

1. Well-structured Policy Framework for Implementation

- To encourage policies that improve infrastructure, basic services and the quality of life of rural populations as well as strategies that help develop sustainable and market-based methods for added-value for promoting the integration through the PBB initiatives.
- To enhance infrastructure resilience for the economic performance, social inclusiveness and environmental sustainability through sharing best practices.
- To enable dialogue exchanges for extensive participations by key stakeholders such as community leaders, local governments, local NGOs, local experts and resource persons.

2. Applicable Financial Resilience

To enhance financial resilience through innovative mechanisms in line with FMP-DRFI workplan for promoting the efforts on Disaster Risk Financing of FMP-DRFI as “Finance is a Shield in Times of Natural Disaster”. Enhancing resilience to disasters became APEC priority for FMP and EPWG. EPWG promoted efficient and effective early warning systems and emergency-actionable plans or countermeasures for disaster risk reduction for years under APEC. The cross-fora collaboration synergy between FMP-DRFI and EPWG can be expected on introducing the best practices both at both economic and social level on APEC Resilient Community. With knowledge sharing in disaster risk financing from FMP, EPWG can further achieve disaster-resilient livelihoods of APEC Resilient City. For example, the pilot project in Iloilo City, limited seed grants can offer sufficient financial support to boost microeconomic activities and sustainable plantation.

3. Effective Public Private Partnership

To enhance public-private partnership on disaster resilience for PBB Initiative: Amid food production process, it requires risk understanding to build up resilience. More valuable disaster risk reduction knowledge sometimes offered by private sector. An appropriate network recommended as Network of Emergency Management Officials (NEMO) designed for integration on infrastructure, agriculture and disaster resilience for APEC Resilient Community be as following:

- To encourage cross-fora collaborations and public private partnership to work out feasible solutions. The proposed project includes experiences and the best practices

sharing on disaster risk management as well as climate change adaptation tools for smallholders and showcases handy tools for improving food security.

- To support strengthening regional cooperation with an aim at creating enabling conditions to face the challenges and leverage the opportunities brought by climate extremes to enhance resilience of our food systems to climate variability for our economies.
- To encourage the **public-private partnership with cross-fora collaborations** for food supply chain as part of disaster risk management in coping with future challenges if extreme event, natural disasters and climate change.
- To facilitate PBB **information and knowledge sharing** on best practices for enrooting food security awareness and good supply chain resilience at agricultural communities
- To facilitate the APEC Capacity Building for Sustainable Development at APEC Resilient Communities if extreme events such as floods or drought impact.
- To intensify efforts to **mitigate impacts** of drought, flood and climate-related disasters on food production and food security.
- To boost microeconomic momentum to tackle future challenges on extreme events and climate change. PBB initiatives endorsed by EPWG for cross-fora supports from ATCWG, PPFS, PPSTI, PPWE and regional institutes to synergize the project deliverables and crosscutting outcomes. Within agendas, workshops and plans under APEC ATCWG and PPFS, the **APEC Food Security Road Map Towards 2020** and the **APEC Food Security Business Plan (2014-2020)** call for actions on cross-cutting collaboration on **disaster risk management** and **food security** issues to increase resilience to natural disaster and **global climate change**.
- To develop workplan in line with PBB toolkits for **APEC Resilient Community** on growing vegetables in the APEC disaster-prone areas.

4. Empower Human Capital and Gender Balance

- To empower women in disaster: The majority of rural or disaster community are women, children and the elderly population. PBB aimed at “Women leading capacity building” on “Home Garden” to better illustrate the important role of women in agriculture and disasters for sustainable and quality growth. To encourage the incorporation of gender into the design of the PBB initiative. Higher level of women participation in the economy is key to raising living standards and boosting economic growth in the disaster-prone areas. Recognizing the significant contribution and impact that women have in rural and coastal communities is key to success the implementation of PBB initiative.
- Leveraging associativity and enhancing food value chains and trade: Micro, small and medium enterprises (MSMEs), including small-scale farmers, indigenous peoples, and women in particular, face constraints to being competitive in food value chains. Individually these actors may have limited capacity to negotiate and less access to the financial system, market information and new technologies, among other challenges. To strengthen their resilience and adaptive capacity, we support identifying new trading opportunities and promotion online (Online to Offline, O2O) to encourage well-functioning markets.

5. Efficient In-time Information Sharing

- Efficient Information Sharing through ICTs on best practices of value-added knowledge base on local demand for disaster-resilience food production
- To facilitate dialogues on formulating robust policies for supporting APEC cross-cutting issue and cross-fora cooperation in generating information and improving measurements; strengthening partnerships with the stakeholders; encouraging research, development and innovation, including information and communications technology (ICT); raising awareness and building capacity for APEC Resilience Community.
- **Embracing innovation, emerging technologies and digital opportunities:** Innovation, emerging technologies and digitalization are engines for sustainable productivity growth in the agriculture. To make innovation a priority, including through effective coordination with the stakeholders for appropriate adoption of new technologies.
- To digitalize agriculture impacts, identifying common approaches to promoting technology adoption, challenges and opportunities for human capital, and developing policy that targets local realities, effectively leveraging the opportunities from the digital transformation, sustainably and inclusively for digital resilience.
- To promote vegetables plantation: Vegetable are cash crops with offering quality nutrition which can help farmers in the affected area reclaim the productivity with healthier workforce.
- To incorporate real scenarios for implementation: Best practices and “Home Garden” toolkits designed with sharing local knowledge and regional resources to better fit in the real situation for planning before or after disasters. Take the example of 2019 pilot community (where is a frequent flood affected community suffered from prolong drought in 2019), the fruitful outcome of plantation activity can inspire and encourage the APEC economies to further promote food security and resilient food supply chain on PBB initiatives.
- To quick recovery after disasters – “Home Gardening”. Healthier lives and more resilient livelihoods through greater diversity in what we grow and eat. Vegetables can **alleviate poverty** by creating new jobs and new sources of income for farmers and landless labourers, **improve health** by providing essential micronutrients lacking in diets, **enhance learning and working capacities of whole community through** improved diets and health, and improve the sustainability of food production practices by **diversifying cropping systems**.

5 Future Perspectives

Stocktaking the PBB project from assessment, implementation and harvests, the team efforts from grass-root support are the spine to sustain the PBB project with fruitful outcomes delivered. Among all factors assessed, women are the integral element to the health and growth of economies at community level. The PBB empowered women for strengthening the local resilience. In total, up to 56% expert and practitioners are female that demonstrates female potentials to make a change for sustainability future.

The medium-term for developing the key findings from PBB initiatives are detailed as following:

- To **widely initiate projects** and **promote capacity building** on PBB disaster-resilient APEC community and encourage the **appropriate public-private partnership with cross-fora collaborations** for food supply chain as part of disaster risk management in coping with future challenges by natural disasters and climate change.
- To facilitate PBB **information and knowledge sharing** on best practices for enrooting disaster risk reduction at agricultural communities through **smart technology**
- To widely share the PBB related publications for enhancing **APEC Resilient Communities and SMEs/MSMEs** for growing vegetables with **business continuity planning (BCP)** for **food supply chain sustainability**.
- To promote adaptation countermeasures of weather related hazards on **socio-economic** impacts for inclusive and sustainable growth
- To promote **digital preparedness** for regional economic sustainability and human security
- To empower women in disaster at agriculture and rural area with easy ‘PBB toolkits’

The future development on the PBB project will conclude here to: 1) Networking - Accumulation of Knowledge, Experience and Know-how of PBB upgrade, 2) Living PBB Community with LCP for better preparedness, 3) Updates or disseminate the involved partners for disaster information for PBB, 4) Synergies of Regional Collaborations for Human Well-being, and 5) Building APEC Resilience Partnership (ARP) Toward APEC Resilient City.

References

1. Science Alert, <https://www.sciencealert.com/super-typhoon-mangkhut-north-atlantic-hurricane-florence-helene-isaac-shown-up-overnight>, last access 2019/10/01
2. The USGS Earthquake Hazards Program, <https://earthquake.usgs.gov/earthquakes/browse/significant.php>, last access 2019/10/01
3. The Sustainable Development Goals Report 2019, <https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf>, last access 2019/10/01
4. The Sendai Framework for Disaster Risk Reduction, <https://www.undrr.org/implementing-sendai-framework/sendai-framework-action>, last access 2019/10/01
5. 2020 United Nations Framework Convention on Climate Change, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>, last access 2019/10/01
6. Report of the Secretary-General for the World Humanitarian Summit, https://www.agendaforhumanity.org/sites/default/files/resources/2019/Jun/%5BA-70-709%5D%20Secretary-General%27s%20Report%20for%20WHS_0.pdf, last access 2019/10/01
7. Habitat III Issue Papers, http://habitat3.org/wp-content/uploads/Habitat-III-Issue-Paper-17_Cities-and-Climate-Change-and-Disaster-Risk-Management-2.0.pdf, last access 2019/10/01
8. Filicetti, John (August 20, 2007). "Project Management Dictionary". PM Hut. Retrieved November 16, 2009, <https://project-management.com/pmo-and-project-management-dictionary/>, last access 2019/10/01

9. The APEC Emergency Preparedness Capacity Building Center, <https://www.apec-epcc.org/>, last access 2019/10/01
10. The World Vegetable Center, <https://avrdc.org/>, last access 2019/10/01, last access 2019/10/01
11. Known You Seed Co., Ltd., http://www.knownyou.com/en_index.jsp, , last access 2019/10/01
12. The National Science and Technology Center for Disaster Reduction, <https://ncdr.nat.gov.tw/oriNCDR/home.aspx?WebSiteID=873f5b27-b86d-4d5c-a356-c369768bffe9>, last access 2019/10/01
13. Yanling Lee, Kenji Watanabe, Wei-Sen Li: Public Private Partnership Operational Model- A conceptual study on implementing scientific-evidence-based integrated risk management at regional level. *Journal of Disaster Research* 14(4), 667-677 (2019)
14. Harvard Business Publishing, <https://hbr.org/1993/07/building-a-learning-organization>, last access 2019/10/01
15. Location of the pilot project at Barangay Lanit, Jaro Iloilo City, the Philippines, www.google.com/map, last access 2019/10/01
16. PhilAtlas, <https://www.philatlas.com/visayas/r06/iloilo-city/lanit.html>, last access 2019/10/01
17. Yanling Lee: Enhancing Disaster Resilience Through Public Private Partnership : from Collaborations, Integration to Practices for Business Continuity, https://nitech.repo.nii.ac.jp/?action=pages_view_main&active_action=repository_view_main_item_detail&item_id=6467&item_no=1&page_id=13&block_id=21, last access 2019/10/01.
18. The Sustainable Development Goals Report 2019, <https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf>, last access 2019/10/01
19. NCDR, EPCC Website : BE_Prepared Illoilo , Last Access 2019/10/01
20. APEC website, APEC Chile 2019 theme of “Connecting People, Building the Future” on Sustainable Growth, Digital Society, Integration 4.0 and Women, SMEs and Inclusive Growth as well as APEC Ministers of Agriculture Joint Statement, https://www.apec.org/Meeting-Papers/Leaders-Declarations/2019/2019_aelm, last access 2019/10/01
21. APEC website, Towards Integrated Smart and Sustainable Food Systems, https://www.apec.org/Meeting-Papers/Sectoral-Ministerial-Meetings/Food-Security/2019_food_security, last access 2019/10/01
22. APEC website, EPWG 03 2017A - Capacity Building and Emergency Preparedness for Sustainable Development at Agricultural Communities through "Plant Back Better" (PBB) Initiatives Completion Report, <https://aimp2.apec.org/sites/PDB/Lists/Proposals/DispForm.aspx?ID=2152> last access 2019/10/01
23. APEC website, Guiding principle on selecting a voluntary pilot community for Plant Back Better (PBB), <https://aimp2.apec.org/sites/PDB/Lists/Proposals/DispForm.aspx?ID=2152> last access 2019/10/01
24. APEC website, Building APEC Resilience Partnership (ARP) Toward APEC Resilient City, <https://aimp2.apec.org/sites/PDB/Lists/Proposals/DispForm.aspx?ID=2152>last access 2019/10/01
25. World Vegetable Center, Home garden seed kits: a sustainable business model (<https://avrdc.org/home-garden-seed-kits-a-sustainable-business-model/>), last access 2019/10/01

26. World Vegetable Center, Entrepreneurs are quick to grasp the value of packing vegetable seed in small quantities for home use <https://avrdc.org/?s=Entrepreneurs+are+quick+to+grasp+the+value+of+packing+vegetable+seed+in+small+quantities+for+home+use>, last access 2019/10/01
27. World Vegetable Center, Home garden seed kits pioneered by AVRDC – The World Vegetable Center four years ago in Jharkhand in eastern India have now stimulated entrepreneurs to supply growing demand for the kits, last access 2019/10/01
28. World Vegetable Center, Seed Kits, <https://avrdc.org/seed/seed-kits/>, last access 2019/10/01
29. Yanling Lee, Kenji Watanabe, Wei-Sen Li: Enhancing Regional Disaster Resilient Trade and Investment – Business Continuity Management; Proceedings of the 2nd IFIP Conference on Information Technology in Disaster Risk Reduction. Ch.14, pp. 108-122. Springer International Publishing (2019)
30. Yanling Lee, Kenji Watanabe, Wei-Sen Li: Enhancing Regional Digital Preparedness on Natural Hazards to Safeguard Business Resilience in the Asia-Pacific; Proceedings of the 1st IFIP Conference on Information Technology in Disaster Risk Reduction. Ch.14, pp. 170-182. Springer International Publishing (2017)
31. Yanling Lee, Kenji Watanabe, Wei-Sen Li: Exploring the Strategic Approaches in Support to Disaster Risk Governance for Public and Private Partnership; Proceedings of the 23rd Pacific Science Congress (PSC-23) 2016, pp. 323. (2016)
32. EPWG 03 2017A - Capacity Building and Emergency Preparedness for Sustainable Development at Agricultural Communities through "Plant Back Better" (PBB) Initiatives PBB Toolkits
33. APEC website, Food Security Road Map Towards 2020 and the APEC Food Security Business Plan (2014-2020), http://mddb.apec.org/Documents/2014/PPFS/PPFS/14_ppfs_008.pdf, last access 2019/10/01
34. FB Tiu Cho Teg-Ana Ros Foundation Integrated School, <https://www.facebook.com/pages/Tiu-Cho-Teg-Ana-Ros-Foundation-Integrated-School/390453294299833>, last access 2019/10/01
35. Iloilo City Government FB, https://www.facebook.com/iloilocitygov/?_tn_=%2Cd%2CP-R&eid=ARAUuajA_yapeSGvZPLh_H5RCnUpZv4QQz_D15W_2XQ4UEzDrYa-9lJEhzrgvYUsvkBmLqrUxR4I9jRF, last access 2019/10/01
36. Iloilo City Disaster Risk Reduction and Management Office FB, <https://www.facebook.com/IloiloCityDRRMO/>, last access 2019/10/01
37. APEC website, Finance is a Shield in Times of Natural Disaster, https://www.apec.org/Press/Features/2019/0613_risk, last Access 2019/10/01
38. EPCC website, <https://www.apec-epcc.org/> for Video on PBB, last access 2019/10/01