



# **Cagayan State University**

**Andrews Campus, Caritan, Tuguegarao City**

*Research and Development and Extension Office*



## **RESEARCH AND DEVELOPMENT AND EXTENSION AGENDA 2019-2024**

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## CSU RDE Agenda and Banner Programs 2018-2022

### The RDE Framework

The RDE framework is based on the Instruction, Research and Development, and Extension interface. It is propelled by the technology development process from Technology Generation (TG), Technology Verification (TV), Technology Adaptation (TA), Technology Dissemination (TD), Technology Piloting (TP), Knowledge for Dissemination (KD) and Technology Commercialization (TC). The generators of technology are the researchers, faculty, students, administrators and research collaborators. TV, TA, TD and TP are conducted at the farmers' level through research cooperators, while KD and TC are done at local, regional and national level with industries and communities as adopters.

The Instruction, Research, and Extension mission of the University is equipped with physical infrastructure and laboratory facilities managed by good governance to produce competent graduates, resilient communities, and the 6Ps as deliverables of RDE as well as enterprise development as offshoot of production.

Financial and technical support from alumni, private sector, and from local and international partners would greatly contribute to the intensification of technology development within the University.

A feed backing is done for the improvement and advancement of technology innovation undertakings in the University.

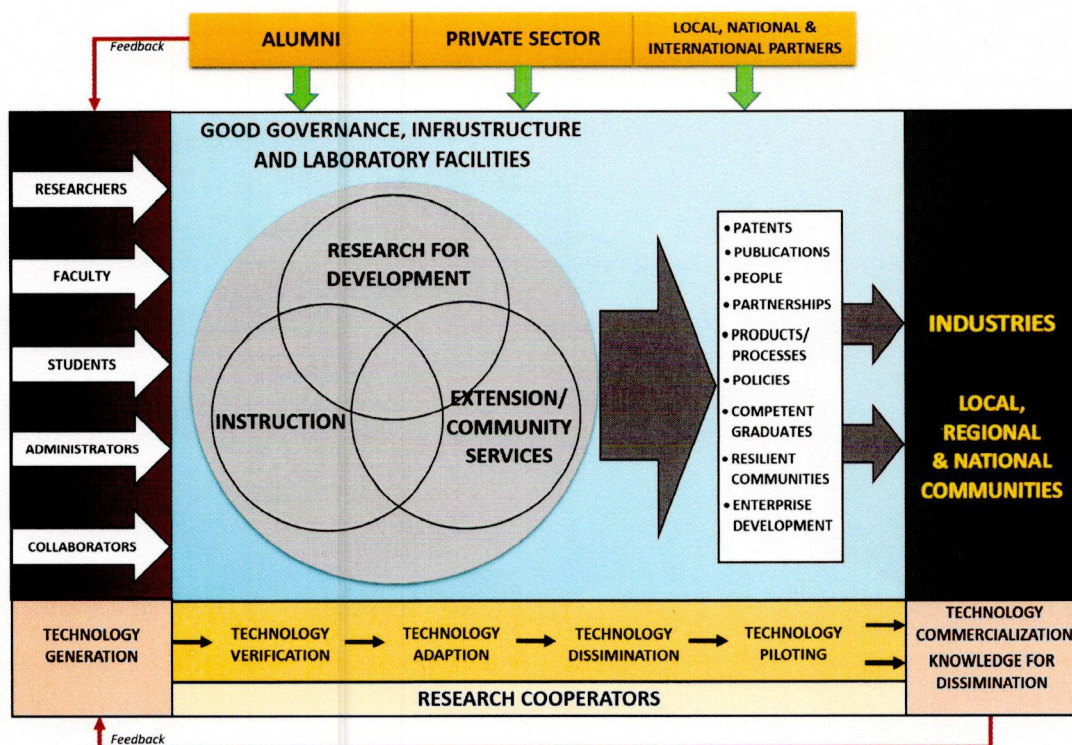


Figure 1. CSU RDE Framework

As CSU gears up to strengthen its capability in RDE, it needs to embrace and pursue a new RDE paradigm. The Sustainable Development Goals (SDGs) have broadened development outcomes from merely increasing food supply to include poverty reduction, human nutrition, environmental protection and related issues. Similarly, the AmBisyon Natin 2040 is the anchor of the country's plans. It envisions Filipinos to enjoy a strongly rooted, comfortable, and secured life. As a consequence, RDE at CSU must be linked with the country's vision and Cagayan's development goals to gain more relevance and have significant impact.

The emergence of global markets and new technologies, particularly ICT and biotechnology has facilitated a paradigmatic shift in RDE. Towards this, public institutions like SUCs have adapted to the contemporary setting by redefining their priorities, changing their focus towards the poor and marginalized sectors of society.

More specifically, RDE are seeing the emergence of new capabilities, organizations, and institutional processes where partnerships are increasingly becoming important. As a result, the process of networking, establishing strategic alliances and coalition building have become very important.

In the foregoing context, Research for Development (R4D) implements RDE programs and projects that (1) has developmental relevance, (2) links RDE with those who can use it, and (3) deploys a variety of approaches and strategies to ensure that the results of its RDE work is used and incorporated into development processes.

CSU should depart from the traditional R&D approach and shift to R4D paradigm. R4D links research outputs with development outcomes (e.g., poverty reduction, environmental protection, people empowerment) and priority RDE agenda is formulated with stakeholder engagement. Likewise, RDE thrusts should be based on market demand and inclusive, people oriented development (IPOD) approaches, and conduct R4D.

To ensure research relevance, CSU should efficiently produce the expected outputs of research in a focused and coordinated manner, to wit: a) information that advances knowledge; b) usable and commerciable technologies; and c) policy recommendations with majority of the outputs being usable technologies. The figure below shows the CSU R4D Roadmap commencing from research foundation to accomplishing its desired output.

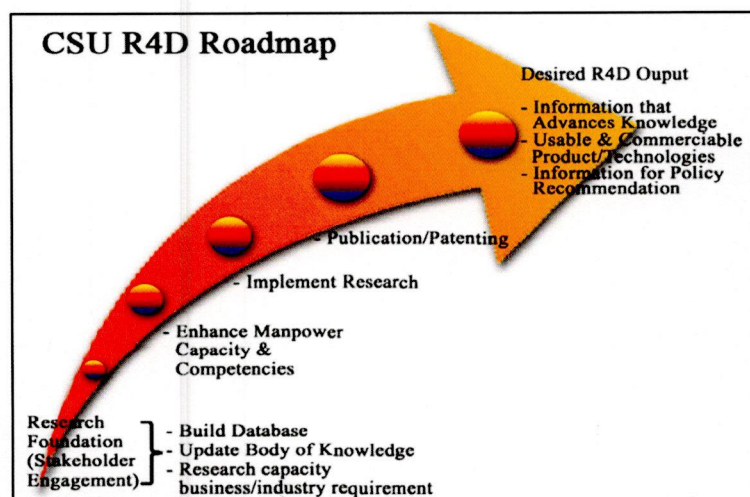


Figure 2. CSU RDE Roadmap

R4D includes the following approaches: 1) analyzing and influencing, 2) advancing innovation, 3) designing, testing and adapting solutions, 4) increasing access to vital products and services, 5) building communities of knowledge and practice and 6) supporting local change agents. R4D is therefore anchored on the innovations paradigm. An innovation system is made up of activities and processes associated with the generation, production, distribution, adaptation and use of new technical, institutional, and organizational or managerial knowledge.

The innovation process involves a series of interaction and participation of multiple stakeholders that operate within a knowledge system. Such interactions result in the initiation, generation, modification, accumulation and utilization of improved technology.

In the local setting, the innovation process involves the complex, iterative, and dynamic interaction among various groups of stakeholders involved in the agriculture RDE spectrum.

Innovations and impacts from research in the life sciences (biotechnology in particular) are increasingly dependent on new groupings, alliances, and relationships within science, and between science and the private business sector. Hence, the innovation process recognizes the importance of linkages, communication, public-private partnerships, coalitions and the way these assist information flows.

Since the innovation process depends on relationships among different people and organizations, managing these relationships is a central task of RDE. Likewise, the conventions or institutions governing the way RDE activities are conducted, and the role assigned to different organizations are pivotal to the innovation process.

In the Cagayan setting, the innovation process involves the complex, iterative, and dynamic interaction among various groups of stakeholders involved in the RDE spectrum. Hence, RDE must be carried out with the broad involvement of partners and stakeholders in the province's development spectrum.

Moreover, in agricultural innovations systems, CSU adopts a perspective which posits strong linkages between ecosystems and people. In this context, innovations are

embedded in three interdependent and interacting systems: 1) agriculture and fisheries; 2) natural resources; and 3) social systems.

Agriculture innovation systems involve the production, processing and marketing of crops, livestock, fisheries aqua marine and trees for food, feed, clothing and shelter. Their productivity and sustainability are driven by changes in climate, technologies and arrangements in the country's natural resource systems and ecological services. Social systems are characterized by population size and quality, culture, peace and order and tenure systems. Finally, governance integrates the manner of how these systems are harnessed for human well-being.

### **Cagayan's Vision**

With an aggregate land area of 9,003 square kilometers, the province of Cagayan has a tremendous potential. Endowed with fertile valleys, rich natural resources, mountain ranges, bodies of water and winding coastal areas, it can support a thriving agriculture, fishing, commerce and tourism industry. Aside from its rich natural resources, the province has an industrious and trainable labor force. Cagayan's major agricultural products are rice, corn, peanut, beans, fruits, cattle, hogs, carabao, poultry and fish. Woodcraft from hardwood, rattan, bamboo, and other indigenous materials are also available in the province.

With its vast natural and human capital, Cagayan is envisioned to become one of the country's major agro-industrial hubs, trading center and premier tourist destination. This is boosted by its bustling economic zone and free port and an investment code which provides, among others, fiscal incentives to investors.

In the near future, the province aims to achieve significant breakthroughs in increasing investments, agricultural modernization and infrastructure development. Positioning itself as the "Gateway to China and Asia-Pacific," Cagayan will indeed play a vital role in the country's socioeconomic development.

### **Role of CSU**

CSU, a credible and distinguished center of higher education in Northern Luzon, is committed to improve the lives of people and communities by providing advanced instruction in the arts, agriculture and natural sciences as well as in technological and professional fields through its strong quality of instruction and innovations in research, resource mobilization and extension. By providing quality instruction, research and extension, CSU contributes primarily to President Duterte's 10-point socio-economic agenda embodied in AmBisyon Natin 2040, the collective long-term vision and aspirations of the Filipino people for themselves and for the country in the next 25 years.

## **CSU Vision and Mission**

**CSU Vision:** Transforming lives by educating for the best.

The basic vision of the University is to make the Cagayan State University as a catalyst of change in improving the lives of individuals and communities by educating for the best. The one-liner vision succinctly captures the profound meaning and ultimate purpose of the collective efforts and educational directions of the University.

**CSU Mission:** Cagayan State University is committed to transform the lives of people and communities through high quality instruction and innovative research, development, extension and production.

## **CSU's RDE Mission and Goals**

**Mission:** To intensively pursue the generation, development, sharing, utilization and application of science-based knowledge, information and innovations for the inclusive agro-industrial development and climate change resiliency of the Cagayan Valley Region.

**Goal 1.** To explore science-based and innovative solutions that will result in real impacts to improve the social and economic development of the region.

**Goal 2.** To address pressing needs of communities for resilience through indigenous and science-based knowledge and technologies.

**Goal 3.** To engage, capacitate and increase access to appropriate knowledge and technologies for sustainable and secure livelihood and wellbeing of communities.

**Goal 4.** To upgrade manpower facilities for resilience.

### **Objectives:**

To achieve the above goals, CSU RDE shall pursue the following objectives:

1. Develop a new RDE agenda, package RDE proposals in line with its banner programs and the priorities of regional, national and international agencies; identify contemporary issues, challenges and opportunities for RDE; and review and assess the outputs, outcomes and impacts of RDE projects in the University.
2. Conduct stakeholders' consultation, need assessment survey, regular multi-sectoral RDE fora and strengthen RDE partnership with regional, national and international agencies.
3. Develop knowledge and technology management information system and intensify technology transfer and commercialization in the University.
4. Intensify applications to intellectual property of technological innovations, creations and inventions in the University.

## **Major Opportunities and Challenges**

### ***Sustaining food sufficiency and commercializing agriculture***

Cagayan has vast prime agricultural lands and about two thirds of this (more than 80,000 hectares) is planted to rice and corn. Most of this is rainfed (56,783 hectares). The province is self-sufficient in food grains (240% for rice and 117% for corn). The province is one of the major suppliers of rice for Metro Manila. Likewise, it is also major supplier of legumes (e.g., peanut). Moreover, it has areas which can be devoted to high value commercial crops which can be linked to agro-industries like peanut, sugarcane, coconut and tobacco and rainfed crops such as pigeon pea and sweet sorghum. Even as is it self-sufficient in rice and corn, farmers average yields are still low. With new technology and optimum use of its land and human resources, Cagayan can become a food exporter and a food basket for Luzon. Working with other agencies (i.e., PhilRice) and SUCs (i.e., Isabela State University) and local government units (LGUs), CSU should modernize agriculture by developing and mobilizing location-specific technology to boost grain and legume production.

Moreover, CSU will collaborate with the Department of Trade & Industry (DTI) to link farmers with food industries to commercialize crop production in the province. By doing this, CSU will spur prosperity of smallholder farmers which is the key to Cagayan's economic development.

### ***Developing manpower for the agriculture and service sectors***

The agriculture and service sectors provide the highest opportunities of employment in Cagayan. The agriculture sector employs 66% of the total labor force while the service sector employs 28%. By strengthening its agriculture degree program in its campuses in Gonzaga, Lallo, Sanchez Mira and Piat, CSU can very well respond to provide the needed manpower for agriculture in Cagayan. This can be done by reviewing the existing curriculum and enriching it, based on contemporary trends and demands at the national and global level.

Likewise, CSU is well positioned to train manpower for the service sector with its strong degree programs especially in Civil Engineering, Computer Engineering, Electrical Engineering and Marine Sciences.

To complement its degree program, CSU will develop and implement non-degree programs (e.g., diploma and livelihood-oriented training courses) in collaboration with other educational institutions like TESDA and the DA-Agricultural Training Institute (DA-ATI).

### ***Developing and conserving aquamarine resources***

Aside from its vast lands, Cagayan has the longest shoreline (more than 400 km) in the region. The China Sea and Pacific Ocean are extensive fishing grounds for its marine and aquaculture industry.

Moreover, the province has crisscrossing rivers and creeks with the Cagayan River traversing the whole province from south to north, along its tributaries (Pinacanauan River in Peñablanca, Dummun River in Gattaran, Pared River in Alcala, Zinundungan

River in Lasam and Matalag River in Rizal) . Other rivers in the province are the Chico River, Pata River, Abulug River, Buguey River, Mission River and Cabicungan River. Likewise, beaches of Sta. Ana and San Vicente fishing grounds are havens for tourists, scuba divers and fishing enthusiasts. Working with the Bureau of Fisheries & Aquatic Resources (BFAR), Southeast Asian Fisheries and Development Center (SEAFDEC), Department of Environment & Natural Resources (DENR) and National Irrigation Administration (NIA), CSU will map out and pursue research and extension programs to develop and conserve these water resources to improve the livelihoods of fisherfolk communities and the people of Cagayan.

Furthermore, these can be tapped to provide water for domestic, agricultural, municipal and industrial purposes including tourism.

### ***Developing manpower for the province as a gateway to Asia***

Cagayan is the country's closest point to big trading partners such as China, Hong Kong, Japan, Taiwan and South Korea. This geographical advantage could be utilized to further develop the agro-industrial potential of the province for domestic and export purposes.

This is bolstered by the presence of the Cagayan Special Economic Zone and Freeport (CSEZFP) which is envisioned as the development catalyst for Northern Luzon. Through its Gonzaga campus and partners, CSU will map out and implement a comprehensive manpower training program in collaboration with the University of the Philippines (UP) and Technical Skills Development Authority (TESDA) to develop the port's human resources, especially in enhancing management capabilities of agro-based and light industries. Reviving forestlands and underutilized grasslands

Cagayan's forest area is facing depletion due to illegal activities. With this problem, there are still a number that remains a vast forest production area of about 296,894 hectares. Considerably, these are rich sources of hardwood and other exotic species, lumber, rattan, bamboo, and other forest products.

A total of 151,768 hectares of pastureland areas and natural grasslands provide considerable potential for livestock production or diversified upland farming, an area which could be developed and improved in line with the national thrust of agro-forestry and industrialization.

## **Governing Principles**

### ***Institutionalization of a research culture***

Institutionalizing a culture of research at CSU means that top level officials, faculty, support staff and students at in all colleges, institutes and departments adopt RD&E as 'way of life' in the University. As a standard practice, administrators will encourage the faculty and support staff to use the power of research to generate innovations and adopt a research-oriented mindset for informed decision-making.

### ***Research for impact***

Impact is the bedrock of relevant research. Hence, RD&E will not only be conducted for generating articles for publications (publish-or-perish research culture) or to satisfy administrative requirements, but most of all, to generate innovations that will eventually improve the livelihoods of farmers, fisherfolk, grassroots communities and society as a whole.

### ***Participatory approach***

The planning, implementation and evaluation RD&E programs will involve key stakeholders particularly the faculty and staff, students, industry, manufacturing, government and nongovernment institutions. The extensive involvement of stakeholders in the whole RD&E cycle is quite necessary to link technology generators with technology users.

### ***Public-private-people partnerships***

Embracing the innovations paradigm requires strategic partnerships in RD&E. As a state funded higher education institution, CSU has limited physical and material resources. However, it is endowed with rich human resources from various disciplines, serving as its social capital which can be leveraged in forging partnerships with public and private institutions. Its eight campuses strategically located all over the province will be mobilized to forge partnerships with various government agencies, private industry, civil society and other sectors.

### ***Gender sensitivity***

Gender is an important dimension of inclusive development. Hence, it is important to link gender dimensions in all RD&E programs, projects and activities, especially in developing and designing gender-friendly technologies, technology utilization and commercialization, capacity building and policy advocacy initiatives.

### ***Complementarity among instruction, research and extension***

Instruction, research and extension, which are hallmark thrusts of CSU are complementary and inter-dependent. Although instruction is CSUs major function, the generation, advancement and sharing of knowledge and innovations are equally important. CSU's research and extension functions manifest the relevance of the university in the communities it serves. The knowledge and innovations generated through RD&E will be inputted into the CSU curriculum primarily aimed at developing human capital to empower people for them to actively participate in the development process.

### ***Balance between basic and applied research***

Basic and applied research will be pursued in a balanced manner in the fields of agriculture, forestry, environment, engineering and other disciplines in the natural sciences alongside mathematics, education and teacher training, health, humanities, information and communication technology and other related disciplines in the social sciences. In addition, as a highly competitive University in the region, CSU will lead in

the generation of policy-oriented and innovative researches that are locally responsive and globally competitive.

### ***Interdisciplinary and multidisciplinary approaches***

The pursuit of CSU's RD&E vision, mission, goals and objectives will cut across a wide spectrum of scientific disciplines. The traditional RD&E approach is not cost efficient and results are often fragmented to provide meaningful impact. Teaming up researchers and support personnel from various disciplines and areas of specialization will be pursued in conducting RD&E.

### ***Technology exchange and intellectual property***

The development of institutional mechanisms for sharing tested and mature technologies developed by the University will be promoted through the establishment of technology ownership and upholding intellectual property rights regimes for the protection of creative work of researchers.

### ***Alliance-building, networking and resource generation***

CSU will actively engage in research collaboration with local and international research organizations through the formation of alliances, building mechanisms for cooperation with these entities and establishing agreements on bilateral S&T cooperation. Industry-university cooperation through the integration of training and training resources of industries, universities, research institutions and consortia shall be promoted. With the gradual decrease of government subsidy to SUCs, there is a need to increase the University's income to help fund its banner RD&E programs without much dependence on government appropriations.

## **RDE Strategies**

### ***Integrated approach***

CSU will adopt an integrated, multidisciplinary approach to RD&E for a more cost-effective, efficient and coordinated method of developing appropriate innovations for a specific production ecosystem. This approach is intended to optimize resources, promote a multidisciplinary interface in developing appropriate solutions to socio-economic challenges, and eliminate overlaps by various academic units of the University. To facilitate the achievement of these benefits, College/Departments RD&E agenda will address their programs towards the attainment of identified gaps around the overall themes and banner programs.

### ***Partnerships & external linkages***

The search for more effective solutions to production constraints requires the greater coordination and participation of partners and stakeholders to be more effective in implementation. Hence, the participation and financial support of local government units and national government agencies on the conduct of urgent and long term research will be sought through the development of viable linkages and partnerships with local officials and residents of critically affected areas.

### ***Resource generation & mobilization***

The commissioning of externally funded RD&E projects shall be promoted as a strategy for providing more opportunities for faculty to engage in research and as a method for generating additional resources to sustain research implementation and governance. Areas of expertise of the faculty will be identified, and the core strength of academic departments to contract research from local, regional, national and international funding agencies will be optimized.

### ***Knowledge sharing & technology commercialization***

The utilization and commercialization of innovations and technologies will be enhanced and supported as a strategy for achieving institutional, regional and national goals. Aside from the usual seminar-workshops and publications, research outputs will be shared through innovative knowledge sharing like ICT- enabled methods. The extensive sharing of RD&E outputs is expected to create opportunities for the faculty to promote their expertise and increase their contribution to institutional and national development.

### ***Capability & capacity development***

For RD&E to be more effective in generating, sharing and commercializing technologies to stakeholders, the human and physical resources of CSU will be continuously developed. Access to training in both degree and non-degree programs offered by local and foreign institutions will be broadened. Likewise, laboratory facilities needed to support the creation of RD&E centers will be improved, upgraded and acquired.

## **RDE Agenda and Priority Thematic Areas**

Within the foregoing context, RDE at CSU will be conducted with strategic local, regional, national and international partners on the following themes:

***Food Security, Self-sufficiency and Safety*** - This thematic area will respond to the country's quest for sustainable food security, self-sufficiency and safety. Cagayan being a major food producer and considering the country's vulnerability to natural calamities and disasters, it is important for people to be assured of available, adequate, affordable and safe food on their table.

***Environmental Resource Management*** - The thrust of this theme is to maintain and improve the state of environmental resources affected by human activities (i.e., the interaction and impact of communities on the environment) and climate change. Environmental issues that affect the land, air and water will also be studied. RDE on environmental resource management will ensure that ecosystem services are protected and maintained for equitable use and also maintain ecosystem integrity for future generations.

***Human Health and Nutrition*** - Sound health is fundamental to human life, meeting basic needs and contributing to a productive life. In developing countries like the Philippines, hunger and health risks are aggravated by extreme poverty. Disease and

malnutrition are mostly attributable to unsafe water, poor sanitation and hygiene. Many communicable diseases are emerging, so the country has to be prepared with appropriate medication, vaccines and diagnostic kits that are available and affordable to the poor.

***Climate Change and Disaster Risk Reduction and Management*** – The Philippines is experiencing warming temperatures brought about by climate change, most especially in the northern and southern regions. These regions (Northern Luzon and Mindanao) have also warmed the most and have dried the most. As climate change significantly affects agriculture and the environment, the National Climate Change Action Plan dealing with mitigation, adaptation, technology exchange and resource sharing will guide CSU's RDE work on this theme. Considering that climate change will impact the present and future scenarios, a strategic and holistic RDE approach will be pursued.

With Disaster Risk Reduction and Management, the university will find out ways and means by which communities and local governments can identify, assess and reduce the risks of natural disasters. RDE along this area will help communities reduce socio-economic vulnerabilities to disasters as well as dealing with the environmental and other hazards that trigger them. The shift from prevention and mitigation to preparedness mode in disaster risk management requires a lot of research not only in policy formulation, community development and public awareness but also in hard science (e.g. forecasting, structural engineering, etc.).

***Sustainable Renewable Energy Sources*** - Increasing the percentage of indigenous renewable energy source into the national energy mix will not only result in dollar saving and protection of the environment but more importantly, ensuring energy security. The search, development and exploitation of renewable energy sources will involve a multidisciplinary approach.

***Emerging Technologies*** - Emerging technologies are technical innovations on progressive developments within a field for competitive advantage, representing previously distinct fields which are moving towards convergence. These are indispensable in propelling the country to sustainable agro-industrial development. Currently emerging technologies include biotechnology, information technology, nanotechnology, robotics and artificial intelligence.

***Social Sciences*** - Being concerned with society and human nature, the social sciences cut across disciplines and has a pivotal role in societal growth and development. In the context of CSU's RDE programs, the social sciences will cover socio-economics, entrepreneurship, higher education and law and governance.

### **RDE Banner Programs**

The University shall adopt banner programs which are consistent with its manpower capabilities, programs and natural endowments. These are:

1. Agriculture for Food Security & Poverty Alleviation

- a. Food crops
- b. High value crops
- c. Livestock & Poultry
- d. Organic Agriculture
- e. Indigenous & tropical fruits
- f. Industrial crops
- g. Honeybee
2. Aquaculture and Marine Technologies
3. Environment, Climate Change and Disaster Risk Reduction Management
4. Health & Nutrition
5. Industry, Energy & Emerging Technologies
6. Socio – Economics & Entrepreneurship
7. Governance
8. Alternative Learning Modalities and Technologies

### **Campus Banner Programs and Projects**

CSU campuses adopted their respective banner programs. Campuses are not limited however to conduct research and extension activities along their banner programs but, they can duplicate the implementation of other programs in their own campuses as long as human resources permit them to.

The campus and centers banner programs and projects for the period 2018-2022 are found in the Appendices A to I as follows:

- Appendix A. Andrews Campus
- Appendix B. Aparri Campus
- Appendix C. Carig Campus
- Appendix D. Gonzaga Campus
- Appendix E. Lal-lo Campus
- Appendix F. Lasam Campus
- Appendix G. Piat Campus
- Appendix H. Sanchez Mira Campus
- Appendix I. Natural Product Research and Innovation Center (NPRIC)
- Appendix J. Geoscience and Climate Disaster Risk Management



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**After Activity Report**  
**Crafting of RDE Agenda 2017-2022**

**I. BACKGROUND**

**Date:** April 25-26, 2018

**Venue:** Conference Hall, Cagayan State University- Andrews

**Purpose:** To craft the RDE Agenda 2017-2022

**Description:** The 2-day consisted of presentations on the regional and national research agenda, with which the university must align its RDE Agenda. A workshop was held to give the participants time to craft/ update their existing agenda which they then presented to the guest of the activity, Dr. Rex Navarro, member, CSU Board of Regents.

**II. SYNOPSIS OF THE ACTIVITY**

**Opening Ceremony**

The first day of the activity started with an invocation and the singing of the national anthem led by Ms. Marshia C. Simeon, Development Communication Staff, Development and Extension office. Afterwards, Dr. Junel B. Guzman, Vice President for Research Development and Extension, gave her opening message. She started by acknowledging the participants and guests who were present in the activity. She emphasized the importance of the activity since it will set the direction of the research, development and extension efforts of the university in the next five years. Everyone was encouraged to actively participate.

**Presentations**

The morning session started with the presentation of the current administrations development plan and the Ambisyon Natin 2040 by Dr. Junel B. Guzman. The ultimate goal of the socio-economic agenda of the current administration is "Matatag, Maginhawa at Panatag na buhay." This will be the outcome that all research projects must contribute to. The direction of the RDE agenda was further narrowed down following the Harmonized National R&D Agenda (HNRDA) 2017-2022, the second presentation of Dr. Guzman.

The Regional Research and Development Agenda 2016-2022 of the Regional Development Council (RDC) 2 and the Research and Development, and Extension Agenda and Programs (RDEAP) 2016-2022 of the Department of Agriculture were then presented by Dr. Vilma D. Conrado, Director, Research and Development. In the presentation, the specific research projects which are prioritized by different organizations were enumerated. These topics were identified as contributory to the national as well as the regional research agenda. The researchers were encouraged to align their respective agendas on the topics discussed.

After the presentations, Dr. Guzman, presented the RDE Agenda 2012-2016 for the campuses to refer to in crafting the new one. Several changes have been implemented and needs



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to be reflected in the new RDE Agenda. One of which is the integration of campus niches. Each campus has a banner program, which also becomes their niche – their specialty. Aside from that, climate change and disaster risk reduction are among the topics that must be given focus.

The activity's consultant, Dr. Rex Navarro, Member, CSU Board of Regents, advised the campuses on how to go about their respective agendas. The RDE agenda, according to Dr. Navarro, is a prerequisite of the RDE Manual, which is still ongoing revision. It must be finalized first before the manual can be published. In order to enhance the RDE Agenda, he recommended that the campuses prioritize the banner programs that are unfinished and have issues that must be addressed. The challenge is to maximize the budget allotted to the university.

After the talk of Dr. Navarro, Dr. Conrado gave an update on the different banner commodities of the campuses. As she was presenting, the following were pointed out by Dr. Navarro.

| Campus/Topic                                                                                                                                                                                                                                                                                                                                                      | Comments                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bamboo Center                                                                                                                                                                                                                                                                                                                                                     | Trim down activities not related to the national research agenda to accommodate 5Million                                                                                                                                              |
| Cacao                                                                                                                                                                                                                                                                                                                                                             | Look for institutions that we can tap as investors. The role of the innovation center is to link with the private sector for such situations. This is really good potential for commercialization, so we hope to develop technologies |
| Coconut                                                                                                                                                                                                                                                                                                                                                           | This is our strength, we must be upscale.                                                                                                                                                                                             |
| Pineapple                                                                                                                                                                                                                                                                                                                                                         | If we can develop an out-of-season pineapple we will become rich.                                                                                                                                                                     |
| Dairy                                                                                                                                                                                                                                                                                                                                                             | If you can resurrect the proposal of Dr. Binasoy, it will be very good. The potential is great but we need a big donor, the DA is planning to visit Piat. Don't forget agritourism in Piat.                                           |
| Fruit trees                                                                                                                                                                                                                                                                                                                                                       | What is the ultimate use/outcome? Pharmaceutical? How can you tie up with pharma companies?                                                                                                                                           |
| Spray dried citrus fruit juice                                                                                                                                                                                                                                                                                                                                    | Define the function/role of FIC on this<br>-there should be a policy (ownership of food products)<br>Dr. Imatong: there was a problem on ownership (e.g. turmeric powder where they labeled only "FIC" not CSU)                       |
| Other Banner Commodities:<br>Chicken/poultry<br>Pig/Swine<br>Beekeeping<br>Fertilizer, Soils,<br>Composting<br>Black Pepper                                                                                                                                                                                                                                       | We need outcomes. What are the expected outcomes of those commodities? We must keep in mind our stakeholders, in the end they must benefit from our projects.                                                                         |
| General Comments:<br>Too many studies on commodities, can't we focus on just a few?<br><ul style="list-style-type: none"> <li>- Given the completed researches, what must be done now? That is what must be done in the workshop and the new can move on to the extension of these projects.</li> <li>- The workshop now should focus on the next step</li> </ul> |                                                                                                                                                                                                                                       |



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- Other agencies are doing research on rice. We can focus on other commodities like coconut. PhilRice is the forerunner in rice research.
- The resource allocation will depend on your banner program.

Later in the afternoon, the participants were given time to group together and proceed with the workshop.

**Day 2**

The second day composed of a series of presentations of the different campuses and Centers. Below are the presentations and the accompanying comments from Dr. Navarro.

| Presenter                                          | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NPRIC                                              | <ul style="list-style-type: none"> <li>- What will be the first product that will come out of the project?</li> <li>- Know the priority product that is to be developed and is marketable.</li> <li>- Your market is the poor, this is a very good potential product to be developed because medicines are very expensive now.</li> <li>- Look into who will be our industry partner to promote the product</li> <li>- Look for farmer cooperators</li> <li>- Look for an international partner to fast track the acquisition of imported goods. Explore Linkages with Biotech in UPLB, World Health Organization, Biotrope and SEARCA</li> <li>- Identify the lacking laboratory facilities in order to move the programs that we have and for it to be prioritized for Tier 2</li> </ul>                                                                                                                                                                     |
| Andrews (Public Health)                            | <ul style="list-style-type: none"> <li>- Assessment of food safety</li> <li>- Look into the possibility of establishing a hospital like PGH. The hospital would be a source of additional income for the university and also additional public service of the University.</li> <li>- In the presentation, I cannot see how we addressed the gap. It is more on objectives. What are the gaps that need to be addressed for your clientele?</li> </ul> <p>Suggestions:</p> <ul style="list-style-type: none"> <li>- The mission would be to decrease the occurrence of diseases. Our studies must be anchored towards addressing the gap. For now, we will just focus on awareness on communicable diseases. The output will be policies and publications.</li> <li>- Adapt a municipality of cluster of barangays and develop a program for external funding and clear the dereliction of extension activities. Add specific projects and timeline.</li> </ul> |
| Andrews (Center for Business and Entrepreneurship) | <ul style="list-style-type: none"> <li>- Business and Entrepreneurship should be in a separate center. Andrews should focus on only one program.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Aparri (Marine Resources and Fisheries)            | <ul style="list-style-type: none"> <li>- Target the whole region because CSU is very lucky to have a fisheries campus in the region</li> <li>- Use scientific name.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



**Republic of the Philippines**  
**Cagayan State University**  
**Andrews Campus, Caritan, Tuguegarao City**

|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  | <ul style="list-style-type: none"><li>- Where will you get the capital? BFAR is just a staff bureau but they can help you identify lending agencies.</li><li>- Make sure that you empower the right people. We can organize fishermen and then empower the organization. Even just to jumpstart their livelihood.</li><li>- How can the people access the technology?</li><li>- Put people first than the product</li><li>- The most important issue and challenge is climate change, the ocean is warming and the ecology of the fish is changing. You don't seem to have projects on climate change.</li><li>- Also add an overview of your ongoing research projects especially those related on climate change.</li><li>- What present challenges need to be addressed?</li><li>- We need to reclaim Aparri as a center of excellence. This must be the strategic objective.</li></ul> |
| Piat (Dairy Cattle and Goat)                     | <ul style="list-style-type: none"><li>- Look into the population of carabao which is declining since 2010</li><li>- You should have data on slaughtering of the carabao and other dairy animals. In India, they have the highest population of dairy because they don't eat dairy animals</li><li>- Aside from women, try also to involve the youth on fresh milk handling practices</li><li>- First objective should be to increase the yield</li><li>- Can we include dairy center for milking operation NC II? (referring to TVET)</li></ul>                                                                                                                                                                                                                                                                                                                                            |
| Carig (Industry, Energy and Emerging Technology) | <ul style="list-style-type: none"><li>- Who will be the future takers of the e-trike? Who will buy and operate the technology? Find an industry partner so that we already have a taker of the technology.</li><li>- Submit the full blown proposal to PCIEERD before they run out of funds, because PCIEERD is interested.</li><li>- How many people will be involved in one center? Take note you only have very limited people in the university how will you meet the manpower? Will you be hiring contract of service?</li></ul> <p>Proposal: why don't you start with a program first before center? Because center requires manpower and capital outlay. It is not easy to establish a center.</p>                                                                                                                                                                                  |

After the series of presentations, the participants were tasked to incorporate the necessary corrections to be submitted to the Office of the Vice President for RDE on the 2<sup>nd</sup> week of May before the Board Meeting on June 2018.

Prepared by:

  
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VPRDE Staff

Noted by:

  
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## Appendix A.

### Andrews Campus RDE Banner Programs and Projects 2018-2022

#### **Banner Program:**

The Cagayan State University Andrews campus aligns its research and extension activities with its banner program, **Public Health**.

#### **Goal:**

It aims to achieve a healthy and wealthy community through research development and extension activities attuned to the National and Regional Public Health priorities. It also aims to empower the beneficiaries and facilitates the dissemination of development information. It is a means that promotes and transfers health-related technologies at the local level.

#### **Objectives:**

1. Conduct studies and implement programs aligned with epidemiology; environmental health; occupational health; community health; diagnostics; nutrition, health economics; information and communication technology for health; drug discovery and development; and formulation of evidence-informed public health policy;
2. Spearhead the conduct of health researches on infectious and communicable diseases, emergency response, disaster risk reduction management, maternal and child health, non-communicable/lifestyle disease, health governance and management, health financing, sexual and reproductive health, functional foods and traditional, alternative and complementary medicine;
3. Conduct initial surveys on need and risk assessments to facilitate interventional studies and prepare extensions and productivity programs for health;
4. Establish linkages and coordination between and among relevant agencies, NGOs, higher education institutions, stakeholders and policy makers for the conduct of health researches in particular along their identified institutional health research agenda;
5. Publish papers to internationally recognized journal publications such as Scopus, Thomson Reuter, ISI and CHED Accredited journals;
6. Create a database or an online repository where researchers can upload their researchers findings related to public health studies.

**Challenges**

- Lack of state-of-the-art facilities
- Limited research training and skills enhancement by some of the faculty members working on Public Health

**Plan strategy**

- To harmonize all research activities to the national agenda
- Researches in Public Health translated to extension works

**Commodity/Banner Program:** Public Health  
**Campus:** Andrews

| Priorities/<br>Research Area | Program/Project/Study                                                                                                                                                                                                                                                                                                                                                                                           | TIMEFRAME |      |      |      |      | EXPECTED OUTPUT |                                                   |                                                                                                                          |                                                                                                                                                                                    |                                                                                         |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------|------|------|-----------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                 | 2018      | 2019 | 2020 | 2021 | 2022 | 2018            | 2019                                              | 2020                                                                                                                     | 2021                                                                                                                                                                               | 2022                                                                                    |
| Environmental Health         | <ul style="list-style-type: none"> <li>Heavy metal determination in soil, air, and water</li> <li>Heavy metal phytoremediation potential of water hyacinth (Eichhornia crassipes ) and other aquatic plants and terrestrial plants</li> <li>Heavy metal determination in vegetables and cultivated soil horizon in Organic Farming System</li> <li>Heavy metal determination in Urban Farming System</li> </ul> | X         |      | X    |      | X    |                 | Submitted papers for publication and presentation | <ul style="list-style-type: none"> <li>Improved soil quality viable for organic farming and urban agriculture</li> </ul> | <ul style="list-style-type: none"> <li>Increased number of informed local farmers through seminar and IEC materials</li> <li>Reduced heavy metal in soil, air and water</li> </ul> | <ul style="list-style-type: none"> <li>Improved water quality and potability</li> </ul> |
| Community Health             | <b>Maternal and Child Health</b> <ul style="list-style-type: none"> <li>Heavy metal determination in breastmilk of lactating mothers in selected</li> </ul>                                                                                                                                                                                                                                                     |           | X    | X    | X    |      |                 | Submitted papers for publication                  | Increased number of informed beneficiaries                                                                               | <ul style="list-style-type: none"> <li>Improved maternal and child health</li> </ul>                                                                                               |                                                                                         |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |   |  |  |  |  |  |                                  |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                     |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|--|--|--|--|--|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>communities (Assessment of exposure)</p> <ul style="list-style-type: none"> <li>• Perceived factors affecting the immunization status of infants aged 0 -12 months in Tuguegarao City</li> <li>• Interventions to improve the social and emotional well-being of school-aged children.</li> <li>• <b>Risk Assessment</b><br/>Common Health Problems in Core Shelters of Tuguegarao City</li> </ul> <p><b>Infectious and Communicable Diseases among population at risk</b></p> <ul style="list-style-type: none"> <li>• Vector borne diseases</li> <li>• Emerging and re – emrging disease</li> <li>• Anti – microbial resistance</li> </ul> |  | X |  |  |  |  |  | Submitted papers for publication | <ul style="list-style-type: none"> <li>• Increased number of informed elementary schools about the interventions to promote social health, emotional health and well-being of elementary pupils</li> <li>• Rendered medical mission, health care and preventive services</li> </ul> | <ul style="list-style-type: none"> <li>• Decreased morbidity rates</li> <li>• Conducted seminars on the elimination of health disparities as experienced by the vulnerable members of the core shelters.</li> </ul> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|--|--|--|--|--|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                     |                                                                                                                                                                                                                                                                                                                     |   |   |   |   |   |  |  |                                  |                                                      |                                       |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|--|--|----------------------------------|------------------------------------------------------|---------------------------------------|
|                     |                                                                                                                                                                                                                                                                                                                     |   |   |   |   |   |  |  |                                  |                                                      |                                       |
| Occupational Health | <b>Assessment of heavy metal exposure among occupationally exposed individuals</b> <ul style="list-style-type: none"> <li>• Street sweepers</li> <li>• Traffic enforcers</li> </ul> <b>KAP</b> <ul style="list-style-type: none"> <li>• Infectious diseases</li> <li>• Occupationally related diseases</li> </ul>   |   | X | X | X | X |  |  | Submitted papers for publication | Increased number of informed beneficiaries           | Decreased occupational health hazards |
| Diagnostics         | <b>Proof of concept for screening</b> <ul style="list-style-type: none"> <li>• Confirmatory and prognosis for 13 priority diseases</li> <li>• Target identification and validation, prototype development, laboratory performance testing and field testing of diagnostic kits for 13 priority diseases.</li> </ul> | X | X | X | X | X |  |  |                                  | Developed rapid test kits<br><br>Conducted trainings | Medical Mission conducted             |

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |   |   |   |   |  |                                  |                                                              |                                                                                                                                                                                                                          |                                                                          |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|--|----------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Nutrition | <b>Food quality and safety</b> <ul style="list-style-type: none"> <li>Nutritional assessment and monitoring</li> <li>Food fortification</li> <li>In-depth and correlation studies (dietary risk factors to non-communicable diseases)</li> <li>Enhancement of food composition database for dietary exposure assessment exposure assessment of selected nutrients, food contaminants, and food additives in commonly consumed foods</li> </ul> | X | X | X | X | X |  | Submitted papers for publication | Developed fortified food products                            | Revised nutrition tools/standards<br><br>Packaged fortified products following the national standards of product Labelling and Packaging<br><br><br>Implemented nutrition intervention program for high risk individuals | Reduced morbidity from non - communicable diseases                       |
|           | <b>Functional Foods</b> <ul style="list-style-type: none"> <li>Determination and analyses of Functional Foods for health promotion and disease prevention.</li> <li>Safety assessment</li> <li>Characterization</li> <li>Establishment of health benefits and product development</li> </ul>                                                                                                                                                   |   |   |   |   |   |  | Submitted papers for publication | Increased number of organisms identified as functional foods | Conducted info-dissemination on roles of functional foods for health promotion and for reduction of risk of a disease.<br><br>Developed functional food products                                                         | Increased number of developed food products and transferred technologies |

|                                                     |                                                                                                                                                                   |   |   |   |   |   |                                            |                               |                                                          |                                                                                            |                                                        |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|--------------------------------------------|-------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Health Economics                                    | Population Economics                                                                                                                                              |   | x | X | X |   |                                            |                               | Submitted papers for publication                         | Conducted training on financial management and cost-saving measures while doing home care. | Increased number of discovered alternative medicine.   |
| Information and Communication Technology for Health | Public health surveillance (Disease prevalence/incidence)<br>- Monitoring proximity to predict possible epidemics<br><br>ICT-enabled medical devices and services |   | x |   |   |   |                                            |                               | Developed Health Information System; e-Health            | Submitted paper for publication                                                            | Increased number of well-informed target beneficiaries |
| Drug Discovery and Development                      | Development of standardized herbal drugs                                                                                                                          | x | x | x | x | x | Number of papers submitted for publication | Presence of Developed Product | Number of papers submitted for publication               | Number of papers submitted for publication                                                 | Presence of Developed Product                          |
| Public Health Policy                                | -Crafting of evidence – informed public health policies                                                                                                           |   | x |   | x |   |                                            |                               | Submitted research output to the Policy Formulating Body | Number of papers submitted for publication                                                 |                                                        |

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**Aparri Campus**  
**RDE Banner Programs and Projects**  
**2018-2022**

**Banner Program:** Marine Resources and Fisheries

**Research Centers:**

- Sustainable Fisheries Research and Development Center
- Integrated Coastal Resource Management Center

**Goal:** A sustainable center of excellence for aqua-marine through science-based multi-disciplinary researches in support to needs-based extension and science-based instruction in Cagayan Valley Region.

**Objectives :**

1. To undertake multi- disciplinary researches along fisheries that would support food security and sufficiency, biodiversity, conservation, management, climate change adaption, policy development, etc.
2. To engage with collaborative GAD - responsive researches.
3. To collaborate with other SUC's, industries and agencies along research and extension.
4. To establish SME's and award OBOL grants to deserving and qualified clients
5. To develop and showcase science – based management pattern for aquamarine RDE programs.
6. To subject outputs for IPR and commercialize mature technologies / product developed from research.
7. To conduct capacity building / training of faculty, community and other stakeholders (fishers, farmers).
8. To disseminate RDE outputs through research fora (international, national), publications (Scopus & Thomson Reuters) and IEC materials.

**Challenges :**

- Fund/Procurement
  - Minimal funds allotted to projects
  - Problems and issues associated to procurement (especially along externally funded)
- Manpower :
  - Motivating faculty to engage in research due to time constraints (faculty loading requirement)
  - Capabilities of faculty in writing publishable research outputs
  - Research culture (IRR on faculty deloading, provision of grants and incentives)
- SUC levelling requirements

**Plan strategy:**

- Capability and capacity development for faculty members
- Integrated Approach/Collaboration
- Partnership and external linkages

**Commodity/Banner Program:** Marine Resources and Fisheries

**Campus:** Aparri

| Priorities/<br>Research<br>Area | Program/Project/Study                                                                                                                                                                                                                              | TIMEFRAME             |      |      |      |      | EXPECTED OUTPUT                       |             |             |                    |      |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|------|------|------|---------------------------------------|-------------|-------------|--------------------|------|
|                                 |                                                                                                                                                                                                                                                    | 2018                  | 2019 | 2020 | 2021 | 2022 | 2018                                  | 2019        | 2020        | 2021               | 2022 |
| Mussel                          | 1. Program title: Improved grow-out technology for a sustainable mussel industry: Project title: Modelling site selection for new area expansion: Study title: Growth performance of green mussel <i>P. viridis</i> transplanted in Cagayan lagoon | Oct. 2015 to Mar 2018 |      |      |      |      | Policy & Publication                  |             |             |                    |      |
|                                 | 2. Assessment of Mussel in the Philippines                                                                                                                                                                                                         | X                     | X    | X    |      |      | Process, Product, Publication         | Publication | Publication | Policy Publication |      |
| Eel                             | 1. Species Biodiversity of Philippine eel ( <i>Anguilla</i> spp.) a precursor for Management and prospect for sustainable aquaculture<br>2. Development of culture techniques for swamp or rice eel                                                | X                     | X    | X    | X    | X    | Publication, Policy, Product, Process |             |             |                    |      |

|                     |                                                                                                                            |   |   |   |   |   |                                          |                                             |                            |                            |                    |
|---------------------|----------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|------------------------------------------|---------------------------------------------|----------------------------|----------------------------|--------------------|
| Post - Harvest      | 1. Development of Post-Harvest Technology for Flying Fish (spp)                                                            | X | X |   |   |   |                                          |                                             |                            |                            |                    |
|                     | 2. Product development on Tilapia                                                                                          | X | X |   |   |   |                                          | Product Patent Publication Empowered People | Product Patent Publication | Product Patent Publication | People Empowerment |
|                     | 3. Post – Harvest Technology For Clams ( <i>Batissa</i> )                                                                  | X | X | X |   |   |                                          |                                             |                            |                            |                    |
|                     | 4. Product development from aramang                                                                                        |   |   | X | X | X |                                          |                                             |                            |                            |                    |
| Freshwater fishes   | Philippine Hito Conservation, Management, Enhancement and Extension and Training in Cagayan                                | X | X |   |   |   | Policy Publication<br>People Empowerment |                                             |                            |                            |                    |
| Organic Aquaculture | Cagayan State University Aparri Integrated Fishery Enterprise Development through Aquaculture and Post –Harvest Technology | X | X | X | X | X | Empowered People (organization)          |                                             |                            |                            |                    |
| Mechanization       | Development of ICT – based application technologies along Fisheries and aquaculture                                        |   |   | X |   |   |                                          |                                             | Product Process            | Product patent Publication |                    |
| Socio – economics   | 1. Multi- disciplinary researches along fishery                                                                            | X | X | X | X | X | People Product Process                   |                                             |                            |                            |                    |

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |   |   |   |   |                                 |                   |                   |  |  |  |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|---|---------------------------------|-------------------|-------------------|--|--|--|
|                      | <p>resource assessment and management</p> <ul style="list-style-type: none"> <li>- Fishery laws and enforcement</li> <li>- IEC Education and Training</li> <li>- Financial Management and Entrepreneurship</li> </ul> <p>2. ICT – based assessment, data mining and GIS Mapping of economically important species in ACRE.</p> <p>3. Supply Chain Modeling, Prediction, and Analytics of economically important species in ACRE</p> |  |   |   |   |   | Policy<br>Publication<br>Patent |                   |                   |  |  |  |
| Upgrading Facilities | <p>1. Upgrading of the multi-species land – based hatchery</p> <p>2. Direct water pumping from the sea</p> <p>3. Nursery of high value species</p> <p>4. Upgrading Post-Harvest Facilities (SSF)</p>                                                                                                                                                                                                                                |  | X | X | X | X |                                 | Upgraded Facility | Upgraded Facility |  |  |  |
| Climate Change       | Management of mangroves as a mitigating measure                                                                                                                                                                                                                                                                                                                                                                                     |  | X | X | X | X | Policy<br>Publication           |                   |                   |  |  |  |

|  |                                                            |  |  |  |  |  |                    |
|--|------------------------------------------------------------|--|--|--|--|--|--------------------|
|  | against climate change in<br>Baguey & Sta. Ana,<br>Cagayan |  |  |  |  |  | People Empowerment |
|--|------------------------------------------------------------|--|--|--|--|--|--------------------|

\*include on-going projects, especially on climate change on marine life, conservation, and management.

## **Appendix C.**

### **RDE BANNER PROGRAMS AND PROJECTS 2018-2022 Carig Campus**

**Banner Program:** Industry, Energy & Emerging Technologies

**Goal:** To become a nationally recognized seat of Research for Development Centres as well as Research Laboratories and Service Facilities for the production of high value food, energy source, technical innovations, engineered products, alternative medicines, and delivery of laboratory services, environmental concerns as well as governance for global competitiveness.

#### **Objectives:**

1. To develop innovative food and conduct value chain for existing food products to ensure food security.
2. To design, innovate, and fabricate industrial equipment and engineered products for commercialization.
3. To develop cost efficient packaging material for food and non-food products through the Regional Industrial Research and Development Service Centre
4. To introduce Innovative Electronic Vehicle for energy and environmental conservation.
5. To develop natural herb remedies with fewer side effects, well-tolerated by the body and less-expensive than synthetic drugs produced by pharmaceutical companies.
6. To be a laboratory service provider in the conduct of biotechnology and animal health researches in the university and other research communities in Region 02.
7. To explore researchable areas along industry, energy, emerging technologies, environment, health, biotechnology, governance, and spearhead in the conduct of such.
8. To partner with stakeholders for the growth and development of metals, blacksmithery, food and other sectoral industries.
9. To develop and publish IEC materials.

#### **Challenges:**

1. Speed up the proliferation of SMEs in the region for the rural poor.
2. Limited Engineering research resources and non-existence of Research and Development centres in the region.
3. Dependence on Traditional Processes and Resistance to change.
4. Rising Cost of Existing Products, Equipment, machineries, implements, Cooking Fuel and Energy.
5. High cost of health care impacting the poor and marginalised families and increasing risk of spreading resistant microorganisms.
6. Increasing demand of laboratory animals as well as animal health services and absence of animal laboratory research facility in the region
7. Pollution
8. Value Chain

**Plan Strategy:**

1. Benchmark on industries abroad to look into their technology and best practices that could be adopted.
2. More Collaborative Researches among faculty and students.
3. Conduct of relevant trainings and seminars.
4. Participation to national and international training/seminars.
5. Establishment of Small and Micro Enterprises.
6. Linkages with Foreign Partners and stakeholders.

**COMODITY/BANNER PROGRAM:** Industry, Energy & Emerging Technology, Environment and Governance.

**CAMPUS:** Carig

| RESEARC<br>H<br>PRIORITY<br>AREAS | PROGRAM/<br>PROJECT/<br>STUDY                        | SPECIFIC<br>ACTIVITIES                                                                                                                                                                      | TIME FRAME |          |          |          |          | EXPECTED OUTPUT                                                   |                                                                                                                                                                                                                                           |      |      |      |
|-----------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------|----------|----------|----------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|
|                                   |                                                      |                                                                                                                                                                                             | 201<br>8   | 201<br>9 | 202<br>0 | 202<br>1 | 202<br>2 | 2018                                                              | 2019                                                                                                                                                                                                                                      | 2020 | 2021 | 2022 |
| Industry                          | E-trike<br>Installation<br>and Stability<br>Research | Project<br>conceptualization.                                                                                                                                                               | /          |          |          |          |          | Submitted full<br>blown<br>proposal to<br>PCIEERD for<br>funding. |                                                                                                                                                                                                                                           |      |      |      |
|                                   |                                                      | Fabrication and<br>Testing of E-Trikes<br><br>• Test and<br>evaluate the<br>performance<br>of E-trike<br><br><br><br><br><br><br><br><br><br>• Determine<br>fuel gas<br>Consumption<br>rate |            | /        |          |          |          |                                                                   | Designed<br>and<br>fabricated<br>innovative<br>E-Trikes.<br><br>Gathered<br>data on<br>mileage,<br>emission of<br>CO2,<br>battery<br>range,<br>utilization<br>rate, odor,<br>acceptability<br>, and<br>efficiency<br>test.<br><br>Reduced |      |      |      |

|  |  |                                                                                                                                                                                                                                                                                                                                                   |  |   |   |   |   |  |                                                                  |                                                                  |                                                                  |  |
|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|---|--|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|--|
|  |  | <ul style="list-style-type: none"><li>Analyse the pollution Reduction in terms of CO2 and odor.</li></ul> <p>Installation of E Trike stations within the government Centre and CSU-Carig Campus</p> <p>Establish partnership with Motor Industries in the commercialization of the E-trikes</p> <p>Conduct of transport business with E-trike</p> |  | / |   |   |   |  | Fossil fuel used.                                                |                                                                  |                                                                  |  |
|  |  |                                                                                                                                                                                                                                                                                                                                                   |  | / | / | / | / |  | Reduced pollution                                                | Phase 11 Developm ent of E-trike Scheme at Carig Campus compound | Commercialization of E-trikes through partner motor industries.  |  |
|  |  |                                                                                                                                                                                                                                                                                                                                                   |  |   |   | / | / |  | Phase 1 Installation of E-trike station in the government center |                                                                  | Operate transport enterprise with E-trike drivers and operators. |  |
|  |  |                                                                                                                                                                                                                                                                                                                                                   |  |   |   | / | / |  |                                                                  |                                                                  |                                                                  |  |

|  |                                                         |                                                    |   |  |  |  |  |                                                                   |  |  |  |  |
|--|---------------------------------------------------------|----------------------------------------------------|---|--|--|--|--|-------------------------------------------------------------------|--|--|--|--|
|  | Construction of Building for Laboratory Animal Facility | Coordination and project preparation.              | / |  |  |  |  | Coordinated with proper authorities for the start of the project. |  |  |  |  |
|  |                                                         | Earth, Concrete, Rebar, Masonry, Plastering, Steel | / |  |  |  |  | Completed Earth, Concrete, Rebar,                                 |  |  |  |  |

|  |  |                                                                                               |  |   |   |   |   |                                                           |                                                                                                          |                                                                                                                                                                                                                                                                                                                                            |  |  |
|--|--|-----------------------------------------------------------------------------------------------|--|---|---|---|---|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  | decking system and Steel works.                                                               |  |   |   |   |   | Masonry, Plastering, Steel decking system and Steel works |                                                                                                          |                                                                                                                                                                                                                                                                                                                                            |  |  |
|  |  | Doors, windows & ceiling works, Tile, Stare Railings, Painting, Plumbing and Electrical works |  | / |   |   |   |                                                           | Completed Doors, windows & ceiling works, Tile, Stare Railings, Painting, Plumbing and Electrical works. |                                                                                                                                                                                                                                                                                                                                            |  |  |
|  |  | Launching and operation of the Laboratory Animal facility                                     |  |   | / | / | / |                                                           |                                                                                                          | Launched and operate the animal Service Facility.<br><br>Supply quality laboratory animals and services to researches in the region.<br><br>Conduct testing of biochemical and pre-clinical trials of medicinal plants.<br><br>Accelerate marketing of products.<br><br>Manage laboratory animals for instruction, research and extension. |  |  |

|  |                                                                           |                                                                                                                                                                                                                                                                                                                                 |   |   |   |   |   |                                                   |                                                                                                                                                                                                                |
|--|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                           |                                                                                                                                                                                                                                                                                                                                 |   |   |   |   |   |                                                   | Provide services to researchers, faculty, students, and pharmaceutical companies.                                                                                                                              |
|  | Establishment and Upgrading of Integrated Engineering Research Laboratory | <p>Setting up of the Integrated Engineering Research Laboratory.</p> <p>Inventory of equipment and installation of newly procured equipment, software and facilities.</p> <p>Conduct of training for faculty and students.</p> <p>Designing and development of auxiliary equipment.</p> <p>Testing of fabricated equipment.</p> | / | / | / | / | / | Upgraded existing Engineering Research Laboratory | <p>Trained faculty and students on the use of equipment in Regions 1,II,III , CAR and other SUCS in the country.</p> <p>Developed and designed auxiliary equipment</p> <p>Tested the fabricated equipment.</p> |

|  |                                                                |                                                                                                                                                                                                                                                              |   |   |   |   |   |                                                 |                                                                                                                                                                                          |                                                                                  |
|--|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|  | Establishment of Biology and Biotechnology Regional Laboratory | <p>Instituting of the Regional Biology and Biotechnology Laboratory.</p> <p>Procuring needed equipment and facilities.</p> <p>Conduct laboratory skills training, laboratory safety and accreditation.</p> <p>Conduct biology and biotechnology analysis</p> | / | / | / | / | / | 1 Regional Biology and Biotechnology Laboratory | <p>Installed microbiology, food testing, histopathology, parasitology, and animal diagnostic equipment.</p> <p>Enhanced laboratory skills of laboratory technicians and researchers.</p> | Biology and biotechnology Analysis<br>Packaged Research and Extension activities |
|--|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|

|  |                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                              |   |   |  |  |  |                                                         |                                                                                                                                                                                                                                                                                        |  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|--|--|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | Establishment of the Regional Industrial trade Research and Development service Center (PET bottles, canisters and tool packaging materials) | <p>Submission of Final Proposal to PCIEERD for funding.</p> <p>Construction of the Regional Industrial trade Research and Development service Center.</p> <p>Conduct of R&amp;D packaging Technologies.</p> <p>Designing and packaging of management system for cost efficiency.</p> <p>Testing and Evaluation of different product packaging materials.</p> | / | / |  |  |  | Justified and submitted final final proposal to PIEERD. | <p>1 Regional Industrial trade Research and Development service Center.</p> <p>5 research studies conducted.</p> <p>Developed sustainable product formulation and process flow and created innovative products with best customer value.</p> <p>Conducted compatibility testing to</p> |  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|--|--|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|        |                                                          |                                                                                                                                                                                                                                                                                                                                                            |  |   |   |   |   |  |                                                |                                                                                                                                                                                                                                                                                                  |  |
|--------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|---|--|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|        |                                                          | <p>Product Analysis on contamination.</p> <p>Precision engineering on industrial packaging research and studies.</p> <p>Packaging of technologies for dissemination and referred journal</p> <p>Patenting of Technology and application of Intellectual Property.</p> <p>Commercialization of PET bottles, Canisters and and tool packaging materials.</p> |  |   | / | / | / |  | developed models.                              | <p>Packaged developed technology for technology transfer.</p> <p>Patents/Utility Models to developed products and established processes.</p> <p>Established delivery clause and Memorandum of Agreement.</p> <p>Established sustainable marketing scheme.</p> <p>Sustainable implementation.</p> |  |
| Energy | Design and Development of Mechanized Briquetting Machine | <p>Fabrication and testing of the shredder, mixer, and compactor.</p> <p>Assembling the three apparatuses into mechanized Briquetting Machine</p>                                                                                                                                                                                                          |  | / | / | / |   |  | Developed 1 Shredder, 1 Mixer, and 1 Compactor | Mechanized Briquetting Machine                                                                                                                                                                                                                                                                   |  |

|  |                                    |                                                     |  |  |   |   |   |  |  |                                                                                                                                                                                                |                                                                                                                                                                 |
|--|------------------------------------|-----------------------------------------------------|--|--|---|---|---|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                    | Research dissemination and publication.             |  |  | / | / |   |  |  | Presentation to Research fora and publications to research journals.                                                                                                                           |                                                                                                                                                                 |
|  |                                    | Extending the matured technology to the adopted LGU |  |  |   | / |   |  |  | 5 Utility Models                                                                                                                                                                               | Extended the technology to the adopted LGU.<br><br>Generated employment to farmers during lean seasons.<br><br>Employment for rural folks (marginalized sector) |
|  | Production of Agri-waste to Energy |                                                     |  |  | / | / | / |  |  | Agri wastes Briquettes from corn cobs and rice husks- an alternative fuel source using the mechanized briquetting machine.<br><br>Packaging and Commercialization of the agriwaste briquettes. |                                                                                                                                                                 |

|                            |                                                                                   |                                                                      |  |   |   |  |  |  |  |                                                                                                              |  |  |
|----------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------|--|---|---|--|--|--|--|--------------------------------------------------------------------------------------------------------------|--|--|
|                            |                                                                                   |                                                                      |  |   |   |  |  |  |  | Extended the technology to the adopted LGU.                                                                  |  |  |
| <b>Emerging Technology</b> | Development of Automated Control System for Energy Management in School Buildings | Develop a customized automated Energy Management System(EMS) for CSU |  | / | / |  |  |  |  | Installed EMS for the College of Engineering Lecture and Laboratory Rooms.<br><br>Operational Manual for EMS |  |  |

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APPENDIX D.

CSU Gonzaga  
RDE Agenda  
CY 2018-2022

| Priorities/<br>Research Area | Program/Project/Study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | TIMEFRAME |      |      |      |      | EXPECTED OUTPUT |      |                                                                                                                                                                                                                                                                                          |                                                                                    |      |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------|------|------|-----------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------|
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2018      | 2019 | 2020 | 2021 | 2022 | 2018            | 2019 | 2020                                                                                                                                                                                                                                                                                     | 2021                                                                               | 2022 |
| Bamboo-based Agroforestry    | <b>I. Ethnobotany and Socioeconomic Aspects of Bamboo Agroforestry</b><br><br>1. Resource Inventory and Ecosystem Services, Current Production, Utilization Practices and Marketing of Bamboo in Cagayan<br><br>2. Assessment of the local knowledge of bamboo within the intended agroecological zone of establishment (local bamboo use, ecological distribution as well as taboos and belief systems about its cultivation and utilization)<br><br>3. GIS-Based Resource Inventory and Mapping<br><br>4. competitive advantage of bamboo (in terms of costs and benefits)<br><br>5. Farmers’ perceptions of deforestation and erosion (including any perceived impact bamboo-based agroforestry on crop yields). | X         | X    |      |      |      |                 |      | <ul style="list-style-type: none"><li>• Baseline Information on Bamboo Resources in Cagayan</li><li>• GIS Map of Bamboo Resources</li><li>• Documented Indigenous Production and Utilization of Bamboo in Cagayan</li><li>• Documented Marketing of Bamboo Products in Cagayan</li></ul> | <ul style="list-style-type: none"><li>• Publication in Research Journals</li></ul> |      |

|  |                                                                                                                                                                                                                                                                      |   |   |   |   |   |  |  |                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                 |                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|  | <b>II. Establishment of Bamboo Genebank and Nursery</b><br><br>1. Production of quality planting materials (campus and community-based)<br>2. Establishment of Clonal Propagator with Drip Irrigation System<br>3. Research on Rapid Propagation Technique           | X | X | X | X | X |  |  | <ul style="list-style-type: none"> <li>At least 10,000 planing materials</li> <li>Provincial Nursery</li> <li>POTs on propagation of bamboo propagules</li> </ul> | <ul style="list-style-type: none"> <li>IEC on Bamboo Planting Materials Propagation</li> </ul>                                                                                                                                                                                                                                                                                                  |                                  |
|  | <b>III. Cultural Management of Plantation and Natural Stand of Bamboo for Shoot and Pole Production</b><br><br>1. Bamboo Gene Bank<br>2. Bamboo Plantation Establishment and Management<br>3. Cultural Management Practices<br>4. Watershed and Riverbank Management |   | X | X |   | X |  |  | <ul style="list-style-type: none"> <li>Bamboo Genebank</li> <li></li> </ul>                                                                                       | <ul style="list-style-type: none"> <li>POT on plantation establishment and management for shoot and pole production</li> <li>POT on shoot and pole production of natural bamboo stand</li> <li>POT on the production of deform bamboo</li> <li>Community Bamboo-based Agroforestry Plantation established</li> <li>Resilient-households with bamboo-based project for food, nutritio</li> </ul> | Publication in Research Journals |

|  |                                                                                                                                                                                                                                                                                                                                                                     |  |   |   |   |   |  |  |                                                                                                                                                                                                                         |                                                                                                                                                            |             |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|---|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|  | <b>IV. Ecological Processes and Component Interaction Within Bamboo Agroforestry</b><br><br>1. Study on the tree-soil-crop interaction in tropical bamboo agroforestry system (Soil Fertility: Chemical, Soil Fertility : Physical, Soil Fertility: Biological) to define the best cultural practices applicable to specific bamboo species and agricultural crops. |  | x | x | x |   |  |  | •                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Bamboo Soil Fertility: Chemical,</li> <li>Soil Fertility : Physical,</li> <li>Soil Fertility: Biological</li> </ul> | Publication |
|  | <b>V. Development of New Process of Bamboo Products</b><br><br>1. Development of Bamboo Soap and Pickles<br>2. Development of Bamboo Wine and Juice<br>3. Design, Fabrication, and Testing of Bamboo Slicer<br>4. Product Development                                                                                                                               |  | X | X | X | X |  |  | <ul style="list-style-type: none"> <li>POT on processing of bamboo products</li> <li>POT on utilization of deform bamboo for fancy products</li> <li>Food and non-food products developed and commercialized</li> </ul> | Publication in Research Journals                                                                                                                           |             |

|  |                                                                                                                                                                             |  |   |   |   |  |  |  |   |                                           |              |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|---|---|--|--|--|---|-------------------------------------------|--------------|
|  | <b>VI. Development of bamboo-based silvopasture systems (Testing Bamboo Fodder for a Wide Range of Livestock)</b>                                                           |  |   |   |   |  |  |  | • | • Bamboo-based Nutrition for Silvopasture | Publications |
|  | 1. Documentation and identification of best practices of integrated tree/crop–livestock production systems in an intended locality;                                         |  | X | X | X |  |  |  |   |                                           |              |
|  | 2. Documentation of predominant livestock feeding practices;                                                                                                                |  | X | X | X |  |  |  |   |                                           |              |
|  | 3. Identification and documentation of priority fodder species and assess farmers’ ethnobotanical knowledge about the species;                                              |  | X | X | X |  |  |  |   |                                           |              |
|  | 4. Determination of the nutritional and mineral profile of the prioritized livestock feed sources;                                                                          |  | X | X | X |  |  |  |   |                                           |              |
|  | 5. Assessing consumption patterns and digestibility of prioritized fodder species in comparison with bamboo; and                                                            |  | X | X | X |  |  |  |   |                                           |              |
|  | 6. Evaluation of the growth and health (using haematological indicators and serum biochemistry) of livestock fed with fodder from common species in comparison with bamboo. |  | X | X | X |  |  |  |   |                                           |              |

|  |                                                                                                                                                                                                                                                                                                                                                                                             |   |   |   |   |  |  |  |   |                                                                                                                                                                                                                                 |             |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|--|--|--|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|  | <b>VII. Development of Bamboo-Crop-Livestock Agroforestry Business Investments Standards</b><br><br>Cost –Benefit Analysis<br><br>1. Bamboo-Pineapple Integration<br>2. Bamboo-Livestock Integration<br>3. Bamboo and other Crops Integration<br>4. Bamboo Handicrafts                                                                                                                      |   | X | X | X |  |  |  | • | • Business Standards for bamboo-based investments                                                                                                                                                                               | Publication |
|  | <b>VIII. Technology validation, Packaging, Promotion and Commercialization, Livelihood and Enterprise Development</b><br><br>1. “Isang Tahanan, Limang Kawayan” . Bamboos in Homegardens<br>2. Community-based Technology Demonstration on bamboo-based agroforestry Farms<br>3. Production of IEC Materials<br>4. Capacity Building<br>5. Bamboo-based Agroforestry Enterprise Development | X | X | X |   |  |  |  | • | • Community Bamboo-based Agroforestry Plantation established<br>• Resilient-households with bamboo-based project for food, nutrition<br>• Capacitated individuals<br>• Materials developed, published and in wide dissemination |             |

|  |                                                                                                                                                                                                                                                                                                                                                                     |  |  |   |   |   |  |  |   |                                                                                                                                                      |             |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|---|---|--|--|---|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|  | <b>IX. Ecosystem &amp; Environment Protection</b>                                                                                                                                                                                                                                                                                                                   |  |  | X | X | X |  |  | • | <ul style="list-style-type: none"> <li>Resilient-households with bamboo-based project for food, nutrition</li> </ul>                                 |             |
|  | 1. The potential of bamboo-based agroforestry in restoring degraded forestlands and also as sustainable carbon sink<br>2. Bamboo as biomass for renewable energy<br>3. Bio-engineering for erosion control<br>4. Watershed management<br>5. Rainwater retention and soil moisture conservation<br>6. Mangrove forest rehabilitation and management<br>7. Wind Break |  |  | X | X | X |  |  |   |                                                                                                                                                      |             |
|  |                                                                                                                                                                                                                                                                                                                                                                     |  |  | X | X | X |  |  |   |                                                                                                                                                      |             |
|  |                                                                                                                                                                                                                                                                                                                                                                     |  |  | X | X | X |  |  |   |                                                                                                                                                      |             |
|  |                                                                                                                                                                                                                                                                                                                                                                     |  |  | X | X | X |  |  |   |                                                                                                                                                      |             |
|  |                                                                                                                                                                                                                                                                                                                                                                     |  |  | X | X | X |  |  |   |                                                                                                                                                      |             |
|  | <b>X. Economics and Marketing</b>                                                                                                                                                                                                                                                                                                                                   |  |  |   | X |   |  |  | • | <ul style="list-style-type: none"> <li>Bamboo and bamboo-based products value chain studies</li> <li>Market and Commercialization Studies</li> </ul> | Publication |
|  | 1. Value Chain Analysis of Bamboo and Bamboo Products<br>2. Product Market Validation (consumer preference, price ect) and Commercialization Studies                                                                                                                                                                                                                |  |  |   | x |   |  |  |   |                                                                                                                                                      |             |

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Appendix E.

**Lal-lo Campus  
RDE Banner Programs and Projects  
2018-2022**

**Banner Program:** High Value Commercial Crops and Cash Crops

- Goals:**
- Peanut germplasm collection, varietal evaluation and maintenance for yield and quality, storage life improvement and continuing production of aflatoxin-free materials
  - Put up a cacao research and development center
  - Nutrient and water management for improvement organic vegetables towards sustainable and profitable farming
  - Come up with banana research and development program development of package of technology on lubeg (*syzyguim lineatum*) production, products and by-products as source of livelihood and income for Cagayanos

- Objectives:**
- Establish Peanut Germplasm Bank in CSUL
  - Establish Peanut Production and Demonstration Farm
  - Evaluate Aflatoxin Disease Variety
  - Identify Good Agricultural Practices for Yield and Quality Peanut Production
  - Conduct study on Variety Evaluation and Shelf Life Performance of Developed Peanut Lines using Low-Cost Seed Storage Facilities
  - Conduct Community-Based Peanut Variety Evaluation for Quality Raw Materials Production for DOST-FIC Product Development
  - Continue project on Cacao Seed/Nursery Management
  - Improve Cacao Breed
  - Continue Cacao Management and Production
  - Conduct study on Integrated Pest Management for Pest and Diseases of Cacao
  - Establish nutrient and water management for Improvement of organic vegetables towards sustainable and profitable farming
  - Enhance yield in organic farms under conversion
  - Develop bio-fertilizer inputs in increasing and sustaining productivity of organic vegetables under upland conditions

Improve water management efficiency in organic farms  
Produce Organic High Value Crops  
Conduct survey thru Geotagging Banana Plantation in Region 02  
Establish Banana Nursery  
Develop package of Technology on lubeg (*syzyguim Lineatum*)  
Production, Products and By-products as source of Livelihood and  
Income for Cagayanos

**Challenges:** Financial constraints  
Time management of faculty in-charge  
Overlapping of schedule (between workload and assigned project)  
especially among faculty in-charge  
Overloading of faculty in-charge  
Overlapping of assignments and designations especially among small  
campuses

**Plan**  
**Strategy:** Specific projects were assigned to able faculty who are believed to be  
experts or capable of handling the project/program  
  
Sought funding from the university and other funding agencies for the  
sustainability of the project  
  
Proposals are conceptualized and made for submission to agencies for  
possible funding

**COMMODITIES/BANNER PROGRAM: HIGH VALUE COMMERCIAL AND CASH CROPS**  
**Campus: CSU Lal-lo Campus**

| Priorities/Research Area | Program/Project/Study                                                                                                                                                       | Time frame    |                                                                                      |         |         |         | Expected Output                                       |                                                                         |                                                                         |                                                                        |                                                                        |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------|---------|---------|---------|-------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
|                          |                                                                                                                                                                             | 2018          | 2019                                                                                 | 2020    | 2021    | 2022    | 2018                                                  | 2019                                                                    | 2020                                                                    | 2021                                                                   | 2022                                                                   |
| <b>PEANUT</b>            | P.1. Peanut Germplasm Collection, Varietal Evaluation and maintenance for Yield and Quality, Storage Life Improvement and continuing Production of Aflatoxin-Free Materials | 6 mos.        | 12 mos.                                                                              | 12 mos. | 12 mos. | 12 mos. | GP w/ 6 Varieties 1 Demo Farm 5 Recipients/1 Barangay | GP w/ add'l 6 Varieties 1 Demo Farm 1POT 1GAP 5 recipient s/+1 barangay | GP w/ add'l 6 varieties 1 demo Farm 1POT 1GAP 5 recipient s/+1 barangay | GP w/ add'l 6 varieties 1 Demo Farm 1POT 1GAP 5 Recipients/+1 Barangay | GP w/ add'l 6 Varieties 1 Demo Farm 1POT 1GAP 5 Recipients/+1 Barangay |
|                          | 1.1. Establishment of Cagayan State University Peanut Germplasm Bank                                                                                                        |               | 12 mos.                                                                              | 12 mos. | 12 mos. | 12 mos. | 6 Varieties                                           | 6 Varieties                                                             | 6 Varieties                                                             | 6 Varieties                                                            | 6 Varieties                                                            |
|                          | 1.2. Establishment of Peanut Production and Demonstration Farm                                                                                                              |               | 6 mos.                                                                               | 6 mos.  | 6 mos.  | 6 mos.  | 1 Demo Farm at CSU                                    | 1 Demo Farm at CSU                                                      | 1 Demo Farm at CSU                                                      | 1 Demo Farm at CSU                                                     | 1 Demo Farm at CSU                                                     |
|                          | 1.3. Aflatoxin Disease Variety Evaluation                                                                                                                                   |               | 6 mos.                                                                               | 6 mos.  | 6 mos.  | 6 mos.  | At Least 1 Variety                                    | At Least 1 Variety                                                      | At Least 1 Variety                                                      | At Least 1 Variety                                                     | At Least 1 Variety                                                     |
|                          | 1.4. Good Agricultural Practices for Yield and Quality Peanut Production                                                                                                    | 6 mos.        | 6 mos.                                                                               | 12 mos. | 12 mos. | 12 mos. | Identified Peanut Farmer to GAP                       | GAP Farmers adopter                                                     | GAP Practitioners                                                       | GAP for Peanut Demo Farms                                              | GAP for Peanut Demo Farms                                              |
|                          | 1.5. Variety Evaluation and Shelf Life Performance of Developed                                                                                                             | 24 mos./cycle |  |         |         |         |                                                       | 1POT Peanut                                                             | 1POT Peanut                                                             | 1POT Peanut                                                            | 1POT Peanut Shelf Life                                                 |

[illegible]

|                 |                                                                                                                                                                       |  |  |  |  |  |                           |                            |                              |                           |                                        |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|---------------------------|----------------------------|------------------------------|---------------------------|----------------------------------------|
| <b>HVCC</b>     | P.3. Nutrient and water management for Improvement of organic Vegetables towards Sustainable and Profitable Farming                                                   |  |  |  |  |  | 1 POT to be verified      | 1 POT to be verified       | 1 POT to be verified         | 1 POT                     | 1 POT                                  |
|                 | 3.1. Enhancement of Yield in Organic Farms under Conversion                                                                                                           |  |  |  |  |  | 1 POT to be verified      | 1 POT to be verified       | 1 POT to be verified         | 1 POT                     | 1 POT                                  |
|                 | 3.2. Development of Bio-Fertilizer Inputs in Increasing and sustaining productivity of Organic Vegetables under Upland conditions                                     |  |  |  |  |  | 1 POT to be verified      | 1 POT to be verified       | 1 POT to be verified         | 1 POT                     | 1 POT                                  |
|                 | 3.3. improvement of Water management efficiency in Organic farms                                                                                                      |  |  |  |  |  | 1 POT to be verified      | 1 POT to be verified       | 1 POT to be verified         | 1 POT                     | 1 POT                                  |
|                 | P.4. Organic High Value Crops production                                                                                                                              |  |  |  |  |  | 100kpg er kind            | 200kpg er kind             | 300kpg er kind               | 400kpg er kind            | 500kgper kind                          |
|                 | 4.1. Organic “pinakbet”                                                                                                                                               |  |  |  |  |  | 100kpg er kind            | 200kpg er kind             | 300kpg er kind               | 400kpg er kind            | 500kgper kind                          |
| <b>Banana</b>   | P.4. Banana research and Development program                                                                                                                          |  |  |  |  |  | 1 center proposal         | 1 nursery                  | 1ha. Demo area               | +1ha.                     | +1ha                                   |
|                 | 4.1. Survey thru Geotagging Banana Plantation in Region 02                                                                                                            |  |  |  |  |  | 1 proposal                | Whole Cagayan              | 3 provinces                  | +3provinces               | +3provinces                            |
|                 | 4.2. Nursery Establishment of Banana                                                                                                                                  |  |  |  |  |  | 1                         | 1 nursery with 2 varieties | 2 nurseries with 3 varieties | 1nursery with 5 varieties | 1nursery with 10varieties              |
| <b>Other(s)</b> | P.5. development of package of Technology on lubeg ( <i>syzyguim Lineatum</i> ) Production, Products and By-products as source of Livelihood and Income for Cagayanos |  |  |  |  |  | 5 Utility Models Packaged | 5 POTs                     | 5 POTs for market testing    | 5 POTs for blast testing  | 5 POTs for market niche identification |



## APPENDIX F.

### CSU Lasam RDE Banner Programs and Projects 2018-2022

Universities are expected to generate new knowledge. In the new knowledge economy, this task, while traditionally and essentially is a function of institutions of higher learning, is increasingly more emphasized because new knowledge providers are emerging and challenging universities' role in creating, producing, and translating knowledge. It becomes imperative then for Cagayan State University at Lasam to strategically position itself in functioning as one of the eight campuses of Cagayan State University. Vital to CSU Lasam's role is the mapping out of puzzle areas in its banner program and translating these into research agenda which will underlie CSU Lasam's RDE initiatives. The CSU-Lasam RDE agenda 2018-2022 is a blueprint for tangible and sustainable research initiatives the university will take in the next years.

### Goal and Objectives

The designation of CSU-Lasam along with its **BANNER PROGRAM** to respond to challenges and demands of varying scales and complexities. Thus, the CSU Lasam's Strategic Development Plan 2018-2022 outlines the specific research, extension and development objectives. The research objectives are as follows:

1. Conduct high impact researches that will improve the quality of cacao-based products and by-products.
2. Develop innovative ideas in product development, education, information technology, and industrial technology.
3. Share expertise and competence in product development, educational research, and technological researches to the community.
4. Provide data to the partner agencies as input in designing curricular programs in teacher education, information technology and industrial technology.
5. Disseminate all timely research inputs systematically in all modalities (print, non-print) to all its stakeholders.
6. Set the research directions of all levels across different disciplines in the Campus particularly teacher education, information technology and industrial technology.
7. Provide appropriate allocation of fund and other related resources to ensure efficient and timely implementation of research projects anchored on the CSU Research Agenda.

## CSU Lasam

| Priorities/ Research Area                                                                                                                                                                                                   | Program/Project/Study                                                                                                                                                                                                                                                                                                                                                                            | TIMEFRAME |      |      |      |      | EXPECTED OUTPUT                                                 |                                                   |                                                                                                                      |                                                                                                                                                         |                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------|------|------|------|-----------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                  | 2018      | 2019 | 2020 | 2021 | 2022 | 2018                                                            | 2019                                              | 2020                                                                                                                 | 2021                                                                                                                                                    | 2022                                                              |
| <b>Product Development on Cacao Processing Program</b>                                                                                                                                                                      | <ul style="list-style-type: none"> <li>Development of Cacao-Based Products and By-Products</li> <li>Learning Resource Package Development for cacao processing</li> <li>Technological/Livelihood Education on cacao Product development</li> <li>Technological and Educational Inventions</li> </ul>                                                                                             | X         | X    | X    | X    | X    | Conducted experimental researches for cacao product development | Submitted papers for publication and presentation | Improved communities as essential foundation for sustainability though cacao processing and product development      | Increased income of cacao farmers                                                                                                                       | Improved quality of life of cacao growers                         |
| <b>Program Quality and Relevance through Multidisciplinary Studies and Pure Research</b><br><br><i>College of Teacher Education</i><br><i>College of Technology</i><br><i>College of Information and Computing Sciences</i> | <ul style="list-style-type: none"> <li>Defining teacher qualities, competence of industrial and information technologists</li> <li>Language-related attitudes and beliefs</li> <li>Language proficiency/skills (verbal and written communication skills) of Pre-service Teachers, Industrial technologist and Information technologist as input to qualification standards for hiring</li> </ul> | X         | X    | X    | X    | X    | Conducted of research surveys and benchmarking activities       |                                                   | Disseminated all timely research inputs systematically in all modalities (print, non-print) to all its stakeholders. | Provided data to the partner agencies as input in designing curricular programs in teacher education, information technology and industrial technology. | Relevant and responsive degree program offerings in the community |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |   |   |   |   |                                                                        |                                                   |                                                                                                                    |                                                                              |                                                                         |
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|  | <ul style="list-style-type: none"> <li>• Research aptitude of CSU-Lasam students</li> <li>• Analysis of the teacher education, information and industrial technology curricula to be responsive to the needs of society.</li> <li>• Innovative teaching approaches/methods/strategies in teaching the discipline</li> <li>• Teacher and student interaction with focus on effective ways of teaching the future teachers</li> <li>• LET as predictor of teaching performance: case of graduates across disciplines</li> </ul> |   |   |   |   |   |                                                                        |                                                   |                                                                                                                    |                                                                              |                                                                         |
|  | <ul style="list-style-type: none"> <li>• Cultural/Multicultural Studies</li> <li>• Indigenous People's Education (Agays of Lasam)</li> <li>• developing indigenous-based instructional model for literacy programs</li> <li>• Ethno--botanical and Etho-Zological studies of indigenous plants used by local people</li> </ul>                                                                                                                                                                                                | X | X | X | X | X | Conducted researches, case studies and other appropriate methodologies | Submitted papers for publication and presentation | Established and maintained a database of practices, culture of indigenous peoples in northern Cagayan, Philippines | Responded to the needs and problems of the local communities and industries. | Improved quality of living among marginalized sectors of the community. |

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |
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| <b>Local Responsiveness</b> | <ul style="list-style-type: none"><li>• Arrangement of selected songs of indigenous people</li><li>• Curriculum Localization</li><li>• Green Technology</li><li>• Technology and Livelihood Education</li><li>• School-Community-Industry Partnership</li><li>• Curriculum localization/multicultural curriculum</li><li>• Alternative learning styles/local ways of doing</li><li>• Use of indigenous products and resources</li><li>• Understanding local history</li><li>• Cultural beliefs, rituals and values</li><li>• Livelihood education in local communities</li><li>• Cross-cultural community-based learning</li><li>• Baseline data for the conservation of priority species of indigenous trees</li><li>• Status of indigenous peoples education as</li></ul> |  |  |  |  |  |  |  |  |  |  |
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|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |   |   |   |   |                                                                                               |                                                                                |                                                                                         |                                                                                                  |                                        |
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|                       | basis for designing multicultural education                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |   |   |   |   |   |                                                                                               |                                                                                |                                                                                         |                                                                                                  |                                        |
| <b>Sustainability</b> | <ul style="list-style-type: none"> <li>• Environment and Climate Change</li> <li>• Information and Communications Technology</li> <li>• Equipment/Infrastructure</li> <li>• Knowledge Management System</li> <li>• Organizational Culture</li> <li>• Financial and Auditing Operations</li> <li>• Empowerment of school managers/leaders</li> <li>• Educational leadership of school managers and institutional management</li> <li>• Research mentoring and continuing education of teachers</li> <li>• Environmental and climate change studies with educational implication</li> </ul> | X | X | X | X | X | Conducted researches, case studies and other appropriate methodologies along sustainability.  | Established and maintained a database for community and organizational growth. | Provided a systematic dissemination of research outputs on environmental sustainability |                                                                                                  | Valued of environmental sustainability |
|                       | <ul style="list-style-type: none"> <li>• Hiring, promotion and retention of faculty (Performance appraisal system)</li> <li>• Supply and requirements for future teachers in the Philippines</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   | X | X | X | X | X | Conducted periodic studies in aid of crafting responsive policies and programs in the Campus. | Created and tested different models of organizational policies                 | Submitted papers for publication and presentation                                       | Provided empirical research data to serve as bases of formulation of policies in the university. |                                        |

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |  |  |  |  |  |
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| <b>Policy Studies</b> | <ul style="list-style-type: none"><li>• Analysis of the family income profile of students, cost-structure of the university and other economic indicators</li><li>• Policy formation on the standardized and intellectualized use of Filipino in a university</li><li>• Creation of new school policies and intervention programs against smoking by determining the TEI stakeholders' knowledge, attitudes and practices on smoking and its related policies</li><li>• Teaching and learning beliefs and experiences in relation to large class large class: basis for policy making</li><li>• Development of an aptitude test for BSIT and BS Ind. Tech graduates</li><li>• Development of exit examination for CSU-Lasam graduates</li><li>• Financial and organizational costs</li><li>• Rewards and incentives systems</li><li>• Mentoring and support</li></ul> |  |  |  |  |  |  |  |  |  |
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|  | <ul style="list-style-type: none"><li>• Improvement in admission policies</li><li>• Governance</li><li>• Administrative Management System</li></ul> |  |  |  |  |  |  |  |  |  |
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## **Appendix F.**

### **Piat Campus RDE Banner Programs and Projects 2018-2022**

#### **Banner Program: Dairy Cattle and Goat**

##### **Goal:**

- Increase profitability and productivity of dairy business
- Accelerate dairy herd build-up and milk production by 10% annually
- Increase local milk consumption by 10% annually
- Ensure safe and quality milk and milk products following the Dairy Food Regulations
- Capacity development of dairy stakeholders

##### **Objectives:**

###### **a. General**

To create a Regional Dairy Center for Research, Development and Training at CSU Piat that will help attain milk sufficiency in Cagayan Valley in partnership with the government and private sectors.

###### **b. Specific**

- 1) Produce sufficient and sustainable quality milk and milk products both in the institution and community of Cagayan Valley.
- 2) Serve as venue for research along forage production, herd and feeding management, animal health, milk production, quality milk products, and genetic improvement of stocks;
- 3) Process various quality milk products such as fresh milk, choco milk, yoghurt, pastillas de leche, and cheese in the institution as an additional source of income;
- 4) Provide venue for hands-on training of students and professors, entrepreneurs, dairy farmers, and other stakeholders.
- 5) Disseminate research outputs to dairy farmers for increased income and improved nutritional status.

##### **Challenges:**

Dairy production had always been the area in the animal industry that has the biggest potential for development in the Philippines. Based on the NDA annual report in 2013, the country is importing 99% of its milk and milk product requirements thus only one percent is being supplied by our local dairy growers. In the liquid milk market, on the average, one out of three glasses of milk is being produced locally, and this means that a Filipino family can now spend more than Php 4,000.00 for dairy products which is 3% higher than 4 years ago. With these figures, dairy farmers have large business opportunities that they can engage into, like milk production, milk processing and marketing. These opportunities would target dairy milk producers, processed milk industry and those that are engaged in trading.

Cagayan Valley Region has vast tracts of land suited for livestock production and some municipalities in the region has an established exotic forage pastures that ensure all year round availability of quality forages to feed the animals like dairy cattle and goat. This led the Region to consider dairy industry as one of its priority investment areas (DTI, 2017). The Department of Agriculture Regional Office 02 (DA-RFO 2) has also partnered with CSU Piat for the improvement of the livestock industry, particularly the forage genebank component.

The buffalo/carabao milk produced by the Philippine Carabao Center (PCC) and their partner farmers' cooperatives cannot sustain the demand of local consumers due to their limited milk production. Hence, the Cagayan State University administration, through technical support and collaborative efforts of the National Dairy Authority, DA, DA-BAR and other government and non-government agencies, wish to venture on cattle and goat dairy production Center as source of quality fresh milk and for processing purposes. Milk produced from the Center will surely bridge the gap on milk supply in the local and domestic market.

The Cagayan State University (CSU) in Piat, Cagayan had already established a small-scale dairy center, a component of its Agri-Eco-Tourism Center named as CSU Dairy Research and Training Center. At present, the dairy center has existing breeds of Holstein Fresian-Sahiwal (dairy cattle) and Saanen-Anglo-Nubian (dairy goat), which were imported from New Zealand through the National Dairy Authority (NDA) and secured from the DA Experimental Station in Nueva Vizcaya, respectively. The center also has its small-scale dairy processing plant that caters mostly only to the people in the university and in the neighboring communities.

### **Program/Project Implementation Strategies**

The roadmap of development of the Center is shown in Appendix A. A Five Year Developmental Plan (Appendix B) was prepared by the pool of researchers and extension workers in support for the developmental activities in the center for the next five years. The activities listed below are the highlights of the activities and strategies along research, development and extension.

#### **1. Upgrading and repair of dairy farm structures/facilities and research and processing laboratory**

One of the priorities of the Center is the establishment of farm structures and dairy processing facilities such as dairy barn, milking parlor and processing laboratory which should be put in place to facilitate milking operation and processing of milk in the institution. This will likewise serve as venue for skills development in dairying for farmers, students and employees and other interested dairy entrepreneurs in the region.

#### **2. Stock procurement**

One of the major concerns of the Center is to establish a sustainable dairy enterprise in the institution and in the nearby communities to enhance the production of milk supply

locally. Along this line, 25 heads of high producing breed of milk of dairy cattle like Holstein Fresian and 25 heads of dairy goat (Saanen breed) will be procured as additional production stock and source of quality milk in the institution.

### **3. Palit-Baka Scheme of Distribution of Dairy Animals**

The Palit-Baka Scheme of Distribution of Dairy Animals refers to the program whereby the Center distributes potential dairy animals to new but eligible and qualified participants who, within a certain period of time, would resort to a payment-in-kind by way of female dairy animals.

### **4. Dairy training, milk collection and processing**

Dairy farmers and other entrepreneurs engage in dairying will be provided with technical skills training especially in dairy production management, milk processing and marketing aspect to enhance their skills and potentials to be more efficient in dairy management and in producing quality dairy products.

### **5. Dairy products**

The Center shall produce the following dairy products:

1. Fresh milk
2. Flavored milk (choco, strawberry, mango, pandan)
3. Pastillas de leche
4. Kesong puti
5. Yoghurt
6. Milk candy
7. Milk-o-gel
8. Others

### **6. Marketing**

#### **a) Target market**

The target markets of the products are the direct consumers, store owners, groceries, travelers, and processors.

Commodity/Banner Program: **Dairy**

Campus: **Piat Campus**

CSU Piat Dairy Road Map (January 2018 – December 2022)

| <b>Parameters</b>                                  | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> | <b>2022</b> |
|----------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Forage and pasture development (ha)                | 14          | 17          | 20          | 23          | 26          |
| Herbage yield of forage per hectare (t/ha)         | 30          | 40          | 50          | 60          | 70          |
| Milking cows (heads)                               | 15          | 20          | 30          | 40          | 50          |
| Grazing areas (ha)                                 | 30          | 40          | 50          | 60          | 70          |
| Daily Milk Yield (kg/dairy cow)                    | 6           | 9           | 12          | 15          | 18          |
| Dairy products (processed/packageged)              | 3           | 5           | 7           | 8           | 10          |
| Milk distribution coverage/buyers (various buyers) | 5           | 8           | 15          | 15          | 15          |
| Dispersed dairy cattle (heads)                     | -           | -           | 5           | 10          | 15          |
| Recipient dairy cattle (dairy farmers)             | -           | -           | 5           | 21          | 15          |
| Dairy cooperatives (organized dairy farmers)       | -           | -           | 1           | 2           | 3           |
| Federated dairy cooperatives (federated coop)      | -           | -           | -           | 1           | 2           |
| Enhanced food security (%)                         | 5           | 10          | 15          | 20          | 25          |
| Improved Poverty Alleviation and Social Equity (%) | 5           | 10          | 15          | 20          | 25          |
| Enhanced Income and Profitability (%)              | 5           | 10          | 15          | 20          | 25          |
| Enhanced Sustainability                            | 5           | 10          | 15          | 20          | 25          |

| Priorities/<br>Research<br>Area                                                                    | Program/Project/Study                                                                                     | TIMEFRAME                                                                          |                                                                                     |      |                                                                                    |      | EXPECTED OUTPUT                                                                                                 |                                                   |                                                        |      |      |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------|------|------|
|                                                                                                    |                                                                                                           | 2018                                                                               | 2019                                                                                | 2020 | 2021                                                                               | 2022 | 2018                                                                                                            | 2019                                              | 2020                                                   | 2021 | 2022 |
| Agriculture<br>for Food<br>Security and<br>Poverty<br>Alleviation<br><br>-Livestock<br>and Poultry | <b>Program 1: Genetic Improvement of Dairy Animals (Cattle and Goat)</b>                                  |  |                                                                                     |      |                                                                                    |      | Breed improvement of cattle and goat                                                                            |                                                   |                                                        |      |      |
|                                                                                                    | <b>Project 1.1 Dairy Cattle Productivity Enhancement through Genetic Improvement of Native Stocks</b>     |  |                                                                                     |      |                                                                                    |      | Increased dairy milk production through genetic improvement of native stocks into dairy-type cattle into stocks |                                                   |                                                        |      |      |
|                                                                                                    | Study 1.1.1<br>Evaluation of the Reproductive Performance of Upgraded Native Cows                         |                                                                                    |                                                                                     |      |  |      |                                                                                                                 |                                                   | Determined reproductive performance of upgraded stocks |      |      |
|                                                                                                    | Study 1.1.2<br>Identification of milk related genes through genotyping and gene mapping                   |                                                                                    |                                                                                     |      |  |      |                                                                                                                 |                                                   | Identified genes related to milk production increase   |      |      |
|                                                                                                    | <b>Project 1.2 Enhancing Dairy Goat Productivity in Piat</b>                                              |                                                                                    |                                                                                     |      |                                                                                    |      | Increased dairy milk production through genetic improvement of native stocks into dairy-type goat into stocks   |                                                   |                                                        |      |      |
|                                                                                                    | Study 1.2.1<br>Effects of Different Feeding System on Saanen Breed Dairy Goat                             |                                                                                    |  |      |                                                                                    |      |                                                                                                                 | Determined the best feeding system for dairy goat |                                                        |      |      |
|                                                                                                    | Study 1.2.2<br>Milk Quality Testing of Saanen Breed Dairy Goat as Affected by Improved Feeding Strategies |                                                                                    |  |      |                                                                                    |      |                                                                                                                 | Identified the best feeding strategies            |                                                        |      |      |

|  |                                                                                                      |  |                                                                                      |  |  |  |  |                                                                                                                |  |  |  |
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|  |                                                                                                      |  |                                                                                      |  |  |  |  | based on milk quality                                                                                          |  |  |  |
|  | Study 1.2.3<br>Effects of Napier Concentrate Ratio on Milk Yield of Saanen Breed of Dairy Goat       |  |     |  |  |  |  | Developed Napier-based feeds for Saanen-bred goat                                                              |  |  |  |
|  | <b>Program 2:</b><br><b>Feeding and Forage Production Research and Development</b>                   |  |    |  |  |  |  |                                                                                                                |  |  |  |
|  | <b>Project 2.1</b><br>Water Harvesting Technologies                                                  |  |     |  |  |  |  | Established a sustainable and efficient water system for the dairy Center (forage production and pasture area) |  |  |  |
|  | <b>Project 2.2</b><br>Grassland and Feed Resource Conservation Management and Utilization in Cagayan |  |    |  |  |  |  | Established forage genebank and technologies for forage and pasture management in Cagayan                      |  |  |  |
|  | <b>Project 2.3</b><br>Total Mixed Ration (TMR): Enhancing Dairy Cattle Productivity in CSU-Piat      |  |    |  |  |  |  | Identified the best Total Mixed Ration (TMR) to enhance dairy cattle productivity                              |  |  |  |
|  | <b>Project 2.4</b><br>Enhancing Dairy Goat Productivity Through Improved Feeding Strategies          |  |  |  |  |  |  | Developed feeding strategies for sustainable and improved dairy goat productivity                              |  |  |  |
|  | Study 2.4.1<br>Analysis of the Nutritive Quality of EM-Treated Silage                                |  |   |  |  |  |  | Determined quality of EM-treated silage                                                                        |  |  |  |

|  |                                                                                                             |  |                                                                                      |  |  |  |                                                     |                                                                                               |  |  |  |
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|  | Study 2.4.2<br>Effect of EM-based Silage<br>as Feeds for Saanen<br>Breeds                                   |  |     |  |  |  | Identified<br>efficiency of<br>EM-treated<br>silage |                                                                                               |  |  |  |
|  | Study 2.4.3<br>Feeds Development<br>derived from Leguminous<br>Forages to Increase Dairy<br>Goat Production |  |     |  |  |  |                                                     | Developed<br>leguminous<br>forage-based<br>feeds for<br>increased<br>dairy goat<br>production |  |  |  |
|  | Study 2.4.4<br>Online Dairy Goat Record<br>Management System                                                |  |     |  |  |  |                                                     | Developed<br>online<br>system for<br>dairy goat<br>inventory                                  |  |  |  |
|  | Study 2.4.5<br>IEC Material Development                                                                     |  |    |  |  |  |                                                     | IEC materials developed                                                                       |  |  |  |
|  | Study 2.4.6<br>Capability Building/<br>Information Dissemination                                            |  |    |  |  |  |                                                     | Technology and information disseminated and<br>extended to target clientele                   |  |  |  |
|  | Study 2.4.7<br>Techno Demo<br>Establishment                                                                 |  |    |  |  |  |                                                     | Technology and information disseminated and<br>extended to target clientele                   |  |  |  |
|  | <b>Program 3:</b><br><b>Dairy Climate Change<br/>Adaptation &amp; Mitigation<br/>Research</b>               |  |  |  |  |  |                                                     |                                                                                               |  |  |  |
|  | <b>Project 3.1</b><br>Greening the Dairy<br>Industry                                                        |  |  |  |  |  |                                                     |                                                                                               |  |  |  |
|  | <b>Project 3.2</b><br>Solar Energy Integration in<br>Dairy Production                                       |  |  |  |  |  |                                                     | Established solar-powered irrigation and other<br>technologies for the dairy center           |  |  |  |

|  |                                                                                                                                             |  |                                                                                     |  |  |  |                                                                                                       |                                                                                                             |  |  |
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|  | <b>Project 3.3</b><br>Agri-based Biogas<br>Generation and By-<br>Products Utilization<br>Improvement                                        |  |    |  |  |  |                                                                                                       | Established agri-based<br>biogas generation<br>technology and utilized<br>this for agricultural<br>purposes |  |  |
|  | <b>Program 4.</b><br><b>Product Processing and<br/>Development</b>                                                                          |  |   |  |  |  | Generated income for the university                                                                   |                                                                                                             |  |  |
|  | <b>Project 4.1</b><br>Processing of High-Value<br>Agricultural Commodities<br>(3Ms – Mango, Meat and<br>Milk) into High Quality<br>Products |  |   |  |  |  | Developed products from agricultural commodities (mango, meat and<br>milk) into high quality products |                                                                                                             |  |  |
|  | <b>Project 4.2</b><br>Economics of Milk<br>Processing of the CSU<br>Dairy Center                                                            |  |    |  |  |  | Determined the feasibility and<br>the possible income that will be<br>generated by the project        |                                                                                                             |  |  |
|  | <b>Project 4.3</b><br>Physico-chemical,<br>Functional and Sensory<br>Properties of Lubeg-<br>Flavored Yoghurt                               |  |    |  |  |  | Identified<br>the needed<br>information<br>for the<br>development<br>of lubeg-<br>flavored<br>yoghurt |                                                                                                             |  |  |
|  | <b>Project 4.4</b><br>Development of Lubeg-<br>flavored ‘pastillas de<br>leche’ with Probiotics<br>(Lactobacillus paracasei)                |  |  |  |  |  | Developed<br>of Lubeg-<br>flavored<br>‘pastillas de<br>leche’ with<br>Probiotics                      |                                                                                                             |  |  |
|  | <b>Project 4.5</b>                                                                                                                          |  |  |  |  |  | Developed<br>coconut milk                                                                             |                                                                                                             |  |  |

|  |                                                                                                                                      |  |  |  |  |  |  |                                                                                                                 |  |  |  |
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|  | Utilization and processing of coconut milk into white soft cheese.                                                                   |  |  |  |  |  |  | into white soft cheese                                                                                          |  |  |  |
|  | <b>Project 4.6</b><br>Feedmill Establishment                                                                                         |  |  |  |  |  |  | Established feedmill for dairy animals for decreased production cost and increased income                       |  |  |  |
|  | <b>Program 5.</b><br><b>Dairy Marketing, Promotion and Extension</b>                                                                 |  |  |  |  |  |  | Commercialized products for increased income of farmers and the institution                                     |  |  |  |
|  | <b>Project 5.1</b><br>Development commercialization of CSU Piat Lubeg-Flavored Yoghurt                                               |  |  |  |  |  |  | Developed and Commercialized lubeg-flavored yoghurt                                                             |  |  |  |
|  | <b>Project 5.2</b><br>Developing an Agri-Eco-Tourism Farm to Promote Awareness on Dairy Production and Processing.                   |  |  |  |  |  |  | Promoted agri-eco-tourism in the region                                                                         |  |  |  |
|  | <b>Project 5.3</b><br>Mobilization of New Farming Techniques through the Development of Agricultural Knowledge Products in Region II |  |  |  |  |  |  | Developed agricultural knowledge products to mobilize new farming techniques in dairy production and processing |  |  |  |
|  | <b>Program 6.</b><br><b>Dairy GADliness Research</b>                                                                                 |  |  |  |  |  |  | Promote GAD in research, development and extension and other related undertakings of the dairy center           |  |  |  |

|  |                                                                                          |  |                                                                                   |  |  |  |  |                                                     |  |  |  |
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|  | <b>Project 6.1</b><br>Training Needs of Women Dairy Farmers of Selected Areas of Cagayan |  |  |  |  |  |  | Assessed training needs of dairy growers in Cagayan |  |  |  |
|  | <b>Project 6.2</b><br>Socio-economic Upliftment of participating women in dairy farming  |  |  |  |  |  |  | Uplifted economic status dairy growers              |  |  |  |
|  | <b>Project 6.3</b><br>Training of Women Dairy Farmers in Selected Areas of Cagayan       |  |  |  |  |  |  | Capacitated dairy growers                           |  |  |  |
|  | <b>Project 6.4</b><br>Fresh Milk Handling Practices of Dairy Women                       |  |  |  |  |  |  | Assessed fresh milk handling of women and men       |  |  |  |

## Appendix H.

### **Sanchez Mira Campus RDE Banner Programs and Projects 2018-2022**

The Cagayan State University at Sanchez Mira is mandated to promote research and extension services along its banner program on **organic agriculture** needed in the social, cultural, health, environmental, educational, and economic development of Northwestern Cagayan.

Through cross-college collaboration, external linkages and multidisciplinary approach, CSU at Sanchez Mira came up with a research agenda that are aligned with the current thrusts of the Philippine agenda, the regional agenda, its partner agencies, and as mandated by its charter with the following goals and objectives to work on for the next five years.

#### **Goal:**

To advance organic agriculture through research, innovation, development, and technology transfer while addressing food safety and security, climate change and degrading natural resources in Northwestern Cagayan.

#### **Objectives:**

To achieve the above goal, the CSU-SM RDE shall pursue the following objectives:

1. To disseminate, apply, and implement innovations and scientific knowledge consistent with the principles of organic agriculture;
2. To produce new and organically grown products, and processing technologies for waste utilization in the production of marketable products;
3. To design, develop and fabricate appropriate facilities, machineries, equipment, and tools for production, harvesting, processing and packaging of organic products;
4. To develop knowledge and technology information system and intensify technology transfer and commercialization in the University
5. To provide continuing education programs for farmers, students, specialists and extension workers on organic Agriculture through coordination with line agencies

#### **Challenges**

The pressing challenges in the implementation of the banner program include the following:

1. Instilling a research culture and research vocation among faculty and students;  
and
2. Improving the research capability of faculty, research staff and students;
3. Increasing research productivity and raising research quality and impact

#### 4. Providing institutional support for the research program

##### Plan Strategy

These are some ways in which sustainable organic agriculture could be enhanced:

1. **By ensuring immediate benefits:** While environmental soundness and resilience are paramount, farmers must experience an immediate benefit if they are going to change their practice. Only then can it be sustainable in the long term. Getting benefits from sustainable organic agriculture is not always quick though, as it takes time for new approaches to be adapted to different agroecological and socio-economic conditions and to show their impacts: rebuilding organic matter dramatically improves soil fertility and moisture, but it can take two or more years for this to happen. Improved variety of organic products that perform even better if grown using conservation practices could provide an incentive for farmers to adopt conservation agriculture. Improved access to market can also trigger farmers' motivation to invest in organic agriculture.
2. **By providing intermediate, appropriate technology:** To be attractive, sustainable practices need to be technically as well as economically efficient. Intermediate technological solutions such as light machinery and affordable tools can encourage small-scale farmers to test them. New tools and practices can be better tested to the local conditions through participatory research.
3. **By carrying out research and technical assistance:** Farmers know a lot, but they may not know about alternative options if these have not been introduced to them. Research and technical extension staff need additional resources to reach more farmers, and they need more training on 'non-conventional' farming methods and on innovative ways to share their knowledge.
4. **By Increasing coordination and planning:** Opportunities for open and honest conversation on sustainable organic agriculture should be provided to stakeholders. Although many of these actors already work on sustainable practices, their impact could be amplified by fostering synergies, making interventions more consistent and avoiding duplication of efforts.
5. **By increasing policy support and leadership:** Addressing technical and financial constraints is important, but policy coherence is essential for scaling-up. One way to reinforce policy advocacy for sustainable agriculture is by producing and consolidating evidence of its benefits, in contrast with the negative impacts of high-input intensive monocultures. A better shared understanding of these issues would provide common ground for local leader to pursue the changes that are needed in agricultural policy and practice.

| Priorities /Res. Area           | Program/Project/Study                                                                                                                                          | Timeframe                                                                                                                                                                                                                                                             |                                                                                                                                                                                      |                                                                                                                                                                |                                                                                                                                                      |                                                                                                          | Expected Output                                                                                                                                                                        |                                                                                                                                                                                                               |                                                                                                                                                                   |                                                                                                                                                         |                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
|                                 |                                                                                                                                                                | 2018                                                                                                                                                                                                                                                                  | 2019                                                                                                                                                                                 | 2020                                                                                                                                                           | 2021                                                                                                                                                 | 2022                                                                                                     | 2018                                                                                                                                                                                   | 2019                                                                                                                                                                                                          | 2020                                                                                                                                                              | 2021                                                                                                                                                    | 2022                                                                                           |
| Sustainable Organic Agriculture | <ul style="list-style-type: none"> <li>conservation of indigenous vegetable crops, tropical fruit trees, ornamentals and forages and stingless bees</li> </ul> | <ul style="list-style-type: none"> <li>collect different organic/indigenous vegetable varieties</li> <li>establish initial organic crop gene bank</li> <li>varietal trial of different varieties of organic crops and analysis of soil samples once a year</li> </ul> | <ul style="list-style-type: none"> <li>Establish organic crop gene bank</li> <li>Experiment on organic crops, ornamentals and forages and analyze soil sample once a year</li> </ul> | <ul style="list-style-type: none"> <li>Establish experiment on organic crops, ornamentals and forages and analyze soil sample once a year</li> <li></li> </ul> | <ul style="list-style-type: none"> <li>Establish experiment on organic crops, ornamentals and forages and analyze soil sample once a year</li> </ul> | <ul style="list-style-type: none"> <li>Publish 4 papers on organic production</li> </ul>                 | <ul style="list-style-type: none"> <li>enhanced collection of different organic/indigenous vegetable varieties</li> <li>started the establishment of organic crop gene bank</li> </ul> | <ul style="list-style-type: none"> <li>established organic crop gene bank</li> <li>Established experiment on organic crops, ornamentals and forages and analyzed soil sample once a year</li> <li></li> </ul> | <ul style="list-style-type: none"> <li>Established experiment on organic crops, ornamentals and forages and analyzed soil sample once a year</li> <li></li> </ul> | <ul style="list-style-type: none"> <li>Established experiment on organic crops, ornamentals and forages and analyzed soil sample once a year</li> </ul> | <ul style="list-style-type: none"> <li>Published 4 papers on organic production</li> </ul>     |
|                                 | <ul style="list-style-type: none"> <li>Develop and improve organic livestock based integrated</li> </ul>                                                       | <ul style="list-style-type: none"> <li>Establish treatments for organic crop-organic-livestock model to popularize</li> </ul>                                                                                                                                         | <ul style="list-style-type: none"> <li>Apply treatments, record yield data</li> <li>Continue</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>Apply treatments, record yield data</li> <li>Continue</li> </ul>                                                        | <ul style="list-style-type: none"> <li>Apply treatments, record yield data</li> <li>Continue organic crop-</li> </ul>                                | <ul style="list-style-type: none"> <li>Publish 4 papers on organic crop-livestock integration</li> </ul> | <ul style="list-style-type: none"> <li>Established treatments for organic crop-organic-livestock model to popularize</li> </ul>                                                        | <ul style="list-style-type: none"> <li>Applied treatments, recorded yield data</li> <li>Continue organic</li> </ul>                                                                                           | <ul style="list-style-type: none"> <li>Applied treatments, record yield data</li> <li>Continue</li> </ul>                                                         | <ul style="list-style-type: none"> <li>Applied treatments, record yield data</li> <li>Continue organic crop-</li> </ul>                                 | <ul style="list-style-type: none"> <li>Published 4 papers on organic crop-livestock</li> </ul> |

|  | farming systems                                                                                                | organic crop-livestock farming                                                                                                                                                                                                                                                 | organic crop-livestock trials                                                                                                                                                                                                                         | organic crop-livestock trials                                                                                                                                                                                                                         | livestock trials                                                                                                                                                                                                                                                               |                                                                                          | organic crop-livestock farming                                                                                                            | crop-livestock trials | organic crop-livestock trials | livestock trials | integration |
|--|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------|------------------|-------------|
|  | <ul style="list-style-type: none"> <li>Develop and improve intercropping models and farming systems</li> </ul> | <ul style="list-style-type: none"> <li>Record growth and yield data of different organic crops intercropped with tropical fruits with stingless bees</li> <li>Apply treatments and record growth and yield data of different organic crops and analyze soil samples</li> </ul> | <ul style="list-style-type: none"> <li>Record growth and yield data of different organic crops intercropped with tropical fruits with stingless bees</li> <li>Apply treatments and record growth and yield data of different organic crops</li> </ul> | <ul style="list-style-type: none"> <li>Record growth and yield data of different organic crops intercropped with tropical fruits with stingless bees</li> <li>Apply treatments and record growth and yield data of different organic crops</li> </ul> | <ul style="list-style-type: none"> <li>Record growth and yield data of different organic crops intercropped with tropical fruits with stingless bees</li> <li>Apply treatments and record growth and yield data of different organic crops and analyze soil samples</li> </ul> | <ul style="list-style-type: none"> <li>Publish 4 papers on organic production</li> </ul> | <ul style="list-style-type: none"> <li>Different organic vegetables intercropped with tropical fruit trees with stingless bees</li> </ul> |                       |                               |                  |             |

|  |                                                                             |                                                                                                                                              |                                                                                                                                                                                                                                             |                                                                                                              |                                                                                                                              |                                                                                                                                                                                            |                                                                                                                                                                   |                                                                                                                                                                                                                                                          |                                                                                                                 |                                                                                                                              |                                                                                                                                                                                                                                                               |
|--|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                             |                                                                                                                                              | and<br>analyz<br>e soil<br>sample<br>s                                                                                                                                                                                                      | and<br>analyze<br>soil<br>sample<br>s                                                                        |                                                                                                                              |                                                                                                                                                                                            |                                                                                                                                                                   |                                                                                                                                                                                                                                                          |                                                                                                                 |                                                                                                                              |                                                                                                                                                                                                                                                               |
|  | <ul style="list-style-type: none"><li>• Soil and water management</li></ul> | <ul style="list-style-type: none"><li>• Irrigation requirements for organic crops</li><li>• Formulate new organic fertilizer mixer</li></ul> | <ul style="list-style-type: none"><li>• Complete 14 pick recordings</li><li>• Collect and analyze soil samples and leaf samples</li><li>• Treatment applications for experiments</li><li>• Analyze drainage samples and fertilize</li></ul> | <ul style="list-style-type: none"><li>• Conduct experimental trials</li><li>• Produce publications</li></ul> | <ul style="list-style-type: none"><li>• Make irrigation and fertilizer recommendations for organic crop production</li></ul> | <ul style="list-style-type: none"><li>• Publish 5 research articles on soil and water management of organic crops</li><li>• Quantify nutrient losses from fertilizer application</li></ul> | <ul style="list-style-type: none"><li>• Irrigation recommendation for organic crops</li><li>• Recommendations of locally available fertilizer materials</li></ul> | <ul style="list-style-type: none"><li>• Completed 14 pick recordings</li><li>• Collected and analyzed soil samples and leaf samples</li><li>• Treatment application for experiments</li><li>• Analyzed drainage samples and fertilizer samples</li></ul> | <ul style="list-style-type: none"><li>• Conducted experimental trials</li><li>• Produced publications</li></ul> | <ul style="list-style-type: none"><li>• Made irrigation and fertilizer recommendations for organic crop production</li></ul> | <ul style="list-style-type: none"><li>• Published 5 research article on soil and water management of organic crops</li><li>• Quantified nutrient losses from fertilizer application</li><li>• Came up with new experiment on fertilizer application</li></ul> |

|                                             |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                 |                                                                                                                                                                                                                                 |                                                                                                            |                                                                                                                             |                                                                                                                   |                                                                                                                                                                |                                                                                                            |                                                                     |                                                                                                                                                                                                                                     |
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|                                             |                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                 | r<br>sample<br>s                                                                                                                                                |                                                                                                                                                                                                                                 |                                                                                                            |                                                                                                                             |                                                                                                                   |                                                                                                                                                                |                                                                                                            |                                                                     |                                                                                                                                                                                                                                     |
| Environ<br>ment<br>and<br>Climate<br>Change | <ul style="list-style-type: none"> <li>Adaption and Mitigation to Climate Change Effects to Reduce Vulnerability of Organic Crops and Animals to Climate Change</li> <li>Disaster preparedness and risk reduction management among organic farmers</li> </ul> | <ul style="list-style-type: none"> <li>Vulnerability indices of the crop growing areas in Cagayan</li> <li>Potential use of organic intercropping for climate change mitigation</li> <li>Waste management and utilization</li> <li>Assess disaster preparedness and management among organic farmers</li> </ul> | <ul style="list-style-type: none"> <li>Continuation of vulnerability assessment</li> <li>Conduct climate change impact assessment on organic farming</li> </ul> | <ul style="list-style-type: none"> <li>Prepare indices for North-western Cagayan</li> <li>Collect monthly field data</li> <li>Prepare data base</li> <li>Conduct climate change impact assessment on organic farming</li> </ul> | <ul style="list-style-type: none"> <li>Prepare indices for e Cagayan</li> <li>Prepare data base</li> </ul> | <ul style="list-style-type: none"> <li>Started vulnerability assessment of crop areas of the province of Cagayan</li> </ul> | <ul style="list-style-type: none"> <li>Continued assessment on climate change vulnerability of Cagayan</li> </ul> | <ul style="list-style-type: none"> <li>Prepared indices for North-western Cagayan</li> <li>Collected monthly field data</li> <li>Prepared data base</li> </ul> | <ul style="list-style-type: none"> <li>Prepared indices for Cagayan</li> <li>Prepared data base</li> </ul> | <ul style="list-style-type: none"> <li>Published article</li> </ul> | <ul style="list-style-type: none"> <li>Vulnerability indices of the Crop growing areas in Cagayan</li> <li>Assessed drought risk organic crops</li> <li>Identified degree of drought tolerance of organic crop varieties</li> </ul> |

|                                                                   |                                                                                                                                                                                                             |                                                                                                                                                                                                                                         |                                                                                                                                                 |                                                                                                                                                 |                                                                                                                                                 |                                                                                            |                                                                                                                                                                             |                                                                                                                                                                                  |                                                                                                                                                  |                                                                                                                                                  |                                                                                                                                    |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Micro, Small, Medium Enterprises (MSMEs, informal sectors)        | <ul style="list-style-type: none"> <li>• Development of profitable production technology packages on organic products</li> <li>• Establishment of village level enterprises for organic products</li> </ul> | <ul style="list-style-type: none"> <li>• Development of production technology packages on organic products</li> </ul>                                                                                                                   | <ul style="list-style-type: none"> <li>• Value adding on organic products</li> </ul>                                                            | <ul style="list-style-type: none"> <li>• Establish common quality standards for various organic products and processes</li> </ul>               | <ul style="list-style-type: none"> <li>• Production of value added organic products</li> </ul>                                                  | <ul style="list-style-type: none"> <li>• Prepare cook book for organic products</li> </ul> | <ul style="list-style-type: none"> <li>• Developed production technology packages on organic products</li> </ul>                                                            | <ul style="list-style-type: none"> <li>• Produced value-added organic products</li> </ul>                                                                                        | <ul style="list-style-type: none"> <li>• Established common quality standards for various organic products and processes</li> </ul>              | <ul style="list-style-type: none"> <li>• Produced value-added organic products</li> <li>• Improved product quality</li> </ul>                    | <ul style="list-style-type: none"> <li>• Prepared cook book for organic products</li> <li>• Published research products</li> </ul> |
| Capacity Development (institution, faculty, Students and farmers) | <ul style="list-style-type: none"> <li>• Establishment of organic farm school</li> <li>• Development and validation of instructional materials on organic agriculture</li> </ul>                            | <ul style="list-style-type: none"> <li>• Train and provide hands-on experience to faculty, students, farmers and to small and medium scale entrepreneurs to develop own industries</li> <li>• Train 1000 trainees on organic</li> </ul> | <ul style="list-style-type: none"> <li>• Provide training on organic product production and value addition to farmers and housewives</li> </ul> | <ul style="list-style-type: none"> <li>• Provide training on organic product production and value addition to farmers and housewives</li> </ul> | <ul style="list-style-type: none"> <li>• Provide training on organic product production and value addition to farmers and housewives</li> </ul> | <ul style="list-style-type: none"> <li>• At least 5 technology adapters</li> </ul>         | <ul style="list-style-type: none"> <li>• Established an organic farm school</li> <li>• Developed and validated of instructional materials on organic agriculture</li> </ul> | <ul style="list-style-type: none"> <li>• Trained and provide hands-on experience to faculty, students, farmers and to small and medium scale entrepreneurs to develop</li> </ul> | <ul style="list-style-type: none"> <li>• Provided training on organic product production and value addition to farmers and housewives</li> </ul> | <ul style="list-style-type: none"> <li>• Provided training on organic product production and value addition to farmers and housewives</li> </ul> | <ul style="list-style-type: none"> <li>• At least 5 technology adopters</li> </ul>                                                 |

|                              |                                                                                                   |                                                                                                                                     |                                                                                                                                   |                                                                                                                                    |                                                                                                      |                                                                                                                                                |                                                                                                                                           |                                                                                                                                                                                       |                                                                                                                              |                                                                                                                                                                  |                                                                                |
|------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                              |                                                                                                   | food manufacturing <ul style="list-style-type: none"> <li>• Train 300 people on production and value addition</li> </ul>            |                                                                                                                                   |                                                                                                                                    |                                                                                                      |                                                                                                                                                |                                                                                                                                           | own industries <ul style="list-style-type: none"> <li>• Trained 1000 trainees on organic food manufacturing</li> <li>• Trained 300 people on production and value addition</li> </ul> |                                                                                                                              |                                                                                                                                                                  |                                                                                |
| Manufacturing and production | Development of a computerized networking system for farmers and entrepreneurs of organic products | <ul style="list-style-type: none"> <li>• Establishment of workstation facilities connected on a local area network (LAN)</li> </ul> | <ul style="list-style-type: none"> <li>• Provide an environment for storage and retrieval of both structured and semi-</li> </ul> | <ul style="list-style-type: none"> <li>• Development of a system for collection, organization, storage and retrieval of</li> </ul> | <ul style="list-style-type: none"> <li>• Establishment On-line shop for organic products.</li> </ul> | <ul style="list-style-type: none"> <li>• Development of interpersonal communications allowing farmers and entrepreneurs communicate</li> </ul> | <ul style="list-style-type: none"> <li>• Developed a system for collection, organization, storage and retrieval of information</li> </ul> | <ul style="list-style-type: none"> <li>• Established On-line shop for organic products .</li> </ul>                                                                                   | <ul style="list-style-type: none"> <li>• Developed strong systems and guidelines to list products on organic shop</li> </ul> | <ul style="list-style-type: none"> <li>• Developed interpersonal communications allowing farmers and entrepreneurs communicate efficiently and easily</li> </ul> | <ul style="list-style-type: none"> <li>• New technologies developed</li> </ul> |

[illegible]

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## **Appendix I.**

### **Research, Development and Extension Agenda Natural Product Research and Innovation Center (NPRIC)**

Goal: To become a production center for personal and home care products, herbal formulations, functional and fortified food products, biofertilizers, and biopesticides.

#### Objectives:

1. Generation of New Natural Product Knowledge
2. New and Improved Natural Product Technology
3. Production of Raw Materials for Developed Natural Product Technology
4. Commercialization of New and Improved Natural Product Technology including Training on New and Improved Natural Product Technologies Generated

#### Challenges:

1. Research for Development and Extension Skills of the Faculty Researchers, namely:
  - a. Research skills
  - b. Product development skills
  - c. Extension skills
  - d. Writing for publication skills
2. Lack of Laboratories (Analytical Chemistry and Cell Culture Laboratories w/ Complete Equipment) for the conduct of the protocols of the Center
3. Additional Funding Sources
4. Procurement concerns particularly delivery concerns especially for chemicals with reagent/technical grade,

#### Plan strategy:

1. Research Capacity Building particularly on the following:
  - a. Research skills
  - b. Product development skills
  - c. Extension skills
  - d. Writing for publication skills
2. Propose for a Laboratory Building under Tier 2 DBM Funding or CHED Institutional Development Program or any other funding agency with an Analytical Chemistry Laboratory, a Cell Culture Laboratory, an Animal House and a Product Development Laboratory complete with equipment.
3. Create research collaboration with funding agencies like PCHRD, PITAHC, CHED, DA, DA-BAR and other funding agencies.
4. Start the procurement process before the first month of the Fiscal Year so that the purchase request will be implementation ready.

Natural Product Research and Innovation Center

University Wide

Expected Outcomes: Products, Utility Models, Publication, Researchers with Track Records on Specializations

| Priorities/<br>Research<br>Area | Program/Project/Study                                                                            | TIMEFRAME |      |      |      |      | EXPECTED OUTPUT                                                                                                                                                                                                                                                                                              |      |      |      |      |
|---------------------------------|--------------------------------------------------------------------------------------------------|-----------|------|------|------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
|                                 |                                                                                                  | 2018      | 2019 | 2020 | 2021 | 2022 | 2018                                                                                                                                                                                                                                                                                                         | 2019 | 2020 | 2021 | 2022 |
| Health and<br>Nutrition         | <b>Project 1: The Profile, Bioactivity, and Innovation Potentials of Terrestrial Plants</b>      | X         | X    | X    | X    | X    |                                                                                                                                                                                                                                                                                                              |      |      |      |      |
|                                 | Study 1.1: The Morphological Characteristics of Terrestrial Plants                               | X         | X    | X    | X    | X    | Physical Characteristics of the Collection Areas<br>Physical, Chemical, and Microbial Characteristics of the Sediments in the Collection Areas]<br>Morphological Characteristics of the Selected Plants<br>Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Collection Areas |      |      |      |      |
|                                 | Study 1.2: The Chemical Characteristics of Terrestrial Plants                                    | X         | X    | X    | X    | X    | Type of Phytochemicals Present in Selected Plants<br>Amount of Phytochemicals Present in Selected Plants<br>Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Selected Plants                                                                                                 |      |      |      |      |
|                                 | Study 1.3: Cell Toxicity Assays of Selected Terrestrial Plants                                   | X         | X    | X    | X    | X    | Levels of Toxicity of the Extracts from Selected Plants on the Cells of the Liver, Intestines, Brain, Kidneys, and Other Sensitive Human Organs                                                                                                                                                              |      |      |      |      |
|                                 | Study 1.4: Acute Toxicity Assays of Selected Terrestrial Plants                                  | X         | X    | X    | X    | X    | Levels of Toxicity of the Extracts from Selected Plants on the Organs of Mice                                                                                                                                                                                                                                |      |      |      |      |
|                                 | Study 1.5: Anti – viral, Anti – bacterial, & Antifungal bioassays on Selected Terrestrial Plants | X         | X    | X    | X    | X    | Presence or Absence of Anti – Viral, Anti – Bacterial, and Antifungal Properties in the Extracts from Selected Plants                                                                                                                                                                                        |      |      |      |      |

|                         |                                                                                                           |   |   |   |   |   |                                                                                                                                                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------------------------------|---|---|---|---|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Health and Nutrition    | Study 1.6: Biological Markers of Metabolic Conditions Using Selected Terrestrial Plants                   | X | X | X | X | X | Presence or Absence of Biological Markers for Hyperuricemia, Hyperglycemia, Hyperlipidemia, Inflammation, High Blood Pressure, and other Metabolic Conditions in Target Cells Using Extracts from Selected Plants |
|                         | Study 1.7: Skin Irritation Assays of Selected Terrestrial Plants Using Rabbits                            | X | X | X | X | X | Presence or Absence of Anti Skin Irritants in the Extracts from Selected Plants                                                                                                                                   |
|                         | Study 1.8: Biological Assay for Allergic Rhinitis                                                         | X | X | X | X | X | Presence or Absence of Anti Allergic Rhinitis Properties in the Extracts from Selected Plants                                                                                                                     |
|                         | Study 1.9: Biological Assay for Urinary Tract Conditions                                                  | X | X | X | X | X | Presence or Absence of Anti Urinary Tract Conditions in the Extracts from Selected Plants                                                                                                                         |
| Agriculture & Fisheries | Study 1.10: Pesticidal Properties of the Extracts from Terrestrial Plants                                 | X | X | X | X | X | Presence or Absence of Pesticidal Properties in the Extracts from Selected Plants                                                                                                                                 |
| Health and Nutrition    | Study 1.11: Product Development for Personal Care and Home Care Products From Selected Terrestrial Plants | X | X | X | X | X | Developed Personal and Home Care Products Utilizing Extracts from Selected Plants                                                                                                                                 |
|                         | Study 1.12: Product Development for Herbal Formulations                                                   | X | X | X | X | X | Developed Products for the Mitigation of Viral and Microbial Infections, Metabolic Conditions, Skin Irritation, Allergic Rhinitis, Urinary Tract Conditions, etc.                                                 |
|                         | Study 1.13: Development of Functional Food                                                                | X | X | X | X | X | Developed Food Products from Indigenous Plant Sources                                                                                                                                                             |
|                         | Study 1.13: Development of Fortified Food (Nutraceuticals)                                                | X | X | X | X | X | Fortified Food Products from Indigenous Plant Sources                                                                                                                                                             |
| Agriculture & Fisheries | Study 1.14: Development of Organic Pesticides                                                             | X | X | X | X | X | Development of Organic Pesticide from the Extracts of Selected Terrestrial Plants                                                                                                                                 |

|                         |                                                                                                      |   |   |   |   |   |                                                                                                                                                                                                                                                                                                         |  |  |  |  |
|-------------------------|------------------------------------------------------------------------------------------------------|---|---|---|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Agriculture & Fisheries | Project 2: The Profile, Bioactivity, and Innovation Potentials of Edible and Non - Edible Macroalgae | X | X | X | X | X |                                                                                                                                                                                                                                                                                                         |  |  |  |  |
|                         | The Morphological Characteristics of Edible and Non - Edible Macroalgae                              | X | X | X | X | X | Physical Characteristics of the Collection Areas<br>Physical, Chemical, and Microbial Characteristics of the Sediments in the Collection Areas]<br>Morphological Characteristics of the Macroalgae<br>Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Collection Areas |  |  |  |  |
|                         | The Chemical Characteristics of Selected Macroalgae                                                  | X | X | X | X | X | Type of Phytochemicals Present in Macroalgae<br>Amount of Phytochemicals Present in Macroalgae<br>Amount of Iron Present in Macroalgae<br>Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Macroalgae                                                                   |  |  |  |  |
| Health and Nutrition    | Cytotoxicity Assays                                                                                  | X | X | X | X | X | Levels of Toxicity of the Extracts from Macroalgae on the Cells of the Liver, Intestines, Brain, Kidneys, and Other Sensitive Human Organs                                                                                                                                                              |  |  |  |  |
|                         | Acute Toxicity Assays                                                                                | X | X | X | X | X | Levels of Toxicity of the Extracts from Macroalgae on the Organs of Mice                                                                                                                                                                                                                                |  |  |  |  |
|                         | Biological Activity Assays                                                                           | X | X | X | X | X | Presence or Absence of Biological Activity in Selected Macroalgae                                                                                                                                                                                                                                       |  |  |  |  |
|                         | Development of Herbal Teas for Mitigation of Iron Deficiency Anemia and other Metabolic Conditions   | X | X | X | X | X | Tea Products for Mitigation of Iron Deficiency Anemia and Other Metabolic Conditions from non – edible Macroalgae                                                                                                                                                                                       |  |  |  |  |
|                         | Development of Functional Food Products                                                              | X | X | X | X | X | Food Products from Edible Seaweeds                                                                                                                                                                                                                                                                      |  |  |  |  |
|                         | Development of Iron Fortified Food Products                                                          | X | X | X | X | X | Food Products with Iron Supplements from Non – Edible Seaweeds                                                                                                                                                                                                                                          |  |  |  |  |

|                                |                                                                                                                                   |   |   |   |   |   |                                                                                                                                                                                                                                                                                                               |  |  |  |  |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Agriculture and Fisheries      | Project 3: The Profile, Bioactivity, and Innovation Potentials of Mollusks                                                        | X | X | X | X | X |                                                                                                                                                                                                                                                                                                               |  |  |  |  |
|                                | Study 3.1: The Morphological Characteristics of Mollusks                                                                          | X | X | X | X | X | Physical Characteristics of the Collection Areas<br>Physical, Chemical, and Microbial Characteristics of the Sediments in the Collection Areas<br>Morphological Characteristics of the Selected Mollusks<br>Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Collection Areas |  |  |  |  |
|                                | Study 3.2: The Chemical Characteristics of Mollusks                                                                               | X | X | X | X | X | Type of Phytochemicals Present in Selected Mollusks<br>Amount of Phytochemicals Present in Selected Mollusks<br>Amount of Chitosan Extracted<br>Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Selected Plants                                                              |  |  |  |  |
| Health and Nutrition           | Study 3.3: Cell Toxicity Assays of Mollusks                                                                                       | X | X | X | X | X | Levels of Toxicity of the Extracts from Selected Mollusks on the Cells of the Liver, Intestines, Brain, Kidneys, and Other Sensitive Human Organs                                                                                                                                                             |  |  |  |  |
|                                | Study 3.4: Acute Toxicity Assays of Mollusks                                                                                      | X | X | X | X | X | Levels of Toxicity of the Extracts from Selected Plants on the Organs of Mice                                                                                                                                                                                                                                 |  |  |  |  |
|                                | Study 3.5: Development of Chitosan Based Products: Antimicrobial and Anti - hyperglycemia Products, Ointments, and other Products | X | X | X | X | X | Developed Chitosan Based Products                                                                                                                                                                                                                                                                             |  |  |  |  |
| Environment and Climate Change | Study 3.6: Development of Biodegradable Plastics and Organic Preservatives from Chitosan                                          | X | X | X | X | X | Developed Biodegradable Plastics and Organic Preservatives                                                                                                                                                                                                                                                    |  |  |  |  |
| Health and Nutrition           | Study 3.6: Development of Functional Food Products from Mollusks                                                                  | X | X | X | X | X | Developed Functional Food Products                                                                                                                                                                                                                                                                            |  |  |  |  |

|                                |                                                                                                                |   |   |   |   |   |                                                                                     |  |  |  |  |
|--------------------------------|----------------------------------------------------------------------------------------------------------------|---|---|---|---|---|-------------------------------------------------------------------------------------|--|--|--|--|
| Environment and Climate Change | Project 4: The Profile, Bioactivity, and Innovation Potentials of Isolated Beneficial Microbes                 | X | X | X | X | X |                                                                                     |  |  |  |  |
|                                | Study 4.1: Isolation and Efficacy Testing of Phosphate and Potassium Solubilizing and Nitrogen Fixing Microbes | X | X | X | X | X | Isolated Efficient Phosphate & Potassium and Nitrogen Fixing Beneficial Microbes    |  |  |  |  |
|                                | Study 4.2: Identification of Phosphate and Potassium Solubilizing and Nitrogen Fixing Microbes                 | X | X | X | X | X | Identified Phosphate & Potassium and Nitrogen Fixing Beneficial Microbes            |  |  |  |  |
| Agriculture and Fisheries      | Study 4.3: Biopesticidal Activity Assay on Isolated and Identified Microbes                                    | X | X | X | X | X | Presence or Absence of Biopesticidal Properties of Isolated and Identified Microbes |  |  |  |  |
|                                | Study 4.4: Biocontrol Properties of Isolated and Identified Microbes                                           | X | X | X | X | X | Presence or Absence of Biocontrol Properties of Isolated and Identified Microbes    |  |  |  |  |
|                                | Study 4.5: Development of Biofertilizers                                                                       | X | X | X | X | X | Developed Biofertilizers                                                            |  |  |  |  |
|                                | Study 4.6: Development of Biopesticides                                                                        | X | X | X | X | X | Developed Biopesticides                                                             |  |  |  |  |

## **Appendix J.**

### **Research and Development and Extension Agenda Geoscience and Disaster Risk Management Research and Development Center**

Goal: A climate change research and training center and serves as repository of up-to-date readily available and compatible geospatial data for researchers, planners and decision makers in Region 02.

#### **Objectives:**

1. To increase GIS users and practitioners to boost climate change adaptation and mitigation strategies in the region;
2. To increase researches with spatial attributes along building disaster resilient communities in the region;
3. To increase awareness of community residents through advocacies and technical assistance to improve climate change risks resiliency in the region;
4. To establish strong collaboration with researchers, local partners and the communities through a network of geospatial climate related information in the region.

| RESEARCH AND DEVELOPMENT PROJECT                                        | COMPONENT STUDIES                                                | R&D RESULTS UTILIZATION                    | TARGET DATE OF IMPLEMENTATION |      |      |      |      | RESPONSIBLE PERSON | BUDGET |  |
|-------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------|-------------------------------|------|------|------|------|--------------------|--------|--|
|                                                                         |                                                                  |                                            | 2016                          | 2017 | 2018 | 2019 | 2020 |                    |        |  |
| Thematic Area 1: HUMAN RESOURCE DEVELOPMENT                             |                                                                  |                                            |                               |      |      |      |      |                    |        |  |
| Project 1: Strengthening CSU competencies in GIS utilization            | Study 1: Survey of GIS Users and Practitioners in CSU            | Benchmark data to determine training needs |                               |      |      |      |      |                    |        |  |
|                                                                         | Study 2: Extent of GIS utilization in CSU Researches             |                                            |                               |      |      |      |      |                    |        |  |
| Project 2: Strengthening Local Partners Competencies in GIS utilization | Study 1: : Survey of GIS Users and Practitioners in Cagayan      |                                            |                               |      |      |      |      |                    |        |  |
|                                                                         | Study 2: Extent of GIS utilization of Researches                 |                                            |                               |      |      |      |      |                    |        |  |
|                                                                         | Study 3: Impact Assessment of GIS Competency Trainings Conducted |                                            |                               |      |      |      |      |                    |        |  |
| Project 3: Capability Building                                          | Conduct of Basic GIS Trainings                                   |                                            |                               |      |      |      |      |                    |        |  |

|                                                                    |                                                                                     |  |  |  |  |  |  |  |  |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
|                                                                    | Conduct of Advance GIS Trainings                                                    |  |  |  |  |  |  |  |  |
|                                                                    | Attendance to trainers training                                                     |  |  |  |  |  |  |  |  |
|                                                                    | Staff Development                                                                   |  |  |  |  |  |  |  |  |
| <b>Thematic Area 2: DISASTER PREVENTION and MITIGATION</b>         |                                                                                     |  |  |  |  |  |  |  |  |
| Project 1: Strengthening Climate Hazards Adaptation and Mitigation | Study 1: Asses Level of Awareness to Climate Hazards                                |  |  |  |  |  |  |  |  |
|                                                                    | Study 2: Assessment of Hazards Adaptation and Mitigation Practices                  |  |  |  |  |  |  |  |  |
|                                                                    | Study 3: Piloting hazard adaptation and mitigation technology packages              |  |  |  |  |  |  |  |  |
|                                                                    | Study 4: Impact Assessment of CCA and DRR initiatives                               |  |  |  |  |  |  |  |  |
| Project 1: Hazards Vulnerability and Risk Assessment               | Study 1: Vulnerability Analysis and Mapping of Representative Ecosystems in Cagayan |  |  |  |  |  |  |  |  |
|                                                                    | Study 2:                                                                            |  |  |  |  |  |  |  |  |

|                                                    |                                                                                                  |  |  |  |  |  |  |  |  |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
|                                                    | Risk Analysis and Mapping of Vulnerable Ecosystems in Cagayan                                    |  |  |  |  |  |  |  |  |
| <b>Thematic Area 3: DISASTER PREPAREDNESS</b>      |                                                                                                  |  |  |  |  |  |  |  |  |
| Project 1.<br>Public Awareness Campaign on CCA/DRR | Study 1.<br>Development of IEC Materials                                                         |  |  |  |  |  |  |  |  |
|                                                    | Hazard awareness campaign to communities                                                         |  |  |  |  |  |  |  |  |
|                                                    | Study 2.<br>IEC on Disaster Prevention                                                           |  |  |  |  |  |  |  |  |
|                                                    | Study 3.<br>IEC on DRR                                                                           |  |  |  |  |  |  |  |  |
|                                                    | Study 4.<br>IEC on CCAM to communities                                                           |  |  |  |  |  |  |  |  |
| Project 2.<br>Packaging of CCA/DRR technology      | Study 1.<br>Technical Assistance on adaptation and mitigation technologies to selected barangays |  |  |  |  |  |  |  |  |
|                                                    | Study 2.                                                                                         |  |  |  |  |  |  |  |  |

|                                                                                            |                                                                                                                                             |  |  |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
|                                                                                            | Model community to package CCA/DRR technology                                                                                               |  |  |  |  |  |  |  |  |
|                                                                                            | Study 1.<br>Develop and pilot technology based Multi hazard EWS in selected municipalities                                                  |  |  |  |  |  |  |  |  |
|                                                                                            | Study 2.<br>Public awareness programme on EWS                                                                                               |  |  |  |  |  |  |  |  |
| <b>Thematic Area 4: CLIMATE RELATED GEOSPATIAL DATA NETWORKING</b>                         |                                                                                                                                             |  |  |  |  |  |  |  |  |
| Project 1<br>Establishment of geospatial climate related information network in the region | Study 1.<br>Compile database of natural disasters in the province                                                                           |  |  |  |  |  |  |  |  |
|                                                                                            | Study 2.<br>Identification of collaborative research studies geared towards creation of climate related geospatial information in Region 02 |  |  |  |  |  |  |  |  |

|  |                                                                          |  |  |  |  |  |  |  |  |
|--|--------------------------------------------------------------------------|--|--|--|--|--|--|--|--|
|  | Study 3.<br>Policy formulation on<br>data acquisition and<br>utilization |  |  |  |  |  |  |  |  |
|  | Study 4.<br>Building climate related<br>geospatial database              |  |  |  |  |  |  |  |  |



Republic of the Philippines  
**CAGAYAN STATE UNIVERSITY**

Tuguegarao City, Cagayan

**BOARD OF REGENTS**

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**EXCERPTS FROM THE MINUTES OF THE COMBINED 71<sup>st</sup> and 72<sup>nd</sup> (3<sup>rd</sup> AND 4<sup>th</sup> QUARTER, CALENDAR YEAR 2018) REGULAR MEETINGS OF THE BOARD OF REGENTS OF THE CAGAYAN STATE UNIVERSITY HELD ON FEBRUARY 22, 2019 AT THE CONFERENCE ROOM OF CAGAYAN STATE UNIVERSITY, ANDREWS CAMPUS, TUGUEGARAO CITY.**

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Hence, on duly seconded motion, the Board passed and adopted-

**Resolution No.11**  
**Series of 2019**

**RESOLVED, AS IT IS HEREBY RESOLVED**, that the Board hereby approves the CSU Research Development and Extension (RDE) Agenda for 2018-2022.

***Approved***

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**I HEREBY CERTIFY** that the foregoing excerpt resolution from the records on file is true and correct.

  
**JOEY L. CAULAN**  
Board Secretary