# Catalyzing Innovation through Collaboration and Partnerships: A Key to Philippines' Agriculture, Aquatic and Natural Resource Transformation

## The success story of the Philippines' National Agricultural Research System (NARS)

## Introduction: Partnership and collaboration at the center of the Philippines' NARS

The Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD), hereafter referred to as "the Council," is the pillar of the National Agricultural Research System (NARS) in the Philippines. It is based on the recognition that no single research organization can respond to many concerns of the agriculture, aquatic and natural resources (AANR) sector.

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As such, the Council has prioritized partnership and collaboration through the establishment of its Regional Research and Development (R&D) Consortia and the National Agriculture, Aquatic and Natural Resources Research and Development Network (NAARRDN), hereafter referred to as "the Network" across the Philippines. In addition to engaging in local partnerships, the Council has initiated and strengthened collaboration with various international agencies and institutions.

Public agricultural R&D in the Philippines has been heavily reliant on government sources of support. Historically, the investment in agricultural R&D as a percentage of agricultural Gross Domestic Product (GDP) has generally remained around 0.3% per year, significantly lower than the World Bank's recommended target of 1% (Brown et al., 2018).

Hence, the challenges of decreasing investment and insufficient R&D funding further urge the Council to forge linkages to supplement the implementation of national R&D systems and programs. Through its research station capability development program, the Council works towards strengthening and improving the capability of the members of the Network, composed of national, multi, and single-commodity and regional R&D centers, cooperating stations, and specialized agencies. This is in the context of its key focus areas, including crops, fisheries, forestry, and livestock.

## How it all started

In the 1960s, the Philippines recognized the need for robust agricultural research amid global shifts, such as technological advancements, global economic structures, and evolving geopolitical dynamics. The Secretary of Agriculture at that time – Arturo Tanco, Jr. – sought an institution for unified agricultural research planning. The Asian Traveling Seminar, a benchmarking activity organized by the North Carolina State University (NCSU) and participated by the Philippines, inspired the creation of a NARS in the Philippines.

Part of the Travelling Seminar was the visit to the Indian Council of Agricultural Research (ICAR) in New Delhi, India. The Philippine delegation was impressed by ICAR's


*Participants of the APAARI International Training Course in New Delhi, India with Dr. Lerma SJ. Maldia from UP Los Baños, member of DOST-PCAARRD's NAARRDN*

national coordination system for agricultural research. ICAR has a network of research institutes and centers spread across different regions of India.

Each institute focuses on specific aspects of agriculture, such as crops, livestock, fisheries, and agricultural engineering. These institutes conduct research, develop technologies, and provide training to enhance agricultural productivity. This urged Secretary Tanco to recommend the establishment of the Philippines' council for agriculture, similar to ICAR. This reaffirmed Tanco's belief in the need for the country's central agricultural research planning and coordinating body. Secretary Tanco then submitted his recommendations to the late President Ferdinand E. Marcos, Sr., leading to the establishment of the Presidential Committee Executive Panel and, later, the NARS under Administrative Order (AO) No. 267.

The Executive Panel formed technical groups to assess existing research and propose improvements. Lack of coordination, funding, workforce, and dissemination hindered progress. Hence, they proposed the creation of the Philippine Council for Agricultural Research (PCAR) to oversee the national research program. President Marcos signed Presidential Decree No. 48 on November 10, 1972, to establish PCAR, which later expanded its scope and became the Philippine Council for Agriculture and Resources Research (PCARR), and consequently renamed to the Philippine Council for Agriculture and Resources Research and Development (PCARRD) and became one of the councils under the National Science and Technology Authority (NSTA).

Executive Order (EO) No. 128 in 1987 created the Philippine Council for Aquatic and Marine Research and Development (PCAMRD) from PCARRD's Fisheries Research Division. PCARRD was renamed the Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development and retained its acronym. Both institutions became under the renamed NSTA to the Department of Science and Technology (DOST).

Finally, EO No. 366 consolidated PCARRD and PCAMRD into the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD), aiming to optimize R&D in agriculture, forestry, aquatic, and natural resources. Now, the Council focuses on developing science and technology (S&T) solutions for pressing sectoral concerns, coordinates national R&D efforts, and allocates resources for S&T programmes.

## Pillars of partnerships and collaboration in the NARS

When the Council was given the mandate "to establish, support, and manage the operation of a national network of centers of excellence for the various research programs in crops, livestock, forestry, fisheries, soil and water, mineral resources, and socio-economic research related to agriculture and natural resources," the challenge to build a network of research centers and stations out of existing ones surfaced.

While other developing countries lament the lack of research stations, the Philippines had too many stations before the Council was established. However, these were poorly managed. The above-mentioned Executive Panel further identified the proliferation of

experiment stations, only some of which were adequately manned and equipped for productive research, as one of the constraints to conducting research effectively.

After an in-depth evaluation of the situation, the Technical Panel strongly recommended the establishment of a national network of selected agricultural centers and stations to operate within the Council's mechanism.

The Council established the regional R&D consortia mechanism in 1975. The consortium strategy is structured to serve as a regional platform for collective planning, management, and coordination of R&D projects, monitoring and evaluation (M&E), and resource sharing.

It is anchored to realize the importance of complementarity of efforts and resources to achieve a formidable combination of strengths and capabilities. Moreover, it aims to prevent duplication of efforts within the system by providing a venue for discussion and exchange of information based on independent expertise, abilities, and available resources among the member agencies. The Council was among the first agencies in the Philippines to advocate regionalization.

## Rationale of the Consortium Mechanism:

- Platform for regional S&T planning, R&D coordination, project implementation, M&E, and resource sharing;
- No single research agency can adequately cope with all the demands on itself from within and outside;
- Balance between central direction and decentralization;
- Willing and reliable partners; and
- PCAARRD's grassroots presence in the regions

Being the central decision-making body for the national agricultural R&D system, the Council provides inputs to national policies guiding the region's R&D activities in the AANR sector. On the other hand, the mechanism is also designed to decentralize research management, exchange of research information, and resource sharing and generation at the regional level. Regionalization is a way of decentralization, which is not a mere transfer of authority and power but forming a groundwork of regional responsibilities.

Moreover, as the Council's visibility in the Philippines' regions intensifies, a need for willing and reliable partners that oversee and assist in the M&E of R&D activities in



*Snapshots: PCAARRD's key national partnership activities. Source: DOST-PCAARRD*

these regions is deemed a crucial concern. The mechanism is also intended to maintain the Council's grassroots presence in the areas to address the varying needs of stakeholders of the AANR sector effectively.

The Council's first consortium, the La Granja Agricultural Research Center, was established in 1975 with four member agencies.

## Expansion of the Council's national network

As the trailblazer of the consortium mechanism in the country, the Council has influenced other government agencies within the Philippines to establish similar R&D networks to strengthen the research capability of the regions through coordination, which can eventually result in a more robust national research system.

Realizing the benefit of being part of the consortia, other research centers and stations in different regions followed suit with the same objectives and established their consortium. After two years, in 1978, seven additional consortia were established in Bicol, Central Luzon, Cagayan Valley, Cordillera Administrative Region, Ilocos Norte, Northern and Central Mindanao, and Eastern Visayas. Ten years later, in 1988, consortia members doubled to 14, operating all over the Philippines.

Membership has expanded through the years. The Council enhanced its engagement with the consortia in 2015, four years after the consolidation of the two councils, PCARRD and PCAMRD.

Aside from increased funding support to the consortia, an additional higher budget was provided for non-degree training programmes, infrastructure improvement, and other initiatives. From 2016 to the present, more than 90 non-degree training programmes were funded by the Council and conducted by the Consortia. 3,999 researchers from different institutions across the regions participated in these training courses. For 2023, support of PHP 5.74 Million (USD102,000) was given to the consortia to conduct non-degree training courses and other capacity-building activities in the regions.


*Map of the Council's regional consortia*
*Source: DOST-PCAARRD*

The consortia also incorporated changes in their institutional arrangements, such as adding the aquatic sector to their official name and inviting the members of the zonal network into the consortium.

Currently, 15 consortia are operating in the country with a total membership of 301 agencies, wherein 215 are R&D implementing agencies, and 86 are R&D support agencies, such as funding agencies, extension agencies, and planning and policy development organizations. The private sector has also expressed interest and become members of many consortia.

*Read more about the regional R&D Consortia*:
*https://www.pcaarrd.dost.gov.ph/index.php/partners/regional-r-d-consortia*

The Council provides support funds for consortia's S&T activities, capacity-building opportunities, technical assistance, and other means of support under the four-banner programs of strategic R&D, its results utilization, policy research and advocacy, and capacity and governance.

## Pursuing international partnerships to benefit the NARS

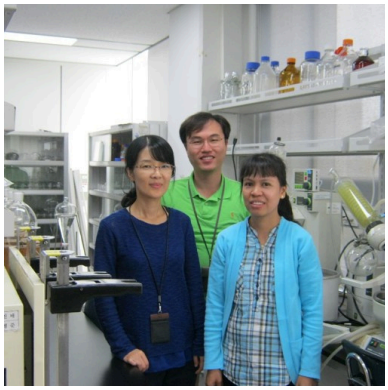
With the commitment to increase the competence and competitiveness of its regional research arm – the Regional R&D Consortia and the NAARRDN, the Council has also continued to tap opportunities through international partnerships.

The first linkages initiated and established were with the Indian Council of Agricultural Research (ICAR), Bangladesh Agricultural Research Council (BARC), International Technical Cooperation Center-Rural Development Administration (ITCC-RDA) of Korea, Malaysian Agricultural Research Development Institute (MARDI), Pakistan Agricultural Research Council (PARC), Agency for Agricultural Research and Development (AARD) of Indonesia, and Japan International Research Center for Agricultural Sciences (JIRCAS).

Initially, the general modes of collaboration within the NARS partnership included joint planning and implementation of collaborative research projects in agreed-prioritized fields; provision of necessary scientific support staff and logistics; exchange of scientists for sharing of experiences, scientific and technical knowledge, and achievement; exchange of scientific and technical literature, information and methodology; participation in joint symposia or conferences; and promotion of direct liaison and other scientific collaborative activities.

Box 1
The PCAARRD-RDA Partnership

- 209 fellows and trainees from PCAARRD, NAARRDN, and other government and private organizations dispatched to RDA for capability building and GTIS activities through the Exchange Scientists/Experts Mission Program, Post-Doctoral Fellowship Program, and Applied Communication Experts Program.
- The programs revolved around crops, livestock, forestry, agricultural resources management, socio-economics, agricultural R&D policies, technology promotion, applied communication, information systems, capability development, R&D management, fiscal/financial management and general administration.





*Snapshots: PCAARRD and NAARRDN researchers who were dispatched to RDA for Capacity Building Programs*


*Bilateral and Multilateral Partners of DOST-PCAARRD*
*Source: DOST-PCAARRD*

The Council has 15 actively-led bilateral and multilateral partnerships and supports an additional 15 partnerships led by its mother agency, the Department of Science and Technology.


*Participants of the APAARI International Training Course on In-Vitro and Cryopreservation Approaches for Conservation of Plant Genetic Resources held on 5-19 November 2019 in New Delhi, India with Dr. Lerma SJ. Maldia from UP Los Baños, member of DOST-PCAARRD's NAARRDN, as the Philippine participant. [photo credit to Dr. Maldia]*

The involvement of NARS in the Council's international partnerships opened up new avenues for research prioritization, learning, and exchange of scientific knowledge and expertise. Researchers/scientists/experts from the Council's Regional R&D Consortia and the Network were able to enhance their linkages and networking, collaborate with their foreign counterparts, explore new technologies/innovations from other countries, learn their best practices, and participate in international trainings, study missions, seminars, conferences, and symposia workshops. It also opened up new avenues for joint R&D and access to experimental fields.

Global collaboration has improved the awareness and capabilities of Filipino agricultural scientists, researchers, experts, and other stakeholders on the most recent breakthroughs, technologies, and innovative processes, which can contribute to the country's competitiveness with international partners.

According to Dr. Ebora, "DOST-PCAARRD has co-sponsored and co-implemented various projects, such as conferences, seminars, and workshops with international partners that have staged proactive discussion and dissemination of agricultural trends, innovations, and technologies in response to major concerns besetting the agricultural sector."

Box 2

Message from Ms. Rona Kay Franco, PCAARRD-nominee to the Advanced Training Course on Food Safety Management Systems


*Participants of the Advanced Training Course on Food Safety Management Systems: Advanced*

- Ms. Rona Kay G. Franco, University of the Philippines Los Baños (UPLB)
- DOST-PCAARRD nominee to the Advanced Training Course on Food Safety Management Systems: Advanced held on 05-08 September 2022

> Thank you DOST-PCAARRD for this opportunity. The training course provided fundamental knowledge on food safety and management and its implementation and it has provided me a wider perspective in viewing food safety.

These partnerships also brought value to human capability and representation in international committees, which increase the visibility of the Filipino NARS globally and strengthen its contributions to a more robust agri-food system in the country. Meanwhile, the Council's Global Technology and Information Search (GTIS), which is a benchmarking activity where the Council provides travel expenses to its personnel and partner researchers, has provided opportunities to explore new technologies/innovations, practices, approaches, and information from international partners that could be adopted locally.

Box 3

GTIS/Benchmarking activity on controlled release of fertilizer conducted by DOST-PCAARRD and NAARRDN researchers

**GTIS on Controlled Release of Fertilizer**

In 2018, DOST-PCAARRD provided travel fund to researchers from the Council and the University of the Philippines Diliman (UPD) to conduct a benchmarking activity in Thailand on the controlled release of fertilizer. The researchers visited the Thailand's Institute of Scientific and Technological Research, Kasetsart University, National Nanotechnology Center, and the Land Development Department of the Ministry of Agriculture and searched for available technologies that can be adapted in the Philippines.

Among the technologies learned and documented by the researcher include:

- Polymer-coated Fertilizers (nCote), which is used for the controlled release of fertilizers and is produced by coating fertilizers with a patented eco-friendly, biodegradable polymer based on polyurethane composites;
- Smart Oil (nGrow), which is produced using an environmentally-friendly cellulosic material through a hydrothermal bio-conversion process;
- Biodegradable Nanocomposite Polymer Film (nanoClays), which are biodegradable films made from double-layered hydroxides, such as smectite clays and have exchangeable cations; and,
- Pelletized Urea, which is a slow release fertilizer and is practical for the use in crops with facile processing methods. Adaptability of these technologies in the Philippines are currently being studied

Through the Council's counterpart funding mechanism with its local and international partners, it has significantly shared knowledge on sectoral challenges and produced impactful agriculture, aquatic, and natural resource technologies and outcomes with and for its national and international communities.

From receiving various development assistance, the Council has now evolved as a reliable knowledge partner of foreign agencies in leveraging science, technology, and innovation through a more sustainable funding mechanism. In 2022, the Philippine Civil Service Commission (CSC) recognized the Council's Regional Collaborative Program with the CSC Pagasa Team Regional Award. This award recognized the significant accomplishments of the consortia for its operations to execute coordination, implementation, and monitoring of R&D programs, projects, and activities in the regions.

Box 4
Projects and initiatives of ViCARP, one of the Council's NAARRDN members

The Visayas Consortium for Agriculture, Aquatic and Natural Resources Program (ViCARP), the regional arm of the Council in Eastern Visayas, has implemented R&D programs/projects on various commodities such as jackfruit, bamboo, vegetables, root crops, coconut, abaca, queen pineapple, and mussel, as well as machinery and other technologies (More information about ViCARP can be accessed here: https://vicarp.vsu.edu.ph/).

The region-generated technologies and information on these significant commodities are packaged and endorsed by the Consortium. To date, 76 technologies have been generated for the said commodities. Among the most popular are the abaca stripping machine, portable vacuum fryer machine, tissue culture-derived bamboo planting materials, macapuno biscotti, cocofresh, ready-to-eat pinoy fries (sweetpotato), sugarless dehydrated jackfruit pulp, and sweet potato wine, among others.

Farmers and growers benefit from these technologies throughout Region VIII. For instance, jackfruit farmer associations from LGUs of Mahaplag, Inopacan, and Ormoc City, Leyte, and Calbayog City, Samar, have benefited from the developed good-yielding variety "EVIARC-Sweet." They ventured into propagating and selling grafted seedlings of EVIARC Sweet, resulting in increased income.

Technologies for coconut, on the other hand, gave farmers easy access to markets, provided sufficient materials for replanting and rehabilitation, and capacitated about 5,000 farmer-beneficiaries on coconut-based technologies from production to processing through farmer's training.

In addition to coconut and jackfruit, rootcrops are considered the valuable cash crop of the region. Sweetpotato, cassava, and taro were the most requested crops for food security in areas prone to calamities, such as typhoons. These crops are resilient crops that can survive during typhoons and drought. Because of this, government agencies and NGOs looked into using root crops for livelihoods or agri-enterprises in calamity-prone areas.

In addition to these initiatives, various projects developed technologies for commodities, such as abaca, vegetables, queen pineapple, bamboo, rain forestation, and shellfish, significantly benefitting the agriculture, aquatic, and natural resources sector in Region VIII.

Visit https://www.pcaarrd.dost.gov.ph/index.php/vicarp to know more about ViCARP.

## Harvesting Progress: The Council's Decades of Collaborative Growth and Innovation with Local and International Partnerships

DOST-PCAARRD considers the consortia mechanism and international partnerships to be integral parts of its regional R&D management system. The partnerships and collaboration of the Council among its local and global partners manifest its commitment to efficiently and effectively deliver the appropriate S&T interventions for the AANR sectors across the country. Amidst challenges and unceasing changes in the S&T environment, the Council maintains its consortia system and international partnerships dynamic and flexible.

Building on its five-decade leadership in AANR, the Council has continuously formed a strong alliance with reliable critical science and technology players across disciplines and geographies to support sustainable agri-food systems. While much has been accomplished in its participation in NARS, the Council strives to sustain and forge more meaningful partnerships and capitalize on each other's strengths and niches to increase its visibility and impact in the Asia Pacific Region.

Moving forward, the Council will continuously support the Regional Consortia in strengthening their initiatives through the implementation of R&D programmes and projects that address the needs of the regional priority commodities, including R&D results utilization initiatives to ensure that the outputs of R&D and S&T innovation will be transformed into applicable and sustainable technologies and would reach its intended users such as farmers, fisherfolk, and other stakeholders, thus creating impact on the lives of the people in the region. It will also continue engaging with bilateral and multilateral partners (including intergovernmental organizations) and international organizations and increase our visibility and impact in the global community.

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About PCAARRD: https://www.pcaarrd.dost.gov.ph

About PCAARRD Regional R&D Consortia: https://www.pcaarrd.dost.gov.ph/index.php/partners/regional-r-d-consortia

About ViCARP: https://vicarp.vsu.edu.ph/
https://www.pcaarrd.dost.gov.ph/index.php/vicarp



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