

RESEARCH AND DEVELOPMENT PRIORITIES ON SMALLHOLDER FORESTRY

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The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) corporate plan – a CORPLAN 2004-2010 – sets out strategic science and technology activities for the agriculture, forestry and natural resources sectors for the the six years 2004-2010. The four banner programs embody PCARRD's strategic S&T directions. These are based on the principles of technology-based productivity and competitiveness; effective science technology-adoption link; conducive R&D environment; and good leadership, collaboration, and coordination. The PCARRD Forestry and Natural Resources concerns include forestry, environment, soil and water sectors. The specific areas of responsibility under forestry are wood-based resources, non-timber resources, agroforestry, protected areas and wildlife, bamboo and rattan, and environment. A major area of research interest involves agroforestry systems. Priority is being placed on: evaluating and documenting indigenous agroforestry systems, the suitability of agriculture commodity recommendations for agroforestry systems in multiple-use and buffer zones of watersheds and protected areas; the social, environmental and economic performance of agroforestry systems; and capacity building for the promotion of agroforestry systems. A number of research and development interventions are in operation with respect to timber utilisation and socio-economics, marketing and policy, including innovative and efficient wood processing and manufacturing technologies.

INTRODUCTION

The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) is one of the five sectoral planning councils of the Philippine Department of Science and Technology (DOST) as embodied in Executive Order No. 128 signed on January 30 1987. It serves as the government's main arm in planning, coordination, evaluating and monitoring the national agriculture, forestry and natural resources research and development program.

The Agriculture, Forestry and Natural Resources (AFNR) sectors will feature prominently in future development efforts as the country strives to achieve encompassing and sustainable development. Science and Technology (S&T) will be a critical tool that will assist in the AFNR sectors' development amidst the present realities. Research and Development (R&D) activities will help develop appropriate innovations that will address concerns on globalisation. Likewise, R&D will enable the sectors to fulfil the multiple goals of food security, poverty reduction and environmental protection. The PCARRD corporate plan – a CORPLAN 2004-2010 – presents PCARRD's strategic S&T plan for the sectors in the next six years. Its vision is to be a creative and effective S&T leader and partner in the sustainable development and utilisation of appropriate innovations and technologies for competitive AFNR sectors.

The underlying theme is to position the AFNR sectors as dynamic, economically viable, productive, and S&T-driven sectors which are financially competitive in the production or agricultural and forest products, while being optimally managed to sustain land, water, and biodiversity resources. The CORPLAN supports the Medium Term Philippine Development

Plan (MTPDP) which outlines the new administration's economic development blueprint, for 2004-2010, to sustain economic growth for the country's more than 80 million people (NEDA 2004).

STRATEGIC S&T DIRECTIONS FOR THE AFNR SECTORS

Four banner programs embody PCARRD's strategic S&T directions. These are based on the principles of technology-based productivity and competitiveness; effective science technology-adoption link; conducive R&D environment; and good leadership, collaboration, and coordination.

Knowledge and Technology Generation Program (KTGP)

PCARRD aims to develop highly productive, globally competitive, sustainable, and modernised agriculture and resource-based industries to fulfil multiple goals in development. The KTGP will capitalise on S&T to increase agricultural productivity, improve farm efficiency and competitiveness, and facilitate the sustainable management of resources. The KTGP will have three major program components — biotechnology, S&T anchor programs, and natural resources management. Biotechnology will use the country's resource strengths in developing and delivering leading-edge knowledge and technology on biotechnology. It will build innovation and sustainability into agricultural and resource-based production to improve productivity and competitiveness. The Philippine Agricultural and Forest Biotechnology Agenda II (2002-2010) will continue to serve as the blueprint of the program.

The S&T Anchor Program will provide comprehensive package of S&T interventions on commodities with high potential economic impacts over the short, medium and long terms. The package of interventions includes critical R&D, technology transfers and market assistance, capability building, and policy reforms. Natural resource management will advance S&T in improving resource use and conservation, promoting production systems that use natural resources efficiently and repair damage to ecosystems.

R&D Results Utilisation Program

PCARRD will lead in forging the science-technology-adoption link to allow the commercialisation and utilisation of knowledge and technology. The effective utilisation of R&D results will increase productivity and income, and empower farming and downstream agriculture and resource-based industries. Through the program, PCARRD aims to be more relevant and dynamic in addressing the information and technology needs of its clientele. Among others, the *Techno Gabay* Program (Faylon 2004) will harness the strong networking and feedback mechanism from the clientele and beneficiaries of the program. The network of Farmers Information and Technology Services (FITS) centres and *Magsasaka Siyentista* will be strengthened through technical assistance, capability building and policy advocacy. Support will improve micro, small, and medium technology-based enterprises through technology interventions and upgrading.

Policy Research and Advocacy Program

The policy environment greatly influences the effectiveness of R&D efforts in propelling the science-technology adoption continuum. PCARRD's Policy Research and Advocacy Program will explore policies and interventions that will provide the enabling conditions for propelling technological progress in the AFNR sectors (Faylon 2004). It will ensure that complementary rural infrastructure, S&T policies, and other support systems are in place. It will also help maintain the balance between the country's economic and environmental goals.

PCARRD will analyse and advocate on macro-policy issues that significantly affect the AFNR sectors. Special emphasis will be placed on, but not limited to global competitiveness, agricultural land use and agrarian reform, food security and poverty alleviation, natural resources sustainability and environmental quality, and agricultural inputs and support services.

Strengthening R&D Governance and Accountability

Strong R&D governance is important in the efficient and effective implementation of R&D programs and projects in the National Agriculture and Resources Research and Development System (NARRDS). PCARRD will strive to develop an enabling environment to manage efficiently and effectively the R&D system. New governance approaches will be explored to enhance the R&D management system and accountability within the NARRDS and the organisation. Specifically, PCARRD will continue to enhance efforts or explore new strategies in the following areas:

DOST-DA RDE convergence initiative

Under the existing structure, concerted effort has been a challenge since R&D resources, responsibilities and accountabilities are spread across many departments and agencies of Philippine government. PCARRD will pursue its commitments to the convergence initiative of the relevant agencies of the Department of Agriculture (DA), DOST, Department of Natural Resources and Environment (DENR), and the Department of Land Reform (DLR). The initiative aims to harmonise the agricultural research, development and extension (RDE) programs of the government to increase the efficiency and effectiveness of RDE public investments and interventions in the sector.

Operationalisation of the Centres for Excellence (COE)

PCARRD will pursue the operation of the COEs within the next few years. This approach will capitalise on the research excellence of R&D organisations to complement and strengthen the National Agriculture Research System (NARS). The COEs will become niches for cutting-edge AFNR technology throughout the country, which will raise the standards of AFNR R&D in the regions.

Regional R&D management

Since its inception, PCARRD has always advocated the Regionalisation of R&D management. Regionalisation was effectively carried out through the consortium mechanism. As partners of PCARRD, the regional R&D consortia have been highly effective in carrying the functions devolved to them. For the next six years (to 2010), PCARRD will take determined steps to have a stronger regional R&D management system. This is to be achieved by empowering the consortia to attain a high level of performance and greater capability to undertake the following:

- Monitor and evaluate R&D activities;
- Generate funds and resources to support the implementation of R&D activities;
- Institutionalise a strong and useful regional data and information system to serve the information needs of the region; and
- Formulate a unified regional framework agenda for defining RDE priorities and assisting the consortia to improve their roles in addressing regional development needs through complementation, integration and resource sharing.

Capability building

Capability building for the efficient and effective management of the research system and implementation of R&D programs remains central in PCARRD's governance agenda. For 2004-2010, PCARRD will continue to enhance the capability of the NARRDS in S&T planning, implementation and monitoring and evaluation through human resource and facilities development, provision of incentives through R&D awards, and degree and non-degree training. New strategies will be explored to strengthen capacities for collaboration between the public, the academics and private institutions.

Resource generation and linkages

The success of the CORPLAN hinges on the adequacy of funds to implement it. Even as the role of R&D in AFNR becomes increasingly recognised in the development agenda, it is unlikely that public support to R&D will increase in the short- to medium-term. In this context, partnerships and linkages with local and international organisations will remain an important element of PCARRD's strategy to realise its R&D vision and mission.

Enhancing accountability

PCARRD implements policies and processes to ensure organisational efficiency and effectiveness. This includes an ISO 9001:2000-certified quality management system (QMS) for providing central direction to the NARRDS for S&T development in the AFNR sectors. PCARRD is committed to continually improve its QMS and procedures to enhance agency performance and service delivery.

Any effective R&D governance and accountability system should have an effective monitoring and evaluation system. In this regard, PCARRD will regularly review the effectiveness of its mechanisms for R&D coordination, technology promotion and commercialisation, and capability development with a view to continually improved delivery of service.

Harnessing ICT and IEC for S&T development

For PCARRD, information is as an important resource as money and people. The importance of sound information management through the application of modern information, communication and technology (ICT) and information, education and communication (IEC) tools stands out in improving organisational efficiency and effectiveness and in facilitating the knowledge-and technology-user interface. PCARRD will continue to harness the use of both ICT and IEC tools in delivering knowledge and technology to target users. Measures include, but not limited to: the development and enhancement of the PCARRD portal, commodity information networks and other database, ICT-based administrative tools and other decision-support systems; ICT facilities development; establishment of e-libraries; and IEC support to major programs and activities.

FORESTRY AND NATURAL RESOURCES R & D CONCERNS

The Forestry and Natural Resources (FNR) concerns under PCARRD-DOST include forestry, environment, soil and water sectors. Specifically, areas of responsibility under forestry are the six forestry-based 'concerns', namely wood-based resources, non-timber resources, agroforestry, protected areas and wildlife, bamboo and rattan, and environment. Other resources include the concerns on soil (e.g. upland soil erosion and degradation, soil management and conservation) and water (water production and conservation). PCARRD's FNR R&D networks include the research arms of DENR – the Ecosystems Research and Development Bureau (ERDB) and Regional ERDS's, State College and Universities (SCUs)

– and Private Colleges and Universities (PCUs) with forestry and environment mandates, Peoples Organisations (POs) and Non-governmental Organisations (NGOs) with an involvement in forestry and environment.

As one of the technical divisions of PCARRD – the Forestry and Environment Research Division (FERD) – manages and coordinates R&D activities of the forestry and environment sector.

At present, the division handles six commodities as follows:

- Agroforestry and multi-purpose trees and shrubs – upland farming systems with the integration of agricultural crops and livestock with forest trees and shrubs, especially those trees and shrubs with multiple uses;
- Bamboo and rattan – including all species of bamboo (erect and climbing) and rattan production in natural stands and in plantation, harvesting, management and utilisation;
- Environmental management – mainly in ensuring the ecological stability and sustainability of the natural resource ecosystem. It focuses on the prevention and providing solutions to various ill effects of the forestry and natural resources environment (soil erosion, land degradation, climatic change, flooding, and drought);
- Minor forest plants – including all other non-timber forest plants that serve as raw materials for gifts, toys and house wares, basketry and all other forest-based handicraft, as well as other uses (e.g. medicine, dye, ropes, medicine and other products);
- Protected areas and wildlife – areas declared as protection forests, parks and the like, as well as the production and management of wildlife (flora and fauna species); and
- Wood production forest – including wood production from the natural and man-made forests as well as areas within the natural forests that still allow utilisation (residuals, secondary, tertiary forests) and tree plantations (man-made) including areas within the public and private lands.

R&D PRIORITIES FOR AGROFORESTRY AND MULTI-PURPOSE TREES AND SHRUBS (MPTS)

Recommended R&D and Policies

The Agroforestry and MPTS R&D team recommended strategic R&D activities for 2001-2005 to address gaps identified from 1990 to 2000. The agenda identified are along the following areas:

Indigenous agroforestry system

Several studies by the R&D team highlighted the contribution of indigenous people in the practice of agroforestry in the Philippines. More studies need to be undertaken to evaluate and document this contribution. Specific projects need to be undertaken on the following:

- Evaluate and document the indigenous agroforestry systems;
- Evaluate and document the existing agroforestry systems;
- Determine the sustainability of indigenous species for hedgerows; and
- Evaluate the indigenous timber and non-timber species for domestication in the agroforestry system.

Biological and physical processes of agroforestry technologies and practices

The challenge of reconciling agriculture, forestry and other land uses needs to be addressed, not only in agroforestry but also in a more holistic manner. In this case, agroforestry will focus on the following:

- Review and evaluate the suitability of agriculture commodity recommendations for agroforestry systems in multiple-use and buffer zones of watersheds and protected areas;
- Develop and adapt the component technologies for coconut-based agroforestry systems and agroforestry gardens;
- Develop and adapt the pest management system in agroforestry;
- Develop and adapt the component technologies for tree domestication in agroforestry systems; and
- Adapt the technologies for integration of animals in agroforestry.

Economics of agroforestry systems

There are current efforts to develop a system to reward upland dwellers providing environmental services. Within these efforts, there is a need to focus on the social, environmental and economic valuation of agroforestry systems. These studies should be undertaken at various levels, including the plot, farm and landscape and watershed levels.

Technology evaluation and impact assessment

Agroforestry practices and systems have evolved and various institutions working on agroforestry have developed the technologies. Thus, the focus will be on: the assessment of the performance of agroforestry systems and technologies; effectiveness of technology promotion, dissemination and utilisation; and institutional capabilities. Specifically these would include, among other things:

- Evaluate the performance of agroforestry systems as to their productivity, profitability, promotion of household food security and food safety, biodiversity, carbon sequestration and alleviating poverty. This involves establishment of a benchmark and basis for measuring performance of agroforestry systems and technologies;
- Establish mechanism to determine areas under risk of soil erosion in each region and establish a plan to address and monitor changes over time;
- Assess the effectiveness and efficiency of agroforestry promotion, dissemination and utilisation processes;
- Evaluate the impact of devolution of agroforestry projects under Integrated Social Forestry (ISF) to local government units (LGUs); and
- Assess the impact of policies, programs and capabilities of government and non-government organisations (DA, DAR, DENR, LGUs, NGOs, POs) to address open access and inappropriate development in the uplands.

Capability Building

Information on agroforestry systems and networking

The IEC strategy in agroforestry will focus on the following:

- Develop and update the integrated database management system for agroforestry systems and technologies; and

- Rationalise existing agroforestry networks in the country and identify lead institutions to become the agroforestry dissemination center at the local, regional, and national level.

Promotions of agroforestry systems

The promotion of agroforestry system will be focused on the capacity building of institutions involved, hence the thrusts are as follows:

- Assess the capability of existing organisations to promote agroforestry;
- Establish the agroforestry learning sites and resource centres through joint efforts of LGUs, SCUs, local offices of national government agencies, NGOs, and other organisations in their respective areas;
- Train extension and development workers of LGUs, SCUs, NGOs, POs, DA, DAR and DENR on agroforestry systems and technologies, technology development, promotion and utilisation, and related policies and programs; and
- Develop and utilise the information and educational materials for the promotion of agroforestry.

Policy Advocacy

The R&D agenda mentioned above will generate information that will support the policy advocacy promoting agroforestry as art, science and practice that promote not only agroforestry production but also its social and environmental services. The following policy directions are being espoused by the Philippine Agroforestry Education and Research Network (PAFERN) and other organisations:

- Rationalise land use;
- Professionalise agroforestry; and
- Increase the role of LGUs by mandating LGUs with vast upland areas to designate agroforestry technicians (municipal level) and specialists (provincial level).

Other Recommendations

Based on the assessment and discussions on the situation of agroforestry in the Philippines, the Agroforestry and MPTS Commodity team recommends the mobilisation of the various government organisations (GOs), NGOs, POs and other agencies involved in agroforestry to work together in the promotion of agroforestry. Since these agencies are strategically located across the country, their expertise and competencies will contribute greatly in the agroforestry research, extension and advocacy.

The harmonisation of networks and effort into a National Agroforestry Development Program (NAFDP) will also create a more systematic mechanism to ensure that the results of R&D programs and policies address the problems of resources degradation (land, soil, water and biodiversity) and poverty in the uplands.

R&D PRIORITIES FOR A WOOD PRODUCTION FOREST

Major R&D Interventions

A number of research and development interventions are in operation with respect to timber production, including:

- a. The Forest Biotechnology Program, being implemented by UPLB-CFNR and ERDB, which will address the need of the tree farming industry for high quality planting materials. Its long-term goal is to produce short-rotation, high yield and high quality (straight, pest-resistant) trees.
- b. The current R&D program, particularly by the Caraga Industrial Tree Plantation (ITP)-based R&D support program, will address the sector's pest and disease problems. The system that will be developed by DENR-Caraga and Northern Mindanao State Institute of Science and technology (NORMISIST) will be on pest and disease monitoring, setting-up of sampling plots, and community involvement (in pest and disease monitoring, and being part of action teams).
- c. Under the Furniture and Handicraft Industries R&D Program (FHIRDP), a research project that seeks to evaluate the sources and causes of wastes from timber harvesting to utilisation. The project will focus primarily on the development of appropriate harvesting techniques suited for smallholder tree farmers. The existing harvesting techniques are the crude, old and inefficient carabao logging and use of the high lead yarding system. A component project of this program plans to study the volume and nature of thin-outs from industrial tree plantation species (ITPS) and how these materials can be converted into high-value products. Farmers are hesitant to conduct thinning as they do not want to reduce the number of trees

Wood Production Forest (WPF) R&D will explore the development of new materials out of the existing characteristics of the ITPS. Because the allowable cut from the natural forests has been reduced, the industry is now slowly shifting to ITPS. The use of ITPS and the development of new materials for the industry are measures to sustain the wood-based industry. Areas of concern include particleboard production and wide panel board development from various ITPS and wood hardening, among other things.

Recommended R&D Priorities

In addressing the major R&D gaps, the following are the recommended R&D priorities in the next five years (2001–2005):

Some of the more important production priorities relate to:

1. Forest biotechnology: production of genetically superior planting materials for reforestation, tree farming, ITP, agroforestry and community-based forestry;
2. Natural resource development and management system and technologies;
3. ICT applications – e.g. decision support systems (DSS) – in forest development and management;
4. Plantation forest development and management;
5. Technical and economic evaluation and postproduction systems of economically important forest trees;
6. Site classification and species-site matching;
7. Phenology, seed technology and nursery practices;
8. Mass production and commercialisation of mycorrhiza and *Rhizobium*;
9. Tree improvement: selection, breeding, and cloning;
10. Assisted natural regeneration; and
11. Plantation management (e.g. site preparation, establishment, spacing, thinning, and pruning).

In terms of timber utilisation and socio-economics, marketing and policy, priorities relate to:

- a. Innovative and efficient wood processing and manufacturing technologies;
- b. Development of new materials for the wood-based industries;
- c. ICT applications in wood-based manufacturing technologies and marketing;

- d. Use of ITPS for wood-based industries;
- e. Product design and development;
- f. Sustainable community-based forest products utilisation system; and
- g. Utilisation of logging and other forest wastes.

SUMMARY

This paper presents the national R&D priorities for the agroforestry and MPTS and wood production forests commodities. It is hoped that these priorities set the direction of the smallholder forestry programs and projects in the Philippines. Further, the priorities set for smallholder forestry would enhance the development of appropriate technologies and strategies on the sustainable management of forest resources as well as provide policy directions for successful implementation of smallholder forestry initiatives in the country. The R&D directions presented in this paper provide the R&D community and decision/policy makers with information on the challenges and issues on agroforestry and MPTS and the wood production forest and the science and technology (S&T) interventions to address the R&D gaps. In addition, this paper would greatly help in formulating the R&D programs and in prioritising the R&D activities for smallholder forestry from 2004 and beyond.

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