







FOOD STAPLES SUFFICIENCY PROGRAM

Enhancing Agricultural Productivity and Global Competitiveness 2011-2016







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Enhancing Agricultural Productivity and Global Competitiveness

Department of Agriculture
Quezon City, Philippines
June 2012

First Edition, June 2012
Published by the Department of Agriculture
Office of the Secretary
National Rice Program
www.da.gov.ph

ISBN 978-971-704-027-1

Policy Statement from the President

In my second State of the Nation Address (SONA) on 25 July 2011, I stated the national policy on food staples sufficiency in terms that every farmer will understand:

> *"Ang gusto nating mangyari:*
> *Una, hindi na tayo aangkat ng hindi kailangan.*
> *Ikalawa, ayaw na nating umasa sa pag-angkat.*
> *Ang isasaing ni Juan Dela Cruz dito ipupunla,*
> *dito aanihin, dito bibilhin."*

The government has invested in agriculture with a record budget allocation of P61 billion in 2012. This is our investment in the future: to secure the food of our people. With the changing world food markets and climate, food is too important to be left to elements beyond our reasonable control. Some of the benefits from our investments today in agriculture infrastructure will be realized many years hence. We expect the commensurate returns on these investments of the people's money in terms of more irrigated service areas, climate-resilient farm-to-market roads, community seed banks, and suitable postharvest facilities as well as responsive and effective research, extension, financial, and marketing services that support the paramount goal of sufficient and affordable food for all supplied by a productive and competitive farming sector.

Through investments in climate change readiness, we are supporting research on drought- and submergence-tolerant rice varieties and appropriate farm systems technologies and on climate change-adaptive infrastructure designs to secure our food for the future.

We commend Secretary Alcala and the Department of Agriculture for pursuing our national goal of food staples sufficiency in ways that impact on the lives of our food producers. The broad participation of irrigators' associations and other farm-based groups in implementing, managing, and monitoring program interventions is our assurance that the benefits of the program actually reach the farmers.

Let us continue the good work on FSSP for this is truly a national program that addresses our one dream of a hunger-free nation.

BENIGNO S. AQUINO III
President of the Philippines

Foreword

The food crisis of 2008 pushed countries and multilateral agencies to rethink development strategies and focus on agriculture development following years of declining support for agriculture. Philippine agriculture has been the subject of voluminous studies and grand plans. But the present administration recognizes that it is not simply agriculture that deserves more attention. It is the farmer, for the farmer is truly central to these plans. The Food Staples Sufficiency Program is a plan anchored on the farmer. Restoring the farmers' trust in government was our mission from day one of the new administration.

We will continue to employ traditional strategies and approaches that have worked. However, where the strategies and plans failed to deliver the desired results, innovations are in order.

Preparing this program entailed reviewing previous plans, analyzing how to improve on them, and innovating based on direct interactions with farmers, program implementers, local officials, business, bankers, and other stakeholders.

Drawing from direct feedback, site visits, and observations, the Department of Agriculture has pursued innovations in implementing the Food Staples Sufficiency Program. Among the farmer-centered innovations that have been initiated and will continue to be tested for farmer-level results are the following:

- Local procurement of buffer stock: Imports will be reduced significantly as production increases. *Itatama ang presyo para sa ani ng magsasaka.*
- Front-loading of investment in public goods: Spending on irrigation, and concreting of farm-to-market roads and other rural infrastructure has been increased in the early years rather than spread out during the six-year period, in order to boost production. *Sapat na tubig sa irigasyon at maayos na kalsada bilang suporta sa pagsasaka.*
- Research on and dissemination of flood- and drought-tolerant varieties and improved farming systems including ways to reduce input costs through organic farming: *Mga angkop na binhi at tamang pagsasanay upang mabawasan ang pagbaba ng ani.*
- Multi-agency approach to production credit, loan guarantees, and crop insurance: *Pautang at* crop insurance *na kakayanin ng magsasaka, habang ang* credit retailers *ay makaaasa sa* loan guarantees.

- Farm mechanization and postharvest facilities: Through agri-roadshows, manufacturers can demonstrate the value of their farm equipment for more transparent procurement. *Mga kagamitang magpapahusay sa produksyon, magpapagaan at magpapabilis ng trabaho, at magpapataas ng halaga ng produkto ng magsasaka.*

- Improved yields in rainfed and upland areas: Production will be increased through programs such as *Palayamanan*®, deployment of Rice Sufficiency Officers, and construction of shallow-tube wells and small farm reservoirs. *Katulong din sa pagpapaunlad ng ani ang magsasaka sa sahod-ulan at bulubunduking lugar.*

- Non-rice staples production: Assistance will be extended to farmers planting white corn, cassava, *kamote*, *adlay*, bananas, and other food crops that serve as staples in various communities. *Susuportahan ang mais, kamote, at iba pang nakagawian nang pagkain sa iba't ibang komunidad.*

- Demand management: Consumers will be encouraged to cook or buy rice in quantities they eat to avoid wastage. Other staples will be popularized. *Palay, bigas, kanin – huwag sayangin.*

- Partnerships with LGU, CSO, and private sector: DA and its attached agencies (DA family), by themselves, cannot achieve our goals. We need partnerships with local government units, civil society and private sector organizations – in the service of farmers, for their sake and that of consumers. *Buong komunidad ng DA ay pakikilusin, katuwang ang LGU, CSO, at pribadong sektor upang makinabang ang magsasaka at ang buong sambayanan.*

- Transparent and accountable agriculture governance: Direct communication with farmers in the field, as well as LGUs and CSOs close to them, is a priority, in order to foster greater transparency and accountability. The use of maps to show the location of farm-to-market roads and irrigated areas (geo-tagging) will be mandatory. Anyone seeking commissions on contracts will be dealt with severely. *Matuwid na daan tungo sa kasaganaan.*

We will stay focused on the national goal: *Pagkaing sapat, magsasakang angat, tagumpay nating lahat!*

PROCESO J. ALCALA
Secretary of Agriculture

Acknowledgements

Setting the economic basis, understanding past performance, recognizing key challenges, and identifying and describing the technical interventions to achieve food staples sufficiency were huge assignments of the Department of Agriculture at the onset of the Aquino administration.

This program document is literally the result of blood (and blood pressures rising), sweat (while visiting rice fields and meeting with farmers), and tears (including tears of joy among farmers who laughed with Secretary Alcala and shared their dreams and plans).

With four or five official drafts since July 2010, we take courage to present this as the final document until the next and better version becomes available. We take consolation in believing that this is proof of a living and evolving document.

The program's early drafts were the product of a team composed of Usec Segfredo Serrano, Usec Joel Rudinas, Former Assistant Secretary Dennis Araullo, and former NFA Administrator Gregorio Tan. They did not only consult and craft the program, they also defended it, with Secretary Alcala, before the Cabinet Economic Cluster Committee and the President until it was finally accepted.

We would like to acknowledge Dr. Flordeliza Bordey and Mr. Clarence Pascual, the tandem who crunched the numbers and labored on the theories after numerous consultations with various units of the DA to come up with a well-thought-out and coherent program document. This core team was led by Director Edmund Sana who subjected every assumption and every draft to rigorous questioning based on his own experience as former Undersecretary for Operations of the DA. This team of three had to slug it out with a Technical Working Group that was extremely difficult to satisfy. We would also like to acknowledge the Secretary's Technical Assistance Group composed of Salvacion Bulatao, Teresa Saniano, Gregorio Tan, and Edicio Dela Torre.

The process that various agencies went through was most exacting. NIA had to do and redo their targets. The NFA reviewed their inventory levels and their projections. PhilRice scrutinized its field tests and identified the appropriate location-specific interventions. ATI had to review the contents of their Farmer Field Schools. PHilMech had to work on their farm equipment designs and conducted the AgriMachinery Fairs. BPI was asked to commit to a minimum turn-around time for the testing of seed varieties.

Regional Executive Directors of the Regional Field Units conducted several planning sessions to refine their targets. To craft the FSSP Credit Component, ACPC, NIA, ATI, NABCOR, and NAFC held many meetings with the Land Bank of the Philippines to arrive at the design of the pilot run of *Sikat Saka*.

After the first year of the program, it was time to celebrate with our early program collaborators. On 10 February 2012, we held the Rice Achievers Awards to recognize the governors and mayors, the provincial and municipal agriculturists, and the irrigators' associations that supported the program and achieved the best results in terms of increases in yields and expansion of harvest area.

Just when we thought the manuscript was ready, we ran the document through two public fora on 13 and 14 March 2012 at which an international food policy expert in the person of Dr. Peter Timmer and an audience composed of civil society groups, members of academe, policy makers, and operations people had the opportunity to scrutinize the program's soundness. Incorporating the inputs from the farms and the forums, we have finally tied up the package for its official launch.

With all the dynamics that this document has gone through, I feel that its evolution is hardly complete without the inputs of the general public, especially the farmers that we seek to serve. Let this open an avenue for the broader public to continue giving suggestions on the most effective approaches to realize our goal.

More than just a policy framework, this document takes us a step closer to realizing our self-sufficiency objectives—a goal that will require not only government and private sector support, but also the active and sustained participation of farmers, fisher folk, and ordinary people.

Each of us has a part in this program – *Palay, bigas, kanin, huwag sayangin!*

DANTE S. DELIMA
Assistant Secretary and National Rice Program Coordinator

Acronyms & Abbreviations

ACPC	Agricultural Credit Policy Council
AEW	Agricultural Extension Worker
AFIS	Agriculture and Fisheries Information Service
AMAS	Agribusiness and Marketing Assistance Service
ARC	Agrarian Reform Community
ASEAN	Association of Southeast Asian Nations
AT	Agricultural Technologist/ Technician
ATI	Agricultural Training Institute
BAR	Bureau of Agricultural Research
BAS	Bureau of Agricultural Statistics
BPI	Bureau of Plant Industry
BSWM	Bureau of Soils and Water Management
CS	Certified Seed
CSB	Community Seed Bank
CSO	Civil Society Organization
DA-RFU	Department of Agriculture-Regional Field Unit
DD	Diversion Dam
DSWD	Department of Social Welfare and Development
FBD	Flat Bed Dryer
FFS	Farmer Field School
FNRI	Food and Nutrition Research Institute
FOS	Field Operations Service
FPA	Fertilizer and Pesticide Authority
FSSP	Food Staples Sufficiency Program
GDP	Gross Domestic Product
GIS	Geographic Information System
ha	Hectare
HVCDP	High-Value Crops Development Program
IA	Irrigators' Association
ICM	Integrated Crop Management
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
ISM	Irrigation System Modernization
ITCAF	Information Technology Center for Agriculture and Fisheries
kg	Kilogram
LBP	Land Bank of the Philippines
LFT	Local Farmer Technician
LGU	Local Government Unit
LSIS	Large-Scale Irrigation System
LSTD	Location-Specific Technology Development
M	Million
MA	Municipal Agriculturist
MARO	Municipal Agrarian Reform Officer
MPDP	Multi-Purpose Drying Pavement
mt	Metric ton
NABCOR	National Agribusiness Corporation
NAFC	National Agricultural and Fishery Council
NFA	National Food Authority
NG	National Government
NGO	Non Government Organization
NIA	National Irrigation Administration
OS	Ordinary Seed
PARO	Provincial Agrarian Reform Officer
PAT	Provincial Action Team
PCIC	Philippine Crop Insurance Corporation
PCNFD	Per Capita Net Food Disposable
PCRC	Per Capita Rice Consumption
PHilMech	Philippine Center for Postharvest Development and Mechanization
PhilRice	Philippine Rice Research Institute
PISOS	Pump Irrigation System for Open Source
PS	Planning Service
R&D	Research and Development
RED	Regional Executive Director
RMC	Regional Management Committee
RSO	Rice Sufficiency Officer
RSV	Rice Sufficiency Volunteer
RTWG	Rice Technical Working Group
SFR	Small Farm Reservoir
SSIP	Small-Scale Irrigation Project
SSIS	Small-Scale Irrigation Systems
STW	Shallow Tube Well
SUC	State University and College
SWIP	Small Water Impounding Project
UPLB	University of the Philippines Los Baños
USDA	United States Department of Agriculture
WTO	World Trade Organization

Contents

Anchored on a vision of a food-secure society where farmers enjoy decent and rising standards of living, the goal of the FSSP 2011-2016 is to achieve self-sufficiency in food staples.

Executive Summary

Food security and raising incomes are the overarching goals of the agriculture sector under the Philippine Development Plan (PDP) 2011-2016. Toward these goals, the Department of Agriculture has launched the Food Staples Sufficiency Program (FSSP) under the *Agrikulturang Pilipino (Agri-Pinoy)* framework. The FSSP covers rice and other staples, including white corn, banana (*saba*), and root crops such as cassava (*kamoteng kahoy*) and sweet potato (*kamote*), traditional staples in some areas in the Philippines. These are also increasingly recognized as healthy alternatives to rice.

The FSSP is anchored on improving farm productivity and making the Filipino farmer globally competitive. Productivity growth in agriculture, which raises rural incomes, is indispensable to sustainable food security and poverty reduction.

It is also essential to structural transformation, a long-term process marked by farm labor moving to more productive jobs in the modern sectors of the economy. History shows that this transformation is at the heart of all successful poverty-reducing efforts and long-run economic development.

This implies two things: First, massive investments in terms of financial resources and policy attention are necessary to raise agricultural productivity. The agriculture sector must figure prominently on the national agenda.

Second, food insecurity and mass poverty in agriculture cannot be solved within the sector alone. A feasible solution hinges on a dynamic link between the agriculture and the industrial and services sectors.

AIMING FOR SELF-SUFFICIENCY

Boosting productivity of food producers is crucial to achieving the goal of self-sufficiency in food staples. In turn, self-sufficiency provides food producers an environment conducive to investing in farm productivity.

While the overall goal is self-sufficiency in food staples, the main focus of the FSSP is self-sufficiency in rice, the country's main staple. Rice remains an important crop as food and as source of livelihood. Rice provides 45% of the caloric intake of Filipinos[1]. It accounts for 20% of the typical household's budget, and as much as 30% for the bottom 30% of families[2]. More than two million households are engaged in rice-based farming; millions more of farm laborers, and tens of thousands of merchants, depend on rice farming and trading for a living.

The realities of world trade make self-sufficiency a desirable goal. First, countries can be held to ransom by any reason (economic, political, ideological) even in a highly globalized world. In particular, world rice trade is the subject of political decisions by governments, who are the biggest market players and who consider rice a vital commodity.

Second, rice is thinly traded and world trade is highly concentrated. Only 7% of global production is sold outside national borders. The top five exporters account for 80% of total exports, which makes importing countries vulnerable to export bans or restrictions.

As the world's 8th largest rice consumer, aggressive buying by the Philippines can have a destabilizing impact on the world rice market as seen in the 2007-2008 world rice crisis, during which time, heavy buying by the country drove the world price of rice to its peak.

Third, in reality, the world rice market is vulnerable to destabilizing speculation and panic. Because millions of rice producers, consumers, and traders, including governments, can hoard the commodity over fairly long periods of time, the rice market is vulnerable to herd behavior and panics. But even in normal times, the world rice market is marked by massive distortions. Governments in the major rice-producing economies intervene heavily in the domestic rice sector through public investments, input subsidies, price support, public procurement, and so on. Except for one, all the major exporters intervene on behalf of domestic producers, effectively shoving poverty and unemployment outside their borders for the rest of the world to absorb.

In principle, market failure in the world rice market can be addressed by international policy coordination. At best, these efforts are in their infancy. Without international policy coordination, most countries strive for self-sufficiency.

No doubt this is not an ideal situation. All countries raising domestic rice production at the same time, generates excess supply in the world market, depressing prices to the ruin of farmers everywhere. Likewise, the pursuit of stable domestic prices by governments during periods of high volatility fuels even greater instability in the world market. Unfortunately, there are no neat and elegant solutions. Policymakers make do with a toolbox of imperfect, conflicting, and costly policies.

PERFORMANCE OVERVIEW

In the last 40 years, the Philippines has made substantial progress in the production of rice, the country's most important food crop. After a slowdown in the 1990s, *palay* production grew at a rapid pace of 3% per annum in the last decade. The remarkable growth in output was in large part due to higher yields. Yield growth accounted for 60% of the growth in total production, with the balance due to harvest area growth. Overall annual yield growth of 2.2% in the 2000s was one of the best in rice-producing Asia, second only to Vietnam's 2.3%.

While irrigated areas accounted for the bulk of incremental harvest during this period, the yield growth of 3% per annum in rainfed areas was the highest recorded in the last four decades. This means that productivity gains spread to small farmers in rainfed areas, who are generally poorer than those in irrigated lands.

Harvest area for *palay* continued to expand, with harvest area growth accounting for 40% of total *palay* production growth in the last decade. Estimates for 1995-2009 show that the growth in harvest area is due to expansion rather than intensification, that is, increase in the physical area planted to rice more than higher cropping intensity. Irrigated and rainfed lowland areas have expanded in terms of net physical area.

Rice imports have gone up in the last decade as growing population and rising incomes raised the demand for rice, particularly among the lower-income groups. Imports as a proportion of consumption escalated to 16.4% in 2006-2010, from less than 1.4% in 1991-1995. In some cases, large importations were justified by bad harvest due to prolonged drought (1997-1998 and 2008-2009). In some other cases, aggressive buying in the world market was clearly not warranted by domestic supply and demand considerations.

Growth in production of non-rice staples in the last decade has been uneven. *Saba* shows the highest production growth rate, followed by white corn and *kamoteng kahoy* which posted moderate growth, while *kamote* declined. The general pattern is one of good yield growth combined with declining harvest area resulting in modest harvest growth. The loss of land area devoted to the other staples, particularly white corn and *kamote*, points to declining economic returns relative to other crops.

KEY CHALLENGES

Food staples policy faces major challenges in the next six years and beyond. First, it must feed a rapidly growing population with rising per capita demand for staples. The task is made more difficult by an increasingly fragile resource base.

Second, we can meet this growing demand for food by raising our productivity, by producing more with less. While the technology to do so is available, the challenge is to make more farmers adopt this yield-enhancing technology.

Third, the government must step up investments in public goods such as irrigation, extension, and research if we are to reap the full potential of new technology, and sustain these gains into the future. Given fiscal constraints, frontloading of irrigation investments, focus on rehabilitation and restoration projects, and improved delivery of extension and research services can address this challenge.

Fourth, inadequate economic incentives to adopt yield-enhancing technology coupled with lack of access to capital and crop insurance can render production interventions futile. Procurement, distribution, and trading policy with regard to rice needs fine-tuning to support the goals of food security, stable prices, and decent incomes for rice producers.

Finally, the capacity of public institutions needs strengthening, which calls for more resources but also innovative schemes that address farmers' needs, including working more closely with farmers' organizations and the private sector. This calls for exploring new approaches to delivering extension, credit, insurance, and other services.

GOALS AND TARGETS

Anchored on a vision of a food-secure society where farmers enjoy decent and rising standards of living, the goal of the FSSP 2011-2016 is to achieve self-sufficiency in food staples. Self-sufficiency means satisfying domestic requirement for food, seeds, processing, and feeds through domestic production. The key target is to produce our domestic requirement by 2013. Beyond 2013, the aim is to strengthen national resilience in staples production to impacts of climate change.

The program aims to increase total production from 15.77 million metric tons (M mt) in 2010 to 22.73 M mt by 2016 at an average growth of 6% per year. Harvest area is expected to expand by 2% annually while yield would increase by 4% yearly.

STRATEGIES & KEY INTERVENTIONS

The FSSP identifies three sets of interventions to raise farm productivity and competitiveness, enhance economic incentives and enabling mechanisms, and manage food staples consumption.

1. Raise farm productivity and competitiveness

1.1. Accelerate the expansion of irrigation services through frontloading of investment, prioritizing rehabilitation, restoration, and quick-gestating construction projects. Further invest in small-scale irrigation systems.

1.2. Encourage more widespread use of suitable high-quality seeds, fertilizers, and other integrated crop management practices.

1.3. Sustain research and development (R&D) in new varieties and crop management; in particular, overcome the low rice yield in rainfed, upland, and adverse environments, and develop new varieties to surpass the dry season irrigated lowland rice yield plateau.

1.4. Promote mechanization of on-farm operations to bolster farm efficiency, ensure timeliness of farm operations, and reduce unit costs. Provide appropriate drying facilities to reduce quantity and quality losses that depress farmers' incomes, and upgrade the rice milling industry.

1.5. Enhance the delivery and effectiveness of extension services through strengthening and greater involvement of Irrigators' Associations (IAs), localization of extension modalities, and mobilization of extension workers at all levels.

1.6. Boost yield and overall productivity growth in rainfed lowland areas through supplemental irrigation, use of high-quality seeds, proper nutrient management, and training on the *Palayamanan*® System. Improve productivity of upland rice areas and raise the capacity of high and medium-elevation rice-based areas as self-sufficient communities, promote sustainable farming systems, and establish seed propagation and production protocols.

2. Enhance economic incentives and enabling mechanisms

2.1. Strengthen price support and raise domestic procurement to 9% of *palay* production by 2016. Focus procurement in areas where trading is not competitive. Allow market forces greater role in setting retail prices. Distribute rice to poor households and victims of calamities through the DSWD. Minimize NFA's role in rice distribution and importation; NFA to focus on buffer stocking. Transfer NFA debt to the national government.

2.2. Strengthen credit provision to small farmers through credit sector reforms, multi-agency approach to credit provision, and innovations in credit delivery, including the FSSP Credit Component's *Sikat Saka* program.

2.3. Expand crop insurance coverage by increasing the capitalization of the Philippine Crop Insurance Corporation (PCIC), allocating more funds to provide coverage to rice farmers, and promoting new products like weather-based insurance.

3. Manage food staples consumption

3.1. Diversify food staples consumption by intensifying the production of other staples including white corn, *kamoteng kahoy*, *kamote*, and *saba*.

3.2. Encourage the consumption of unpolished rice or brown rice which, compared with white rice, is more nutritious and has higher milling recovery rate (75% vs 65%).

3.3. Reduce food wastage.

WHY SELF-SUFFICIENCY?

A third of the Philippine population can be found in agriculture living on one-tenth of the national gross domestic product (GDP). Close to half of farm households live in absolute poverty. For the rural poor, including small farmers and landless farm workers, getting access to adequate nutritious and healthy food is a daily struggle.

Under the Philippine Development Plan 2011-2016, food security and raising incomes are the agriculture sector's overarching goals. Toward these, the Department of Agriculture has launched the Food Staples Sufficiency Program (FSSP). The FSSP covers rice, the country's most important staple, and other staples including white corn, *saba*, and root crops such as *kamoteng kahoy* and *kamote*. The latter are traditional staples, especially in rural areas in many parts of the Philippines. They are also increasingly recognized as healthy staples in other parts of the country.

RAISING AGRICULTURAL PRODUCTIVITY

The FSSP is anchored on improving agricultural productivity and making the Filipino farmer globally competitive. History shows that productivity growth in agriculture is indispensable to sustainable food security and long-term poverty reduction.

At constant prices, higher farm productivity raises farm incomes and spills over onto the rural economy by raising agricultural wages, thereby eliminating the worst dimensions of absolute poverty (Timmer, 2009).

Beyond its immediate impact on the rural economy, higher productivity in agriculture feeds growth in the urban and industrial sectors by providing ample supplies of food, labor, and even savings (Timmer, 2009). In turn, the urban and industrial sectors generate new technology and products that further boost agricultural productivity and incomes. Consequently, rising rural incomes fuel the demand for industrial goods and services, sustaining growth in modern sectors of the economy. This virtuous cycle drives the structural transformation in a developing economy (Badhuri, 2004).

A key feature of this transformation is that farm labor moves out to more productive and better-paying jobs elsewhere. Because agricultural labor makes up the bulk of the poor, a reduction in poverty rates is seen over time. This structural transformation is at the heart of successful poverty-reducing efforts and long-run economic development (Badhuri, 2004; Felipe, 2010; Timmer, 2009).

Two policy implications are relevant. First, achieving food security and reducing poverty call for massive investments in terms of financial resources and policy attention to raise agricultural productivity (Timmer, 2009). After several decades of costly neglect, the agriculture sector must figure prominently on the national agenda (Javier, 2012). Second, food insecurity and mass poverty in agriculture cannot be solved within the sector alone. A feasible long-term solution hinges on a dynamic link between the agriculture and the industrial and services sectors.

AIMING FOR SELF-SUFFICIENCY

Raising productivity in food staples production is essential to boosting the overall agricultural productivity and is crucial to achieving the national goal of self-sufficiency. A policy of self-sufficiency provides food producers a stable and remunerative environment conducive to investing in higher farm productivity.

While the overall goal is self-sufficiency in food staples, the main focus of the FSSP is self-sufficiency in rice, the country's main staple. Given the critical role of rice to food security, it is risky to rely on the world rice market to even out fluctuations in domestic supply, let alone depend on it for a significant

proportion of national consumption. The world rice market is vulnerable to destabilizing speculation and panic as most recently shown in the 2007-2008 crisis. Governments of key exporting and importing nations have not been immune to market ills. In the absence of international policy coordination, trade becomes subject to political decisions of governments who consider rice a vital food commodity.

Rice provides 45% of the caloric intake of Filipinos[1]. It accounts for 20% of the typical household's budget[2]. This share rises to 30% for the bottom 30% of families. A durable crop that can be relied on to bring good harvest year in and year out, rice is sown in some 3.2 million hectares of land, providing livelihood to more than two million households engaged in rice-based farming, millions of farm laborers, and tens of thousands of merchants. Supply shortages and price instability can have serious implications for poverty and hunger.

While rice is the main focus of the FSSP, other equally healthy staples are included in the program. White corn, *kamoteng kahoy*, *kamote*, and *saba* are traditional staples eaten solely or in combination with rice especially in rural areas in some parts of the Philippines. While the share of these items in total food intake has declined over time, they remain important in many local diets. These staples are very important sources of food and income for households living in remote areas and adverse environments. They also offer an option as healthy food energy source for the general population.

Self-sufficiency in food staples means that the country must produce the national food requirement while maintaining a buffer stock to be used in times of need.

It is a theme that has resonated in past decades and political administrations. It cuts across countries as well, above all where rice is an important staple. Yet it is often argued that self-sufficiency is neither necessary nor desirable. Under this argument, the country can rely on imports to meet the national demand for staples, rice in particular. And instead of maintaining a buffer stock, the government can leave it to private traders and international trade to even out fluctuations in prices. In this view, aiming for self-sufficiency creates inefficiencies, results in high retail prices, and leaves a heavy financial burden on government.

The objection to self-sufficiency overlooks certain realities of trade. First, countries can be held hostage to some economic, political, and/or ideological reasons even in a highly globalized world. In particular, the world rice trade is subject to political decisions of governments who are the biggest players in the market. It is politically risky to rely entirely on the private market to ensure food security and to stabilize prices.

Second, rice is thinly traded, with world trade amounting to 30 M mt in 2010, or just 7% of global production. Moreover, exports are highly concentrated, with the top five countries accounting for 80% of total exports. Importing countries become vulnerable to export bans or restrictions.

The Philippines' being the world's 8th largest rice consumer can also have a destabilizing impact on the world rice market. Figure 1 shows that rising Philippine imports drive up the price of rice in the world market. This so-called "large country effect" came into play during the 2007-2008 world rice crisis.

Reacting to rising market panic, the Philippines bought 2.4 M mt or 20% of domestic consumption in the world market, pushing prices to their peak during the crisis.

Third, the world rice market is far from an ideal and efficient market in which prices reflect true costs. In reality, rice prices are vulnerable to destabilizing speculation and panic. This flaw arises from the industrial organization of rice in which millions of rice producers, consumers, and traders, including governments, can hoard the commodity over fairly long periods of time, with no one knowing how much rice is being held in the aggregate (Timmer, 2010).

A gradual shift in perception among market players, with or without basis in market fundamentals, can create a sudden shift in market conditions, including widespread panic.

Even in normal times, the world rice market is marked by massive distortions. Governments in the major rice-producing economies intervene heavily in the domestic rice sector through public investments, input subsidies, price support, public procurement, etc. While such interventions are costly, the growing economic clout of the major rice exporters means that these are increasingly affordable and are thus bound to grow.

Market intervention for whatever reason is, of course, a prerogative of every government. But this means that countries making these interventions are exporting their domestic poverty and unemployment outside their borders for the rest of the world to absorb.

In principle, the above-mentioned realities reflect market failures in the world rice market, which can be only addressed by international policy coordination (e.g. WTO, ASEAN). At best, these efforts are in their infancy and progress faces formidable obstacles. With no international policy coordination, most countries strive for self-sufficiency. No doubt this is not an ideal situation. All countries raising domestic rice production at the same time, generates excess supply in the world market, depressing prices to the ruin of farmers everywhere. Likewise, the pursuit of stable domestic prices by governments during periods of high volatility fuels even greater instability in the world market. Unfortunately, there are no neat and elegant solutions. Policymakers make do with a toolbox of imperfect, conflicting, and costly policies.

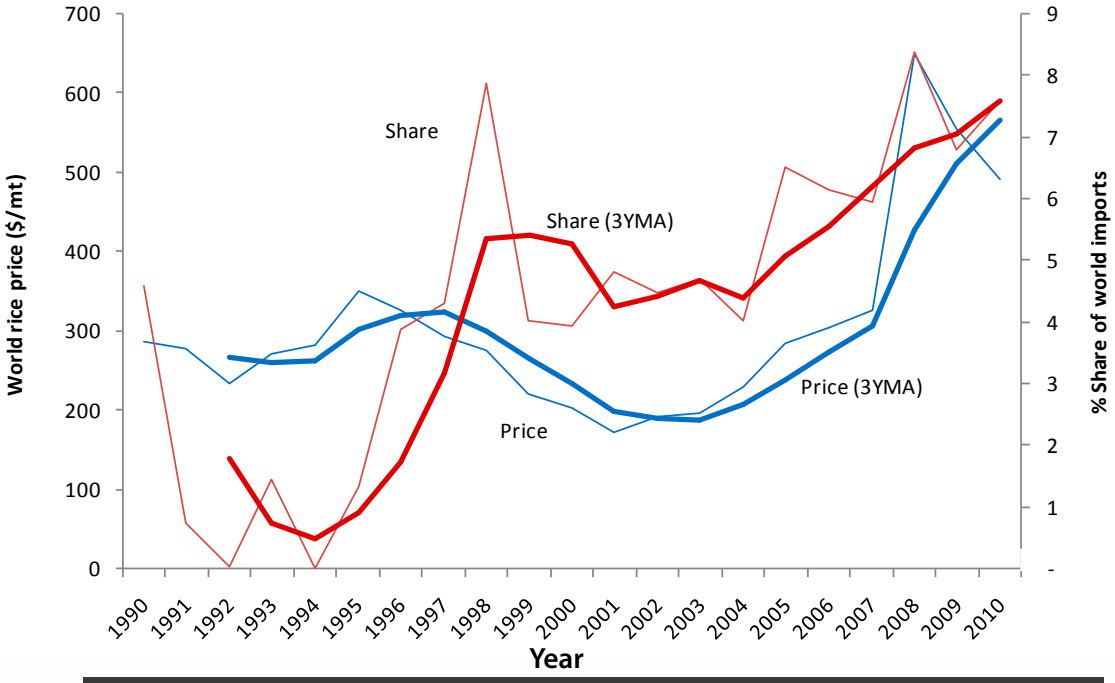


Figure 1. World rice price and Philippine share in world imports, and three-year moving average (3YMA)
Source of basic data: United States Department of Agriculture (USDA)

PERFORMANCE OVERVIEW

RICE

The Philippines has taken big strides in food staples production, particularly *palay*, the country's most important food crop. *Palay* production has been growing faster than population since the 1970s. Yields have continued to improve, driving increases in total harvest. Substantial productivity gains have been made across regions, in irrigated and rainfed farms, in areas close to urban centers and in more remote places as well. When it comes to rice production and yield growth, the country's performance compares favorably with the world's major rice producers. But there is scope to further boost production in order to meet the growing domestic demand for rice—and arrest the increasing reliance on imports.

Tables 1 to 3 present recent trends in *palay* production, yield, and harvest area, respectively, in the period 2000-2010. Table 4 presents growth performance in the past 40 years.

Table 1. Palay production, 2000 and 2010

	PRODUCTION LEVEL (M mt)		ANNUAL GROWTH	
	2000	2010	M mt	Contribution to growth
All ecosystems	**12.39**	**15.77**	**0.428**	**2.7%**
Jan-Jun	5.44	6.62	0.188	2.2%
Jul-Dec	6.95	9.15	0.240	3.2%
Irrigated	**9.41**	**11.99**	**0.314**	**2.7%**
Jan-Jun	4.51	5.53	0.149	2.3%
Jul-Dec	4.90	6.46	0.165	3.2%
Non-irrigated	**2.98**	**3.78**	**0.114**	**2.7%**
Jan-Jun	0.93	1.09	0.039	1.7%
Jul-Dec	2.04	2.69	0.075	3.2%

Source of basic data: BAS

Table 2. Palay yield, 2000 and 2010

	YIELD LEVEL (mt/ha)		ANNUAL GROWTH	
	2000	2010	kg/ha	%
All ecosystems	**3.07**	**3.62**	**63**	**1.8%**
Jan-Jun	3.13	3.64	69	1.6%
Jul-Dec	3.02	3.61	58	2.0%
Irrigated	**3.49**	**3.99**	**59**	**1.4%**
Jan-Jun	3.56	4.03	67	1.3%
Jul-Dec	3.41	3.95	50	1.6%
Non-irrigated	**2.23**	**2.81**	**66**	**2.6%**
Jan-Jun	1.98	2.44	67	2.3%
Jul-Dec	2.37	2.99	65	2.6%

Source of basic data: BAS

Table 3. Palay harvest area, 2000 and 2010

	HARVEST AREA (M ha)		ANNUAL GROWTH	
	2000	2010	ha	Contribution to growth
All ecosystems	**4.04**	**4.35**	**47,773**	**0.8%**
Jan-Jun	1.74	1.82	18,345	0.5%
Jul-Dec	2.30	2.54	29,428	1.0%
Irrigated	**2.70**	**3.01**	**38,655**	**1.1%**
Jan-Jun	1.27	1.37	15,337	0.8%
Jul-Dec	1.44	1.63	23,318	1.4%
Non-irrigated	**1.33**	**1.35**	**9,118**	**0.1%**
Jan-Jun	0.47	0.45	3,008	-0.6%
Jul-Dec	0.86	0.90	6,110	0.4%

Source of basic data: BAS

Table 4. Annual growth rates of palay production, harvest area, yield, and population, 1970-2010

PARTICULARS	IRRIGATED	RAINFED LOWLAND	RAINFED UPLAND	ALL
Production				
1970-1984	5.3%	1.9%	-5.1%	3.6%
1985-1999	2.6%	-1.3%	2.0%	1.6%
2000-2010	3.3%	4.2%	-8.4%	3.0%
Harvest Area				
1970-1984	1.6%	-0.8%	-6.7%	-0.1%
1985-1999	2. 3%	-1.3%	-0.5%	0.9%
2000-2010	1.4%	1.5%	-12.4%	1.1%
Yield				
1970-1984	3.6%	2.6%	1.6%	3.7%
1985-1999	0.3%	0.0%	2.4%	0.7%
2000-2010	1.9%	2.9%	3.1%	1.8%
Population				
1970-1984				2.7%
1985-1999				2.3%
2000-2010				1.9%

Source of basic data: BAS

Production growth. Total *palay* production has generally been growing since the 1970s, reaching a peak of 16.8 M mt in 2008. The key achievement in this area is that the growth in total harvest surpassed population growth in the past four decades, notwithstanding a slowdown in the mid 1980s to late 1990s. In the last decade, *palay* production grew 3% per annum compared with population growth of close to 2% (Table 4).

High growth in *palay* production can be traced to impressive production gains in irrigated areas, starting with a 5.3% annual growth in 1970-1984, slowing down to 2.6% in 1985-1999, and picking up pace again to 3.3% in 2000-2010 (Table 4). Production in irrigated areas accounted for the bulk of increases in

total harvest in the past decade because of greater hectarage and higher yields compared with rainfed lowlands and uplands. In 2000-2010, 73% of the increase in production came from irrigated areas while only 27% from non-irrigated areas (Table 1).

But rainfed lowland areas have shown promise in recent years with *palay* output growing at a rapid annual clip of 4.2% in 2000-2010 on the back of a 1.5% expansion in harvest area and 2.9% improvement in yield levels. This has important welfare and policy implications, a point we return to below. By season, the growth of *palay* production in 2000-2010 was faster in the wet season (July-December) than in the dry season (January-June), with the former accounting for 56% of growth (Table 1).

Yield growth. Yield growth is critical to sustaining gains in production in the face of increasing scarcity of land and water resources. After stagnating in the period 1985-1999, yield growth recovered to 1.8% annually in 2000-2010. In the last decade, yield growth accounted for 60% of growth in total production. The bigger contribution of yield to production growth replicates the experience in 1970-1984 during the Green Revolution, albeit to a lesser degree (Table 4).

Notable is the substantial yield growth in rainfed lowland and upland areas in the last 10 years, where annual yield growths of close to 3% were recorded, the highest over the past 40 years.

Yield growth in 2000-2010 translates to an annual gain of 66 kg/ha in rainfed areas (lowland and upland) compared with 59 kg/ha in irrigated areas (Table 2). Farmers working in rainfed farms are generally poorer than irrigated farmers. Indeed, they are among the poorest of rice farmers: the bottom 20% of rice farmers cultivates a harvest area of 1.3 hectares in a year (Dawe, 2006). Thus, sustaining the momentum of productivity growth in rainfed lowland areas can boost total production and improve the lives of small farmers.

Area growth. Growth in harvest area accounted for 40% of total *palay* production in the last 10 years. After shrinking in the 1970s due to much loss of upland areas and, to a lesser extent, rainfed lowland areas, harvest area expanded by about 1% per annum between 1985 and 2010 (Table 4). In 2000-2010, 81% of the increase in harvest area was due to expansion of irrigated areas, and the balance to non-irrigated areas. By season, 62% was gained in the wet season and 38% in the dry season (Table 3).

Following Pandey *et al.* (2010)[3], estimates of physical area and cropping intensity from the available quarterly data on harvest area were derived to answer whether the growth in harvest area was due to an expansion in the physical area or intensification of cultivation through multiple cropping as measured by cropping intensity (Table 5).

Focusing on the period 1995/97 to 2007/09, physical area expanded by 11% while cropping intensity increased only by 2.4%. Cropping intensity increased in rainfed areas but fell in irrigated areas by 0.1%. In addition, cropping intensity in irrigated farms is not much higher than in rainfed lowland farms, 1.56 versus 1.32. This shows that physical expansion, more than intensification of production, accounts for the increase in harvest area in the last decade and a half.

Comparing with Asian producers. The Philippines is part of the "Rice-Producing Asia" or Asian countries from Pakistan in the west to Japan in the east, which accounts for 90% of world rice production (Pandey *et al.*, 2010). As the 8th biggest producer of rice in the world, the Philippines nevertheless produces just half of the average production of the seven top producers, who collectively account for 80% of the world's production. The country has made remarkable gains in rice production, notably total harvest growth above high population growth to start with, and accelerated yield improvements in the 2000s. Annual *palay* yield growth from 2000 to 2009 was the second highest in Southeast Asia, next only to Vietnam (Table 6).

Table 5. Harvest area, estimated physical area, and cropping intensity, 1995/97 and 2007/09

	1995/97	2007/09	Change	% Change
Harvest area (ha)				
All	4,142,754	4,690,014	547,260	13%
Irrigated	2,547,745	3,115,636	567,891	22%
Rainfed	1,595,009	1,574,378	(20,631)	-1%
Lowland	1,431,950	1,516,058	84,108	6%
Upland	163,059	58,320	(104,739)	-64%
Physical area (ha)				
All	2,898,509	3,204,807	306,298	11%
Irrigated	1,629,618	1,994,790	365,172	22%
Rainfed	1,268,891	1,210,017	(58,874)	-5%
Lowland	1,105,832	1,151,697	45,865	4%
Upland	163,059	58,320	(104,739)	-64%
Cropping intensity (CI)				
All	1.429	1.463	0.034	2.4%
Irrigated	1.563	1.562	-0.002	-0.1%
Rainfed	1.257	1.301	0.044	3.5%
Lowland	1.295	1.316	0.021	1.7%
Upland	1.000	1.000		

Source of basic data: BAS, PhilRice

Table 6. Palay yield level and growth in selected countries, 2000-2009

COUNTRY	YIELD LEVEL (mt/ha)		ANNUAL GROWTH
	2000	2009	RATE (%)
China	6.26	6.59	0.72
India	2.85	2.98	1.34
Indonesia	4.40	5.00	1.35
Philippines	3.07	3.59	2.19
Thailand	2.61	2.87	1.68
Vietnam	4.24	5.23	2.33

Source: PhilRice (2011)

Rising consumption. Growth in population and per capita income are the most important determinants of the demand for rice. While annual population growth has been on the downtrend from a high of 2.7% in the 1970s to 1.9% in the 2000s, it is still one of the highest in Asia. Population outgrew *palay* production in 1985-1999 making the country a marginal importer during this period. Although this trend was reversed in 2000-2010, the country's rice imports in this decade nevertheless grew at a faster pace due to rising per capita consumption.

There is an upward trend on the per capita net food disposable (PCNFD), which is an estimate of per capita rice consumption (PCRC) based on the "disappearance method" used by the government to estimate total use and import requirements[4]. Until recently, PCNFD has been rising, reaching a peak of 128 kg/year in 2008, but has since gone down to 113 kg/year in 2010. The increasing trend was confirmed through a nationwide household survey of food consumption conducted by BAS, which shows an increase in PCRC from 106 kg/year in 1999/00 to 119 kg/year in 2008/09.

Shortfalls in domestic production relative to total requirements are filled up by imports, which had been growing in absolute terms and relative to total consumption. The mirror image is declining levels of self-sufficiency (Figure 2). Rapidly rising imports put the country in a most vulnerable position on the eve of the 2007-2008 world rice crisis. Until recently, the Philippines has emerged as the largest importer of rice whose buying decisions influenced the price of rice in a thin and increasingly nervous world market. On some occasions, large importations were justified by bad harvest due to crop damage caused by typhoons or prolonged drought. On others, increased imports were not clearly warranted domestic supply and demand considerations. Observers of the world rice market, for example, decried as "incomprehensible and reckless" the decision of the previous administration to buy 2.2 million metric tons from the world market towards the end of 2009. Earlier, aggressive buying by the Philippines was widely blamed for world prices soaring to over $1,000 per ton during the 2007-2008 world rice crisis (Timmer and Slayton 2009). Ample stocks and decline in PCNFD have reduced the need to import in 2011.

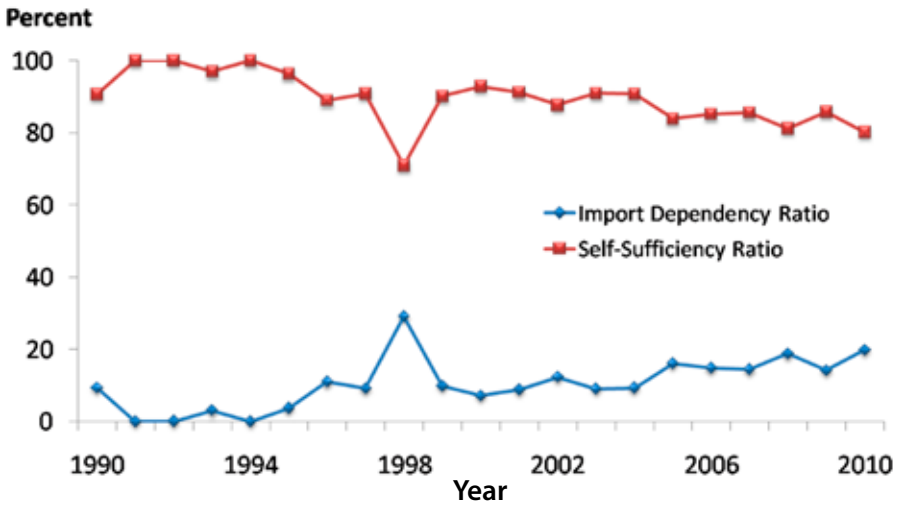


Figure 2. Import dependency and rice self-sufficiency ratio, 1990-2010
Source: PhilRice (2011)

OTHER STAPLES

In many households especially in the rural areas of Visayas and Mindanao, white corn, *kamoteng kahoy*, *kamote*, and *saba* are traditionally a major part of the daily meal. These home-grown crops are eaten solely or together with rice, especially for households in less favorable rice production areas.

Figure 3 shows the level of per capita consumption of other staples on the one hand, and as a ratio of the PCRC in selected provinces. For example, in Zamboanga del Sur, total consumption of these food items was close to 120 kg/year, which was more than one-and-a-half times the PCRC in that province. The ratio shows that households consume more of these staples than rice in four other provinces, while consumption of these non-rice staples approaches that of rice in 15 other provinces. To households in these areas, ensuring adequate supplies of these staples is as critical to food security as securing rice supplies.

Non-rice staples possess nutritional and health advantages. For example, rootcrops have low glycemic index and their consumption helps lessen the risk of diabetes mellitus (FNRI, 2009). In addition to low glycemic index, white corn has also lower caloric content compared with rice.

Recent studies of the demand for food in the Philippines show that corn, banana, and cassava are substitutes for rice based on cross-price elasticities, implying that an increase in the price of rice results in a shift in consumption toward these commodities (Francisco *et al.* 2011, Abad Santos 2010, Chen 2009). Thus, to the extent that these are important to households in less favorable environments, addressing

food security and poverty requires paying closer attention to non-rice staples. Moreover, encouraging the consumption of these staples eases the pressure on rice.

Production of non-rice staples including white corn, *saba*, and *kamoteng kahoy* has grown at a moderate pace in the last decade, while that of *kamote* has declined. Table 7 shows a general pattern of good yield growth combined with declining harvest area, resulting in modest harvest growth. Yield growth, for example, was highest in white corn, averaging 3.5% per annum, but harvest area was down by 1.5% per annum. In the case of *kamote*, the 1.4% annual yield growth was offset by an equal reduction in harvest area, leading to a small decline in production.

Saba shows the highest production growth owing to rapid annual yield growth of 2.9% and a modest 0.85% expansion in harvest area, indicating improved profitability on account of yield growth and strong demand. But the loss of land area devoted to the other staples, particularly white corn and *kamote*, points to declining economic returns relative to other crops. For example, a shift from white to yellow corn has been apparent in some areas owing to strong demand and higher yield for the latter.

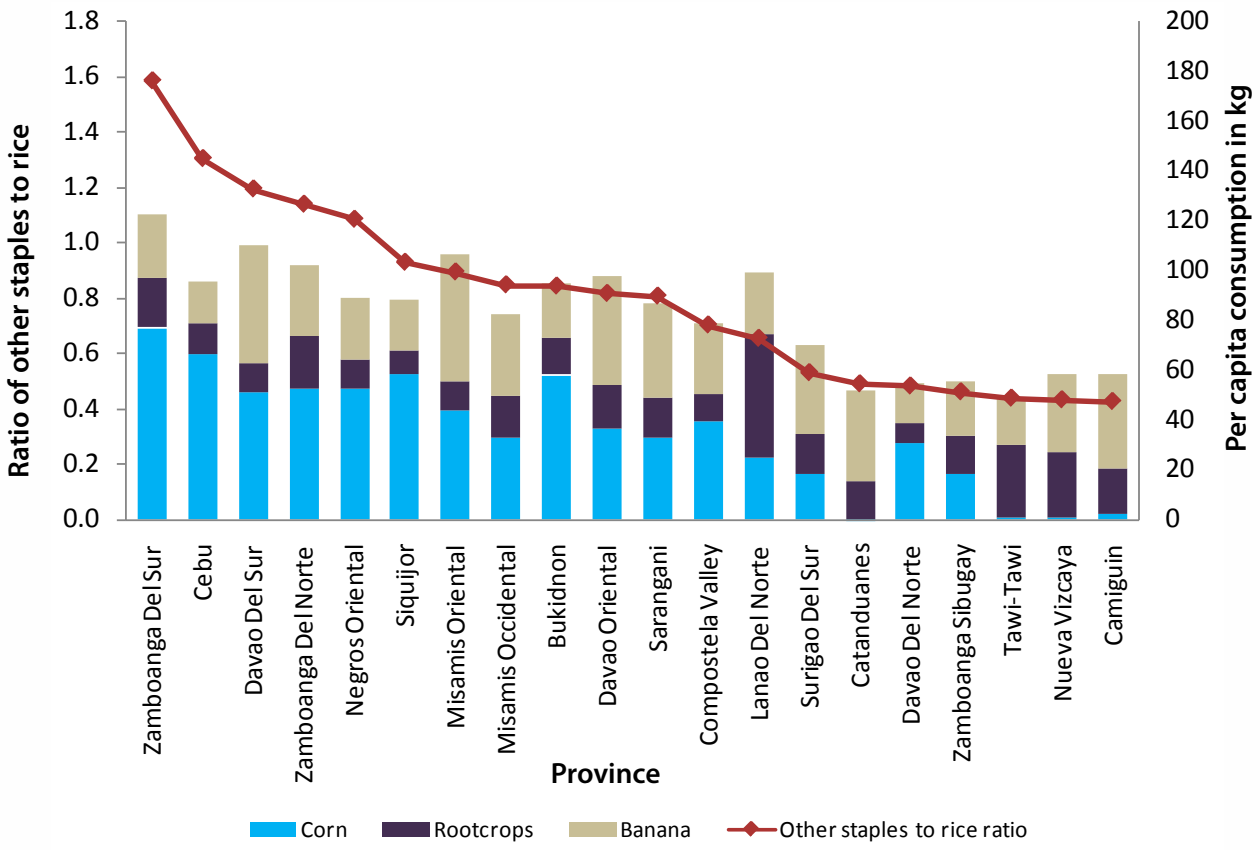


Figure 3. Per capita consumption of other food staples and ratio to rice in rural barangays of top 20 provinces (based on ratio)
Source of basic data: BAS

Note: The line graph shows the ratio of the total consumption of corn, rootcrops, and *saba* to rice. A higher ratio indicates greater importance of these staples relative to rice. A ratio greater than unity means that the other staples are collectively more important than rice in the local diet. For example, in Zamboanga del Sur where the ratio of other staples to rice is almost 2, this means that in the rural areas of this province, the population consumes twice the amount of other staples compared with their consumption of rice.

Table 7. Production, harvest area, and yield of selected non-rice staples, 2000-2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2000-2010 GROWTH
Production (M mt)												
Banana (*Saba*)			2.01	2.02	2.02	2.20	2.29	2.39	2.53	2.64	2.63	3.91%
Kamote	0.55	0.55	0.55	0.55	0.55	0.57	0.57	0.57	0.57	0.56	0.54	-0.23%
Cassava	1.77	1.65	1.63	1.62	1.64	1.68	1.76	1.87	1.94	2.04	2.10	1.90%
White Corn	1.89	1.92	1.80	2.05	2.23	2.25	2.36	2.53	2.25	2.32	2.17	1.48%
Harvest Area (M ha)												
Banana (*Saba*)			0.174	0.180	0.182	0.185	0.182	0.183	0.183	0.185	0.186	0.85%
Kamote	0.128	0.125	0.122	0.122	0.121	0.121	0.119	0.118	0.116	0.114	0.109	-1.43%
Cassava	0.210	0.208	0.208	0.209	0.206	0.205	0.205	0.210	0.212	0.216	0.218	0.35%
White Corn	1.573	1.565	1.503	1.565	1.562	1.492	1.471	1.469	1.367	1.403	1.339	-1.49%
Yield (mt/ha)												
Banana (*Saba*)			11.53	11.21	11.08	11.90	12.59	13.03	13.80	14.24	14.17	2.86%
Kamote	4.34	4.38	4.49	4.47	4.52	4.76	4.77	4.88	4.92	4.90	4.95	1.40%
Cassava	8.40	7.94	7.83	7.75	7.97	8.19	8.59	8.93	9.17	9.46	9.66	1.50%
White Corn	1.20	1.23	1.20	1.31	1.43	1.51	1.60	1.72	1.65	1.65	1.62	3.49%

Source of basic data: BAS

Recent studies of the demand for food in the Philippines show that corn, banana, and cassava are substitutes for rice based on cross-price elasticities, implying that an increase in the price of rice results in a shift in consumption toward these commodities (Francisco *et al.* 2011, Abad Santos 2010, Chen 2009). Thus, to the extent that these are important to households in less favorable environment, addressing food security and poverty requires paying closer attention to non-rice staples. Moreover, encouraging the consumption of these staples eases the pressure on rice.

KEY CHALLENGES

Food staples policy faces major challenges in the next six years and beyond. *First,* it must feed a rapidly growing population with rising per capita demand for staples. The task is made more difficult by an increasingly fragile resource base. To meet this challenge, government must significantly boost productivity and production levels, promote prudent consumption of rice, and encourage food staples diversification.

Second, we can meet this growing demand for food by raising our productivity or producing more with less. While yield-enhancing and cost-reducing technologies to do so are available, the challenge is to make more farmers adopt these. Providing farmers access to inputs such as quality seeds and fertilizers, developing their knowledge and skills about integrated crop management, promoting mechanization and use of postharvest facilities, paying closer attention to the special needs of rainfed lowland and upland areas can contribute to realizing the potential of new technology.

Third, government must step up investments in public goods such as irrigation, research and development (R&D), and extension, if we are to reap the full potential of new technology, and sustain these gains into the future. Given fiscal constraints, frontloading of irrigation investments, focus on rehabilitation and restoration projects, and improved delivery of R&D and extension services can address this challenge.

Fourth, inadequate economic incentives to adopt yield-enhancing technology, coupled with lack of access to capital and crop insurance, can render production interventions futile. Procurement, distribution, and trading policy with regard to rice need fine-tuning to support the goals of food security, stable prices, and decent incomes for rice producers.

Finally, the capacity of public institutions needs strengthening, which calls not only for more resources but also innovative schemes that address farmers' needs including working more closely with farmers' organizations and the private sector. This calls for exploring new approaches to delivering extension, credit, insurance, and other services.

MEETING FOOD DEMAND

Rapid population growth and rising incomes mean that demand for food staples would continue to grow in the next six years. With a population of 94 million in 2010, this is expected to continue to grow 2% per annum or close to 2 million Filipinos every year, adding 12 million people between 2010 and 2016. At the country's current level of development, rising incomes mean increasing per capita staples consumption. A shift away from traditional staples such as white corn, *kamoteng kahoy*, *kamote*, and *saba* has also contributed to the growing demand for rice.

Rice. At PCRC of 119 kg/year, the country's total requirement in milled rice equivalent would reach 17.7 M mt in 2016, up by 18% from 15.1 M mt in 2010. Rice consumption alone would rise by close to 2 M mt over the same period.

Other staples. Adding to the demand for rice is a shift away from traditional staples on account of rising incomes, urbanization, and inadequate supplies leading to rise in their prices relative to rice (Francisco *et al.*, 2011).

Encouraging the consumption of these other staples by improving supply and availability as well as raising awareness of their nutritional and health value can help stave off the shift to rice.

To the extent that consumption of non-rice staples comes from own production, raising production directly addresses food security in households dependent on non-rice staples in less favorable environments. And because they grow on less favorable environments and require less water and inputs, greater reliance on non-rice staples promotes diversification and helps ease the pressure on resources and the environment.

PRODUCING MORE WITH LESS

On the production side, the primary challenge is to promote widespread use of yield-enhancing technology embodied in modern rice varieties, fertilizers and pesticides, and integrated crop management practices as well as appropriate farm machinery and postharvest facilities. Yield-enhancing technology produces more output per unit of input, easing the pressure of feeding a growing population on natural resources and the environment.

Planting quality seeds. Across regions, seasons and ecosystems, farm survey data show that farmers using high-quality seeds—certified seeds (CS) and hybrid seeds—has a big yield advantage over farmers using home-saved ordinary seeds (OS). In 2006-2007, farms planted with CS had an average yield advantage of 644 kg/ha over farms planted with OS, especially in irrigated farms and during the dry season. Furthermore, yield of hybrid seeds was 21% higher than CS and 43% higher than OS, although yields vary more widely than other seeds (IRRI, 2009a). Despite substantial yield advantage of quality seeds, only 56% of farms were sown to CS and good seeds, 4% to hybrid seeds, 2% to traditional and native varieties, and 38% to ordinary seeds in 2009.

Efficient use of fertilizers. Current application rates of fertilizer nutrients—nitrogen (N), phosphorous (P), and potassium (K)—are well below recommended rates, holding down yield levels. In 2009, farmers' rates of application of N averaged at 74 kg/ha and 73 kg/ha on irrigated farms, and 39 kg/ha and 57 kg/ha on rainfed farms during the January-June and July–December cropping seasons, respectively (PhilRice, 2011). With a target yield of at least 5 mt/ha, the recommended rate of N application is about 100 kg/ha. Given the current low rates of fertilizer application, it is no wonder that average yield in the country is way below 5 mt/ha. The low rate of fertilizer use has persisted in the last decade, indicating binding economic constraints at the farm level. High fertilizer prices are a major constraint, so is the lack of water since fertilizer application requires it. That is why use rates are at least 50% higher on irrigated farms than on rainfed farms. Optimizing fertilizer use rates to farm conditions combined with proper timing and more efficient methods of application will ensure that rising use rates do not cause damage to soils and the environment (Gregory *et al.*, 2010).

Promoting farm mechanization. Promoting the use of farm machinery is a sensitive issue in the face of apparent excess labor supply and low wages in farming areas. Timeliness of farm operations and cost considerations, however, make farm mechanization economical especially in the context of rising total production. For example, land preparation must be performed while water is available; harvesting must be done at the optimal time to get the most yield; and *palay* should be dried within 24 hours of harvest to prevent losses in quantity and quality (Gummert *et al.*, 2010). Farm mechanization can also reduce labor cost which typically accounts for 45% of total production cost. In particular, mechanizing harvesting and threshing is one way to reduce unit cost and improve the competitiveness of local farmers (Dawe, 2006).

Reducing postharvest losses. Substantial quantities of rice are lost during drying and milling, not to mention loss of quality which reduces the value of production. The postharvest loss assessment project conducted jointly by PHilMech and PhilRice in 2010 shows that postproduction losses represent about 16.47% of total harvest, 5.86% during drying, 5.52% during milling, and the balance during harvesting, piling, threshing, and storage. Quality losses from poor drying—discoloration, high proportion of broken grains, and uneven moisture content—can further reduce the value of rice. Poor drying also contributes to low milling recovery rates. Lack of access to affordable drying services represents lost income to farmers who are forced to sell immediately after harvest at a low price. The opportunity cost rises when typhoons hit around the harvest season or in areas that typically experience long wet seasons. Investment in modern drying, milling, and storage facilities is needed to improve milling recovery rates and meet the growing demand for high-quality grains in urban markets.

BOLSTERING PUBLIC INVESTMENT

Public investments in key public goods including irrigation, R&D, and extension, have stagnated in the last two decades and will require beefing up. More resources are necessary, but the effectiveness of investments and service delivery also needs improvement.

Irrigation. Irrigation is the most robust way to boost production. It allows more than one cropping, increasing the area planted to rice. A reliable water supply maximizes yields through the use of high-yielding rice varieties, efficient application of fertilizers, and crop management techniques. The high cost of new construction has focused emphasis on rehabilitating and restoring existing facilities as a way to improve efficiencies and recover lost hectarage[5]. System performance can be improved through various measures such as tapping additional water sources, building drainage reuse systems, and establishing transitory water storage facilities. Investment in the construction of new large-scale irrigation systems (LSIS) also needs to be scaled up.

At the same time, additional investment in small-scale irrigation projects (SSIPs) will be critical in areas that are not served by national irrigation systems. SSIPs harness a variety of water sources using shallow tube wells, pump irrigation systems from open sources, small water impounding projects, and small diversion dams. SSIPs have low investment cost, more flexible operation and maintenance requirements, take less time to construct, allow efficient use of water, and promote better management of conflict among users. They can serve as supplemental water source in rainfed areas allowing more efficient application of fertilizers. The lower project cost of SSIPs relative to large-scale systems can entice local government units (LGUs), non-government organizations (NGOs), and people's organizations (POs) to invest in irrigation.

Research and development. Technological innovations in rice have made significant contributions to yield improvements. The impressive yield growth posted in past decades can be traced to increased use of modern inputs, products of previous investments in R&D—new rice varieties and crop management practices (Bordey, 2010). Led by PhilRice with its network of 57 members, local R&D activities have focused on four main areas: (i) breeding new rice varieties; (ii) improving crop management practices; (iii) developing appropriate farm machinery; and, (iv) integrating rice farming with other agricultural activities. Biotechnology and conventional breeding techniques are used to develop new varieties that perform well under specific conditions—irrigated areas, rainfed lowlands and uplands, cool and elevated areas, and saline-prone areas.

Extension. An effective extension system that can spread knowledge, skills, and technology to farmers is critical to closing yield gaps—the gap between what can be achieved at experiment stations and what is realized in farmers' fields with the same characteristics. Extension provides the link between R&D and the farmer, ensuring that farmers reap the full benefits of the new technology generated through R&D.

It addresses the lack of access to information, extension services, and technical skills, particularly in physically isolated areas, bridging the gap caused by physical distance. At the local level, a key challenge is to mobilize extension workers (some 25,000 in 2000) employed by autonomous LGUs in provinces, cities, and municipalities. Low priority and inadequate funding have led to the deterioration of LGU-provided extension services (Contado, 2004). At the national level, there is need to integrate and coordinate extension activities with local extension services. While not traditionally seen to be part of extension, organizing and capacity-building of irrigators' associations (IAs) is undertaken by the National Irrigation Administration (NIA). IAs assist the NIA in the day-to-day management and maintenance of irrigation facilities within their respective areas of responsibility.

Mandatory membership and their strategic role as stewards of water make IAs a natural channel of extension services. Wide variations in degree of functionality and capacity of IAs, however, point to the need for greater efforts at organizational strengthening and capacity-building.

REFORMING THE DOMESTIC STAPLES MARKET AND POLICY

An inefficient market and distribution system for food staples can bring to waste even the most impressive gains in raising production. Addressing the conflicting goals of ensuring food security, price stability, and income security of farmers requires effective and efficient procurement, distribution, and trading policies.

Price support and procurement. Government price support aims to ensure farmers reasonable income from *palay* farming. The effectiveness of this policy is limited by the low level of procurement. As a percentage of local production, NFA procurement was below 1% in 2006-2007, improved to 5.2%

in 2008-2010, but dropped again to 1.7% in 2011 (NFA). At the local level, government procurement provides a price signal to the market especially in areas where trading volumes are low. In some cases, the mere threat of NFA buying from the market can influence the farmgate price. Increasing the volume of procurement and focusing on areas where farmgate prices are low and *palay* markets are underdeveloped can improve the effectiveness of price support.

Distribution and safety net program. The NFA also carries out processing activities, dispersal of milled rice to strategic locations, and distribution to various marketing outlets. The NFA aims to stabilize prices using buffer stocks which are distributed during lean months or when price surges are observed. Compared with its intervention in the *palay* market, the NFA has been more effective in influencing prices in the rice market due to its significant share to total consumption of about 12%. With low domestic procurement, over 95% of rice distributed by NFA is imported. An effective and efficient distribution policy must ensure adequate supplies above all in times of shortages, make sure that the poor has access to these supplies, and minimize the fiscal burden on government.

Strengthening service delivery. The enormousness of the task ahead requires robust public institutions that are up to the challenge. Institutional reform cuts across all divisions and agencies. The scarcity of financial resources poses a binding constraint in key areas of operation. This calls for increased public investment but also more effective and efficient ways of delivering public services. Mobilizing the private sector leverages limited public resources by mobilizing additional financial resources, benefiting from synergies, and maximizing public support for policies.

Strengthening the financial base of institutions. The NFA is saddled by huge debt obligations which hamper its capacity to effectively fulfill its mandate. Agricultural credit is largely left in the hands of the private sector where market failure has led to the dominance of informal lenders charging a high cost of credit. Crop insurance remains *de facto* the domain of government, but lack of capital severely limits the capacity of government agencies to provide adequate coverage to the sector.

Enhancing input and service delivery. Innovative mechanisms are also needed to overcome bottlenecks in credit access and payment of insurance claims, to mention just two examples. Mechanisms or schemes that work with farmers are needed for extension, technology adaptation, managing irrigation systems, mechanization, providing credit and insurance, and procurement.

Mobilizing resources for public goods. One encouraging example of private sector investments is the development of hybrid seeds and the multiplication of inbred seeds. Development of appropriate farm machinery and postharvest facilities is another promising area. Government has been opening up opportunities for the private sector to undertake an increasing portion of rice importation. The expected increase in the demand for rice requires concerted efforts to mobilize private sector resources to finance investments in research and development (*e.g.* seeds and machinery), postharvest facilities, and marketing infrastructures.

THE PROGRAM

VISION

Our vision is a food-secure society where farmers enjoy decent and rising standards of living.

Moving toward this vision is a long-term process of successively realizing the goals of rising rural productivity, growing farm incomes, and self-sufficiency in food staples. This can only be achieved in a progressive economy in which rural and urban sectors are linked in a mutually reinforcing process of growth and development.

GOALS

The FSSP 2011-2016 aims to achieve self-sufficiency in food staples toward ensuring food security.

Food staples refer to rice and other staples including white corn, root crops, and *saba*. Rice is the country's most important food while other staples are consumed in significant quantities in certain parts of the country. Self-sufficiency is reached when domestic production can meet domestic requirements for food, seeds, processing, feeds, and adequate buffer stock.

Self-sufficiency will be achieved by prioritizing productivity growth and boosting production, thereby improving access to affordable staples. Productivity growth and increased production will raise incomes of small farmers and farm workers, addressing food security and poverty among staples producers.

TARGETS

The main target is to produce our domestic requirement by 2013. Beyond 2013, the aim is to strengthen national resilience through the production of food staples to impacts of climate change.

To achieve the overall target of self-sufficiency, total *palay* production, area harvested, and yield are targeted (Table 8). From 15.77 M mt in 2010, total production is targeted at 22.73 M mt by 2016 at an average growth of 6% per year. Harvest area is expected to expand by 2% annually while yield will rise by 4% yearly. Thus, yield improvement and area expansion will account for 60% and 40%, respectively, of the growth in production.

Figure 4 presents the range of target supply and demand estimates for rice. On the supply side, the high scenario occurs when the production target is realized. The other scenario adjusts for the impacts of climate change by lowering the production target by 500,000 mt [6]. On the demand side, the high scenario assumes a per capita rice consumption of 119 kg/year while the low scenario considers 114 kg/year [7], which translates into an annual difference of 700,000 mt of rice between the two scenarios.

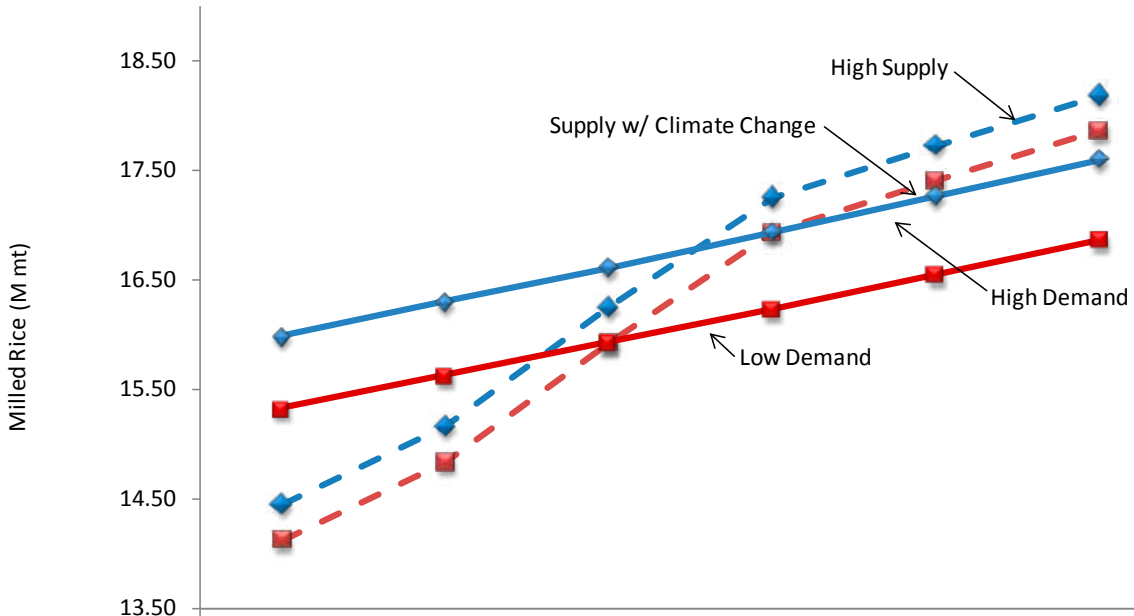
Table 8. Target palay production, harvest area, and yield, 2011-2016

PARTICULARS	2010*	2011	2012	2013	2014	2015	2016
All Ecosystems							
Yield (mt/ha)	3.62	3.78	4.03	4.23	4.43	4.48	4.53
Harvest area (M ha)	4.35	4.49	4.58	4.74	4.85	4.94	5.02
Production (M mt)	15.77	16.96	18.46	20.04	21.50	22.13	22.73
Irrigated Ecosystem							
Yield (mt/ha)	3.99	4.16	4.46	4.66	4.87	4.90	4.93
Harvest area (M ha)	3.01	3.16	3.27	3.50	3.65	3.75	3.83
Production (M mt)	11.99	13.13	14.61	16.30	17.78	18.37	18.90
Non-Irrigated Ecosystem							
Yield (mt/ha)	2.81	2.88	2.95	3.02	3.09	3.16	3.23
Harvest area (M ha)	1.35	1.33	1.31	1.24	1.20	1.19	1.19
Production (M mt)	3.78	3.83	3.85	3.75	3.72	3.75	3.83

** Values for 2010 are based on actual statistical data from BAS.*

In 2013, the country can be self-sufficient with both high and medium-supply scenarios under the assumption of low demand. By 2014, self-sufficiency can be achieved with both high and medium-supply scenarios even under the high-demand scenario. This implies that the FSSP production target has become more responsive to the negative effects of climate change. While surpluses are projected beyond 2013, these only provide cushion to absorb the potential climate change impacts on production.

Two implications follow if the low-demand scenario is realized. First, import requirements prior to 2014 will be lower (Figure 5). Second, there is higher probability of achieving self-sufficiency and generating some surplus beyond 2013. In this case, a surplus-management strategy will be established.



	2011	2012	2013	2014	2015	2016
High Supply	14.45	15.16	16.25	17.26	17.73	18.19
Supply w/ Climate Change	14.12	14.84	15.93	16.93	17.41	17.86
High Demand	15.99	16.30	16.61	16.93	17.26	17.59
Low Demand	15.33	15.62	15.92	16.23	16.54	16.86

Figure 4. Target rice supply and demand estimates, 2011-2016

Note: Supply accounts for total production (in milled rice terms) and beginning stock of rice inventories. Demand accounts for total use and ending stock of rice inventories. Imports constitute the difference between supply and demand. (For more details, see Tables A.4 and A.5 in Annex, pages 55-56).

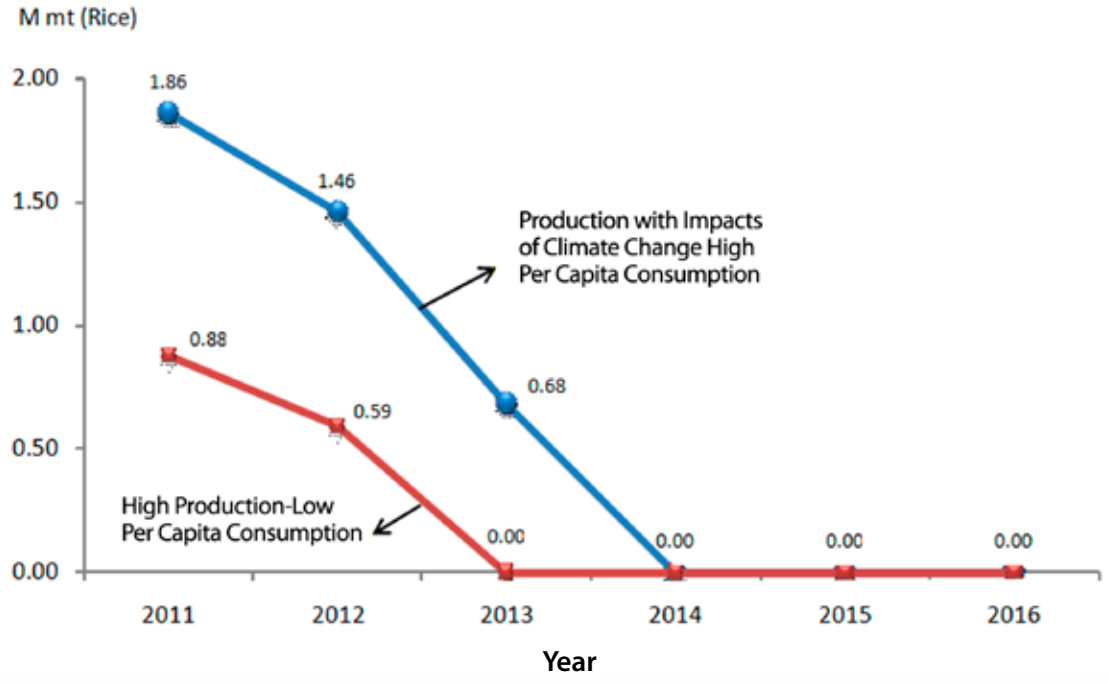


Figure 5. Range of import requirements under various supply and demand scenarios, 2011-2016

STRATEGIES & INTERVENTIONS

1. Raise Productivity and Competitiveness

This strategy involves: (i) accelerating the expansion of irrigation services; (ii) ensuring the adoption of suitable high-quality seeds, fertilizers, and other integrated crop management practices; (iii) sustaining research and development (R&D); (iv) promoting mechanization of on-farm and postharvest operations; (v) enhancing the effectiveness and strengthening the delivery of extension services; (vi) boosting yield growth in rainfed areas; and (vii) harnessing the potential of the upland rice ecosystem. These interventions are expected to expand harvest area, bolster yields, reduce postharvest losses, and boost total production. At the farm level, these measures aim to raise productivity, improve cost-efficiency and competitiveness, and maximize the returns from farming.

1.1 . Accelerate the expansion of irrigation services. The objective is to generate irrigated rice areas to meet production targets by boosting investments in large-scale and small-scale irrigation projects (LSIPs and SSIPs), maximizing cost-effectiveness of irrigation spending, and raising the efficiency of existing irrigation systems. Irrigation is a major area of investment and is thus expected to contribute a substantial share of projected incremental production. The target is to increase irrigated rice harvest area under LSIPs by more than 728,000 ha by 2016 (Table 9) and an additional 96,000 ha under SSIPs (Table 10).

1.1.1. Prioritize rehabilitation and restoration of existing facilities, and construct new irrigation systems. Rehabilitation and restoration involve improving the flow of water to water-deficit areas and restoring irrigation services to water-deprived areas typically found at the tail end of the system. While rehabilitation does not add to harvest area, this is essential to avoid the deterioration of existing systems that can eventually reduce harvest area. Unlike rehabilitation, restoration adds to harvest area. Construction of new irrigation systems will generate 114,000 ha or 53% of additional NIA service area.

1.1.2. Improve efficiency of irrigation systems through irrigation system modernization (ISM) and integrated water resource management. Modernization is integrated in rehabilitation and restoration projects to improve system performance and service delivery through measures such as tapping additional water streams, establishing drainage reuse systems, and building transitory water storage facilities. Water resource management involves enhanced water-diverting and conveying capacity, canal flow control and measurement, and automated hydrological and meteorological data collection. Improving the capacity of IAs to manage irrigation facilities will also raise system efficiency.

Table 9. Target NIA service area, cropping intensity, and incremental harvest area, large-scale irrigation projects, 2011-2016

PARTICULARS	2011	2012	2013	2014	2015	2016
(A) Beginning Service Area (ha), [(E_{t-1})]	1,536,135	1,577,607	1,676,790	1,727,011	1,752,743	1,752,743
(B) Area Generated (ha)	21,910	52,398	26,532	13,594	-	-
(C) Area Restored (ha)	19,562	46,784	23,689	12,138	-	-
(D) Area Rehabilitated (ha)	46,084	47,328	50,304	51,810	56,250	56,250
(E) Ending Service Area (ha), [(A)+(B)+(C)]	1,577,607	1,676,790	1,727,011	1,752,743	1,752,743	1,752,743
(F) Cropping Intensity	1.44	1.47	1.50	1.53	1.56	1.60
(G) Harvest Area (ha), [(A) x (F)]	2,212,030	2,319,080	2,515,180	2,642,330	2,734,280	2,804,390
(H) Incremental Harvest Area (ha), [(G_t) – (G_{t-1})]	135,630	107,050	196,100	127,150	91,950	70,110

Table 10. Target BSWM service area, cropping intensity, and incremental harvest area, small-scale irrigation projects, 2011-2016

PARTICULARS	2011	2012	2013	2014	2015	2016
Beginning Service Area (ha)	**206,425**	**212,620**	**230,530**	**246,854**	**253,304**	**260,204**
SWIP/DD	86,356	91,426	99,476	106,160	111,660	117,500
SFR	22,282	22,282	24,642	26,782	27,732	28,792
STW/PISOS	97,787	98,912	106,412	113,912	113,912	113,912
Generated New Areas (ha)	**6,195**	**17,910**	**16,324**	**6,450**	**6,900**	**7,213**
SWIP/DD	5,070	8,050	6,684	5,500	5,840	6,100
SFR	-	2,360	2,140	950	1,060	1,113
STW/PISOS	1,125	7,500	7,500	-	-	-
Ending Service Area (ha)	**212,620**	**230,530**	**246,854**	**253,304**	**260,204**	**267,417**
SWIP/DD	91,426	99,476	106,160	111,660	117,500	123,600
SFR	22,282	24,642	26,782	27,732	28,792	29,905
STW/PISOS	98,912	106,412	113,912	113,912	113,912	113,912
Cropping Intensity						
SWIP/DD	1.60	1.60	1.60	1.60	1.60	1.60
SFR	1.40	1.40	1.40	1.40	1.40	1.40
STW/PISOS	1.50	1.50	1.50	1.50	1.50	1.50
Harvest Area (ha)	**316,045**	**325,844**	**353,278**	**378,219**	**388,349**	**399,177**
SWIP/DD	138,170	146,282	159,162	169,856	178,656	188,000
SFR	31,195	31,195	34,499	37,495	38,825	40,309
STW/PISOS	146,681	148,368	159,618	170,868	170,868	170,868
Incremental Harvest Area (ha)	**12,718**	**9,800**	**27,434**	**24,940**	**10,130**	**10,828**
SWIP/DD	5,968	8,112	12,880	10,694	8,800	9,344
SFR	-	-	3,304	2,996	1,330	1,484
STW/PISOS	6,750	1,688	11,250	11,250	-	-

1.1.3. **Frontload investments to 2011-2013 to accelerate area expansion and realize benefits within the plan period.** Investments are programmed so that a larger share is allocated in the first half of the program period (2011-2013). Priority in funding is given to pipeline projects near completion and quick-gestating projects. Frontloading also supports the emphasis on rehabilitation and restoration.

1.1.4. **Improve cropping intensity.** Prioritize irrigation development in areas that could lead to double cropping or more per year. In addition, quick turn around and ratooning will be promoted where appropriate. Expansion of irrigation services either to existing rainfed rice areas or to non-rice lands will be reflected in higher overall cropping intensity.

1.1.5. **Invest in small-scale irrigation systems to serve areas that are not reached by large-scale facilities.** Small systems include shallow tube wells, small farm reservoirs, small water impounding projects, and pump irrigation from open sources. They have low investment costs and short gestation periods supporting the thrust to generate new areas quickly.

1.2. Ensure adoption of suitable high-quality seeds, increased use of fertilizers, and other integrated crop management practices. This intervention aims to raise yield through wider adoption of integrated and locally adapted technologies. An integrated approach takes advantage of the synergy across component technologies. Implementation will take into account variations in local conditions and current farming practices, as local innovation is encouraged.

High-quality seeds can be either certified seeds produced by accredited seed growers, seed companies, or home-saved seeds produced by farmers.However, seeds are considered of high quality only if they meet certain standards as to suitability of the variety to location and season, germination rate, physical purity, and are free of seed-borne diseases.

By 2016, additional 25% of the total harvest area will be sown to high-quality inbred seeds with an average yield of 5 – 5.5 mt/ha (Table 11). Moreover, additional 10% of total harvest area will be planted to hybrid seeds with an average yield of 6.5 mt/ha. These should be on top of the current areas that are already planted with high quality inbred and hybrid seeds. To achieve these targets, the following approaches will be adopted:

1.2.1. **Develop effective seed production systems and strengthen seed linkages and networks.**

1.2.2. Strengthen seed certification activities through improvement and upgrading of national, regional, and satellite seed testing facilities.

1.2.3. Work with private seed growers to raise production capacity and improve distribution of high-quality seeds.

1.2.4. Maintain buffer seed stocks equivalent to 10% of planting requirement in the wet season and 5% in the dry season in all regions and provinces to ensure availability of quality seeds during calamities and crop failure.

1.2.5. In partnership with LGUs, private seed growers, and farmers' organizations, establish community seed banks (CSB) to maintain the required buffer seed stock and promote an informal system of seed exchange in areas that are not adequately served by the private market.

Table 11. Target yield and program areas for technology and knowledge interventions, 2012-2016

INTERVENTION	2012	2013	2014	2015	2016
Target Yield (mt/ha)					
HQ Inbred Seeds + Nitrogen + ICM	5.50	5.50	5.50	5.50	5.50
HQ Inbred Seeds + Nitrogen	5.00	5.00	5.00	5.00	5.00
HQ Hybrid Seeds + Nitrogen	6.50	6.50	6.50	6.50	6.50
Nitrogen	4.75	4.75	4.75	4.75	4.75
Other Areas – Irrigated	4.11	4.17	4.23	4.29	4.35
Other Areas – Non-Irrigated	2.95	3.02	3.09	3.16	3.23
Target Area (ha)					
HQ Inbred Seeds + Nitrogen + ICM	270,000	292,500	337,500	337,500	337,500
HQ Inbred Seeds + Nitrogen	200,000	450,000	600,000	800,000	900,000
HQ Hybrid Seeds + Nitrogen	100,000	250,000	400,000	500,000	500,000
Nitrogen	200,000	300,000	400,000	400,000	400,000
Other Areas – Irrigated	2,503,523	2,204,557	1,911,647	1,713,727	1,694,665
Other Areas – Non-Irrigated	1,306,995	1,241,287	1,203,031	1,187,586	1,185,286

*HQ – High-Quality; ICM - Integrated Crop Management

Nitrogen is the most limiting nutrient in rice production. Current application rates of nitrogen fertilizer are way below the optimum rates. In rainfed areas, fertilizer application is limited by the availability of water. But even in irrigated areas where potential contribution to yield is higher, low nitrogen application continues to limit yield. Nitrogen application will be increased to optimize the potential of high-quality seeds. Encouraging optimal nitrogen application will be pursued through a variety of strategies depending on local conditions and capacities. Facilitating supply and distribution, improved credit, and extension tie-ups are some of the options available. While direct subsidy as a policy is shunned at the national level, this does not prevent LGUs from subsidizing fertilizer use as they see fit.

1.2.6. Reduce the gap between optimal and actual rates of nitrogen use by enhancing farmers' access to credit and insurance (see Section 2.1 and 2.2).

1.2.7. Maximize the utilization of farm wastes and locally available biomass including non-burning of rice straw.

1.2.8. Promote supplementary irrigation in rainfed areas to optimize timing and rates of fertilizer application

Integrated Crop Management (ICM) covers seed quality, land preparation, crop establishment, and management of nutrients, water, pest, diseases, and harvest. These factors are interdependent and interrelated on their impact on the growth, yield, rice grain quality, and on the sustainability of the environment. In terms of nutrient management, proper timing of application and balanced fertilization will be promoted to avoid deficiencies of micronutrients and other macro-elements. To increase the adoption of ICM, the program will:

1.2.9. Conduct soil analysis and develop soil fertility maps for all rice-producing areas

1.2.10. Conduct effective surveillance and monitoring of pests and diseases at the local level

1.2.11. Conduct training, and provide technical assistance by government extension workers and selected farmer–leaders

Various combinations of technology- and knowledge-based interventions will be promoted in suitable areas. To attain the target yield level, these interventions will be intensified in selected program areas to maximize potential yield gains. However, other technology promotion activities will continue to be provided in other areas.

1.3. Sustain research and development (R&D) in new varieties and crop management. R&D aims to sustain future yield growth by promoting local adaptation of existing technologies, breeding new rice varieties to raise the potential yields in irrigated and rainfed areas, and developing high-value products to add to farmers' incomes.

1.3.1. Develop location-specific technologies to accelerate adoption of new technologies suited to local conditions. Location-specific technology development (LSTD)) tests the appropriateness of component technologies using *PalayCheck*® (for irrigated areas) and *Palayamanan*® Systems (for rainfed lowland and upland areas) as platforms to suit local, seasonal, soil, and climatic conditions as well as farmers' financial capacity.

1.3.2. Develop technologies to break the low rice yield barriers in rainfed, upland, and other adverse environments. Research aims to raise potential yield in less favorable rice areas to 4-5 tons per hectare for inbred varieties and 6-7 tons for hybrid varieties. Improved crop management practices—land preparation, seeding, and water, soil, nutrient, and pest management—will be integrated into a *Palayamanan*® System for these areas.

1.3.3. Develop technologies to surpass the dry season irrigated lowland rice yield plateau. The objective is to shift the production frontier in irrigated areas by developing rice varieties with potential yields of 9-11 tons per hectare for inbred varieties and 12-15 tons for hybrid varieties. Efficient seed production protocols, better nutrient, pest and water management will go into an improved *PalayCheck*® System.

1.3.4. Develop natural products and value-adding systems for rice. Activities will promote high-value rice varieties and rice-based products as sources of additional income to rice farmers. Specialty varieties, micronutrient-dense rice, and improved organic and brown rice will be developed along with rice-based food products and beverages. Alternative uses of rice by-products will be explored.

1.3.5. Conduct impact evaluation, policy research, and advocacy. This will monitor the effectiveness of R&D programs, promote informed policy and decision-making, and accelerate technology development and adoption through information and feedback.

1.4. Promote mechanization of on-farm and post harvest operations. Mechanization aims to raise efficiency of farm operations, lower unit costs, and reduce postharvest losses in support of production targets. Acquisition of various farm machinery and postharvest facilities will be encouraged through counterpart financing schemes and soft loans. Allocation of equipment and facilities will be based on production levels, technology gaps, potential impact on yields and productivity, and appropriateness of technology to local needs and conditions.

1.4.1. Promote the acquisition of appropriate farm machinery to bolster efficiency, ensure timeliness of farm operations, and lower unit costs. This involves the distribution of farm machinery—hand and medium-size tractors, and

threshers, as well as seeders and combine harvester-threshers—through farmers' associations. The use of farm machinery facilitates timely completion of critical farm tasks such as land preparation, transplanting, and harvesting, while lowering labor cost in labor-intensive processes such as harvesting and threshing. Government investment in the distribution of farm machinery aims to encourage private sector investment in mechanization. Table 12 shows the target distribution of farm machinery.

Table 12. Target distribution of farm machinery, 2011-2016

Farm Machinery	2011	2012	2013	2014	2015	2016
Primary						
Hand tractor	3096	8989	8830	3263	3351	3462
4-Wheel tractor	163	100	75	75	50	37
Thresher	1031	2996	2944	1088	1120	1154
Secondary						
Drum seeder		1145	1275	510	525	545
Combine harvester		16	16	16	16	16
Mini combine		16	16	16	16	16
Reaper		945	990	345	355	365
Seed cleaner		360	360	360	360	360

1.4.2. Provide appropriate drying facilities to reduce farmers' dependence on conventional drying methods (e.g. drying *palay* on highways) that result in loss of *palay* and dependent on good weather. Flatbed and mechanical dryers, with multi-purpose drying pavements (MPDP), will be provided to farmers' organizations through a counterpart scheme based on need and strategic location. Farmer-managed drying centers will be established in regions that typically experience prolonged wet seasons and where road access is difficult. Complementing this approach is the retrofitting of NFA facilities to use biomass fuel for drying to accommodate the demand for drying facilities. Table 13 presents the target distribution of postharvest facilities.

1.4.3. Modernize the rice milling industry to increase milling recovery rates. Modern rice mills will be provided to farmers' associations with proven capacity to manage the operation through a counterpart financing scheme, with beneficiaries contributing 25% of cost. Private millers can acquire a modern rice milling system, including rice mill, warehouse, mechanical drying, and support milling facilities, through a soft loan.

1.4.4. Provide affordable access to appropriate farm machinery through distribution to qualified beneficiaries, establishment of service centers, and pooling of equipment. Farm machinery and postharvest facilities will be made available to qualified irrigators' associations and farmers' cooperatives, with beneficiaries paying for 15% of the facility cost. The private sector, including cooperatives, will be encouraged to offer services to farmers, while pooling of farm equipment in cluster areas will be promoted.

Table 13. Target distribution of postharvest facilities, 2011-2016

Facility	2011	2012	2013	2014	2015	2016
Drying Program						
Flatbed dryers (FBD)	391	896	891	348	358	369
Multi-purpose drying pavement (MPDP)	871	787	844	348	358	369
Rice Milling						
Ricemill for farmers	16	100	107	33	36	37
Ricemill for private millers		40	40	15	15	15

1.5. Enhance the effectiveness and strengthen the delivery of extension services. Enhanced extension services aim to accelerate the adoption of new technologies, and provide an effective venue for farmers to learn new practices and innovate. The approach is to combine extension, education, and training. In irrigated areas, extension services will prioritize IAs and farmers' cooperatives. This implies a broader view of extension services to include strengthening and capacity-building of farmers' organizations. Moreover, the provision of extension services can complement other efforts to empower farmers (e.g. on-going efforts to transfer management of irrigation facilities to irrigators' associations). Extension and education services will be provided not only to farmer-operators/cultivators but also to farm workers and service providers.

Although yield-enhancing technologies are based on general scientific principles, the emphasis of messages and the means of delivery can be localized to respond to peculiarities of the various target areas. This requires a highly participatory assessment of local conditions to determine the major constraints in rice production, the appropriate technology solutions, and required support services.

The Department of Agriculture-Regional Field Units (DA-RFUs), in collaboration with local stakeholders (SUCs, NGOs, LGUs, farmer organizations), will conduct this assessment. After the assessment, DA-RFUs will develop their regional extension action plans. DA-RFUs may tailor the component activities for a particular locality given a budget ceiling. However, they have an option to obtain funds from other sources.

Extension modalities at the farm level may include establishment of Farmer Field Schools (FFS) and technology demonstration farms, conduct of field days, dissemination of information materials, school-

on-the-air, technical visits and briefings, and use of electronic extension as appropriate. The localized extension action plan can mobilize extension workers from LGUs, NGOs, and Local Farmer Technician (LFT). To optimize the potentials of these extension workers at the farm level, they will attend retooling and refresher courses, which will be led by rice specialists from the DA-RFUs and with support from ATI, PhilRice, and SUCs within the region.

Rice Sufficiency Officers (RSOs) who have undergone intensive specialized training in rice production provide the link between R&D and extension, serve as technical resource persons on rice production and rice-based farming systems, and assist in adapting *PalayCheck*®/Rice ICM to local conditions. As special extension workers specifically mandated to work toward the attainment of self-sufficiency, RSOs provide technical support to extension workers, and link farmer extensionists to sources of technology, information and support services (Table 14).

Table 14. Target distribution of extension activities, 2011-2016

PARTICULARS	2012	2013	2014	2015	2016
Number of field schools	12,000	13,000	15,000	15,000	15,000
Number of farmers/site	30	30	30	30	30
Assumed adoption rate	0.75	0.75	0.75	0.75	0.75
Average area/farmer (ha)	1.00	1.00	1.00	1.00	1.00
Total program area (ha)	270,000	292,500	337,500	337,500	337,500

In addition, rural out-of-school youth with basic experience in rice farm work will be trained as Rice Sufficiency Volunteers (RSV). They will undergo season-long rice production training. These volunteers will assist in implementing the FFS in their community. They can also do field monitoring and surveillance for occurrence of pests and diseases. They can also serve as information intermediaries ("infomediaries") between farmers and technicians.

1.5.1. Adapt the Farmer Field Schools and other extension modalities to fit the priority technology and information needs of farmers in the locality

1.5.2. Upgrade technical and facilitation skills of extension workers at the farm level

1.5.3. Organize farmers, and strengthen existing cooperatives and organizations

1.5.4. Strengthen monitoring and evaluation of rice extension programs

1.6. Boost yield growth in rainfed areas. Raising yield levels in rainfed lowland areas will boost marketable surplus from these areas. *Palayamanan*® offers a platform for rice-based farming in rainfed lowland areas, emphasizing the adoption of appropriate technology for rice production and farm income diversification. A key intervention is the promotion of supplemental irrigation with Small-Scale Irrigation Systems (SSIS) such as STW, PISOS, and SFR to extend the availability of water during the rainy season (possibly to allow double rice cropping) and to allow the planting of other crops in the dry season. To complement the SSIS intervention, FFS will be conducted with focus on promoting high-quality seeds of appropriate varieties of rice and other crops, and appropriate nutrient management (i.e. use of Minus-One Element Technique [MOET]), providing 60-70% of nitrogen requirement within 7-15 days after transplanting, and use of farm wastes and other biomass as source of organic nutrients to reduce production cost and enhance sustainable soil fertility.

1.6.1. Promote supplemental irrigation such as STWs, PISOS, SFR

1.6.2. Encourage use of high-quality seeds of appropriate varieties of rice and other crops

1.6.3. Promote nutrient management appropriate to rainfed areas

1.6.4. Provide extension services and training on *Palayamanan*®

1.6.5. Extend credit & crop insurance for rice and other crops

1.7. Harness the potential of high-elevation and upland rice ecosystems. In the rainfed and even the irrigated rice-based higher elevation areas, the objective is to develop food-staples-self-sufficient communities. Where appropriate, the production of non-rice staples such as white corn, root crops, and *saba* will be encouraged to maximize land use and enhance community food security.

In the low and medium-elevation unbunded upland areas, main interventions are the promotion of sustainable farming systems and the promotion of modern rice varieties along with traditional upland varieties.

1.7.1. Promote sustainable farming systems and practices in communities, thereby increasing farmers' income. An agriculture extension system geared toward higher elevation and rainfed upland rice-based communities will be created by a network of government and non-government organizations. Farmer Field Schools will promote sustainable agriculture and organic-based food production, focusing on effective bio-fertilizers for rice, protocols for organic rice farming, and integrated rice-based farming modules.

1.7.2. Establish a seed propagation program and production protocols for traditional and modern rice varieties suitable to specific areas. Community-based seed systems will be established to promote seed exchange and encourage more farmers to plant rice using traditional and where acceptable modern-bred varieties. Seed bank centers facilitate the purification and distribution of traditional varieties. Proper selection, collection, and storage of seeds ensure quality of special-purpose rice varieties for the next planting season. Rice varieties are screened and evaluated for nutritional and aromatic qualities as well as suitability to community conditions.

2. Enhance Economic Incentives and Enabling Mechanisms

The objective is to encourage farmers to boost production by providing adequate economic incentives and improving access to credit and crop insurance. Price support, procurement, distribution, and trade policy create powerful incentives to rice producers that facilitate the adoption of new technology. Increased access to credit and crop insurance that effectively address farmers' needs will enable farmers to take advantage of improved economic opportunities and manage risks.

2.1. Market Reforms. One key reason why a significant gap exists between potential and actual yields is lack of economic incentives including low market price or lack of access to product markets. To create favorable market conditions for increased production, reforms in the *palay* and rice markets will be implemented.

2.1.1. Strengthen price support and procurement policy. Support price will be set at levels that guarantee farmers reasonable returns. Currently, the support price is set at P17/kg but is subject to future review based on changes in the cost of paddy production and other market conditions. NFA will gradually increase *palay* procurement to 9.5% of total production or 15% of the marketed surplus by 2016. Procurement will focus on areas where trading is not competitive and during periods of excess supply (Table 15).

2.1.2. Allow market forces greater role in setting retail prices. Reduced market intervention is expected to raise retail and farm gate prices. Government through the NFA will intervene only to mitigate surges in retail prices. Distribution of rice to poor households and victims of calamities will be done through the DSWD. NFA will sell the rice at cost to DSWD to spread the financial burden of the subsidy.

2.1.3. Implement reforms to enable NFA to effectively perform price support and procurement functions. NFA will minimize its role in rice distribution and importation, allowing the private sector greater role in international trading, with the NFA focusing on buffer stocking and domestic procurement. A necessary condition for NFA to perform its functions effectively is the transfer of debt obligations to the national government.

Table 15. Target support price and procurement of NFA, 2012-2016

PARTICULARS	2012	2013	2014	2015	2016
Production (M mt)	18.46	20.04	21.50	22.13	22.73
Procurement (%)	0.07%	0.08%	0.10%	0.10%	0.10%
In M mt	1.20	1.64	2.04	2.10	2.16
Price support	17.00	17.00	17.00	17.00	17.00

2.2. Strengthen credit provision to small farmers through credit sector reforms, improved credit guarantee programs, and innovations in credit delivery. Interventions in the agricultural credit market aim to increase farmers' access to timely, adequate, and affordable credit. At the credit sector level, this involves: (i) synchronized credit, guarantee, and insurance policies and programs; (ii) increased private participation in the provision of financial services to the sector; (iii) managed risks in agriculture and fisheries; and (iv) enhanced service delivery.

One innovation in credit delivery is the *Sikat Saka* launched by the DA in partnership with the Land Bank of the Philippines (LBP). This is a credit package that forms part of the FSSP Credit Component (FSSP CC).

Sikat Saka opens opportunities for farmers who currently do not have access to loans but have the capacity to be more productive if given access to appropriate inputs. The credit program provides a venue for individual farmers who are ready to take on the responsibilities of regular bank clients and establish a long-term banking relationship. In its pilot stage, the program will be open for members of Irrigators' Associations in Isabela, Nueva Ecija, Iloilo, and North Cotabato.

Through FSSP CC, the DA introduces *Sikat Saka* as well as strengthens and expands existing credit programs. As its main approach to credit packaging, DA ensures collaboration of agencies involved in rice production: the NIA for its work among irrigators' associations, the NFA and the NABCOR for their *palay* procurement role, the ATI to conduct sessions on financial discipline, and the ACPC to augment loan funds and to handle monitoring and evaluation. All these agencies, working together with other banks and conduits, are focused on making affordable credit available to farmers' needs from farm to market.

FSSP Loan Fund provides credit to qualified individual farmers using a clean land title as "table collateral". The individual lending approach allows the farmer to establish a credit record. To be qualified, a farmer must be a member of an irrigators' association, cooperative, or an eligible organization; he must have a contract-to-buy from NFA, or belongs to a group that has one. The money is deposited in a bank account that performs both credit and savings functions which the farmer can access through an ATM card. The loan is payable in six months and failure to repay after a year results in management takeover of the farm by the group.

2.3. Expand insurance coverage by strengthening institutional capacity and developing innovative products that better address farmers' needs. Insurance aims to improve the capacity of farmers to manage risks. For crop insurance, there is a need to strengthen the capacity of the Philippine Crop Insurance Corporation (PCIC) to provide insurance cover to more farmers and fishers through increased capitalization and additional funding to cover government share in the insurance premium. An initial allocation of P150 million has been made to provide insurance coverage to rice farmers. Innovative ways of protecting farmers from risks are at the pilot stage. Provision should be made to scale up new products currently at the pilot stage should these show promise. One example is weather-based index insurance which is expected to speed up payment of claims.

3. Manage Food Staples Consumption

The strategy involves demand side interventions for rice, combined with supply side measures for other staples, to ease the pressure on rice production to support the goal of achieving self-sufficiency in food staples. It encourages consumption of unpolished rice (which has higher milling recovery rate) and waste reduction. A complementary approach is to encourage consumption of other staples by intensifying production to improve availability and affordability.

3.1. Diversify food staples consumption by intensifying production of other staples including white corn, *kamoteng kahoy*, *kamote*, and *saba*. Encouraging planting of non-rice staples and raising productivity address food security at the household level especially those found in less favorable environments (rainfed lowlands, low-elevation uplands, and the higher-elevation rice-based areas). Improving supply and availability, and promoting consumption of non-rice staples among the general population are the two key strategies in this area.

To improve the supply and availability of high-quality non-rice staples, crop programs aim to raise yields and expand harvest area. This includes identification of new production areas to increase area planted to these crops, ensuring the availability of quality seeds and planting materials in order to raise yield.

Efforts to promote consumption of other staples will aim to raise awareness of the health, nutritional, and economic advantages of these other food sources of energy. Product development and marketing initiatives will be strengthened to push other staples in new markets.

3.2. Encourage the consumption of unpolished or brown rice. Brown rice is more nutritious than white rice because it retains most of the nutrients from the rice bran that are removed by polishing. In addition, brown rice has a higher milling recovery rate at 75% compared with 65% for white rice. That is, 100 kg of *palay* produces 75 kg of brown rice compared with 65 kg of white rice.

3.3. Reduce food wastage. The 2008 National Nutrition Survey of the Food and Nutrition Research Institute shows that table wastes amount to 9 g per day of milled rice or approximately two tablespoons of cooked rice per person. With roughly 94 million Filipinos wasting this in a year, the wastage translates to some 300,000 mt of rice per year, enough to feed 2.6 million Filipinos for one whole year. Thus, an advocacy campaign will be launched to encourage responsible consumption of rice.

Managing food staples consumption encourages the eating of unpolished rice and other staples, and reduces rice wastage.

PROGRAM MANAGEMENT

Figure 6 shows the organizational structure to implement the program.

1. Roles of Key Implementers

Secretary of Agriculture

- Provides overall leadership in the implementation of the Food Staples Sufficiency Program (FSSP);
- Provides policy directions;
- Ensures the availability of the required budgets;
- Serves as Chairperson of the National Steering Committee; and
- Approves detailed implementation plans of the FSSP.

Provincial Governors

- Provide overall leadership in the development and implementation of provincial FSSP using the Agri-Pinoy program framework of DA;
- Ensure that the provincial production targets are met;
- Ensure provision of provincial counterpart budget and resources;
- Mobilize support from national government and constituent municipality units; and
- Serve as chairperson of the Provincial Action Team (PAT) that will steer the implementation of the program plan in the province.

DA Undersecretary for Operations

- Provides operational and administrative leadership in the implementation of the FSSP;
- Ensures that required budgets are released on time;
- Ensures that national production targets are met;

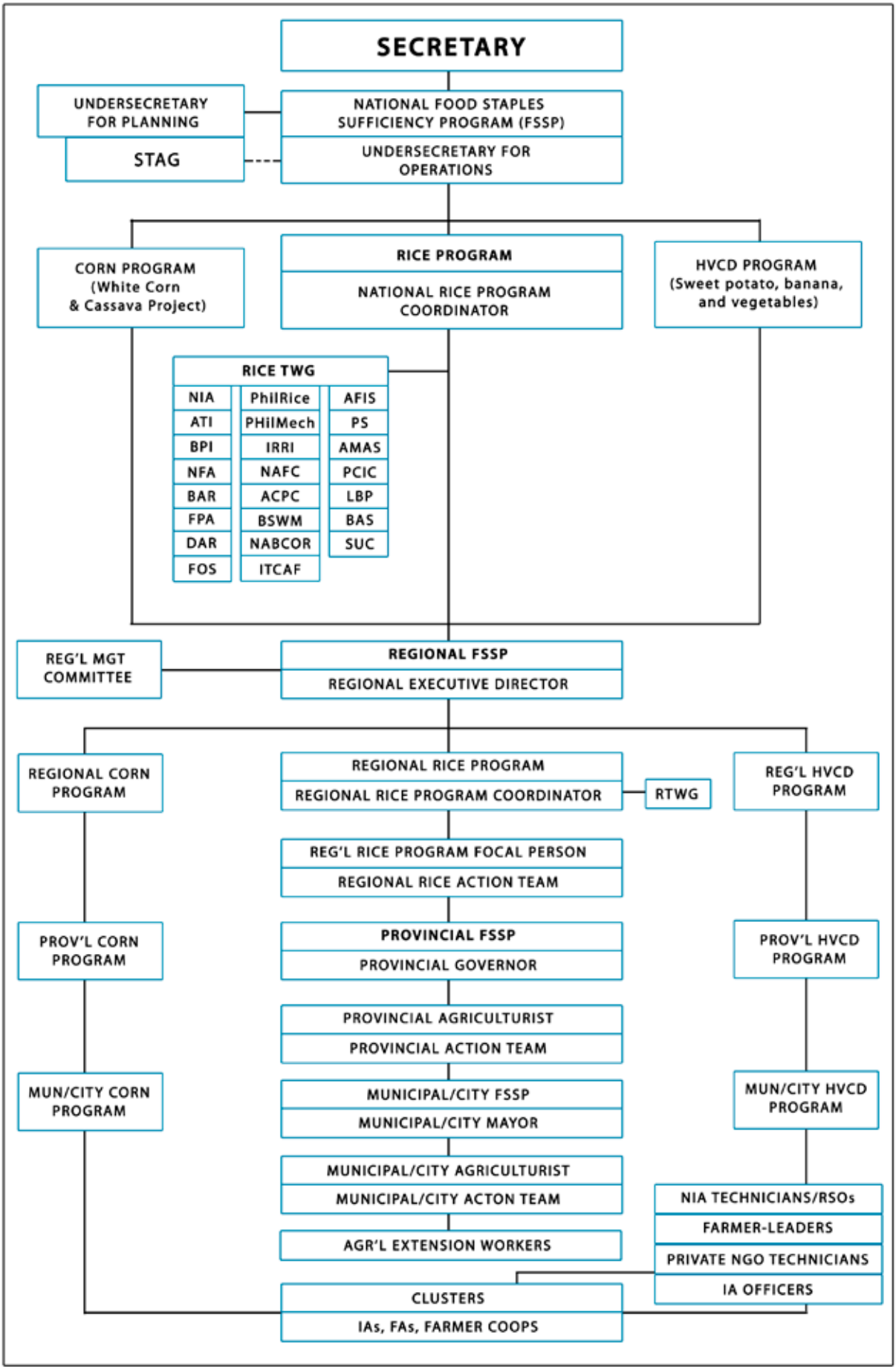


Figure 6. Program management organizational chart

- Mobilizes the DA bureaus and attached agencies to support the FSSP;
- Conducts periodic and on-the-spot assessment on the progress of the implementation of the program;
- Serves as co-chairperson of the National Steering Committee; and
- Provides the necessary manpower and facilities/equipment for program coordination.

Rice Program National Coordinator

- Serves as the Chairperson of the National Technical Working Group for Rice and head of the National Program Secretariat for Rice;
- Prepares the detailed implementation of the rice program;
- Prepares the timetable for rice program activities, including assessment meetings;
- Provides overall coordination of program activities nationwide;
- Coordinates the implementation of interventions for Corn and HVCD Programs under FSSP; and
- Coordinates the implementation of approved interventions for different agencies.

Corn and HVCD Program National Coordinators

- Prepare the detailed implementation of the corn/high-value crops programs;
- Prepare the timetable for corn/high-value crops program activities; and
- Provide overall coordination of program activities nationwide.

DA Regional Executive Directors

- Lead in the development of the regional FSSP using the Agri-Pinoy program framework of DA;
- Provide leadership in the implementation of the plan in the regions;
- Ensure that the regional production targets are met;
- Mobilize support from national and constituent provincial government units; and
- Serve as chairperson of the Regional Management Council (RMC) that will steer the implementation of the program plan in the regions.

Regional Rice Focal Persons

- Work closely with the REDs in the development and implementation of the regional rice programs;
- Coordinate activities of the RMC; and
- Coordinate with the provincial agriculturists.

Provincial Agriculturists

- Provide technical and operational leadership in the development and implementation of the provincial FSSP;
- Coordinate the activities of the Provincial Action Team (PAT);
- Provide guidance and coordination with the municipal agriculturists toward the attainment of the provincial and municipal targets; and
- Supervise the implementation of the provincial FSSP.

Municipal/City Mayors

- Lead the development and implementation of rice programs in the municipalities/cities;
- Ensure that the municipal/city production targets are met;
- Mobilize counterpart resources in support of the programs;
- Mobilize support from national government and constituent municipality units; and
- Lead in partnering with the private sector groups and NGOs in the communities.

Municipal/City Agriculturists

- Provide technical and operational supervision in implementing the rice program in the municipalities/ cities;
- Identify locations within the municipalities/cities for clustering of farmers; and
- Supervise the ATs in the implementation of the municipal/city rice program and the eventual attainment of the cluster targets of municipalities/cities.

LGU Agricultural Technologists/Technicians

- Do necessary groundwork for the establishment of farmer clusters;
- Conduct social preparation activities for cluster members;
- Conduct consultation with cluster members and identify the necessary interventions for the clusters;
- Provide technical assistance to the cluster members;
- Orchestrate necessary interventions for the clusters to achieve their yield targets;
- Link cluster members to the agribusiness sector in the localities; and
- Ensure the attainment of the yield and production targets in the clusters.

NIA Technicians

- Assist the ATs in providing technical assistance to cluster members, and act as resource persons whenever necessary;
- Regularly inspect and report the conditions of lateral and turn-out irrigation services leading to cluster areas;
- Assist the ATs in organizing farmers into clusters by convincing the existing members of irrigators' associations to become cluster members;
- Provide training to cluster members on water management techniques, and proper irrigation usage; and
- Communicate water schedules.

Farmer –Leader Extensionists

- Assist ATs in providing technical assistance to cluster members, and act as resource persons on best farm management practices;
- Use their fields as technology demonstration farms and learning sites for the cluster members;
- Help ATs in doing the necessary groundwork for the establishment of clusters;
- Lead the cluster members in attending farmer group discussions and meetings; and
- Provide information about the necessary social and cultural practices of farmers in target clusters to guide ATs in developing their social preparation activities.

Private Company Agricultural Technicians

- Assist ATs in providing technical assistance to cluster members, and act as resource persons whenever necessary; and
- Link promotional activities (technical assistance, product discounts, free items) of the companies to target cluster areas.

Rice Sufficiency Officers (RSO)

- Provide the link between R&D and extension;
- Serve as technical resource person on rice production and rice-based farming systems;
- Assist in adapting PalayCheck®/Rice ICM to local conditions; and
- Provide technical support to extension workers, and link farmer-extensionists to sources of technology, information, and support services.

Irrigators' Associations

- Serve as initial nucleus in the clustering approach for program interventions;
- Actively participate in the planning and implementation of localized rice plans; and
- Assist in the delivery of support services to farmer-members.

Agrarian Reform Communities

- Serve as alternative nucleus in the clustering approach;
- Facilitate the delivery of support services to farmer-members; and
- Encourage farmers to actively participate in meetings and other activities that will be conducted by the LGUs.

Cluster/IA Members

- Commit to follow technology recommendations;
- Attend group discussions and cluster meetings with ATs;
- Provide counterparts to production inputs necessary to achieve the target yields; and
- Provide necessary management in their farms.

Farmers' Organizations/Associations/Cooperatives

- Assist the DA, MAs, and LGUs in establishing clusters, identifying, and validating the profiles and masterlists of each cluster;
- Actively participate in the planning and implementation of localized rice plans;
- Provide information, practices, and technologies on sustainable agriculture rice technologies to MAs, LGUs, and farmers;
- Join ATs in providing technical assistance on sustainable rice production to cluster members; and
- Encourage other farmers' organizations to actively participate in meetings and other activities that will be conducted by the LGUs.

Non Government Organizations

- Assist the DA, MAs, and LGUs, farmers' associations/organizations/cooperatives in establishing clusters, identifying, and validating the profiles and masterlists of each cluster;
- Actively participate in the planning and implementation of localized rice plans; and
- Provide technical assistance to farmers' associations.

2. Roles of Key Institutions

DA-Regional Field Units (DA-RFUs)

- Responsible in the overall planning, coordination, and monitoring of program implementation in the regions;
- Coordinate, monitor, and implement (through stations) seed production activities;
- Coordinate, monitor, and provide technical assistance on small-scale irrigation projects, postharvest, marketing, and credit;
- Ensure proper conduct and timely completion of farmers' masterlists in collaboration with LGUs; assist in the evaluation of qualified farmers' organizations/beneficiaries;
- Deploy subject matter specialists;
- Provide accurate and timely reports; and
- Provide resource persons in training courses for ATs.

Philippine Rice Research Institute

- Continually develops and updates packages of technologies on rice production with emphasis on high productivity and sustainability;
- Produces breeder, foundation, and registered seeds of inbreds and parentals of hybrids;
- Maintains buffer stocks of higher seed classes;
- Provides technical support to LGUs, RFUs, and ATI;
- Assists in the promotion of mature rice production technologies; and
- Conducts in-depth R&D on varietal improvement, fertilizer nutrient management, IPM, and water-use efficiency, including farm mechanization and policy research and advocacy in coordination with other government agencies.

International Rice Research Institute

- Leads in the assessment and identification (with PhilRice, BAR, BSWM & UPLB) of potential rice-growing areas using GIS, remote sensing, crop and climate modeling, and overall assessment and synthesis techniques;
- Assists PhilRice and UPLB in developing strategies that will fast-track national testing and release of new inbred and hybrid rice varieties, and in developing seed production and supply systems to ensure adequate seed supply at the right time; and
- Collaborates with PhilRice in the conduct of research on new cropping systems, new approaches/methodologies in varietal improvement, and development of innovative capacity enhancement approaches for extension personnel and farmers, and accelerate the delivery of proven effective crop management technologies such as SSNM, controlled irrigation, and PH technologies.

BAR

- Provides funds for research; and
- Identifies technologies generated from the research network.

Department of Agrarian Reform

- Coordinates the implementation of the program in the Agrarian Reform Communities (ARCs) through the Provincial/Municipal Agrarian Reform Officers (PARO/MARO);
- Assists in the establishment of links between farmers' organizations and agribusiness enterprises that will provide market opportunities to farmers, and will facilitate access to production inputs, new technologies, and credit facilities;
- Assists LGUs in selecting ARC sites;
- Assists ATs in the implementation of the municipality/city rice program plans and in the conduct of trainings for ARC farmer-members; and
- Assists ATs in organizing farmer groups in non-ARC communities.

Bureau of Plant Industry

- Coordinates and monitors seed production;
- Supervises seed testing laboratories;
- Accelerates seed testing and certification; and
- Provides technical assistance on crop protection.

National Irrigation Administration

- Maintains and rehabilitates existing irrigation systems;
- Conducts training courses and institution-building activities for the irrigators' associations;

- Provides technical assistance to LGUs on maintenance, management, and repair of irrigation systems;
- Assists LGUs in selecting cluster sites;
- Coordinates schedules of irrigation water releases and cut-offs with LGUs; and
- Mobilizes its technicians to provide technical assistance to farmers.

Bureau of Soils and Water Management

- Provides technical assistance on the balanced fertilization strategy, small water impounding projects, shallow tube wells, and small farm reservoirs;
- Characterizes and map aquifers;
- Conducts research and development on small-scale irrigation systems and soil management and fertilization; and
- Leads in providing soil analysis services to farmers.

Agricultural Training Institute

- Administers training, extension, and social preparation programs in coordination with RFUs, SUCs, and LGUs; and
- Monitors and evaluates post-training performances of national agencies and LGUs authorized to conduct training.

Philippine Center for Postharvest Development and Mechanization

- Provides technical assistance on equipment testing and accreditation;
- Conducts research and development on Philippine technologies and farm mechanization; and
- Establishs postharvest facilities.

Field Operations Service

- Conducts field monitoring and evaluation of the FSSP implementation; and
- Consolidates periodic/regular reports of implementation of the FSSP submitted by the RFUs.

DA Program Monitoring and Evaluation Division

- Establishes a comprehensive program monitoring and evaluation system;
- Consolidates provincial and national production performances; and
- Provides details and summary of program accomplishments from the clusters in the municipal, city, provincial, and national levels in coordination with BAS.

Bureau of Agricultural Statistics

- Helps monitor the yield, area, and production performances of each province and the national levels;
- Provides details and summary of program accomplishments from the clusters in the municipal, city, provincial and national levels in coordination with the PPMO of DA;
- Manages micro and macro level rice production databases; and
- Monitors price behavior and trends.

National Food Authority

- Implements the modernization of grain processing facilities at the countryside in coordination with PHilMech.

- Manages the buffer stocks.
- Implements grains supply and price stabilization policies; and
- Assists in market provision to farmers.

Land Bank of the Philippines

- Provides production, processing, and marketing loans; and
- Provides loans to millers and traders.

National Crop Protection Center

- Monitors the incidence of pests and diseases by using surveillance and early warning systems;
- Conducts training on the control and proper management of insect pests and diseases, and rodents; and
- Prepares technical and extension bulletins on rice IPM for use by RCPC and AEWs.

Fertilizer and Pesticide Authority

- Ensures that available fertilizer grades and pesticides in the market are effective and not hazardous to human health and environment.

State universities and colleges

- Conduct extension activities within the provinces or regions of their locations;
- Conduct location-specific research and development;
- Serve as venues for training of LGU technicians; and
- Mobilize farm land for seed production use.

3. Roles of Key Committees

National Steering Committee for the Rice Program

Composed of heads of DA bureaus and attached agencies working in the grains sector, it shall be created for the following purposes:

- Deliberate on policy issues besetting the rice industry;
- Finalize the rice program design, strategies, and interventions;
- Formulate guidelines for the implementation of the program;
- Review and set national targets and accomplishments; and
- Provide technical recommendations to its chairperson on the policy directions that should be followed by the rice program.

National Technical Working Group for Rice

Composed of representatives from different DA bureaus, attached agencies, and other relevant government and private sector bodies, it shall be created to perform the following:

- Finalize the rice program design, strategies, interventions, and budgets for the Secretary's approval;
- Formulate guidelines for the implementation of the program;
- Review and set national targets and accomplishments;
- Prepare detailed operational plans, and budgets of the rice program;

- Design a monitoring and reporting system; and
- Periodically assess the roles and contributions of different DA bureaus and attached agencies to program implementation.

National Rice Program Secretariat

- Prepare and consolidate the rice program's detailed work and financial plans;
- Conduct field monitoring to assess the status of program implementation;
- Consolidate, analyze, and prepare summary reports based on progress reports of DA-RFUs, BAS, and other agencies;
- Coordinate with DA-RFUs, the private sector and other concerned agencies to facilitate the implementation of the rice program; and
- Provide technical and staff support to the Rice Program Coordinator and Regional Rice Program Coordinators.

Regional Management Councils

Composed of representatives from different agencies working on agriculture within the regions, it is responsible for the following:

- Coordination and harmonization of activities of different agricultural agencies within the regions;
- Share experiences on different approaches in solving encountered problems; and
- Explore resource-sharing in the implementation of the Rice Program.

Provincial Action Teams

These shall be headed by the Provincial Governor, and composed of the Provincial Agriculturist, Provincial Planning and Monitoring Officer, Rice Coordinator of the DA-RFUs, Provincial Manager of NFA, Provincial Manager and Superintendents of NIA responsible for the operation and maintenance of national irrigation systems, LGU-designated Provincial Seed Coordinator, PhilRice Senior staff assigned in the area; Superintendent of ATI; representative from BAS; Chairperson of Federated IAs, Chairperson of the Association of Grains Millers/Traders and Retailers, DAR-PARO, Municipal/City Mayor, Municipal/City Agriculturist of rice-growing towns/cities, and the Chairperson of the Seed Growers Association. Other stakeholders in the rice sector may be included like the LBP provincial/Field Managers, representatives from PCIC, and representatives from the agricultural college or university, POs, NGOs located in the province. It shall perform the following specific tasks:

- Prepare an operational plan containing details on the schedules, locations, institutional arrangements, accountable persons, implementing milestones, manning and logistics, including budgetary requirements and monitoring structures, and mechanisms of the following

    - Mapping of program areas and identification of clusters/farmers;
    - Seed supply and distribution – requirements by location/time/schedule & mode of delivery-distribution/quality specifications of seeds, and actual planting;
    - Farmers' classes and technical briefings – identification of participants/resource persons/schedules/venues/logistics;
    - Technology promotion – identify cooperators for techno demo (TD) farms and determine the input requirements and their sources; establish benchmark and documentation requirements, developing/producing/disseminating multi-media communication and information campaigns at the local level; and
    - Marketing – develop market promotion campaigns targeted toward rice millers, traders, and consumers, and coordinate with NFA procurement.

- Execute operational plan as approved by the Provincial Governor;
- Develop pest profile and undertake pest surveillance and early warning systems by assigning measures among the community; establish pest clinic in the PA's office with assistance from DA-RFU and RCPC;

- Create market niche in cooperation with institutional buyers and consumers within the province or region through formal market agreements;
- Provide documentation of successful rice enterprises/farms which can serve as the standard of excellence and benchmark of good farm practices for the province. The SUC in the province or organizations of business practitioners can provide technical expertise in setting the economic and technical parameters;
- Organize teams led by the provincial officer of the BAS and the provincial PMO to validate the accomplishments of the different clusters and municipalities/cities; and
- Monitor the progress of program implementation and provide feedbacks to the Governor and the RED.

End notes

[1] Total per capita caloric intake was 2,565 calories in 2010. (IRRI, World Rice Statistics).

[2] In 2009, national average monthly expenditure for all households was P14,667 at current prices, while average household expenditure for the bottom 30% was P5,333. (NSO, FIES 2009).

[3] The methodology exploits the quarterly and semestral data on harvest area for *palay* by ecosystem (irrigated, rainfed lowland and upland). It assumes that all farms harvested during the dry season are also harvested during the wet season. A season is defined as a six-month period on the assumption that farms are unlikely to be harvested more than once in that period. Thus, the harvest area during the main planting season is a good approximation of the physical land area devoted to rice production. In the Philippines, planting schedules differ across provinces in accordance with the rainfall pattern. At the provincial level, the main harvest season is the six-month period (two consecutive quarters) with the maximum harvest area for a given crop year. Using this methodology, the main (wet) harvest season in most provinces is either July-December or September-March.

Furthermore, the quarterly data for rainfed areas is not disaggregated between lowland and upland areas, but we do have such disaggregation for the semestral data. To derive the physical area for rainfed lowland areas, we first estimate the physical area for all rainfed areas (lowland and upland) in the manner described above. We then assume a cropping intensity of unity for upland areas so that the physical area for upland is the harvest area for the whole year. Finally, the physical area for upland areas is subtracted from the physical area for all rainfed areas to arrive at the area for rainfed lowland.

[4] The disappearance method estimates rice consumption (i.e. net of non-food uses such as seeds, waste, processing and feeds based on fixed coefficients) by taking the difference between available supply (which is the sum of beginning inventory, local production, and imports) and end-of-period inventory. See Francisco *et al.* (2011) for a description of the methodology and a critical review of the parameters used.

[5] The cost of constructing new irrigation facilities is estimated to be P250,000 per hectare of service area compared with P80,000 for restoration and rehabilitation projects.

[6] This amount corresponds to average crop loss per year due to typhoons/floods in 2000 – 2010.

[7] Source: Francisco, *et al.* (2010). Increasing per capita rice consumption: Myths and realities. PhilRice, Maligaya, Muñoz City, Nueva Ecija.

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Annex

Tables A.1 to A.3 summarize the regional distribution of target production, harvest area, and yield, 2011-2016.

Table A.1 Regional production target (M mt), 2011-2016

REGION	2011	2012	2013	2014	2015	2016
CAR	459,643	497,198	524,998	572,107	601,702	638,057
1	1,451,833	1,528,152	1,636,386	1,829,087	1,846,042	1,861,683
2	2,241,665	2,290,839	2,549,390	2,730,765	2,768,396	2,874,604
3	3,442,179	3,581,809	3,682,451	3,877,091	3,932,620	3,972,961
4a	393,998	433,917	481,424	510,728	523,163	556,559
4b	914,533	1,028,605	1,126,956	1,204,465	1,243,895	1,278,170
5	1,096,105	1,174,376	1,246,397	1,351,095	1,411,074	1,459,527
6	2,077,295	2,414,253	2,684,988	2,857,187	3,063,375	3,203,368
7	263,888	293,865	319,290	338,603	344,886	350,489
8	924,979	1,039,739	1,151,628	1,222,818	1,253,400	1,276,227
9	556,979	619,461	685,740	726,991	743,798	759,668
10	577,280	647,051	721,135	780,000	807,928	838,104
11	402,956	436,913	466,576	510,191	538,108	565,221
12	1,166,395	1,353,666	1,514,198	1,637,723	1,659,620	1,671,474
13	428,025	484,674	547,484	591,862	616,380	636,830
ARMM	563,761	634,969	704,154	754,435	771,497	786,111
PHILIPPINES	**16,961,514**	**18,459,487**	**20,043,193**	**21,495,148**	**22,125,884**	**22,729,055**

Table A.2 Regional harvest area target (ha), 2011-2016

REGION	2011	2012	2013	2014	2015	2016
CAR	121,062	122,447	125,044	127,665	131,030	135,556
1	385,480	388,440	410,197	442,463	446,415	449,348
2	524,583	533,312	557,348	570,195	577,051	584,923
3	740,696	738,257	747,433	751,281	752,787	755,502
4a	108,005	108,633	113,397	114,353	115,213	116,471
4b	267,053	271,395	279,167	281,883	284,327	286,770
5	303,729	309,957	320,382	328,639	337,282	340,237
6	617,178	642,676	653,132	667,626	706,582	733,493
7	97,720	99,347	101,644	102,951	103,583	104,514
8	264,028	271,052	282,190	286,668	289,827	293,208
9	148,903	152,371	158,850	160,997	162,589	164,839
10	145,227	148,654	156,088	161,252	165,001	172,933
11	95,688	98,234	102,438	106,054	109,455	113,146
12	332,316	350,435	367,524	379, 502	380,505	382,029
13	137,192	141,717	151,204	155,332	159,475	164,039
ARMM	198,314	203,591	212,305	215,318	217,692	220,443
PHILIPPINES	**4,487,173**	**4,580,518**	**4,738,343**	**4,852,178**	**4,938,813**	**5,017,451**

Table A.3 Regional yield target (mt/ha), 2011-2016

REGION	2011	2012	2013	2014	2015	2016
CAR	3.80	4.06	4.20	4.48	4.59	4.71
1	3.77	3.93	3.99	4.13	4.14	4.14
2	4.27	4.30	4.57	4.79	4.80	4.91
3	4.65	4.85	4.93	5.16	5.22	5.26
4a	3.65	3.99	4.25	4.47	4.54	4.78
4b	3.42	3.79	4.04	4.27	4.37	4.46
5	3.61	3.79	3.89	4.11	4.18	4.29
6	3.37	3.76	4.11	4.28	4.34	4.37
7	2.70	2.96	3.14	3.29	3.33	3.35
8	3.50	3.84	4.08	4.27	4.32	4.35
9	3.74	4.07	4.32	4.52	4.57	4.61
10	3.98	4.35	4.62	4.84	4.90	4.85
11	4.21	4.45	4.55	4.81	4.92	5.00
12	3.51	3.86	4.12	4.32	4.36	4.38
13	3.12	3.42	3.62	3.81	3.87	3.88
ARMM	2.84	3.12	3.32	3.50	3.54	3.57
PHILIPPINES	**3.78**	**4.03**	**4.23**	**4.43**	**4.48**	**4.53**

Table A.4 Projected rice supply and utilization, high-production and low-consumption scenario, 2011-2016

PARTICULARS	2011	2012	2013	2014	2015	2016
TOTAL SUPPLY (M mt)	15.33	15.62	16.12	17.12	17.59	18.05
Beginning Stock	3.42	3.03	3.09	3.15	3.21	3.27
Production:						
in milled rice terms	11.02	12.00	13.03	13.97	14.38	14.77
in palay terms	16.96	18.46	20.04	21.50	22.13	22.73
Actual/Probable Import	0.88	0.59	0.00	0.00	0.00	0.00
TOTAL USE (M mt)	12.30	12.53	12.77	13.02	13.27	13.53
Foods	10.93	11.16	11.38	11.62	11.85	12.09
Seeds	0.24	0.25	0.25	0.26	0.26	0.27
Processing	0.45	0.46	0.47	0.48	0.49	0.49
Feeds and Wastes	0.67	0.67	0.67	0.67	0.67	0.67
ENDING STOCK (M mt)	3.03	3.09	3.15	3.21	3.27	3.34
Good for number of days	90.00	90.00	90.00	90.00	90.00	90.00
Related Indicators						
Daily Requirement (M mt/ha)	0.03	0.03	0.03	0.04	0.04	0.04
Per Capita Rice Consumption (kg/yr)	113.57	113.57	113.57	113.57	113.57	113.57
Population (million)	96.27	98.24	100.24	102.28	104.37	106.50

Table A.5 Projected rice supply and utilization, and production under climate change and high-consumption scenario, 2011-2016

PARTICULARS	2011	2012	2013	2014	2015	2016
TOTAL SUPPLY (M mt)	15.99	16.30	16.61	16.93	17.41	17.86
Beginning Stock	3.42	3.16	3.22	3.29	3.35	3.41
Production:						
in milled rice terms	10.70	11.67	12.70	13.65	14.06	14.45
in palay terms	16.46	17.96	19.54	21.00	21.63	22.23
Actual/Probable Import	1.86	1.46	0.68	0.00	0.00	0.00
TOTAL USE (M mt)	12.83	13.07	13.33	13.58	13.84	14.11
Food	11.46	11.70	11.94	12.18	12.43	12.68
Seeds	0.24	0.25	0.25	0.26	0.26	0.27
Processing	0.45	0.46	0.47	0.48	0.49	0.49
Feeds and Wastes	0.67	0.67	0.67	0.67	0.67	0.67
ENDING STOCK (M mt)	3.16	3.22	3.29	3.35	3.41	3.48
Good for number of days	90.00	90.00	90.00	90.00	90.00	90.00
Related Indicators						
Daily requirement (M mt/ha)	0.04	0.04	0.04	0.04	0.04	0.04
Rice per capita (kg/yr)	119.08	119.08	119.08	119.08	119.08	119.08
Population (M)	96.27	98.24	100.24	102.28	104.37	106.50

Notes:

1. Total supply = Beginning stock + Production in milled rice terms + Actual/Probable import
2. The milling recovery rate of 65% was used in converting palay to milled rice.
3. Total use = Food + Seeds + Processing + Feeds and Wastes
4. Ending stock = Total Supply - Total Use
5. Population was estimated to grow by approximately 2% per year.

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