

WHITE PAPER

EFFICIENT AGRICULTURE, STRONGER ECONOMIES IN ASEAN

PRIVATE SECTOR PERSPECTIVES FOR POLICY MAKERS



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Paul Teng, Margarita Escaler (Nanyang Technological University Singapore)





FOREWORD

Paul Teng, Nanyang Technological University Singapore and Andrew McConville, Syngenta

This paper aims to provide policy makers with an overview of how different organizations and sectors perceive the challenges and opportunities of sustainable agriculture in ASEAN as well as its contribution to strong, developing economies. Agriculture is central to the economies of the region and provides livelihoods to a large segment of the population. In some ASEAN countries, agriculture employs over 60 per cent of the workforce and is an essential driver for growth and poverty alleviation. As we look to the future, it becomes obvious that to meet the goals enshrined in the ASEAN Vision 2025, it will be necessary for governments to have businesses align with these goals and actively contribute to them. The World Business Council for Sustainable Development's (WBCSD) Vision 2050 provides a lens to consider how businesses can grow sustainably in ASEAN and be direct contributors to the ASEAN Vision and its supporting frameworks.

The early chapters in this paper provide the background and context within which agriculture and its two major shareholders – governments and businesses – operate. As population continues to grow and ASEAN's middle-class population further increases, demand for not only more food but also more diverse foods will also rise, while our natural resource base diminishes. This means that the need for more efficient agriculture has never been greater. We also find ourselves operating in an increasingly complex environment, involving a web of different stakeholders that need to cooperate towards the common goal of sustainable agriculture. External pressures such as climate change will also require more resilient agricultural sectors. A private sector vision of sustainable development in ASEAN is provided using the WBCSD's Vision document, emphasizing global issues like climate change which have regional implications. Several key challenges in



sustainable agriculture are explicated with policy implications in chapters that follow, namely concerning food security, inclusive supply chains involving smallholders, and the importance of harmonization in crop protection regulations.

By producing this paper, the global network partners of the Business Council for Sustainable Development in Singapore, Indonesia, Viet Nam and the Philippines have brought together some of the key stakeholders that have a part to play in improving the agriculture environment in ASEAN, with a special focus on smallholder farming. Viewpoints from several business entities and their responses to the sustainability challenges are provided in a final multi-sectioned chapter.

Throughout the course of the paper, policy makers will be provided not only with a broad overview of the challenges facing agriculture in ASEAN but also with suggestions on how best business practices and conducive policy frameworks can help address these challenges.

In addition to different industry views, the paper seeks to provide further insight into the current environment in Indonesia, the Philippines, Thailand, and Viet Nam using statistical data to support policy makers in identifying areas for action.

Only by bringing together all stakeholders throughout the value chain can we hope to meet the growing demand for agricultural commodities in a sustainable way. No single entity can do it alone. By bringing together different players and reviewing the current scenario, this paper points to where progress is already being made and explains how success shall continue to be realized. Ultimately, we hope to spark dialogue and provide the support needed for ASEAN to meet the food security challenge and spur the creation of stronger economies.

1

SETTING THE SCENE IN ASEAN

Lead Contributors: Paul Teng and Margarita Escaler, Nanyang Technological University Singapore

AGRICULTURE'S IMPORTANT ROLE IN ASEAN

Agriculture occupies a special role in the socio-economic development of countries in ASEAN as most of them have their roots in agrarian societies. Historically, agriculture's role in the region has been anchored by the public sector but post the "Green Revolution" era, when modern technologies became evident in fuelling both production and productivity, the private sector has emerged as a key player and an important catalyst for change.

This chapter provides the backdrop against which inclusive agri-business is to be viewed in the context of a logical evolution to the modernization of agri-food supply and value chains, and the participation of smallholder farmers, producers, business entities and government entities.

The Multiple Roles of Agriculture and Agribusiness in ASEAN

Agriculture has played and continues to play an important role in the ASEAN region despite its declining contribution to the region's GDP during the last two decades. It is viewed as an important driver for social, inclusive growth; an important source of export earnings in support of economic development; a guarantor of food availability to its citizens for staple and non-

staple food items; and a source of employment directly and through agriculture-related, value adding activities.

Despite this declining contribution, the sector still employs a significant proportion of the workforce in every country in the region, with the exception of Singapore and Brunei Darussalam, which are primarily urban city centres, and to a lesser extent Malaysia. In the transition economies of Cambodia and Lao PDR, it employs over 60 per cent of the workforce.

Moreover, ASEAN agriculture remains a powerhouse for the production and supply of important food items. It is home to the world's top two largest rice exporters (Thailand and Viet Nam) and has among the top three exporting countries for pineapples, bananas, mango, sugar crops, coffee, cashew nuts and cassava. It is the top producer and exporter of palm oil, coconut and rubber and a major producer and exporter of seafood.

ASEAN also has a strong private sector presence in SMEs, and both national and multinational companies that are involved in the different parts of global value chains, such as providers of farm inputs (e.g. fertilizers, pesticides), traders, processors and retailers. There is also a significant number of agri-food industry entities which have in their portfolios, activities spanning

more than one part of the supply or value chain, and with revenues exceeding USD1 billion, as exemplified by Wilmar (Singapore), CP Group (Thailand) and Sime Darby (Malaysia). Many of these private sector players are engaged in large-scale contract farming and are providing farmers with technical, financial and marketing assistance, as farming gets more organized as part of a supply value chain both to domestic and global markets.

Smallholder Farmers in ASEAN

Of the various world regions, Asia has the smallest sized farms and the largest number of smallholder farmers. Asia is estimated to have about 85 per cent of the world's 525 million smallholder farmers, most from India and China. In the ASEAN region available statistics show more than 100 million farmers (more details in Chapter 4 of this paper). Furthermore, farm size has declined in Asia over the years; about 85 per cent of farmlands are being cultivated on farm areas less than 1 ha. The number of farm holdings less than 1 ha were, for Indonesia, Viet Nam, Philippines and Myanmar, respectively, 18.6 million, 9.1 million, 1.9 million and 1.2 million, in 2013. Within the ASEAN region, disaggregated data further show that the per capita arable land area is 0.12 ha.

Farm sizes have important implications for food production because relatively large consolidated farms have the capacity to be more efficient and productive by optimizing mechanization and using modern technologies. While smallholder farmers have the potential to realize dramatic increases in income by joining these organized supply chains, especially if they can upgrade their farming and postharvest practices, they face many challenges including, but not limited to, access to technology, extension services and market, a lack of organization, informal landholdings and poor access to credit. These trends and patterns point to the unequivocal importance of engaging smallholder farmers in the ASEAN agri-food sector.

CHALLENGES TO ASEAN AGRICULTURE

Endowed with abundant resources including land, water and people, ASEAN's agriculture sector has the potential to have even more of a positive impact on the region's food security and economic progress. However, trends in several parts of the agri-food landscape do exist which have the potential to become real bottlenecks to progress. Several of these are highlighted below.

Declining Performance of Agriculture

At the global level, the annual growth in productivity, measured in terms of average aggregate crop yield of the world's main staples has slowed down over the years. Global aggregate yield growth of grains and oilseeds averaged 2.0 per cent per year between 1970 and 1990, but declined to 1.1 per cent between 1990 and 2007. Yield growth is projected to continue declining over the next ten years to less than 1.0 per cent per year. The top three rice and wheat producing nations are witnessing very low yield growth rates. China, India and Indonesia are witnessing rice yield increases of only 0.7 per cent, 1.0 per cent, and 0.4 per cent improvement per year. China, India, and the U. S., the top three wheat producers similarly were witnessing yield increases of only 1.7 per cent, 1.1 per cent, and 0.8 per cent per year, respectively. For all the major crops, there is potential with existing technology to raise productivity both per unit of land and per unit of water. The gap between the potential yield of current crop varieties and the actual on-farm yield is a huge one for most crops. Farmers in ASEAN are rarely able to achieve more than 70 per cent of potential yields due to a range of agronomic and economic constraints. It is necessary to consider the inter-link between ASEAN crop yields and those in the extra-ASEAN Asian region as well as in the traditional sources from which ASEAN imports its grains (i.e. North America, South America, Australia). Corn and soybean yields are generally higher in the countries from which ASEAN imports these two commodities. There is clear scope for efforts to

assist farmers through traditional extension and modern technologies including improved crop varieties, cropping techniques, fertilization and irrigation to enhance productivity.

Diminishing Quality and Quantity of Natural Resources and Climate Change

Agriculture is the largest user of natural resources, occupying almost 40 per cent of the world's total land area and annually withdrawing about 70 per cent of its renewable freshwater resources. As a result, farming (including, livestock, forestry and fisheries) has the largest environmental footprint compared to any other human activity and its impact on biodiversity and ecosystems can be devastating.

Changes in dietary preferences and increases in food prices are among the factors that have led to the expansion of land used for crops as a percentage of total land area in most of ASEAN. The percentage of agricultural land area in ASEAN increased from 20.2 per cent to 29.4 per cent during 1970-2011 while forest areas have declined significantly. Forests play a key role in mitigating climate change and carbon sequestration, as well as having considerable potential to contribute to the region's food security. Land degradation and soil erosion are rapidly taking place in the region while arable lands are increasingly being converted to other non-food uses that provide higher economic returns than from food production, e.g. biofuel production. A pronounced shift in Asian diets towards meat and dairy products is driving animal production in Asia thus resulting in a higher livestock density per hectare which is exerting additional pressure on the environment and resources. With more water being used by industry and urban populations, there is proportionately less available for agriculture.

Lastly, climate change will exert additional pressure on natural resources and food security through higher and more variable temperatures, changes in precipitation patterns, and increased

occurrences of extreme weather events. Climate change is also responsible for rising sea levels leading to increased salinisation in river deltas and lakes, thus further reducing freshwater availability. According to projections by the International Food and Policy Research Institute (IFPRI), Asia's production of irrigated wheat and rice will be 14 and 11 per cent lower, respectively in 2050 than in 2000 due to climate change.

CHALLENGES TO ASEAN FOOD SECURITY

The Urbanization Phenomenon

The ASEAN region is fast becoming an urban society. ADB estimated that in 2012 ASEAN had already become 51 per cent urban. This urbanization phenomenon has strong implications for agriculture and food security. For agriculture, it means a huge reduction in the number of farmers, accompanied by an ageing farming population. Countries like Malaysia and Thailand are already seeing the increased use of migrant labour for agriculture. There is an added problem of attracting new entrants into farming, and this is one area where new farming technologies produced by either public or private sector, will have an important role to play to ensure farming is an attractive vocation.

Linked to the urbanization phenomenon in ASEAN is the accompanying rise in the urban middle-class population, currently estimated at 190 million by the World Bank and anticipated to reach 400 million by 2030. The new middle-class has already influenced food consumption patterns in ASEAN.

Rising Food Demand, Rising Incomes and Diet Diversification

According to the United Nations, the region's population is expected to increase by almost 100 million during the 2015-2030 period, concomitant with the overall growth in Asia's population. This, alongside urbanization and a growing middle

class in emerging economies will result in an increase in food demand and diet diversification. All of the ASEAN countries at least doubled their GDPs during the 2000-2015 period. The resulting rise in incomes has led to a shift from a mainly cereal diet to one that includes more resource-intensive food products, such as meat, dairy, eggs, fruits and vegetables thus unleashing a rapid increase in demand for raw agricultural commodities. In Asia as a whole, the share of energy supplied by cereals, roots and tubers has declined from 63 per cent in the early 1990s to 57 per cent in the 2008-10 period while meat and fish consumption nearly doubled from 15 to 26 grams per person per day over the same period. In just over the last decade, meat consumption in the developing countries of Asia has grown by some 3.5 per cent per year and dairy production consumption by 4.4 per cent.

Globalization and Trade Expansion

The value of international trade and overall volume of agricultural products has increased considerably in the last five decades, reflecting global economic growth and increased economic integration involving a globalized agri-food system. The distribution of trade flows has also changed dramatically. Because of lagging yield growth rates, particularly of staple foods, there has been a growth of agricultural imports and consequent trade deficits, turning many of the region's countries into net food importers. In 2014, Asia as a whole ran a >USD60 billion agricultural trade deficit with China and Japan contributing the largest to the region's overall net deficit. In the trade year 2013-14, ASEAN imported 16 million tonnes of wheat, 10.5 million tonnes of corn and 6 million tonnes of soybean, mainly from the Americas.

Increased global and regional trade has been a key driver of the modernization of the agricultural sector in the region. It has spurred technological changes of production practices, shifted production from traditional to high value products, expanded food processing industries,

boosted other value-added industries along the supply chain, and improved quality and safety standards. While the increase in trade and transformation of the sector have provided consumers with a greater variety of products of higher quality at lower prices, the distribution of benefits along the supply chains has been uneven. Market participation by smallholder farmers has been noted to be lower.

Policy Approaches to Agriculture and Food Security in ASEAN

ASEAN member countries range from those that are heavily dependent on agri-food imports, such as Singapore and Brunei Darussalam, to those with significant self-production of many food items, such as Thailand and Indonesia, although not necessarily being self-sufficient in all of them. Given such diversity in the region, member countries have differing policies to ensure food security, from declared self-sufficiency, (e.g. rice for Indonesia and the Philippines) to self-reliance (i.e. having the ability to purchase food through imports, e.g. Singapore and Brunei Darussalam). Some member countries have also chosen to focus their development policies on more "export-oriented" agriculture (e.g. palm oil and rubber in Indonesia and Malaysia, high value beverages like cacao and coffee in Viet Nam) while others have recognized the importance of both export and food security needs (e.g. Thailand and Viet Nam).

Food self-sufficiency implies meeting food needs as far as possible from domestic supplies and minimizing dependence on international trade, and advocates diets that are simple and natural that can be produced domestically. Food self-reliance advocates reliance on the international market for the availability of food in the domestic market, and implies maintaining some level of domestic food production plus generating the capacity to import from the world market as needed; international trade is an essential component.

No approach to food security ensures total stability due to the uncertainty and vulnerability inherent in food supply chains. A self-sufficiency approach is still largely vulnerable to factors such as the volatile prices of production inputs, availability of land, labour and capital and natural disasters. On the other hand, food self-reliance and resilience are also vulnerable to the hazards faced by the various sources of food supply as well as market volatility and the trade policies of partner countries. This approach is also dependent upon the import capacity of the country which in turn relates to the income generating goods and services that can finance food imports.

ASEAN Vision 2025

The ASEAN Vision 2025 articulated by ASEAN leaders for the post-2015 period is based on three supporting frameworks, respectively called the ASEAN Economic Community (AEC), the ASEAN Socio-Cultural Community (ASCC) and the ASEAN Political Security Community (APSC). The aim is to create an integrated ASEAN market with strong trade, people and investment flows between member economies. More economic and social equity is also envisioned. Currently, agriculture and food security are primarily addressed within the AEC while climate change and social equity by the ASCC. There is a strong argument for cross-framework cooperation to address the complexity of issues described in the preceding two sections, as many of them intersect when action is taken to address them. For example, food security requires the ASCC and the AEC in matters related to climate change and disaster risks. There are three main reasons for this. Firstly, the larger scope of environment security, climate change and disaster risks already fall under the ASCC. ASEAN needs to think about food security beyond an economic standpoint under the flagship of the AEC. Climate change alters regional food systems, agriculture and fisheries, which contribute significantly to the livelihoods and well-being of all people in the region. Despite

the fact that the distribution of impacts and risks of climate change will vary from place to place and household to household, marginal farmers, fisherfolk and poor urban consumers are likely to be impacted disproportionately. Thus, there needs to be a shared governance of food security and climate change under both the ASCC and AEC in order to comprehensively consider the issue of availability, accessibility, utility and stability of food for populations from both an economic and socio-cultural perspectives. Failure to address future food insecurity under the AEC and ASCC will potentially compromise the APSC pillar; without the APSC, it will be a challenge to ensure food security through both the AEC and ASCC pillars.

The post-2015 ASCC blueprint has to recognise the inter-linkages between food security, climate change and farmer livelihoods. The insecurities of vulnerable populations and their lack of adaptive capacities need to be addressed under the umbrella of a single ASEAN Community. While the AEC has successfully taken a top-down, production and economic centric approach towards safeguarding food security, the ASCC (with its aims of building “a caring and sharing community”) provides a complementary bottom-up and people-centric approach. This shared governance would provide a more comprehensive approach towards a regional strategy for food security, with climate change as a starting point.

THE CASE FOR MORE PRIVATE SECTOR PARTICIPATION IN ASEAN ECONOMIC DEVELOPMENT

Given the many challenges currently faced by the agriculture sector in ASEAN, there is growing evidence for a complementary relationship between the public and private sector, with each one acknowledging the strengths of the other. The public sector, which includes governments, universities, international aid agencies, philanthropic foundations, and civil society focus much of their efforts and resources on

public interest goals such as food security and poverty reduction and therefore, work on a much broader portfolio of agricultural topics. The private sector which includes a wide range of for-profit businesses from local small to medium sized enterprises (SMEs) to national and multi-national companies specialize in fewer topic areas and focus their R&D in areas with established markets. The public sector is key to protect the interests of the rural community through policies and regulations but evidence points to the importance of the private sector to generate and deliver agri-food products to consumers.

Analyses by the University of Asia and the Pacific, show, furthermore, that the private sector is key to making smallholder farmers' shift from a "subsistence" to a "entrepreneurial" state, in which there is much value-add to their livelihoods. For example, in the Philippines, while agriculture contributes only 12 per cent to GDP, agri-business amplifies that to 35 per cent, thereby effecting a multiplier value of about 2.9. This permeates throughout the value chain and benefits the entire economy. Similar figures for Malaysia and Thailand show multiplier effects of

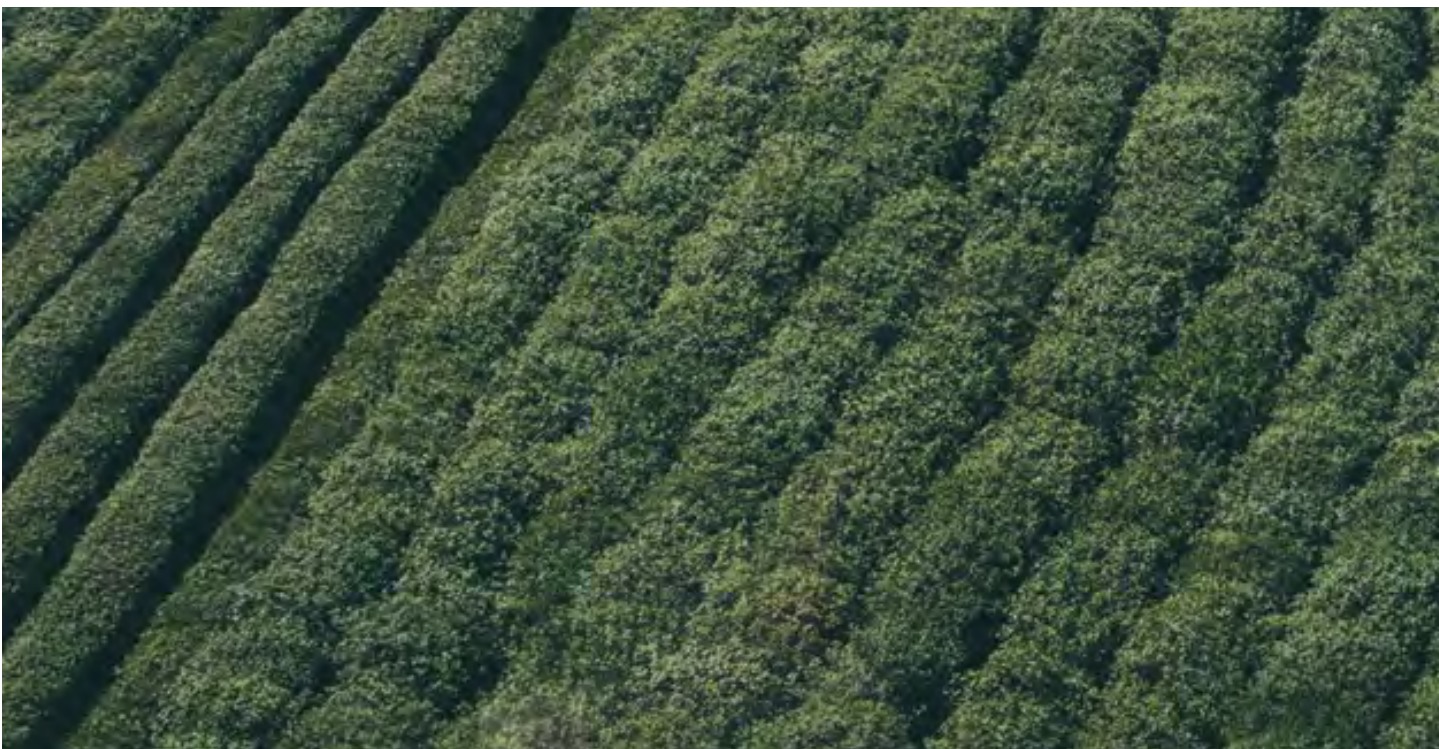
agri-business to be 2.8 and 3.9 respectively. The private sector is a key agent to amplify the value of agriculture in ASEAN.

RECOMMENDATIONS FOR ASEAN

Given the pivotal role that agriculture plays in the ASEAN economy, the following recommendations are made with the view of building on the current situation to further enhance this role:

- Explicit pronouncements at highest ASEAN government levels to support public-private synergies

Many of the challenges to ASEAN agriculture and food security cannot be solved by a single entity. Closer cooperation between the public and private sectors, whose activities complement one another, are urgently needed. However, in order to be successful, such partnerships must be based on trust, mutual respect and transparency. Mechanisms exist within the ASEAN machinery (such as AMAF, SOMs) to make such explicit pronouncements.



- Encourage policies which increase private sector investment in R&D for food production, processing, distribution and safe supply chains

Currently, export-oriented agricultural commodities such as oil palm and rubber evidence much private sector investment in R&D. Although public sector investment in food crops and fisheries has been the conventional approach to improve farm productivity in these sectors, World Bank data shows that private sector investment worldwide in crops such as maize and soybean dwarf those of the public sector. It is essential that ASEAN develops ways to harness this huge private sector investment for the benefit of the millions of smallholders, in a “win-win” situation.

- Support for policies and implementation guidelines which enable inclusive agri-business

Historically, the public sector in ASEAN has been the key player in food security and poverty reduction goals. However, given the current trends and many challenges faced by

the agriculture sector, the private sector is increasingly being recognized and acknowledged as a true development partner in helping achieve many of the region’s goals. Engaging the millions of smallholder farmers in ASEAN who do not have adequate access to technology, inputs and services required to produce high quality products demanded by consumers will be critical. This provides a strong argument for ASEAN to consider a stronger push towards “inclusive agri-business” approaches to sustain growth in the agriculture sector.

- Support for joint governance mechanisms within the ASEAN Vision 2025 and its three blueprints so that food security issues related to climate change, food affordability and nutrition may be addressed by cross-blueprint (AEC, ASCC, APSC) initiatives involving relevant public and private sector entities

The succeeding chapters in this publication will illustrate how such partnerships, if given the chance, can make a significant impact in helping increase agricultural productivity, raise farmer incomes and preserve and conserve the environment.





2

FROM GLOBAL TO REGIONAL: A PRIVATE SECTOR VISION FOR SUSTAINABLE DEVELOPMENT IN ASEAN

Lead Contributor: Matthew Reddy, World Business Council for Sustainable Development

The world in 2050 will be a vastly different world from today and the difference will be in more than just the 9 billion people who will be living on this planet. While it is generally recognized that there will be complex challenges facing governments, it is also acknowledged that new opportunities and new roles will emerge for business. Sustaining development will require public and private sectors to work towards common goals and find common cause for cooperation and synergistic action.

Towards this end, the World Business Council for Sustainable Development (WBCSD) articulated a vision for the journey to 2050 in its document titled "Vision 2050: The New Agenda for Business." Vision 2050 seeks to provide a common understanding so leaders can make the decisions that deliver the best outcomes possible for human development over the next four decades. A pathway was developed and nine elements of this pathway were detailed to connect this sustainable future with the present. The nine areas covered are values and behaviors, human development, economy, agriculture, forests, energy and power, buildings, mobility and materials. The translation of the Vision into action is done through a plan called Action2020,

which provides guidance on nine priority areas and business solutions with associated metrics. We focus in this chapter on the priority areas of concern to the ASEAN region.

PRIORITY AREAS AFFECTING ASEAN: FOOD, FEED, BIOFUEL AND CLIMATE CHANGE

Land use is the source of about a quarter of all global greenhouse gas (GHG) emissions, with roughly half the contribution coming from the agriculture (crop and livestock) sector and the other half from agriculture-driven deforestation. Meeting the growing demand for food, feed, and biomass energy in the coming decades will pose considerable challenges for climate change mitigation and adaptation in the ASEAN region.

Government and business attitudes to climate change and the land-use sectors have been rapidly evolving. Until quite recently, agriculture and land-use change were considered too hard to meaningfully address at scale due to the widely dispersed sources of non-CO₂ GHG emissions, the large number of smallholder farmers that would need to be engaged, cultural practices and significant political challenges.

CONFERENCE OF PARTIES 21 (COP 21): A TIPPING POINT

The Paris Agreement reached last December at COP 21 commits signatory nations to holding global temperature rise to “well below 2 degrees Celsius.” The scale of this challenge is beyond any faced in the history of our planet and will require the action and collaboration of all sectors, including energy, transport, waste management and importantly, land use. A robust, multi-sector response, through government and business partnerships is the urgent solution needed for a more sustainable future for all – the future in which more than 9 billion people are all living well and within the boundaries of our planet.

The Paris Agreement calls for the active support of business and finance, mayors and governors, academia and civil society, as well as national governments. The new climate regime will create a floor for progress, not a ceiling, and look to coalitions of all these actors to determine how we can accelerate ambition and achieve the kind of progress necessary to secure the ASEAN region’s future.

Climate-smart land use presents an opportunity for advancing the triple-win of food security, climate change mitigation and adaptation. It can directly help curb GHG emissions; it can enhance carbon sinks (soils, biomass and forests); it can provide renewable energy from sustainably managed sources of biomass, and it can help create low-carbon alternatives to emissions-intensive and fossil fuel-derived materials.

Of the more than 190 countries that submitted their Intended Nationally Determined Contributions (INDCs) in advance of COP21, almost half made reference to land use, land-use change and forestry as one focus area for achieving the objectives as stated in their respective INDCs. This underscores the importance of land use for achieving global climate change goals.

Table 1 shows all of the ASEAN countries that made commitments under the Paris Accord by November 1, 2015 and the potential for the inclusion of land use in each INDC. Clearly, the countries in the ASEAN region aspire to using land use and forestry as ways to attain their targets and engage the international community and financial markets in their implementation.



Country	GHG Coverage	The Use of Markets in Meeting INDCs	Coverage of Land Use
Indonesia	CO ₂ , CH ₄ , N ₂ O Energy; industrial processes and product use; agriculture; land use, land-use change and forestry; waste.	Will meet its unconditional commitment regardless of market mechanisms, but Indonesia would welcome them.	Land use included; Inventory based on 2006 IPCC guidelines, and IPCC guidelines for greenhouse gases from land-use sector.
Thailand	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ Energy; industrial processes and product use; agriculture; waste.	Continue to explore the potential of bilateral, regional and international market mechanisms.	Inclusion of land use and forestry will be considered later.
Viet Nam	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ Energy; agriculture; land use; land-use change and forestry; waste.	Not mentioned.	Land use included; IPCC Guidelines and national GHG inventories.
Philippines	Energy; transport; waste; forestry and industry.	Not mentioned.	Land use and forestry included; 2006 IPCC Guidelines.
Cambodia	CO ₂ , CH ₄ , N ₂ O Energy; industrial processes, land use; land-use change and forestry.	Not mentioned.	Land use included; will be updated after the release of REDD+ Strategy.
Lao (People's Democratic Republic of)	Not specified. Energy; transport; forestry.	Not mentioned.	Forestry included; accounting methodology not specified.
Singapore	CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆ Energy; industrial processes and product use; agriculture; land use; land-use change and forestry; waste.	Intends to achieve INDC through domestic efforts, but will continue to study the potential of international market mechanisms.	Land use included; Singapore has begun monitor and report carbon storage and carbon fluxes related to land-use change and forestry.

Table 1: ASEAN nations' commitments to land use GHG reduction as at November 1, 2015

At the same time, there are questions about the experience and capability of governments, both national and local, business and finance sectors, and other players to implement projects and sectoral approaches at sufficient scales and in accordance with established GHG accounting principles and the generally accepted rules of compliance-based market schemes. More broadly, many of the land-use emissions reduction commitments made under INDCs lack clear implementation goals and elaboration of the means by which land-use GHG emissions could be reduced and organic carbon stores protected and increased.

CONVERGING EFFORTS

The strong focus on land-use in the INDCs is consistent with the increased momentum around this agenda that has been spurred by a range of initiatives in recent years, including for example the Bonn Challenge, New York Declaration on Forests, Global Alliance for Climate-Smart Agriculture, Global Partnership on Forest Landscape Restoration, and existing initiatives focused on sustainable commodity supply chains (e.g. Roundtable on Sustainable Oil Palm, Roundtable on Responsible Soy, and the Global Roundtable for Sustainable Beef).

The Paris Agreement, the United Nations Convention to Combat Desertification's (UNCCD) Land Degradation Neutrality (LDN) target and the Sustainable Development Goals (SDGs) all include significant targets for land use and agriculture that are mutually reinforcing.

The UNCCD highlights the significant potential of the land-use sector for reducing emissions and sequestering carbon in soils and biomass. Achieving LDN through sustainable land management and the restoration of degraded lands holds a global mitigation potential of up to 3.3 GtCO₂e per year. Exploiting this potential in the ASEAN region could be a major element for future climate action through regional collaboration. Harnessing the climate benefits of

land restoration and avoiding land degradation, especially in carbon-rich peat forests and in mangrove ecosystems would make one of the most cost effective mitigation actions and contributions to adaptation and climate change resilience.

The SDGs were also agreed in 2015 at the UN Sustainable Development Summit in New York. These 17 goals and 169 targets address the most pressing sustainable development challenges including preventing hunger, limiting global warming and addressing sustainable land use.

Also in 2015, the WBCSD launched the Low Carbon Technology Partnerships initiative which includes business solutions for agriculture and forestry that are now being implemented by WBCSD member companies and global partner networks in the ASEAN region.

Moreover, many financial institutions, notably pension funds, have dedicated capital targeted towards 'high sustainability' investments. In some cases, individual funds have more capital assigned for this purpose than all of the money invested to date in REDD+ and associated capacity development initiatives.

The challenge then is to align these efforts and create an ASEAN coalition for collective action at multiple scales, particularly in the context of implementing the INDCs.

THE ROAD AHEAD FOR SUSTAINABLE DEVELOPMENT IN ASEAN

The combined effect of the Paris Agreement, the UNCCD's LDN target, the SDGs and private sector initiatives has the potential to transform one of the region's biggest challenges into one of ASEAN's biggest opportunities.

The ASEAN regional competencies of technology implementation, educated and mobile workers, economic and political stability, innovative business leadership and, not least of all, a

willingness to collaborate in the transnational boundary context on major climate issues are key to reversing land-use emissions growth, increasing productivity and resilience to climate change.

The WBCSD has identified four major areas where government leadership in the ASEAN region, supported by business solutions, could have profound, long-lasting benefits for sustainable development.

Climate-smart Agriculture

To meet the rising demand in ASEAN for food, feed, fiber and fuel, agricultural production will need to increase dramatically by mid-century. With finite land, water and natural resources available to expand agricultural output, future growth will rely overwhelmingly on agricultural intensification and increased efficiency. At the same time, climate change is projected to have increasing, adverse effects on agricultural production, particularly in the countries and regions that are already most food-insecure and that rely most heavily on agriculture for growth, employment and subsistence.

A defining challenge for ASEAN nations in the 21st century is therefore to harness land, water and other natural resources to meet growing demands for food, feed, fiber and fuel; while at the same time reducing agricultural emissions, enhancing carbon sequestration and promoting more resilient lives and livelihoods for people living in the region.

Against this background, climate-smart agriculture (CSA) is emerging as a major policy and investment priority. The Food and Agriculture Organization (FAO), United Nations, considers CSA to sustainably increase agricultural productivity and incomes, adapt and build resilience to climate change, reduce GHG emissions and enhance national food security and development. A vast majority of INDCs provide for enhanced mitigation action in the land-use

sector, and agriculture is a longstanding priority for climate change adaptation, especially in the highly vulnerable countries of the ASEAN region. The Center for Global Development report shows that all countries in the ASEAN region are in the top 20 per cent of rankings based in the key dimensions of climate impact: extreme weather, sea level rise and agricultural productivity loss.

Some ASEAN countries such as the Philippines, Myanmar and Viet Nam are already investing in CSA.

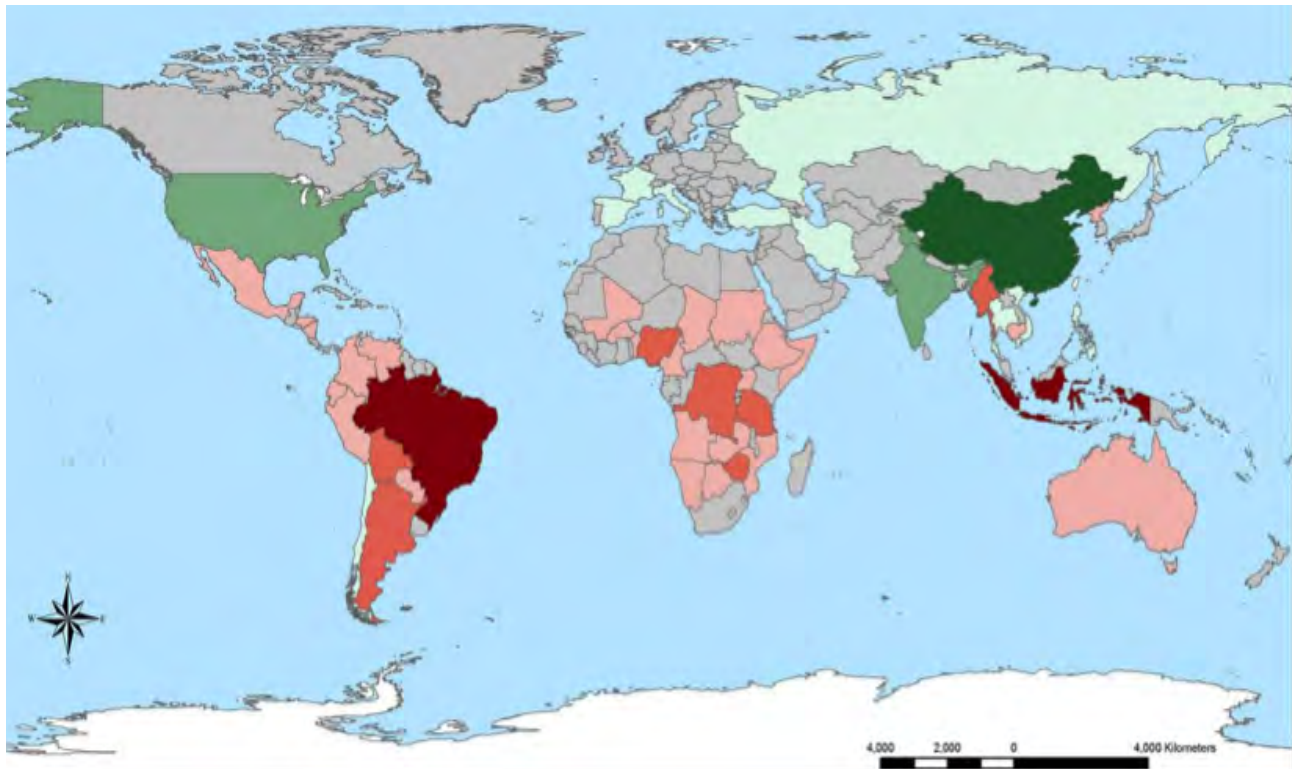
Taking Deforestation Out of Commodity Supply Chains

Palm oil, soy, beef and other global commodities are used in a wide range of foods and goods that are consumed by billions of people around the world. They are a key part of global commodities trade and have become dominant economic forces in many national and local economies. Global commodities are responsible for about 80 per cent of the approximately 7.6 million hectares of tropical forest that are lost every year. At the same time, the value of the annual production of these commodities amounts to tens of billions of dollars. These commodities thus become important in many local and national economies. Therefore, sustainability within commodities will only be achieved by linking long-term national sustainable development plans with day-to-day value chain management.

There are already a number of initiatives underway in major producer countries to promote sustainable production of commodities. The Roundtable on Sustainable Palm Oil, Tropical Forest Alliance, and Consumer Goods Forum are among the existing platforms influencing supply chain actors, to work toward diverting the frontier for commodities away from primary forests and areas of high conservation value.

Taking deforestation out of global supply chains can also be a key link to meeting ASEAN nations' INDCs and therefore represents another

ANNUAL CHANGE IN FOREST AREA (1990-2015)



1000 ha

Net Gain

	50-250
	250-500
	>500

Net Loss

	>500
	500-250
	250-50

Small Change
(Gain or Loss)

	<50
	No data

Map 1: 2015 Global Forest Resources Assessment by the FAO

opportunity for business and government to work in regional collaboration platforms to address this issue.

The annual change in forest area from 1990 to 2015 (Map 1) shows the extent of forest loss in the ASEAN region, with Indonesia in particular losing millions of hectares during this period. The loss of forests and carbon-rich peatlands has resulted in Indonesia becoming the sixth largest global emitter of greenhouse gases, an improvement from 2007 when Indonesia was the third largest emitter of greenhouse gases during the peak period of deforestation and degradation. Annually, over 2 billion tonnes of carbon dioxide equivalent was emitted from

the loss of peatlands and forests in Indonesia alone, dwarfing emissions from all other sectors combined.

Landscape Restoration

Complementing measures to put a brake on land degradation and deforestation, also high on the international political agenda are efforts to reverse past degradation. There are great opportunities to halt degradation processes and commit to restoration efforts, which maintain habitats, secure ecosystem services and offer livelihood opportunities for local communities. Consequently, the United Nations Framework Convention on Climate Change (UNFCCC),

Convention on Biological Diversity (CBD), and UNCCD have all identified forest landscape restoration as an important component in reaching their goals. The restoration of landscapes will also play a prominent role in achieving the proposed SDGs highlighted by the New York Declaration on Forests that seeks to restore 350 million hectares by 2030. Achieving the main restoration goal would generate at least USD85 billion a year in net benefits from carbon sequestration, watershed protection, improved crop yields and forest products, and could also reduce conflict in some fragile states.

Several initiatives are either ongoing or starting. The Bonn Challenge is a global aspiration to restore 150 million hectares of the world's deforested and degraded lands by 2020 and much of the previously deforested and degraded land in the region could be included in reaching the target.

In addition to innovations for land management in agroecosystems, restoration of landscapes is also increasingly seen as critical for achieving multiple environmental and development benefits.

Scaling Up Financing for Climate-smart Land Use

Scaling up and accelerating climate-smart land use will require significantly higher levels of financing, as well as a shift in current investment flows. Much of the additional investment capital will have to come from the private sector. The Paris Agreement introduces important opportunities for mobilizing private financing for climate-smart land use; and experiences from developed and developing countries alike demonstrate ways in which these opportunities could be seized. There are considerable barriers to scaling up financing for climate-smart land use, however, and concerted action is needed to strengthen enabling environments.

Article 6 of the Paris Agreement provides for the use of “internationally transferred mitigation outcomes” on a voluntary basis, and it establishes a mechanism to “contribute to the mitigation of greenhouse gas emissions and support sustainable development”. These mechanisms open the opportunity to share the experience developed under a number of compliance-based emission reduction schemes operating at a state or national level that have successfully integrated land-use and forestry into the suite of mitigation options.

Crucially, while all of the ASEAN INDCs include emissions reductions from land-use and forestry, few countries have the experience or the capacity to deliver emissions reductions from the land-use sector with robust and transparent monitoring, reporting and verification.

Beyond the potential use of internationally transferred mitigation outcomes; several risk-mitigation initiatives are paving the way for scaled-up financing for climate-smart land use. Importantly, many such initiatives are delivering multiple benefits for climate change mitigation and adaptation, as well as sustainable and diversified livelihoods. These include REDD+ finance, the LDN Fund and green bonds.

Last but not least, the adoption of strategic CSA across the ASEAN region could initiate a process to create a unified and harmonized set of land-use principles, rules and frameworks that would better facilitate public and private investment in land-use GHG management.

3

FOOD SECURITY ROBUSTNESS IN ASEAN: A COUNTRY REVIEW

Lead Contributors: Frontier Strategy Group and Syngenta

Food security is a necessary condition for economic growth and it continues to be at the top of many government agendas in the ASEAN region. Many threats remain in the short term to destabilize the food availability; while over the mid- to longer-term, challenges such as climate change and arable land loss affect the ability of countries to be food secure. Food security robustness is the capacity of a country to withstand disturbances to the different dimensions of food security. The Rice Bowl Index (RBI) is a measure of this “robustness,” and provides an indication of what factors are likely to challenge food security and require intervention. Government intervention in all areas of food and agriculture is increasing; effective and robust dialogue is required for this intervention to be a positive force in supporting food security robustness. Over the last twelve months the food security robustness of the 15 countries covered by the RBI (see <http://www.ricebowlindex.com> for more information) has continued to improve, though this has been at a slower pace than in previous years. Scores increased by 2.0 per cent compared to 3.6 per cent in 2014, while the 10 year average improvement is slightly above this year’s result at 2.9 per cent.

This slowdown in improving food security could be due to a number of factors. Lower commodity prices have resulted in reduced investment by farmers in technology which is likely to reduce on-farm productivity, and this may offset the (short term) benefit that lower commodity prices bring in terms of lower food prices. A challenge of structural change and protracted instability in regulatory and political systems has hindered improvements in countries that remain most vulnerable to food insecurity.

This chapter will seek to use data from the RBI to review these challenges on a country-by-country basis and make suggestions on how food security robustness might be improved.

ABOUT THE RICE BOWL INDEX

In early 2011, Syngenta Asia Pacific spearheaded the development of the RBI by partnering with Professor Paul Teng of Nanyang Technological University Singapore, an authority in the area of Asian food security, and Frontier Strategy Group, a global leader in information and advisory services. It was important to all three parties that the joint initiative focus on solutions

that drive toward a continuously improving and strengthening food security environment in Asia, on both regional and country levels.

To do this the group developed a differentiated approach that assesses “Food Security Robustness,” measuring data series across four rubrics: Policy and Trade, Farm-Level, Environmental and Demand and Price. Every rubric responds to a specific question, as follows:

- Policy and Trade: Does the trade and policy environment encourage open markets, investment and innovation?
- Farm-Level: Do farmers have the capability and means to be productive over the long term?
- Environmental: Does the environmental capacity provide for long-term agricultural productivity and sustainability? and
- Price and Demand: How are food security needs likely to evolve in terms of quantity, affordability and access?

Each rubric consists of seven to ten indicators that are relevant to the questions addressed by a particular rubric. For example, indicators for inflation and urbanization are in the Demand and Price rubric. Values for a particular indicator are scaled relative to the values for each country, and scored so that they can be aggregated within a rubric. Within each rubric a country receives a 1 to 100 score allowing them to be easily compared. For example, in the chart below, Thailand receives a higher score in the Demand and Price rubric than Indonesia, indicating that Thailand’s ability to address food security in terms of quantity, affordability, and access is more robust than Indonesia’s ability.

The resulting quantitative index serves as a useful tool to engage relevant stakeholders in the area of Asian food security.

Designed to translate the complexity of food security into an opportunity for action, the RBI is a living database that assesses how robust a country’s capacity is to address the challenges of food security. The countries addressed by the RBI and used to calculate the baseline level

RUBRIC SCORES FOR INDONESIA, PHILIPPINES, THAILAND, AND VIET NAM

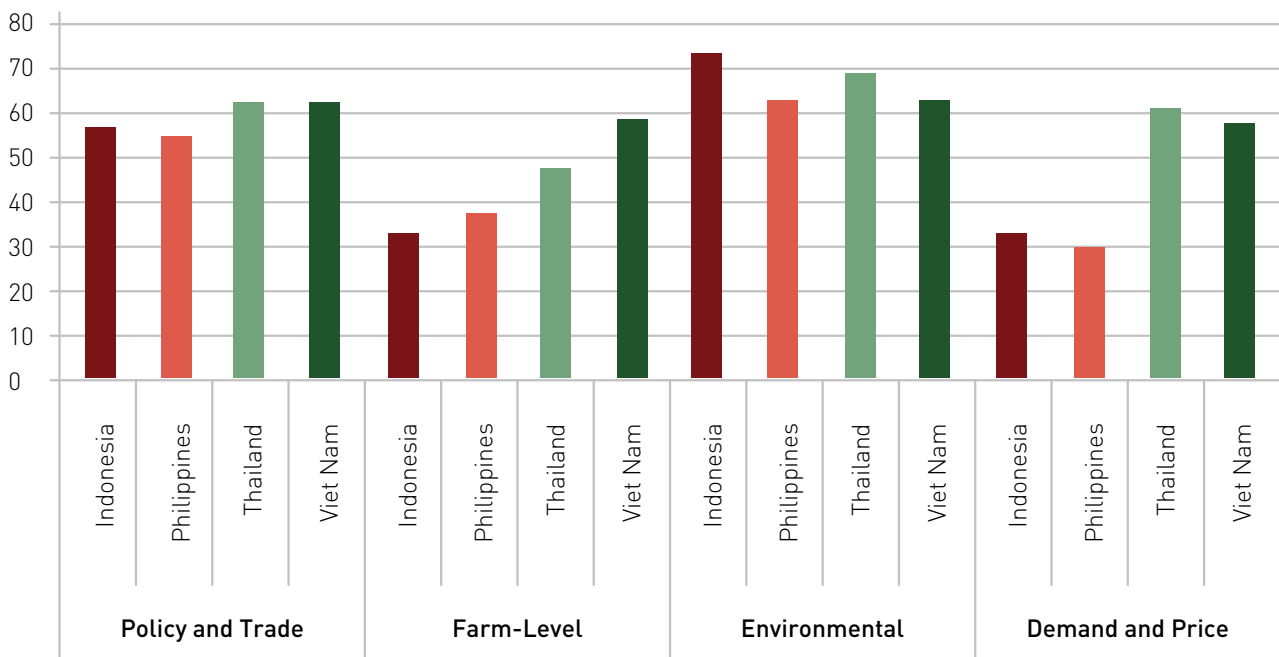


Figure 1: Rubric scores from the RBI for selected countries

of Food Security Robustness are: Australia, Bangladesh, China, India, Indonesia, Japan, South Korea, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Taiwan, Thailand, and Viet Nam. Only the results of four ASEAN countries, namely Indonesia, Philippines, Thailand and Viet Nam, are shown here to illustrate the capabilities of the RBI, given the significant contribution of agriculture to their national GDP and employment structure.

1. INDONESIA

Indonesia has prioritized food sovereignty in its National Medium-Term Development Plan. Food security and malnourishment significantly improved between 2009 and 2015. Despite improvement, progress is at risk of regressing if challenges, such as the potential for climate-related hazards, are not addressed. Strengthening its ability to adapt to the consequences of natural disasters, deforestation, and climate change will be crucial to avoiding temporary food insecurity.

Composite RBI Score

In the overall Composite Index Indonesia is ranked 10th amongst the 15 countries included in the RBI. Indonesia's position in the Composite Index is pushed up by its Environmental factors rubric score, where it ranks 5th, but pulled down by its 12th place ranking in the Farm-Level factors rubric.

Areas for Action

The RBI suggests there are concrete goals that policy makers can work towards to improve food security in Indonesia:

- Indonesia's relatively low ease of doing business deters investment that could add to growth in the agriculture sector, increasing food security
- Stronger and more transparent intellectual property rights would also help to increase investment in the agriculture sector
- Indonesia has a very high rate of mobile phone use, therefore efforts to reduce poverty and improve agricultural productivity should focus on maximizing access to affordable technology

RBI SCORE DETAIL

Policy & Trade (Score: 55)		Farm-Level (Score: 32)		Environmental (Score: 71)		Demand & Price (Score: 32)	
	Value		Value		Value		Value
Ease of Doing Business Ranking	114	Road Density per 100 Square km of Land Area	29.9	Vulnerability to Extreme Weather	0.6	Domestic Food Price Level Index	6.8
Ecosystem Vitality - Biodiversity & Habitat	55	Domestic Credit to Private Sector, % of GDP	33.4	Vulnerability to Sea-Level Rise	2.6	Food Supply per capita, calories per day	2,812
Ecosystem Vitality - Agriculture	146	Arable Land, '000 ha	23,740	Vulnerability to Agricultural Productivity Loss	1.8	Change in Oil Imports, %YOY, '000 bbl per day	3.4
Ecosystem Vitality - Fisheries	47	Land Equipped for Irrigation, '000 ha	6,791	Ecosystem Vitality - Forestry	119	Consumer Price Index, %YOY	6.5
Production of Biodiesel and Ethanol, Gallons Millions	42.6	Cereal Yield, kg per ha	52,217	Electric Power Consumption, kWh per capita	748	Population, %YOY	1.1
Political Stability and Absence of Violence/ Terrorism	-0.2	Mobile Phone Subscriptions, per 100 people	145.2	Total Internal Renewable Water Resources, qm per capita	7,987	Urban Population, number %YOY	2.5
Logistics Performance Index	3.1	Improved Water Source, Rural (% of Rural Population with Access)	78.5	Freshwater Withdrawal as % of Total Renewable Water Resources	5.6	Protein Supply Quantity, g per capita per day	63.5
Government Spending, US\$ per capita	318.5	Adult Literacy Rate, % Aged 15 and Above, 100% = 1	0.9				
Intellectual Property Rights, index	5						
Net Trade in Agricultural Products, USD millions	26,044						

Table 2: RBI score detail for Indonesia

2. PHILIPPINES

The Philippines has a high prevalence of food insecurity amongst its population, with the highest being in the Mindanao region. Existing food insecurity is further exacerbated by aging farmers and the need for a climate change/natural disaster adaptation strategy.

Composite RBI Score

In the overall Composite Index the Philippines is ranked 12th amongst the 15 countries included in the RBI. The Philippines' position in the Composite Index is pushed up by its Environmental factors rubric score where it ranks 9th, but pulled down by its 12th place ranking in the Demand and Price rubric.

Areas for Action

There are concrete goals policy makers can work towards to improve food security in the Philippines:

- Philippines performs poorly in the Demand and Price rubric, therefore efforts to improve food security in Philippines should focus on this rubric
- Adapting to the effects of climate change, cultivating existing arable land, and expanding access to improved water sources will improve the agriculture sector outlook and encourage growth

RBI SCORE DETAIL

Policy & Trade (Score: 53)		Farm-Level (Score: 36)		Environmental (Score: 61)		Demand & Price (Score: 29)	
	Value		Value		Value		Value
Ease of Doing Business Ranking	95	Domestic Credit to Private Sector, % of GDP	39.7	Vulnerability to Extreme Weather	3	Domestic Food Price Level Index	6.7
Ecosystem Vitality - Biodiversity & Habitat	82	Arable Land, '000 ha	5,704	Vulnerability to Sea-Level Rise	3.2	Food Supply per capita, calories per day	2,632
Ecosystem Vitality - Agriculture	162	Land Equipped for Irrigation, '000 ha	1,714	Vulnerability to Agricultural Productivity Loss	2.2	Change in Oil Imports, %YOY, '000 bbl per day	2
Ecosystem Vitality - Fisheries	64	Cereal Yield, kg per ha	36,293	Ecosystem Vitality - Forestry	70	Consumer Price Index, %YOY	1.9
Political Stability and Absence of Violence/ Terrorism	-1.4	Mobile Phone Subscriptions, per 100 people	124.9	Electric Power Consumption, kWh per capita	638	Population, %YOY	1.7
Logistics Performance Index	3	Unit Labour Cost Index, %YOY	-1.2	Total Internal Renewable Water Resources, qm per capita	4,793	Urban Population, number %YOY	1.4
Government Spending, USD per capita	309.9	Improved Water Source, Rural (% of Rural Population with Access)	93.1	Freshwater Withdrawal as % of Total Renewable Water Resources	17	Protein Supply Quantity, g per capita per day	60.9
Intellectual Property Rights, index	5.3	Adult Literacy Rate, % Aged 15 and Above, 100% = 1	1				
Net Trade in Agricultural Products, USD millions	-4,365						

Table 3: RBI score detail for the Philippines

3. THAILAND

Thailand has successfully implemented agricultural development policies to tackle food insecurity. Nationally, Thailand is a food surplus country with other countries in the region looking to Thailand for rice exports in times of shortage. Regionally, households struggle with access to food, especially in remote rural areas. Food prices and production costs particularly impact poor rural households.

Composite RBI Score

In the overall Composite Index Thailand is ranked 8th amongst the 15 countries included in the RBI. Thailand's position in the Composite Index is pushed up by its Environmental factors and Demand and Price rubric scores where it ranks 7th, but pulled down by its 8th place ranking in the Farm-Level factors rubric.

Areas for Action

There are concrete goals policy makers can work towards to improve food security in Thailand:

- Thailand's lowest score is in the Farm-Level rubric, but improving cereal yield could change this. Currently Thailand's cereal yield is just 62 per cent that of Indonesia
- By focusing on the rubric where Thailand performs best, Policy and Trade, policy makers can improve Thailand's overall composite score
- Increasing government spending per capita or increasing agricultural exports would both positively impact Thailand's RBI score

RBI SCORE DETAIL

Policy & Trade (Score: 60)		Farm-Level (Score: 46)		Environmental (Score: 67)		Demand & Price (Score: 59)	
	Value		Value		Value		Value
Ease of Doing Business Ranking	26	Domestic Credit to Private Sector, % of GDP	123	Vulnerability to Extreme Weather	0.3	Domestic Food Price Level Index	4.6
Ecosystem Vitality - Biodiversity & Habitat	69	Arable Land, '000 ha	17,879	Vulnerability to Sea-Level Rise	1	Food Supply per capita, calories per day	2,812
Ecosystem Vitality - Agriculture	106	Land Equipped for Irrigation, '000 ha	6,581	Vulnerability to Agricultural Productivity Loss	1.1	Change in Oil Imports, %YOY, '000 bbl per day	3
Ecosystem Vitality - Fisheries	80	Cereal Yield, kg per ha	32,560	Ecosystem Vitality - Forestry	80	Consumer Price Index, %YOY	-0.3
Political Stability and Absence of Violence/ Terrorism	-2	Mobile Phone Subscriptions, per 100 people	156.3	Electric Power Consumption, kWh per capita	2,532	Population, %YOY	0.4
Logistics Performance Index	3.4	Unit Labour Cost Index, %YOY	2.5	Total Internal Renewable Water Resources, qm per capita	3,338	Urban Population, number %YOY	2.7
Government Spending, USD per capita	783.5	Improved Water Source, Rural (% of Rural Population with Access)	95.7	Freshwater Withdrawal as % of Total Renewable Water Resources	13.1	Protein Supply Quantity, g per capita per day	59.4
Intellectual Property Rights, index	5.3	Adult Literacy Rate, % Aged 15 and Above, 100% = 1	0.9				
Net Trade in Agricultural Products, USD millions	26,723						

Table 4: RBI score detail for Thailand

4. VIET NAM

Viet Nam has experienced agricultural growth through improved land use, increased investment, and technology adoption. Viet Nam produces more than enough rice to feed its population and is one of the world's major rice exporters. However, food security is tested by factors such as climate change induced natural disasters and decreased access to food as a result of high prices and poverty.

Composite RBI Score

In the overall Composite Index Viet Nam is ranked 8th amongst the 15 countries in the RBI. Viet Nam's position in the Composite Index is pushed up by its Farm-Level factors rubric score where it ranks 3rd, but pulled down by its 9th place ranking in the Environmental factors rubric.

Areas for Action

There are concrete goals policy makers can work towards to improve food security in Viet Nam:

- Viet Nam performs best in the Policy and Trade rubric, therefore efforts to improve food security should focus on the country's strengths in this rubric
- Viet Nam's ease of doing business can be a source of potential agriculture sector growth through the further development of staple food producers
- Viet Nam should be wary of its vulnerability to agriculture productivity loss due to climate change

CONCLUSION

The RBI provides a starting point for assessing countries' ability to address issues of food security, and serves as quantitative framework for engaging in constructive conversations on the topic. As seen in the charts and statistics presented, headline RBI scores are made up of four rubrics that address specific questions concerning food security. These rubrics in turn are made up of indicators germane to each question.

To understand why any one country performs better than a peer, a reader can identify its relative performance in each rubric, and then examine the detailed indicators to understand which factors have a relatively positive or detrimental influence on the country's RBI score. These results provide a common framework for dialogue between sectors and disciplines on how best to provide interventions to improve food security robustness.

RBI SCORE DETAIL

Policy & Trade (Score: 60)		Farm-Level (Score: 57)		Environmental (Score: 61)		Demand & Price (Score: 56)	
	Value		Value		Value		Value
Ease of Doing Business Ranking	78	Domestic Credit to Private Sector, % of GDP	106.7	Vulnerability to Extreme Weather	4.5	Food Supply per capita, calories per day	2,823
Ecosystem Vitality - Biodiversity & Habitat	116	Arable Land, '000 ha	6,353	Vulnerability to Sea-Level Rise	11.7	Consumer Price Index, %YOY	1.7
Ecosystem Vitality - Agriculture	118	Land Equipped for Irrigation, '000 ha	4,774	Vulnerability to Agricultural Productivity Loss	2.4	Population, %YOY	1.1
Ecosystem Vitality - Fisheries	76	Cereal Yield, kg per ha	55,264	Ecosystem Vitality - Forestry	101	Urban Population, number %YOY	3.1
Political Stability and Absence of Violence/ Terrorism	0.1	Mobile Phone Subscriptions, per 100 people	157.6	Electric Power Consumption, kWh per capita	1,210	Protein Supply Quantity, g per capita per day	84.2
Logistics Performance Index	3.2	Improved Water Source, Rural (% of Rural Population with Access)	98.9	Total Internal Renewable Water Resources, qm per capita	3,889		
Government Spending, USD per capita	134.8	Adult Literacy Rate, % Aged 15 and Above, 100% = 1	0.9	Freshwater Withdrawal as % of Total Renewable Water Resources	9.3		
Intellectual Property Rights, index	4.8						
Net Trade in Agricultural Products, USD millions	5,307						

Table 5: RBI score detail for Viet Nam

4

A NEW PARADIGM: THE BUSINESS CASE FOR ENGAGING SMALLHOLDER FARMERS

Lead Contributor: Alison Eskesen, Grow Asia

Business-as-usual in the food and agriculture sector looks considerably different than it did ten years ago, and based on current trends, it will continue to evolve rapidly. One of the key drivers to the transformation of the sector is the looming threat of global food insecurity. This threat has implications beyond humanitarian and geo-political ones. The implications of mitigating a global food security crisis directly affect individual companies and entire value chains.

THE IMPORTANCE OF SMALLHOLDER FARMERS

In the ASEAN region, the source of agriculture supply is highly dependent on smallholder farmers. Smallholder farmers, according to the United Nation's Food and Agriculture Organization (FAO), produce upwards of 80 per cent of the food consumed in Asia and sub-Saharan Africa. In most crops smallholder farmers work on less than two hectares, roughly the size of two and a half football pitches. The ASEAN region has more than 100 million farmers, with nearly 50 per cent of smallholder farmers being women.

ASEAN Country	% of GDP, Agriculture	Number of Smallholder Farmers
Brunei	0.9	Unavailable
Cambodia	30.5	3,727,000
Indonesia	13.7	38,973,000
Laos	24.8	Unavailable
Malaysia	9.0	1,659,800
Myanmar	27.9	Unavailable
Philippines	11.3	11,801,000
Singapore	N/A	2,100
Thailand	10.5	12,732,700
Viet Nam	18.1	24,400,000

Table 6: Number of smallholder farmers in selected countries, Asian Development Bank, 2014

Smallholder farmers are instrumental to achieving food security; however, there are some fundamental challenges that must be overcome to mitigate a food crisis. Smallholder farmers have high yield gaps compared to industrial farms; their yields can be less than 20 per cent of the possible yield, depending on the crop. Smallholder farmers often lack knowledge about modern farming practices, fail to have up-to-date information about market prices and consumer preferences, lack access to technology and machinery, and struggle with working capital to finance farm operations. Add to this the challenge of changing weather patterns due to climate change, limited natural resources, and outbreaks of pests and diseases, and it is clear that smallholder farmers need substantial assistance to access markets and optimize their contribution to feeding the world.

Agriculture is estimated to contribute 17 per cent of greenhouse gas emissions (GHGs) worldwide. When combined with deforestation – often related to the clearing of land for agriculture production – they account for 30 per cent of GHGs. Because of agriculture's significant effect on the environment and smallholder farmers' prominent role in agriculture production in ASEAN, moving toward environmental sustainability is essential.

And while the food and agriculture sector has been at the forefront of industries striving for environmental sustainability, consumers – particularly in developed countries – are increasingly using their purchasing power to insist on it. Greater consumer expectations about sustainable sourcing and traceability are helping to push the entire industry toward better environmental sustainability. To achieve this in ASEAN, the food and agriculture sector needs to recognize the role of smallholder farmers.

THE BUSINESS CASE FOR SUPPORTING SMALLHOLDER FARMERS

Repeatedly, it has been demonstrated that engaging smallholder farmers makes commercial sense.

Securing consistent and high quality suppliers is vital to operations for buyers. Also having clear traceability about the source of crops is a competitive advantage. Because smallholder farmers grow the majority of crops that processors rely on, strengthening the smallholder farmers' ability to produce sufficient quantity and adequate quality is vital.

Opening new customer bases is part of every business' growth strategy. For example, seed, fertilizer, and pesticide companies that both demonstrate the effectiveness of their input as well as build the capacity of smallholder farmers to efficaciously use their products can result in bigger and loyal customer bases.

Improving the dynamics of smallholder farming can also make farming a more attractive profession to younger generations. According to the Guardian newspaper, the average worldwide age of farmers is over 60. Young people do not view farming as an attractive profession in part because of low profitability. The aging of farmers in ASEAN could lead to a serious future labour and supply shortage for businesses.

And helping to improve rural livelihoods in a meaningful and quantifiable way is a contributor to good government-corporate relations. Additionally, it helps corporations to establish their social license to operate in rural areas.

The business case is currently being built by agribusiness leaders, as they demonstrate that using commercial resources to build the capacity of smallholder farmers does result in a competitive advantage.

THE RATIONALE FOR MULTI-STAKEHOLDER PARTNERSHIPS

Bringing together the expertise of partners operating within and in support of crop value chains results in sustainable agriculture improvements that surpass what any one partner could do alone. It is a win-win proposition when stakeholders come together and collaborate on tailored solutions that meet the specific needs of the targeted smallholder farmers.

There are many ways in which different stakeholders can contribute.

- Agriculture input companies fund and operate demonstration plots that become training aids on growing and harvesting techniques, which are already proven and widespread in industrialized nations
- NGOs and donors support women to own and operate nurseries that then enable farmers improved access to higher yielding plantlets
- Cooperatives organize smallholder farmers to strengthen their bargaining power and to facilitate knowledge transfer
- NGOs, research institutes and companies provide training on good agriculture practices, such as efficient water, fertilizer and pesticide usage
- Governments improve access and enforcement of land rights, protect the environment, support policy changes to improve the market, and invest in infrastructure.
- Buyers offer purchase contracts to ensure that farmers earn a reasonable income. These contracts also serve as collateral to facilitate bank lending to smallholder farmers for their input purchases and other costs.

While each of these potential modes of engagement are valuable as stand-alone interventions, their impact is magnified when done in coordination. Multi-stakeholder partnerships can unlock this synergy. Through multi-stakeholder partnership around value chain projects, smallholder farmers increase their yields, profitability, and environmental sustainability while companies strengthen their supplies chains and/or expand their customer bases.

One such collaboration is Grow Asia catalyzed by the World Economic Forum and ASEAN Secretariat with the aim to help 10 million smallholder farmers to increase by 20 per cent their yields, net incomes and environmental sustainability by 2020. Grow Asia currently supports country partnerships in Viet Nam, Indonesia, Myanmar, Philippines and Cambodia reaching almost half a million smallholder farmers through 26 value chain initiatives, engaging about 200 organizations.

COLLABORATION ON COFFEE IN VIET NAM

In Viet Nam, the private sector, government, civil society, research institutes and farmer organizations came together to help smallholder farmers growing coffee to expand their productivity, increase their profitability and improve their environmental sustainability. 41 organizations are collaborating to connect smallholder farmers into the formal value chain by fostering direct linkages to fertilizer, crop protection, roasters, and exporters companies while building the capacity of smallholders and strengthening the enabling environment.

Together they operate 75 demonstration plots in four provinces. They delivered 10,200 days of training through 280 farmer field schools and introduced new higher yielding coffee varieties. Last season, this investment resulted in an increase in smallholder farmers' yield by 21



per cent and net income from coffee by 14 per cent. Additionally, smallholder farmers reduced their water footprint by 30 per cent from 1,390 to 470 litres per irrigated plant. Fertilizer usage was more targeted, resulting in a reduction in over-fertilization by 18-23 per cent depending on the location. And participating farmers reduced their carbon emissions by 63 per cent.

The active leadership of the alternating co-chairs Nestle and Yara alongside the support of the Ministry of Agriculture and Rural Development and engagement of civil society including IDH, Rainforest Alliance and 4C and research institutes, such as WASI and IPSARD has propelled this project forward. Through this action-oriented partnership, the members created a package of training materials that has evolved into the draft National Sustainability Curriculum, made available throughout the country's agricultural extension service. Additionally, the success of the partnership's collaboration has catalyzed the creation of Viet Nam Coffee Coordination Board. This value chain partnership is now collaborating to set up farmer cooperatives and farmer groups to enable the provision of financing solutions to smallholder farmers.

INNOVATIVE FINANCING IN INDONESIA

In Indonesia a collaborative value chain initiative engaged financiers early on to help smallholder farmers have the working capital to upgrade their inputs and better satisfy off-takers crop quality needs. The private sector, led by Cargill, Monsanto, and Syngenta are collaborating with the national and regional governments as well as Mercy Corps to improve corn farmers' livelihoods through improved access to technology, finance and knowledge in two localities.

Together the partnership has trained 34,100 smallholder farmers at 15 field schools and operates one demonstration plot. Recognizing the challenge that smallholders have in affording quality inputs, the partners helped broker access to financing for smallholder farmers by engaging Bank Andara, BPR Pesisir and BRI in the multi-stakeholder partnership. Through this innovative approach to credit, the partnership has channelled USD25,000 in small-scale loans to farmers, so they can invest in higher quality inputs. And as the partnership matures, ACA assurance is engaging to help mitigate the risk of borrowing for smallholder farmers.

On average, the smallholder farmers participating in the value chain initiative have

benefited from a 33 per cent increase in productivity and a 44 per cent increase in income. Having successfully tested their integrated corn supply chain partnership model in West Java, the partnership is in the process of replicating it in West Nusa Tenggara.

CHALLENGES

As the industry comes together through multi-stakeholder partnership to engage and support smallholder farmers, there remain challenges to overcome. The key obstacles that many partnerships grapple with are:

- *Farmer aggregation:* To effectively work with smallholders, businesses need farmers to be organized into economic units that reduce the transaction costs of engagement
- *Land title:* As businesses engage smallholder farmers, one of the key challenges is the informal nature of land tenure. Perceived land security affects smallholder farmers' willingness and ability to invest in their farms
- *Better use of technology:* Injecting greater use of technology can help overcome farmer aggregation and information asymmetry
- *Access to different types of financial services:* Smallholder farmers have distinct capital needs and challenges with accessing capital. From credit to equipment leasing to micro-insurance to warehouse receipts, there is a need for engaging financial sector actors into the multi-stakeholder value chain partnerships

BENEFITS OF THE NEW PARADIGM OF INCLUSIVENESS

A multi-stakeholder approach to testing inclusive and sustainable approaches that engage and benefit smallholder farmers can amplify impact on-the-ground – contributing to rural development, food security and environmental

sustainability. There is commercial justification and a growing evidence base to support why all stakeholders should challenge the go-it-alone approach.

In summary, the advantages of collaborative efforts to support smallholder farmers can provide significant results for all partners.

- By helping smallholder farmers to grow more high-quality crops, thereby resulting in an increase in farm income, companies can expand their customer base and ensure consistent supply and predictable quality of crops
- By helping smallholder farmers to be more environmentally sustainable, such as reducing water usage, optimizing external chemical input use and reducing greenhouse gas emissions, companies can fulfil their corporate targets on sustainability while meeting changing consumer expectations about sustainable sourcing
- For civil society and government, working through multi-stakeholder partnerships can accelerate the achievement of development objectives, such as the Sustainable Development Goals because they leverage the private sectors' expertise, resources and technology while successfully integrating smallholder farmers into formal value chains and protecting high conservation areas

Through greater collaboration, partners together can strengthen the sustainability of value chains while improving the productivity and livelihoods of smallholder farmers. Through a concerted multi-stakeholder effort, it is possible to harmonize actions to tap the benefits of synergy. It is through this synergy that we will unlock the very best of the food and agriculture sector, help alleviate rural poverty, achieve measureable progress in protecting our environment, and avert a food crisis.

5

CROP PROTECTION REGULATORY HARMONIZATION IN ASEAN

Lead Contributor: Duke Hipp, CropLife Asia

Agriculture is integral to the culture, traditions, prosperity and societal norms of countries across ASEAN. It is also the economic engine that drives competitiveness and economic growth for member countries. Crop protection technology is critical to catalysing this economic engine for the community today and in mitigating the challenges that must be faced towards 2025.

The concept of a harmonized regulatory framework for crop protection products is not new to ASEAN. Nevertheless, while the great potential that regulatory harmonization brings is beginning to be realized across a number of industries in the region, the enabling technology of crop protection is not among them.

Estimates by the United Nations indicate the world's population will exceed nine billion inhabitants by the year 2050. Asia alone is projected to have roughly one billion more people calling it home. The UN's Food and Agriculture Organization (FAO) has also estimated that roughly two-thirds of the world's hungry live in Asia and the Pacific.

To meet these demands, growers around the world will need to produce more food – as much as 70 per cent more than today – while reducing

the footprint of farming. The technology of plant science is a key resource towards making that possible.

In particular, crop protection products help to prevent nearly 40 per cent of global rice and maize harvests from being lost every year. With respect to the “perfect storm” brewing for 2050, projections suggest the crop protection products that enhance the control of insects, diseases and weeds could also increase worldwide yields of rice, maize and wheat by 20-30 per cent that same year.

THE CASE FOR REGULATORY HARMONIZATION

As detailed in the “Vision and Strategic Plan for ASEAN Cooperation in Food, Agriculture and Forestry (2016–2025)” endorsed by the 37th ASEAN Ministry of Agriculture and Forestry (AMAF), ASEAN faces a daunting array of challenges in the agricultural sector in the coming decade. To help meet these challenges and realize the great potential within our region, the AMAF Vision and Strategic Plan sets forth a number of goals that are focused on raising the vitality, robustness and sustainability of ASEAN agriculture. A number of these goals

are particularly well aligned with the results an ASEAN harmonized regulatory framework for crop protection products would bring. Among these goals are:

- Ensuring equitable, sustainable and inclusive growth
- Alleviating poverty and eradicating hunger
- Ensuring food security, food safety and better nutrition
- Deepening regional integration
- Enhancing access to global markets
- Increasing resilience to and contributing to mitigation and adaption to climate change, natural disasters and other shocks

In support of realizing these goals, the AMAF 2016-2025 Vision and Strategic Plan endorses appropriate policy initiatives, strategic investments, regulatory and institutional changes that promote increased agricultural output. In that same spirit, regulatory harmonization of crop protection products is one such strategic initiative that would herald a wide range of benefits, including increased productivity, safety, enhanced opportunities, trade and bureaucratic efficiencies.

Critically, within the countries of ASEAN, it is the farmers, food/feed stakeholders, and end-users that stand to gain the most from a harmonized crop protection regulatory framework. Harmonization will reduce complexity in trade; provide farmers with greater access to quality, innovative products and advanced technology platforms; increase local R&D investment; and lower costs through shared regulatory capacity and operating efficiencies within the region.

Meanwhile, the challenges exacerbated by an absence of a harmonized regulatory framework for crop protection products in the

region continue to impact the ASEAN food and agriculture sectors – in particular, farmers. Additional and unnecessary obstacles to trade, the proliferation of counterfeit crop protection products, and limited access to technology are among these challenges. A quick check of how ASEAN stacks up relative to nearby neighbour Australia in the category of average regulatory approval time (respectively, on average roughly 70 months compared to 20 months) illustrates the access issue specifically that regional farmers suffer from today.

Regulatory harmonization for crop protection products is therefore an essential component to the future success of agricultural trade, robust economic growth, and food security within the ASEAN community. The realization of regulatory harmonization presents itself as a tangible goal as the ASEAN Economic Community (AEC) moves forward. The crop protection industry strongly supports the inclusion of regulatory harmonization for its products within the AEC.

THE ROAD TO HARMONIZATION

Historically, numerous efforts have been made towards the goal of regulatory harmonization of crop protection products in ASEAN.

The early interest in harmonization was led by the FAO. The 1975 FAO Ad Hoc Government Consultation on Pesticides in Agriculture and Public Health recommended that FAO establish an international consultation to analyse and discuss the basis for harmonizing the requirements for registration of pesticides in different countries. In 1991, member governments of the Organization for Economic Cooperation and Development (OECD), together with several international organizations, NGOs and industry, strongly agreed on the need for harmonization of registration data requirements, test guidelines and the evaluation of registration data.

An FAO project titled “Assisting countries in Southeast Asia toward achieving pesticide regulatory harmonization” (2012) brought the participation of seven ASEAN countries, and reached agreement on five regional guidelines on various aspects of pesticide management and registration. These include:

- Harmonization of pesticide registration requirements including the format for minimum data requirement and the modality for a sustainable process
- Harmonization of bio-pesticide registration requirements including the format for minimum data requirement and the modality for a sustainable process
- Harmonization of pesticide labelling requirements
- Harmonization of bio-efficacy testing
- Harmonization of monitoring and surveillance of pesticide residues in agriculture products

At the same time, the crop protection industry and its advocates have worked with ASEAN and its member states in advancing harmonization for the benefit of all stakeholders. Through the efforts undertaken by the Experts Working Group on Harmonization of Maximum Residue Levels of Pesticides (EWG-MRLs) starting in 2002, over 1,000 MRLs have been harmonized. Since 2013, most of these MRLs (>750) were adopted by key ASEAN member states as national standards.

Meanwhile, CropLife Asia has worked recently within ASEAN to promote the larger concept of harmonization and advance the FAO recommendations and good work carried out by the EWG-MRLs. At the Special Senior Officials Meeting of the 36th Meeting of the ASEAN Ministers on Agriculture and Forestry (Special SOM-36th AMAF) held in Myanmar, CropLife Asia presented the benefits of a harmonized

regulatory framework for crop protection products to ASEAN member states.

In January 2016, a similar presentation was made in concert with the 20th Meeting of the EWG-MRLs in Indonesia. In its review, the Meeting generally concluded that crop protection regulatory harmonization could be part of a successful path forward for ASEAN agricultural trade and should be considered by the ASEAN Sectoral Working Group (ASWG) on Crops.

Regulatory harmonization for cosmetics and medical devices is complete, and the Department of Agriculture within the ASEAN Secretariat has issued harmonized Good Agricultural Practices standards for environmental management, food safety and worker health, and food quality. Pharmaceutical and bio-pesticides regulatory harmonization is similarly underway.

While regulatory harmonization of crop protection products has been discussed for decades, a number of factors now seem to be perfectly aligned to push this forward to realize the goal. Among these are: the substantial challenges facing agriculture in the region; imperatives regarding policy and strategic innovations; and lastly, and by no means least, the range of benefits to the region itself.

THE BENEFITS FOR ASEAN

The Key Crop of Rice and MRLs Harmonization

The production and trade of key crops in the region has seen tremendous growth in recent years, and the aforementioned harmonization results realized through ASEAN’s EWG-MRLs have played a role in that progress.

In particular, ASEAN’s agro-based exports more than tripled between 2003 and 2010 – going from USD12 billion to USD40 billion. Beginning at roughly the same time, the ASEAN effort to



realize harmonization for MRLs made great strides with products used to treat a number of crops. This ultimately resulted, as previously noted, in over 1,000 harmonized MRLs, with more than 75 per cent of those adopted as national standards by member states.

A quick study of the all-important crop of rice serves as helpful food for thought. According to the International Rice Research Institute, 90 per cent of the world's rice supply is produced in Asia – with much of that production emanating within ASEAN. Before 2002, no MRLs for this crop had been harmonized within the region. By 2011, some 12 harmonized MRLs for rice were in place. That same year, based on data from the Asian Development Bank, the region's rice exports eclipsed 45 per cent of worldwide rice exports. Roughly 129 million tonnes of rice were produced within ASEAN in 2012.

ASEAN Farmers Competitiveness: Access to Technology

With the unrelenting proliferation of global trade, the farmers of ASEAN are vulnerable to competing with large-scale farmers who benefit from pragmatic and progressive regulatory systems. This regulatory advantage ensures their access to the latest crop protection technologies and delivers a competitive advantage over small farmers in ASEAN.

ASEAN countries have agreed to support the UN Zero Hunger Challenge (including a 100 per cent increase in smallholder farmer productivity and income). A harmonized regulatory system in ASEAN for crop protection products would make this challenge more achievable by bolstering the competitiveness of the region's farmers through ensuring their access to the latest innovations and technology available.

Safeguarding Human Health and the Environment

Harmonizing the crop protection regulatory framework in ASEAN provides safeguards for human health and the environment as it enables farmers to access new crop protection technologies safely, taking into account the prevailing agricultural conditions and practices in ASEAN.

Such framework would be based around a science-based risk assessment approach that appropriately balances risks and benefits. Uniform labelling guidelines would be implemented across ASEAN for effective communication to protect the farming community via responsible use.

Regulatory Efficiency Means Higher Quality Products

Crop protection regulatory harmonization across ASEAN will deliver uniform and high quality products where they are needed most.

Regulatory registration systems in a number of ASEAN countries are being taxed to their limits. Addressing this situation and unravelling the tangle of standards and regulations impeding trade is both difficult and costly.

Providing a harmonized regulatory framework for crop protection products in ASEAN would ensure sharing of the regulatory capacity, knowledge, and data among the member states, hence minimizing costs and redundancies.

Efficient registration of new products reduces costs by realizing expedited testing and approval for new products while providing incentives that encourage R&D investments in crop protection within ASEAN.

Technology's Role in Fuelling ASEAN's Economic Engine

Among the top eight agri-producing countries of ASEAN, agriculture accounts for around 20 per cent average of national GDP. What is more, between 2003 and 2010, agri-based exports from ASEAN more than tripled, with the total value rising from USD12 billion to approximately USD40 billion. Sustaining and enhancing this level of growth is a realistic goal.

Global, regional and intra-ASEAN agricultural commodity trade can be facilitated and promoted through the harmonization of crop protection products by reducing non-tariff barriers. This is in line with the AMAF 2016-2025 Vision's stated goal of fostering competitiveness and global market penetration by eliminating trade-impeding regulations and standards.

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

Regulatory harmonization for crop protection products in ASEAN will help ensure that the economic engine that is the region's agriculture sector is enabled to reach its full potential. The costs of inaction, or continued delayed implementation of crop protection harmonization, are immense.

By delivering greater efficiency and higher yields, regulatory harmonization in this critical area will play a pivotal role in making food security, food safety and food sustainability achievable goals for the countries of ASEAN. Add to this enhanced prospects for trade, environmental and public health protection, higher quality products and responsible on-farm use, as well as bolstering of national economies, and regulatory harmonization for crop protection products in ASEAN (alongside industries already benefitting from similar initiatives) represents a critical step forward for our region's agriculture sector.

Among the key recommendations to achieve these goals are:

- Adopting Codex and ASEAN Maximum Residue Limits into national standards
- Supporting acceptance of data for product registration leveraging the competence among ASEAN member states
- Harmonizing labelling standards, including use of pictograms and safety phrases for effective communication to protect farmers and the environment
- Adopting evidence-based scientific approach on evaluation and approval of products, balancing risks and benefits
- Sharing competency, facilities and best practices to support inter-regional anti-counterfeiting initiatives

6

BUSINESS SOLUTIONS



The following sections showcase relevant business solutions which can contribute to achieve sustainability in agriculture through multi-stakeholder partnerships, eased access to finance and adoption of new technologies that can lead to productivity gains and improved farmers livelihoods to the benefit of ASEAN economies.

The policy recommendations formulated in the following sections originate from the analysis of real case studies and best practices. They are a contribution from the private sector to policy makers with the aim to create a conducive business environment to replicate these business solutions at scale.

6.1

HOW TO BUILD RESILIENCE TO CLIMATE CHANGE IN AGRICULTURE

Lead Contributor: Constant Van Aerschot, Business Council for Sustainable Development Singapore

Climate change poses new and not widely recognized risks to global supply chains, particularly in the agriculture and food sectors. We expect an increased frequency and severity of disruptive weather events such as heat waves and droughts, more intense storms and flooding, and higher sea levels. Projected changes in long-term average conditions are creating a new and business-critical context. Potential impacts on supply chains are among the least recognized of these risks.

This topic is particularly relevant in the ASEAN context given the socio-economic importance of the agricultural sector to the region, threatened by a high vulnerability to climate change impacts. Trust and collaboration between governments and business is fundamental to find avenues to increase ASEAN's agricultural sector resilience to climate change.

In this chapter, we:

- Examine the structure of supply chains and their exposure to climate change
- Propose a 5-step framework on how to mitigate risk of climate change in supply chains
- Propose recommendations for policy makers in ASEAN

THE NEED FOR A SYSTEMS-APPROACH TO FOOD SUPPLY CHAINS

We advocate for a “systems view” to account for complex dynamics, behaviours, functions, interconnections and changes in the supply chain over time. A systemic and cross-boundary approach is necessary because of the global nature of the food supply chain. It requires a broader approach to risk management, which focuses on the resilience of the network as a whole to create the ability to tolerate surprises and recover quickly from disruption.

Companies should consider suppliers and customers as much as their own assets and operations. A company at the head of a supply chain might seek greater resilience through measures such as diversifying supply routes, maintaining up-to-date business continuity plans and procedures, and increased inventory levels. Nonetheless, these measures do not necessarily entail that their suppliers' resilience will be equally increased. Approaching resilience collaboratively rather than competitively by assisting suppliers with adaptation strategies enhances a company's own resilience.

Governments' role is about ensuring quality of infrastructure, such as transport networks (road, rail, air and sea), supply of water, energy, waste and pollution management, which are all integral parts of supply chain resilience.

Sharing climate resilient approaches to supply networks can achieve a collective advantage for business, governments and society at large.

Understanding Supply Chains

The modern, globalized economy has developed interconnected and complex supply chains. No single company today owns the entire supply network with disaggregated supply chains remaining the norm. And supply chains are only as strong as their weakest links.

Supply networks are composed of a collection of actors operating in an uncertain environment, each with their own goals and abilities, with often limited and/or incorrect information. It is therefore necessary for all participants to understand and address their vulnerabilities together, turning mutual dependence into mutual competitive advantage.

Technological developments have made it possible to cope with extreme complexity. Tools such as enterprise resource planning systems and advanced shipment notification help manufacturers to keep track of activities. These tools have resulted in improved information exchange, better service levels, reduced inventory levels and lower costs.

Re-visiting Risk Management Processes

Most companies have risk management procedures which identify, analyse, evaluate and treat risks. The typical approach provides a solid foundation, helping to protect individual vulnerable assets, but it is faced with a number of challenges to providing guidelines for the scale, complexities and uncertainties of global or regional supply chains.

Risk management is generally based on representing risk as a function of the probability and consequences of an event. This is appropriate where potential threats are relatively well-known in advance and the system can be prepared to face the threat. However, it is impractical to

maintain an estimate of the probability and consequences of events for the whole supply chain because of:

- The sheer number of nodes in global supply chains
- The dynamic, frequently changing nature of the network
- The uncertainties inherent in climate change, including the possibility of unpredictable individual events which could have extreme consequences

It is therefore necessary to take a broader view, thinking about resilience as well as risk management. Resilience is the capacity to deal with unknown or highly uncertain hazards, with the aim of enabling a system to tolerate surprises. It includes strengthening defences but also developing multiple pathways, providing alternatives and creating an ability to recover quickly.

What is new about vulnerabilities?

Supply chains have always been vulnerable to disruption from a variety of sources, including adverse weather affecting crops but also services such as transport or power generation. The scale and nature of modern supply networks have increased these vulnerabilities. Several aspects make them now more vulnerable to cascading failures, with a relatively minor issue at one point in the network causing increasing problems throughout. Some of these key aspects include globalized world, geographical concentration, clustering, fragmentation, complexity, narrowing scope, and reliance on information.

A 5-STEP FRAMEWORK FOR ACTION ON CLIMATE RESILIENCE

We propose a framework for companies and governments to build resilience to climate risks in global supply chains. How to build resilience

is based on learning, collaboration, spare capacity and flexibility. It provides the capacity to deal with changes and stresses and the ability to create new connections. Assessing risks and building climate resilience is an iterative process where results and findings in one step are used as feedback and input to other steps. The framework, divided into five stages, is best implemented through cross functional participation (e.g. from the environmental, supply chain, and corporate risk functions) and draws on external knowledge of subjects such as meteorology, climate science and business risk management.

Step 1: Map supply chain and identify critical features

The aim of this step is to:

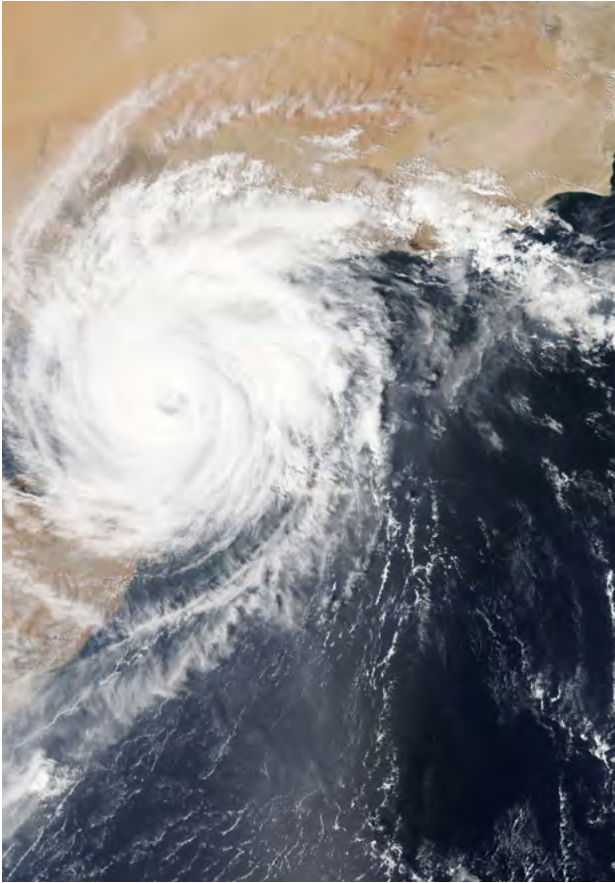
- Understand the principal material flows, stocks and locations in the supply chain
- Identify the numbers, locations and diversity of organizations, products and business connections at each stage of the chain
- Identify interface points with other industries, including utilities
- Identify key international and national laws, policies and regulations that may affect critical features in the event of disruption

This analysis may be complex for an entire supply chain. Hence the initial stage should be focused on an overall understanding of the key production locations, material stocks and major paths of material movement. Mapping provides a basis for outlining the critical features of the supply chain and for identifying potential climate-related hazards that could disrupt performance.

To better understand critical features, companies and governments should consider the issues that are most important for a particular crop. Insofar as companies are dependent on services and infrastructure (e.g. utilities, transport, suppliers, customers), these should be considered as part of the 'critical features' assessment. Governments can resort to legislation to require major infrastructure providers to report on their climate resilience.

Critical features may relate to one or more of the following aspects:

- Few supplier locations, or a lack of alternative suppliers
- Geographical concentration/ clustering of supplier locations (or warehousing/ storage), or an overall lack of geographical diversity (particularly where geographical concentration is in an area known to be subject to climatic hazards)
- Competition for resources used in the supply chain (e.g., alternative uses for primary materials such as agricultural products or resources such as water)
- Dependence on climate-sensitive materials (e.g. agricultural raw materials that rely on a certain climate and water availability)
- Lack of alternative transport routes or concentration of routes (e.g. via specific ports)
- Legal or regulatory requirements on infrastructure providers



Step 2: Determine weather-related hazards

The supply chain is likely to be affected by current weather events and by future climate change. The relevance of weather-related hazards to different components can be determined through reference to historical disruptions and consequent business losses, for example:

- What weather-related hazards have impacted the supply chain in the last 5 to 10 years?
- Which ones are specific to ASEAN and where are the key elements of the supply chain under consideration located?

Future climate change projections also serve as input to climate resilience assessments, with potential changes in the frequency, duration or intensity of weather-related hazards or to new hazards. The next table shows some examples.

Temperature	Heatwaves are very likely to become more frequent and longer lasting. Extreme temperatures can for example create stress that affects pollination and grain formation, affecting final yields.
Drought	The combination of rainfall and temperature changes is expected to result in longer and more frequent drought.
Precipitation	Rainfall is expected to be more intense in some areas while others will experience more days with no precipitation.
Flooding	Floods are likely to become more frequent and more severe, with flash floods resulting from heavy local rainfall.
Tropical Cyclones	Likely to become more severe along the Pacific coast, mainly in the Philippines and the eastern region of ASEAN

Table 7: Weather-related hazards affecting supply chains



Step 3: Identify vulnerabilities and evaluate risks

Large companies are likely to have an existing mechanism or framework for assessing supply chain risk. Extreme weather and climate change are additional elements which should be considered within such frameworks. Climate change increases the likelihood and severity of events so an assessment should consider the existing level of risks and how climate change might amplify those risks.

Relevant weather-related hazards identified in step 2 are to be applied at every step to assess major risks and vulnerabilities within a supply chain.

Process	Questions and examples of how weather-related hazards impacts the process
Inputs	Are seeds grown in the same parts of ASEAN, making their own yield dependent on the same factors that affect crop locally? Are disruptions of imported and domestically produced fertilizers affecting the production?
Production	Excessive rainfall at the end of the growing season destroys the harvest, or leave crop useful only as animal feed. Can warmer temperatures shift the optimal location of crop production? Will it facilitate movement of diseases and pests in the region?
Collection	How resilient are transport infrastructures used for crop collection and distribution to higher temperatures and heavy precipitation? Where are most of the exports passing through? How would tropical cyclones disrupt exports?
Processing	Which crop relies most on electricity and clean water? How do droughts and declining aquifers threaten water supply, quality and cost? Will more energy be needed for pumping, depriving energy for development in other areas?
Transport	Flooding can also affect transportation infrastructure, delaying transport and jeopardizing crop quality due to higher storage time

Table 8: Identification of risks and vulnerabilities affecting supply chains

Step 4: Defining and applying resilience-building measures

Such measures should ideally be conceived and applied with close attention to benefits and consequences across the supply chain system. This approach requires a collaborative outlook, a holistic approach to considering risks and mitigation, and a willingness to consider changes to supply chain structures as well as to apply individual measures.

A resilient supply chain must include learning, collaboration, spare capacity and flexibility such as detailed hereafter.

Learning

Understanding the exposure of the supply chain to climate risk is fundamental to implementing suitable measures to deal with disruption. Continual learning, experimenting and gathering information is essential to update and improve the system understanding.

- Assess what information supports decision-making process for resilience-building measures
- Improve data collection and availability
- Build trusted relationships to share information
- Develop effective monitoring that can provide continual understanding of how the supply chain is affected by extreme weather events and recovery processes

Collaboration

An actor in an interdependent supply network is only as strong as the system. Companies must go beyond the boundaries of their own business, working across industries, disciplines and stakeholders, possibly formalizing the collaboration in contracts. Examples include:

- Develop and apply policies that encourage collaboration across the supply chain, including information sharing
- Require suppliers to carry out assessments of their vulnerabilities and implement resilience building measures

Spare Capacity

The first line of defence is to build spare capacity (or “redundancy”) into the supply chain – that is, the capacity to cope with a system failure without total collapse. Public, private or household stockpiling is one way of creating spare capacity in the agricultural sector.

Flexibility

Actors in supply networks need to have options to adapt to disruptions. Flexibility can be achieved through standardized processes (e.g. interchangeable parts, products and production facilities), alternative traffic routes and procedures that can handle emergencies. In particular:

- Consider multiple suppliers for critical items (e.g. labour, seeds, equipment, water)
- Explore alternatives to existing logistics arrangements
- Identify potential alternative production sites

Examples of resilience-building measures include:

- Define and adopt “supply chain stewardship” policies and approaches encouraging collaboration and information exchange throughout the supply chain
- Maintain and understand the supply chain’s overall capacity and its capacity utilisation

- Monitor and document how the supply chain is affected by extreme weather and weather-related events and the approach to associated recovery processes. This helps to understand the nature of the risks in more detail and allows wider resilience to be built by learning from previous experiences
- Collaborate with governments to identify critical infrastructure and promote resilient and robust transportation networks

Step 5: Monitoring and reviewing

The analysis process has to be iterative, with monitoring and review being an important aspect. Information should be gathered continuously to:

- Review how the supply chain has been affected by extreme weather events, to improve understanding of relevant risks
- Interpret logs of climate-related impacts to gain further insight into risk ratings
- Review the effectiveness of resilience-building measures

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

South East Asia is highly vulnerable to climate change as a large proportion of the population and economic activity is concentrated along coastlines. Moreover, the region is heavily reliant on agriculture for livelihoods and is highly dependent on natural resources and forestry. This situation is matched with significant levels of poverty.

Against this background, we propose the following recommendations with the aim of building climate change resilience in the ASEAN agricultural sector:

- Create a task force at ASEAN-level comprised of government representatives and business.

Its purpose is to recommend concrete action plans for a selected number of crops after having gone through a “systems-view” analysis as described in this chapter. It shall liaise with the ASEAN Multi-Sectoral Framework on Climate Change: Agriculture and Forestry towards Food Security

- Climate change will have a profound economic impact in ASEAN. The topic should therefore be housed under to the ASEAN Economic Community; and not under the ASEAN Socio-Cultural Community
- Governments can resort to legislation to require infrastructure providers to report on their climate change resilience, as agriculture heavily relies on water, land, energy and transport.

Building resilience to climate change in supply chains is an emerging topic worldwide. The 5-step approach described in this chapter allows stakeholders within a specific supply chain to engage with each other in a structured and coherent way.

Moving toward an efficient agriculture in ASEAN requires us to increase our understanding of mutual dependencies and the benefits of learning, collaboration, information sharing and building flexibility in the food and agricultural system.

We recommend further reading of two case studies that use the 5-step approach described in this chapter: “The corn supply chain for beverages in the US” and “Lithium-ion batteries supply chain”. Both can be found in the World Business Council for Sustainable Development’s full report, which this chapter is based upon.

WBCSD, “Building Resilience in Global Supply Chains”, 2015. Lead authors are DNV GL: Alexander F. Christiansen, Bradd Libby, Edwin Aalders and Bente Pretlove; ERM: Charles Allison, Lisa Constable, Ian McCubbin and Ioannis Chrysostomidis; and WBCSD: Rasmus Valanko.

6.2

LANDSCAPE APPROACH TO SUSTAINABLE AGRICULTURE AND FORESTRY



In ASEAN, the terrestrial landscape commonly consists of space used, inter alia, for agriculture, forestry, water resources and urban settlements, apart from infrastructure like roads and canals. Each has its unique challenges with respect to sustainability but there also known common

challenges. A landscape approach is one way to act holistically and treat the landscape as a continuum of natural and anthropogenic uses. In this chapter, case studies are used to illustrate the application of a landscape approach to forestry and agriculture.

6.2.1

LANDSCAPE APPROACH TO CONSERVING FORESTED AREAS

Lead Contributor: Lucita Jasmin, APRIL Group

In this chapter, we will discuss the following:

- Challenges to forestry in ASEAN, with a particular focus on Indonesia
- The regular occurrence of forest fires in Indonesia
- The benefits of a landscape approach to forest conservation
- The case of APRIL Group in Riau Province, Indonesia
- The need for multi-stakeholder collaboration to stop fires in Indonesia
- Recommendations for ASEAN countries facing deforestation

FORESTRY IN ASEAN

Home to about 20 per cent of global plant, animal and marine species, Southeast Asia is one of the world's most important biodiverse regions. However, according to 2009 studies by the United Nations Environment Programme (UNEP) and the UN's Food and Agriculture Organization (FAO), the region is losing approximately 1.2 per cent of its remaining forest annually with Cambodia, Indonesia and the Philippines each reporting annual losses of two per cent between 2004 and 2009.

The same studies note that the conversion of forest for agriculture and cash crop plantations, including the recent expansion in the area devoted to oil palm, continues to be one of the main causes of land use conversion in the region. Alongside unsustainable logging, other deforestation drivers include use of fire for land clearing (Indonesia, Thailand); mining (Indonesia, Laos); urbanisation (Myanmar); hydropower construction (Mekong Basin); road construction (Laos, Cambodia); wood fuel collection (Myanmar, Thailand, Viet Nam); migration of ethnic groups (e.g. Myanmar); and community resettlement (Laos).

Concern is growing about increases in greenhouse gas (GHG) emissions due to the rate of deforestation and forest degradation in the ASEAN region. Of particular concern are peatland forests where peat deposits can be up to 20 metres deep and contain vast reserves of near-surface terrestrial organic carbon. Of the 27 million hectares of peatland in Southeast Asia, some 12 million hectares have been deforested or degraded over the past ten years, according to UNEP and FAO estimates.

Deforestation is also influenced by changes in the monsoon cycle. The drought brought on by the El Niño in 1992-1993 led to uncontrolled fires that ravaged more than 27,000 square kilometres. Similar conditions in 1998 served as the catalyst for thousands of forest fires across Malaysia and the Indonesian Archipelago.

Amid these trends, Indonesia reported a significant drop in net forest loss between 2000 and 2005. Although the rate has increased again in the past five years, it is still less than half that experienced during and after the peak period for deforestation that coincided with the large-scale government-backed transmigration programme of people from province to province in the 1980s and early 1990s.

According to the World Resources Institute's 2016 "Forests and Landscapes in Indonesia" study, around 50 to 60 million Indonesians highly depend on forests to support their livelihoods, while smallholders and industrial forestry, including pulp and paper production, are estimated to contribute around 3.5 per cent of Indonesia's GDP. Overall, the conversion of forested areas and carbon rich peatlands caused Indonesia to become the world's 6th largest GHG emitter.

FOREST FIRES IN INDONESIA

Forest fires have long been identified as a major contributor of deforestation in Indonesia. Fires occur on both mineral soil and peatlands across Sumatra and Kalimantan. Slash-and-burn methods to clear land are the main cause of fires and according to 2013 research, approximately 60 per cent of the fires occur on unmanaged land. However, once fires start, they can easily spread into pulpwood and palm oil concession areas.

In 2015, Indonesia faced one of its worst forest fire episodes, with an estimated 2.1 million hectares of land burnt. The fires spread quickly to other areas due to the El Niño conditions that caused extremely dry weather. The transboundary haze that spread across the Southeast Asian region led to carbon dioxide (CO₂) emissions in September 2015 that the World Resources Institute reported as having exceeded the average US daily output on 26 out of 44 days.

According to the Government of Indonesia, the 2015 fires and transboundary haze affected the health of more than 43 million people in Indonesia, Malaysia, Singapore, the Philippines, and south Thailand. An estimated 500,000 people were reported to have suffered respiratory infections and 19 people died due to haze-related illnesses. Many schools were closed and flights were cancelled. Thousands of hectares of wildlife habitat were destroyed, with Wetlands International estimating economic losses to be around USD 15 to 30 billion.

Acknowledging the adverse impact of deforestation and forest fires, the Government of Indonesia voluntarily committed to a GHG emissions reduction target of 26 per cent by 2020 while implementing a moratorium on the clearing of primary forests and forested peatlands. The moratorium was first introduced in 2011 and has been extended by President Jokowi Widodo to 2017. The President also announced the establishment of a National Peatlands Restoration Agency in January 2016 to advance the conservation and restoration of peatlands across Indonesia.

According to Wetlands International research, there are 13 million hectares of degraded peatlands in Indonesia, concentrated in Sumatra and Kalimantan. This area produces 2,000 million tonnes of CO₂ emissions per year, contributing to the largest share of global emissions from degraded peatlands and poses a challenge to the achievement of Indonesia's climate goals.

Preventing forest fires is crucial to stopping the annual transboundary haze and curbing climate change. Companies in the forestry sector can make a significant contribution to this goal by implementing conservation and restoration programmes on degraded peatlands and forest areas used for agricultural purposes.

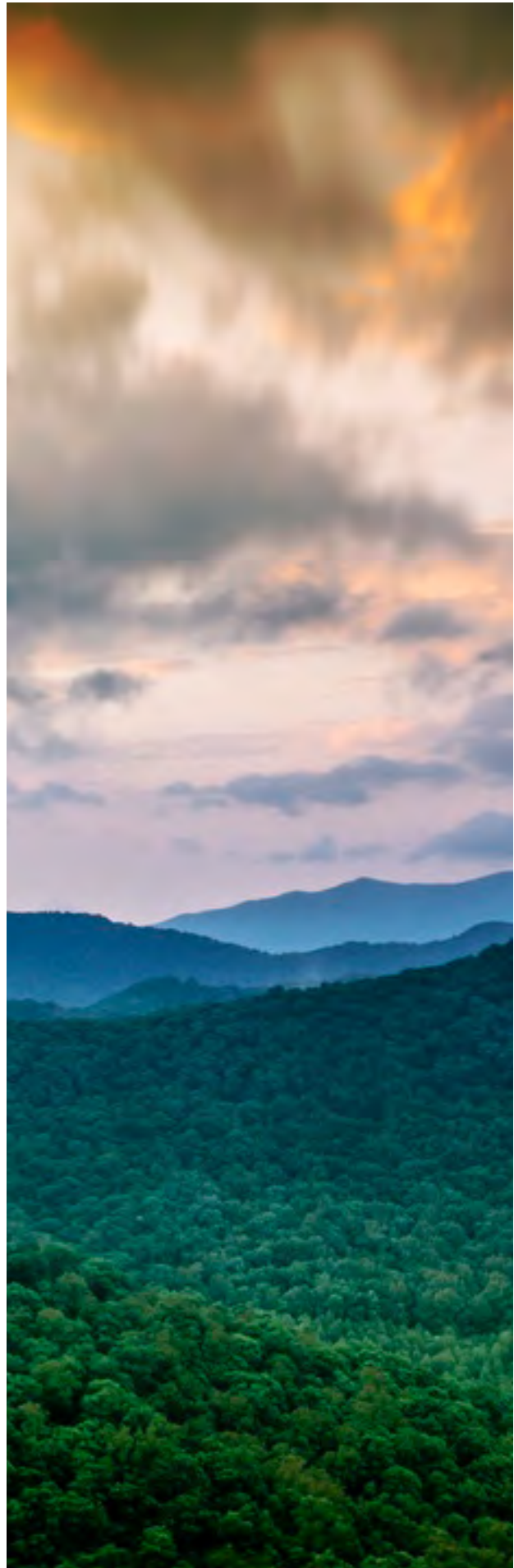
THE BENEFITS OF THE LANDSCAPE APPROACH FOR FOREST CONSERVATION

A landscape approach is a holistic approach to sustainable development that integrates the various development imperatives in the landscape. It emphasises managing land use in a holistic way by considering environmental conservation, the livelihood of local communities, biodiversity protection and climate change mitigation. From a company perspective, it aims to achieve a healthy natural infrastructure that creates a balance where plantations receive the ecosystem services they need including water, productive soil and overall biodiversity, while also ensuring primary forests are conserved and protected, and communities have livelihood and quality of life gains.

This is a model that many sustainability-focused agriculture and forestry companies are working to in order to achieve a balance between production and protection. It is an approach that is necessary to address the issue of continuing degradation of unmanaged land in Indonesia. Unmanaged land is vulnerable to degradation, poor agricultural practices and illegal logging driven by economic pressures in a country where 30 million people live below the poverty line. The goal is to ensure land is managed so that it can be protected and conserved or developed responsibly as part of a holistic, sustainable development framework.

Of the total forest area of 130 million hectares identified by the Indonesian Government, 74 million hectares have been allocated to production forestry while the balance of 56 million has been slated for conservation. Approximately 10 million hectares have been set aside for commercial plantation.

Advocates believe that a landscape approach is essential to the future protection of unmanaged lands. This requires collaboration and constructive engagement between



communities, government, NGOs and business with a full understanding of the challenges and opportunities on the ground and respect for each other's needs and interests.

CASE STUDY: APRIL GROUP IN RIAU PROVINCE, INDONESIA

Asia Pacific Resources International Limited (APRIL Group) is a paper and pulp company that has plantations and production mills in Pangkalan Kerinci, a small township in Riau Province. The company implements a landscape approach to sustainable forestry management that balances production forests with the other pillars of its operations: social empowerment, conservation and restoration, water management on peatlands, and fire prevention.

Conservation and Restoration of Forested Areas

APRIL Group conserves and protects 400,000 hectares of forest. Some 250,000 hectares have been set aside following High Conservation Value Forest (HCVF) assessments within its concessions, and a further 150,000 hectares are being restored as part of the Riau Ecosystem Restoration (RER) project. APRIL Group has voluntarily committed to conserve one hectare of forest for every hectare of plantation, also known as its 1-for-1 commitment. Currently, APRIL Group is 83 per cent towards achieving this target.

The company's experience over 20 years of operation in Indonesia has demonstrated that unprotected forested areas are prone to deforestation and degradation by human encroachment, burning and illegal logging if they are not actively managed and monitored. To protect HCVF areas, ring plantations of acacia trees are established around conservation forests, acting as a protective buffer against illegal encroachment, fire and illegal drainage.

The RER project is a multi-year project to restore 150,000 hectares of degraded forests on the Kampar Peninsula, Riau Province. APRIL Group commits financial, technical and operational resources to the project, working in partnership with Fauna & Flora International, The Nature Conservancy and BIDARA, a local non-governmental organisation. Local communities are also involved in the RER project.

Water Management

In Riau Province, rainfall varies between 55mm per month to more than 500mm during the wettest months. To ensure peatlands remain wet, APRIL Group has installed a water management system to maintain water levels in its concessions season-round. Using a system of water control structures, water level is kept within a prescribed range, depending on the weather season, topography and land use (i.e. plantations, conservation, restoration). This approach has been informed by science-based consultations and industry best practice.

Eliminating Fire Risk

Preventing fires is more effective as a long-term solution than putting them out. In July 2015, APRIL Group launched the Fire Free Village Programme (FFVP) - a comprehensive fire prevention programme that aims to address the root causes of fire through close engagement at the village level. APRIL Group manages the FFVP with two local NGOs, Rumah Pohon and Blue Green, with support from the local governments, police, military and Riau's Disaster Mitigation Agency.

In 2015, APRIL Group launched a pilot programme in nine villages located inside its concession area. The FFVP combines education and training with infrastructure incentives for local communities to remain fire-free. It also provides fire-fighting equipment for villages and trains villagers on fire suppression capabilities. In the incentive scheme, villages that remain

fire-free receive an IDR 100 million grant from APRIL Group to finance village infrastructure projects.

The success of the programme can be measured by the reduction in burnt area. Prior to the FFVP pilot, 750 hectares of forest was burnt in 2013. In 2015, the burnt areas were reduced to only 50 hectares, or by more than 90 per cent in two years. Additionally, there were few fires on peatlands areas. APRIL Group will increase the reach of the project from 2016 onwards, recruiting more villages to participate in FFVP and a complementary Fire Awareness Community programme.

The success of the FFVP has been attributed to intensive community engagement and villager's taking ownership of the programme. In implementing the FFVP, APRIL Group acted as a facilitator rather than a decision maker. The villagers were enabled to define the most appropriate course of action to achieve a fire-free outcome, giving them a strong sense of empowerment and autonomy.

ALTERNATIVE SOURCES OF LIVELIHOOD

APRIL Group acknowledges that encroachment, illegal logging, and land burning will persist if local communities are not presented with viable livelihood alternatives and support to implement them.

As an integral part of its landscape approach, the company promotes the social and economic wellbeing of the local communities where it operates through a variety of initiatives. For example, the company assists with the creation of various sources of income for community members and offers training and materials to support their livelihood through community development programmes.

An Integrated Farming System provides training on best practices for community farmers as

well as facilitation and technical support. The Community Fiber Farm Programme fosters partnerships with small landowners to help establish their own acacia plantations.

Complementing this, a small-to-medium sized business enterprises programme works to provide aspiring entrepreneurs with technical and financial expertise.

ENCOURAGING MULTI-STAKEHOLDER COLLABORATION

The Fire Free Alliance (FFA) is an example of a multi-stakeholder collaboration focused on fire prevention through community engagement. Launched on 1 March 2016, the FFA comprises primarily forestry and agriculture companies with the aim of eliminating fire haze in Indonesia. Members of the FFA have committed to adopting the FFVP model while making necessary adaptations to the programme according to the context of the local communities and landscape in which they operate. Members also commit to share knowledge, best practices and resources. The FFA is guided by a panel comprising senior management representatives from each member and supported by a secretariat.

As well as corporate members, the FFA engages NGOs and other relevant stakeholders to actively participate. NGOs will help the FFA to engage local communities, provide general advocacy work at the grassroots level, and provide research support.

As well as participating in the FFA, there are other ways for stakeholders involved in agriculture and forestry to contribute to efforts to prevent forest fires. Private companies can provide financial and technical assistance to villages that are prone to fires, while fulfilling the fundamental responsibilities of implementing sustainable land management practices across their supply chain.

NGOs have an important role to play in educating local communities on the negative long-term impact of destroying and burning forests, particularly on community livelihoods and health. NGOs can also collaborate with private companies on educating local communities on alternatives to fire as a way of clearing land. For local communities, working closely with local governments and private companies operating around their areas provides access to skills, financial and technical assistance.

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

Annual forest fires cause transboundary haze and huge losses to the economy, environment, and the health and wellbeing of communities in Indonesia and across Southeast Asia.

The landscape approach to sustainable forestry management works to reduce the number of forest fires in Riau Province by balancing production with protection through close community collaboration and a focus on a long-term, balanced outcome.

There is the potential to adopt a landscape approach on a national basis in Indonesia and more widely across ASEAN countries. This will require concerted collaboration between the public and private sector, as well as a long-term vision for community empowerment.

Such collaboration might consider the following factors in striving to produce positive outcomes in Sumatra:

- Incorporating a stronger conservation framework into future forestry concession licenses, where conservation and plantation are actively managed and protected as part of a single framework
- Increasing the areas of land set aside for community development, as part of a commitment that places the community at the heart of protection strategies

- Sponsorship of localised economic development programmes aimed at transforming the way land is managed
- Developing localised business models to support long-term landscape conservation and protection, balancing protection and production
- Community-based, multi-stakeholder fire education and prevention programmes
- Support for further R&D to improve yield and rotation cycles for plantation based industries, which in turn reduces the need for further land clearance
- Encouragement of research on managing peatlands subject to mixed usage, ensuring water levels and peat depth are maintained at optimum levels

The progress of APRIL Group's FFVP and its RER project highlight the opportunity for governments to continue to develop enabling regulatory frameworks that encourage more public-private sector conservation and restoration initiatives.

In the same vein, the formulation of its sustainable development policies can benefit from engaging companies, NGOs and communities constructively with a full appreciation of the day-to-day realities in rural communities – a concept that is central to the idea of a landscape approach.

6.2.2

SUSTAINABLE AGRICULTURAL LANDSCAPE APPROACH IN SUMATRA

Lead Contributor: Monsanto Company



Forestry and agriculture play a significant role for the economy of Pakpak Bharat, on the Indonesian island of Sumatra. However, forest cover is declining due to the expansion of agriculture activities and due to harvesting operations. Low crop yields by smallholder farmers lead to clearing of additional forest areas (usually through slash-and-burn) for further crop planting to meet their income and food needs, as opposed to intensifying productivity on existing farm plots. At the same time, reforestation activities have been unsuccessful due to poor participation of the local community. Sustainable agriculture intensification is crucial to help farmers to improve agriculture productivity. Equally important is the preservation of the natural forest capital and minimizing the impact to the ecosystem. The Pakpak Bharat regency is also classified as a significant biodiversity “hotspot” in Southeast Asia and it still retains original Sumatran forest ecosystems.

An effort to address the multiple land use needs of forestry, agriculture, conservation and other uses in the regency was initiated in 2013. With the consent and partnership of the local government in Pakpak Bharat Regency, a multi stakeholder pilot program was called by the Sustainable Agriculture Landscape Partnership (SALP). The partnership’s stakeholders included a conservation NGO (Conservation International, CI), a private sector stakeholder with expertise in agricultural production (Monsanto) and local NGO’s with experience in agriculture extension. The project’s aim is to evaluate sustainable land use models by combining sustainable agriculture technology and production management training with forest conservation training and education. The goal is to gain information and knowledge on appropriate land use models that address both sustainable agricultural land use and conservation of natural capital and reduced deforestation. The results from this pilot study, covering 120,000 hectares over three years, could provide strategic inputs to inform government policy and models for sustainable agriculture and conservation practices in the regency. In addition, the best practices learned can be amplified and translated to other areas in Indonesia and across Southeast Asia.

Key project deliverables are to:

1. Demonstrate models of agricultural development that increase productivity of farmers

2. Identify, map and protect critical forests and other natural areas in the landscape that provide ecosystem services such as freshwater flows, flood regulation, and habitat for pollinators
3. Improve the incomes of farmers and farming communities

Under the scope of this project, the risks and opportunities that growth in agriculture production presents to the regency are identified. The three parties will test and develop practical sustainable agriculture and conservation interventions designed to enhance farm productivity and incomes of communities living in biodiversity corridors, conserving forest areas and ecosystem services, such as water regulation and soil conservation.

Agricultural productivity in Pakpak Bharat needs to be improved, especially due to the community's lack of land management skills and limited use of fertilizer, hybrid seeds and other technological inputs. As a response, SALP developed four locations in Pakpak Bharat that have four different land characteristics – two locations in Pargetteng Getteng Sengkut (PGGS) sub regency, one location in Sitellu Tali Urang Jehe sub regency, and one location in Kerajaan sub regency. Two nurseries were also built for fruit tree seedlings to support forest rehabilitation and to promote intercropping methods.

SALP INNOVATIONS AND BEST PRACTICES

The SALP project promotes an integrative approach to sustainable agriculture and conservation that considers environmental preservation as well as economic and social benefit for the community. Therefore, both environmental and economic impact can be performed correspondingly. This approach is believed to be the best approach to ensure the sustainability of the project.

The implementation of the SALP model combines three types of sustainable agriculture plants through the poly culture method: first, forestry conservation plants such as *pete*, *jengkol*, and *durian*; second, annual plantation crops that are in line with conservation projects, such as coffee and *gambier*; and third, seasonal food crops suitable in all geographical and climate conditions, such as corn, peanuts, and chilli. It is expected that the SALP project implementation will not only provide benefit for the ecosystem, but also contribute to the welfare of the community, both in the short and long term.

PROGRAM IMPACT

The SALP project covers four comprehensive initiatives that support sustainable agriculture practice in Pakpak Bharat regency, which are sustainable agriculture intensification, community conservation agreement, farmer field school and environmental education.

Sustainable Agriculture Intensification

This initiative has been conducted since February 2015 on a total of 30 hectares in 5 villages: Kaban Tengah, Bandar Baru, Mahala, Majanggut 1, and Majanggut 2. The five villages were chosen due to crop suitability of their lands and their location adjacent to forest areas, making them important conservation stewards to help reduce deforestation. The initiative involved 75 farmers who were provided with technical support and agricultural inputs from the land preparations stage to the post-harvest process. The project also introduces the concept of land conservation, including adjusting planting methods based on the land's contour lines, no tillage practices, and planting fruit tree seedlings as part of agro forestry practices. Besides supporting forest conservation and environmental protection, this agro forestry approach will provide farmers with additional income.

Community Conservation Agreement

The villages of Malum, Tanjung Meriah, Sukaramai Kutameriah and Siempat have signed a community conservation agreement covering approximately 10,000 hectares of forest. The agreement was signed on May 25 and June 10, 2015, and late December 2015, with the presence of village heads, customary leaders, community leaders, village officials, and CI Indonesia representatives.

Farmer Field School

Farmer Field School aims to improve farmers' capacity and skills, especially in citrus and coffee cultivation techniques, including pest and disease control. The purpose of this activity is to promote sustainable organic farming systems through participatory real-life practices in the field. Through this approach, it is expected that the farmers will have good knowledge and skills, which will create independent growers who can transform their farms into a sustainable business, leading to improved welfare for 100 participating farmers.

Environmental Education

Environmental education started in April 2015 and has involved 117 students from two elementary schools, namely 030426 Lae Trondi Public Elementary School in Salak subdistrict and 030414 Kecupak Public Elementary School in PGGS sub-district. Each student has received three environmental education sessions focusing on the themes of forest, water, and waste.

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

This multi-stakeholder partnership is an example of how local governments, private sector and sustainability NGOs can combine their respective areas of expertise to address challenging and complex issues on sustainable land use across ASEAN. It is well recognized that

we must increase agricultural productivity and reduce impact on biodiversity while addressing farmer livelihood issues. Understanding how to allocate multiple land uses in the most efficient fashion is a critical component to achieving this goal. Pilot studies such as the SALP can generate information that can help inform ASEAN policy makers in other regions how to achieve this critical land use balance.

Greater research and analysis is needed to develop meaningful information on sustainable, multiple use landscape planning in a biodiversity rich region. Learnings to date include:

- Multiple sector stakeholder (private, public, NGO, etc.) involvement is critical to provide the breadth of expertise and knowhow to make a meaningful contribution to sustainable landscape utilization
- It is critical to focus on both preservation of natural capital and increasing farm productivity at the onset
- Use of local stakeholders (regency agronomists, local NGOs) is best suited to transfer knowledge on best management practices to increase productivity and forest preservation
- Development of meaningful metrics is essential to assess the impact of the program on farmers and the local community

6.3

EMPOWERING SMALLHOLDERS THROUGH PUBLIC-PRIVATE PARTNERSHIPS

Lead Contributors: Jonathan Parry and Cindy Lim, Syngenta

In this chapter we:

- Discuss barriers faced by smallholders as obstacles to rural development and efficient growth of the agricultural sector
- Discuss how strategic partnerships can deliver innovative business models to address current challenges in the agriculture space, and ways to promote more collaboration between the private sector, government and farmers
- Introduce Syngenta's solutions through the cases of Indonesia and Viet Nam, while assessing the potential impact if solutions are scaled up in the region
- Explore barriers to public-private partnerships (PPPs) and provide policy recommendations to ASEAN governments

BARRIERS FACING SMALLHOLDERS

A critical part of the region's ability to provide for an increasing population lies with smallholder farmers. Helping smallholders to increase productivity sustainably is important to the development of the region.

However, as noted previously, many smallholder farmers are not producing at optimal capacity as they lack access to the tools, knowledge, and technology necessary to enable sustainable productivity increases. There are also many

other factors in the increasingly complex world of farming, including extreme weather, access to markets, and market changes. These could impact their profitability and affect their ability to support the development of their families and communities. Smallholders in ASEAN are exposed to El Niño and changing weather patterns that have a profound impact on their ability to produce. For example, many of Thailand's rice growers lost an entire season's harvest in 2015 due to drought. Hence, helping small growers tackle challenges becomes extremely important.

No one government or organization alone is able to remove all the barriers that present themselves. Only by working together can we hope to efficiently address the challenges facing smallholder farmers and their communities. The following sections address how PPPs can help address some of the barriers mentioned above and identify some of the challenges that prevent the right stakeholders from coming together. We will then highlight some of the areas where policy changes can help to create an environment in which these partnerships can flourish.

PPPs AS A PRIORITY FOR ACTION

PPPs can be a good way for the public sector to leverage private sector expertise and innovation to improve operational efficiencies. They also allow public sector institutions to benefit from

private sector capabilities and best practices, while working together to shape the policy environment within which they must operate.

These partnerships will become increasingly important in shaping the future of the region. In ASEAN, government leaders have established PPP principles covering the areas of policy and organizational framework for private participation; project selection, development and implementation; affordability and budget transparency; and transnational infrastructure connectivity. They provide guidance on how to implement successful PPPs in ASEAN.

SYNGENTA'S EXAMPLES OF EFFECTIVE PARTNERSHIPS

As part of its Good Growth Plan, Syngenta has committed to reach 20 million smallholder farmers to help increase their productivity by 50 per cent, while preserving the long-term potential of their land by 2020. To achieve this, Syngenta is developing solutions that are integrated, addressing the broad range of challenges facing the farmer on farm. This is then supported by scalable and impactful knowledge transfer platforms designed for the smallholders that cover a range of topics from agronomy to safe use. Some examples of these solutions are the “Houses for Farmers” program in Viet Nam and the “Partnership for Smallholder Corn Farmers” in Indonesia.

Viet Nam: “Houses for Farmers”

Launched by Syngenta Viet Nam in 2010, “Houses for Farmers” is a program that provides much needed housing for smallholder farmers in Viet Nam. These farmers work extremely hard to maintain their small farms of around 0.2 to 1 hectare of land and are often willing to adopt new technologies and ways of working to improve their farms. However, in erratic weather conditions, these growers often have to give up caring for their crops in order to make extra preparations to secure their homes, which are frequently not

built to withstand the bad weather. By helping these farmers with their basic housing needs, they are able to continue caring for their farms, improve their income and ultimately benefit their families and communities.

The program is jointly implemented by Syngenta Viet Nam and local authorities in the target regions. Strategic partners, distributors and dealers also contribute equipment such as fans, televisions, and other amenities in order to give farmers a fully-furnished and operational home. Syngenta also provides technical advice and training to these farmers to help them improve their productivity and gradually work their way out of poverty.

To date, “Houses for Farmers” has contributed 35 houses, transforming the lives of farmers across 15 provinces throughout Viet Nam. By 2017, the program is expected to provide 110 houses to poor farmers in rural areas.

Indonesia: Partnership for Smallholder Corn Farmers

Access to finance can improve smallholder farmers’ yield and livelihoods by enabling them to invest in better agricultural technology, including inputs and equipment. Partnerships are needed to expand the availability of micro financing to small growers looking to improve the performance of their farms and also to help them gain access to markets.

In East Indonesia, Syngenta partnered with Mercy Corps Indonesia, Bank Andara and BPR Akbar Pesisir in establishing a micro financing model. The partnership also involved retailers and grain traders, who act as off-takers for the harvest of the smallholders.

The pilot started with 198 farmers in Dompu and Bima in late 2014. In addition to working capital to buy agricultural inputs and finance labour cost, farmers also received financial literacy training. To help them improve their

yields, Syngenta provided training on agronomy, including an integrated approach using better seeds, nutrients, pest and weed management, soil conservation and safe use practices. The solution is known as Start Right and trials have shown significant yield improvements from traditional farmer practices, ranging from 9 per cent in Thailand to up to 50 per cent in China and the Philippines.

On average, this first pilot saw a harvest of corn at 7.2 tonnes per hectare, representing a 20 per cent increase from the average productivity of corn in the village, and an increase of 25 per cent over the average income. The project aims to reach approximately 1,000 farmers in the area by 2016, and expand to other regions to benefit more farmers in Indonesia.

ESSENTIAL ELEMENTS OF SUCCESSFUL PPPs

In the smallholder context, knowledge transfer is one of the ways of improving productivity. Getting the technology into the hands of growers is important but without the knowledge of how to use this technology and how to market the outputs, growers cannot sustainably increase production and profitability. Governments and aid agencies can play a crucial role in helping to disseminate knowledge through extension services and through partnerships with the private sector.

Projects must also have the ability to sustainably scale up. Projects need to hold the long-term view of becoming self-sustaining instead of being dependent on private or public funding. They also need to be built with the intention to scale up in the long-run. If we are to truly address the challenge of food security in the region, we need to be able to reach millions of smallholder growers.

Governance continues to be extremely important. A strong governance framework recognizes that

all partners cannot always maintain the same level of involvement as when a project first kicks off. A robust framework also supports the more effective involvement of a variety of players from along the value chain and providers of adjacent technology, which is also essential for success.

Finally, PPP projects must be seen as more than corporate social responsibility. In order to secure the real commitment of all parties involved and build long-term sustainability, projects need to take into consideration the commercial needs of the private sector and the development agenda of public organizations.

BARRIERS TO PPPs

In order to drive collaboration across wide ranging stakeholder groups to benefit the smallholders across ASEAN, supporting policy frameworks that catalyse and encourage partnerships and access to innovation are necessary. More harmonized policy frameworks across the countries, as ASEAN becomes more integrated as part of the ASEAN Economic Community would also support best practice sharing and learning from various successful models that exist across ASEAN.

From a private sector perspective, there are a number of challenges that may prevent private companies from fully investing in a market, and subsequently in committing to PPPs. These challenges are highlighted below with suggestions on how policy can help to foster a more supportive environment.

Protectionism

Trade protectionism is increasingly problematic as countries aim to encourage the purchase of domestically produced goods and services in hopes of enhancing their economic structure. As cautioned by the World Trade Organization (WTO), “protectionism has slid to dangerous

levels for the first time since the global financial crisis of 2008”.

While trade protectionism allows domestic companies to develop capabilities in the initial stages, the long-term effect is that the industry as a whole weakens. The lack of diversified competition ultimately results in lacklustre incentives for innovation and development of the right products and services. The spread of research and information is limited within the nation, and companies cannot learn from the best practices of foreign entities. This prevents smallholders from having access to the best technology which can enable them to greatly improve the quality and yield of their crops.

Regulation

Many countries are regulating certain industries in a way that is creating a business environment that is increasingly challenging for foreign direct investment to take place.

The level of uncertainty is high in such countries as individual government agencies often have excessive power over the companies that are allowed to operate within national boundaries. Furthermore, the lack of established policies raises the lack of confidence to operate. In a similar way to protectionist policies, this can prevent smallholders from having access to the best technologies. It can also prevent greater levels of local investment in adapting technologies to the local market.

Mutual Recognition of Regulation and Approvals

Currently, there is no clear standardization of regulation and safety approval standards across ASEAN countries. Whilst many countries recognize similar standards, there is no clear harmonization of these standards at country level.

The lack of harmonization can lead to unnecessary complication of the approval process for new products, technologies and solutions that have clearly been beneficial in another similar market. Whilst similar standards are imposed across ASEAN there is no centrally agreed process which leads to a need for further testing and regulation at country-level. This has a negative impact on resources for both public and private sectors and adds unnecessary inefficiencies.

This also impacts producers and exporters since an exporting country cannot be too sure if practices applied to its products are acceptable in an importing country. An importing country will then have to ensure that the imported products are tested and comply with its standards. This raises confusion and slows down trade flows between countries. It also means that smallholders across ASEAN have access to different products and technologies. This in turn leads to inconsistencies in agricultural production, preventing individual markets from realizing their competitive advantage.

Intellectual Property Rights

Some countries are beginning to take steps, or are strengthening existing frameworks, toward protecting Intellectual Property (IP) rights and combating the sale of counterfeit products. The right laws will help to protect intellectual property rights, but these changes are moving too slowly.

In some countries however, there are no clear or enforced IP laws which means that key products are easily copied, and this prevents companies from fully engaging in the market. In other countries IP enforcement efforts have not been sufficiently effective in addressing rampant IP infringement and counterfeiting. These ineffective or unenforced laws mean

that companies are unable to fully commit investment in a market, preventing smallholder farmers from having access to the products they need. This can increase the risk of smallholders being sold counterfeit products that will not provide the desired results in the field and may even have a negative impact on health.

The slow change in developing new policies to prevent counterfeits would reflect the lack of quality and safety controls, and also result in consumer confusion. Companies will be discouraged to sell products in nations with lax intellectual property laws since their innovative products are not recognized and protected.

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

With a view to overcoming the abovementioned challenges and barriers to successful PPPs, we provide the following set of recommendations:

- Governments can take steps towards free trade by creating an avenue of appeal for organizations impacted by protectionist policies. By creating such avenues, both the public and private sectors are able to effectively collaborate and remedy potential drawbacks caused through protectionist policies
- Consultation with industry should be conducted by government before broad-based policies are implemented. This will ensure that industry is able to provide input to policy makers, avoiding potential conflicts and later revisions. This may also avoid wasted time and resource arising from challenges to legislation and claims of ambiguity
- Although the WTO has the Technical Barriers to Trade Agreement to ensure that testing standards do not create unnecessary obstacles, there should be consideration of having standardized testing to facilitate the ease of approvals and trade between countries. This could be supported by the creation of a central “Council of Excellence” made up of representatives from across ASEAN which could be held responsible for passing mutually accepted approvals on certain products. This would enable these products to be safe for market across ASEAN, saving both time and resource
- ASEAN must have consistent and enforceable IP laws which are agreed by member countries in order to create an environment in which foreign direct investment can flourish, allowing the region to benefit from global resources and technology. An ASEAN-wide regulatory framework needs to be established and strictly enforced to discourage counterfeits

6.4

FINANCING SMALLHOLDER FARMERS IN THE PHILIPPINES TO IMPROVE AGRICULTURAL PRODUCTIVITY

Lead Contributors: Bank of the Philippine Islands Foundation, Inc and World Wide Fund for Nature - Philippines

Improving the productivity and competitiveness of smallholder farmers in the light of the ASEAN Economic Community (AEC) is both an opportunity and a challenge. The smallholder farmers' sector has the opportunity to sustainably address the growing global demand and the shifts in consumer preferences for agricultural commodities. In fact, according to the UN's Food and Agriculture Organization (FAO) smallholder farmers contribute to as much as 80 per cent of the food supply in the Asian region and share an increasingly important portion of the global agricultural value chain. Smallholder farmers in the Philippines can seize this opportunity if provided with access to affordable agriculture and agrarian reform credit to boost their productivity and realize potential increase in income and promote inclusive growth.

This chapter presents:

- The state of the agriculture sector and the smallholder farmers in the Philippines
- The important role of credit and finance as a driver of inclusive growth in agriculture
- An innovative approach in engaging smallholder farmers to improve food self-sufficiency
- Ways forward in the effort to participate in agricultural and agrarian reform credit



BACKGROUND: THE STATE OF THE FILIPINO SMALLHOLDER FARMER

According to official statistics, the contribution of the Philippines' agriculture and fishery sector to the GDP has significantly declined over the years from a high of 18.4 per cent in 2008 down to 11 per cent in 2012. In spite of this downward trend, the agriculture sector remains the main source of income and employment to one third of the working population, which roughly translates to more than 12 million total employed workers. While the sector is important in food production and income-generation in rural areas, it still has the highest incidence of poverty. Farmers' poverty incidence hardly improved from 36.7 per cent in 2003 to only 37 per cent in 2009.

The Philippines' total agricultural area is 9.67 million hectares, of which 5 million hectares are arable and 4.22 million hectares are classified as permanent cropland. Being the staple food of most Filipinos, rice production area is 4.7 million hectares or 94 per cent of the total arable land. In terms of production, rice is the second most produced commodity in the country (next to sugarcane) at 18.9 million metric tonnes annual output. The top agricultural exports of the country are coconut oil, fresh banana, pineapple, mango and tuna.

The agriculture sector is largely dominated by smallholder farmers with over 7.9 million hectares covered by the agrarian reform program. Despite the growing demand for agricultural produce from consumers, and the advances in agrarian reform, agriculture modernization and rural finance, the economic plight of the smallholder farmers has barely improved.

ACCESS TO AFFORDABLE CREDIT AS A DRIVER OF AGRICULTURAL PRODUCTIVITY

Access to affordable credit has been recognized as a key driver in boosting agriculture productivity. This is very important especially for smallholder farmers who are mostly dependent on external financing for their working capital and in most cases, their subsistence. However, most of the smallholder farmers are still trapped in the vicious cycle of debt brought about by their dependence on informal lenders who can easily provide them with capital and sustenance but with expensive interest rates and unsustainable payment terms. Adding to this burden are the impacts of climate change which have become a new norm and pose a threat to the viability of agriculture production. For the smallholder farmer, maximizing incomes and minimizing risks has become a great challenge.

In the late 1970s, as a means to boost lending to the agriculture sector, the Philippine government

through Presidential Decree (PD) 717, mandated all banking institutions to set aside 25 per cent of their loan portfolio to agricultural (15 per cent) and agrarian (10 per cent) lending. Compliance in lending to the agriculture sector has not been difficult as banks can lend to large agri-business corporations and plantation farms. Lending directly to agrarian reform beneficiaries, however, was challenging due to the lack of infrastructure in the banking operations to provide small loans to the widely dispersed agrarian reform beneficiaries. Despite the alternative compliance mechanisms in place, commercial banks were still found not lending directly to small farmers.

In February 2010, the Philippine government enacted the Agri-Agra Reform Credit Act (RA 10000 or the Agri-Agra Law). The law reinforced and retained the 25 per cent credit allocation of PD 717. It also rationalized the modalities for alternative compliance but imposed stricter penalty fees for non-compliance.

Essentially, the Agri-Agra Law provided the impetus for the participation of the banking industry in agriculture and agrarian financing. The banking industry in general complied with the agricultural quota but fell short of its compliance to the agrarian reform quota. Over the years, the compliance to the agrarian portion has been declining, an indication that some banks choose not to lend to the "agra" sector. This may be attributed to the perceived high risks and costs to financing the sector, smallholder farmers being unbankable (lack of collateral and capacity to pay) and the sheer lack of business interest in this market by the banks.

TURNING RISKS INTO OPPORTUNITIES

In every challenge lies an opportunity. While it is true that agriculture and agrarian financing is a continuing challenge given the issues that beset the sector, the opportunity lies in creating a paradigm shift that allows new thinking and new

approaches that will drive inclusive business and create shared value.

In the Philippines, the agriculture sector comprises 26 per cent share of Inclusive Business. This is mainly because of the high incidence of poverty in rural communities in the country and the agribusiness sector's contribution to income generation and employment. The agribusiness value chain model supports agricultural inclusive business by way of engaging smallholder farmers in the production of high value commodities. Agribusinesses do not only purchase the yields of the farmers at fair price but also provide technical, capacity building and even financial assistance to ensure high productivity and quality of produce.

From this perspective, there is an opportunity for providing access to credit and finance through the establishment of "financially inclusive systems" that foster strategic collaborations among the different value chain actors including the banking sector to deliver the needed financial products to smallholder farmers while mitigating the risks involved in agriculture and agrarian reform credit by tapping into or unlocking existing risk transfer mechanisms available. The multi-stakeholder collaboration approach in providing access to affordable credit is envisioned to contribute in ensuring food self-sufficiency by including smallholder farmers in the value chain and sustainable production more effectively.

MULTI-STAKEHOLDER COLLABORATION APPROACH

Financing the agriculture and agrarian sector should be viewed from a broader perspective that is hinged on sustainability whose critical components include access to affordable credit and finance, the well-being of the smallholder farmers through capability development interventions, and identifying opportunities to sustainably increase productivity.

The multi-stakeholder collaboration approach in agriculture and agrarian financing is the business model that aims to provide an enabling environment for the government, resource organizations, NGOs and value chain actors to participate in risk management and help in addressing issues related to policy, financing, market linkage, productivity, capability building and sustainable production systems for the agriculture sector to improve.

THE FINANCING FRAMEWORK FOR SMALLHOLDER FARMERS: THE BPI STRATEGY

The Bank of the Philippine Islands (BPI) Foundation, Inc. in partnership with the World Wide Fund for Nature Philippines is currently developing a financing framework that not only provides financing to smallholder farmers but also access to affordable credit and the provision of value-added interventions in the form of social preparation and the implementation of environmental sustainability standards. This is in line with BPI's shared value and inclusive business paradigms.

An agriculture crop financing mechanism is being developed which manifests the principles of affordability of interest rates, flexibility of payments, availability of potential risk transfer mechanisms in the form of agricultural guarantee funds and crop insurances, micro-savings and micro-insurance provisions for the smallholder farmers. There are actually existing risk transfer mechanisms that can provide the safety nets needed to address environment shocks and economic stresses brought about by crop damages, low farm returns, death and illness in the family. In order to unlock the potentials for these mechanisms, entering into institutional partnerships with government agencies like the Department of Agriculture (DA) – Agricultural Guarantee Fund Pool (AGFP), Department of Agrarian Reform (DAR) and Philippine Crop Insurance Corporation (PCIC), private sector composed of agribusiness

partners, non-government organizations and other financial sector players were seen as essential by the Bank.

Implementing the financing program is coupled with focused interventions on capacity development of smallholder farmers in a business approach and assistance in the implementation of sustainability standards like the code of good agricultural practices (GAP) at the farm level. These interventions will be done in partnership with farmers' organizations like cooperatives and agrarian reform beneficiaries' organizations.

The capacity development focuses on firming up the capability of smallholder farmers' cooperatives to manage the business. The objective is to deliver effective business development and agricultural extension services to the cooperatives and ensure better management, profitability and long-term sustainability. The core of the capacity development intervention is the provision of financial education; hence BPI will educate smallholder farmers on financial management and wellness with the aim of transforming them from producers to farmer-entrepreneurs. The Bank will also provide access to platforms for different financial transactions to the smallholder farmers' cooperatives including online and mobile banking. Access to this information is necessary to help smallholder farmers improve business decision-making.

Smallholder farmers not only deal with low productivity due to the lack of access to investments in agriculture but are now faced with the increasing frequency and magnitude of extreme weather impacts caused by climate change.

The challenge is to ensure sustainable production systems that protect the environment and improve farm productivity for the smallholder farmers. Mainstreaming environmental sustainability standards is therefore critical in

addressing issues of sustainable yields, product quality and environmental stewardship. Certain GAP standards are already in place for key commodities (i.e. rice, high value vegetables, onion, coffee). What is needed is to encourage more uptakes in the implementation of the standards through information and education campaigns and providing the business case for the smallholder farmers to subscribe to it. Assessing agriculture's impact on soil fertility and water supply is also an important part of this process.

CASE STUDY: POTENTIAL FINANCING FOR BLOCK SUGAR FARMS

The sugarcane industry in the Philippines contributes around PHP 70 billion to the national economy. Sugarcane lands cover more than 422,000 hectares of which 80 per cent are owned by smallholder farmers. The industry has about 62,000 farmers and employs more than 700,000 farm workers. In terms of the value chain actors, the industry is supported by 29 operating raw sugar mills with an aggregate capacity of 185,000 metric tonnes of fresh cane per day, 13 refineries with a total capacity of 8,000 metric tonnes of refined sugar per day and 4 bioethanol plants with a combined rated capacity of 222 million litres per day.

The sizes of sugarcane farms are largely fragmented due to land distribution under the agrarian reform program of the Philippine government. This fragmentation has led to diminished productivity among small farms. In order to maximize yields and economies of scale, the government through the Sugar Regulatory Administration (SRA), DA and DAR has implemented the block sugar farming program to consolidate smallholder farms into blocks of 30-50 hectares to take advantage of plantation-scale production, introduce cost-efficient farming practices and focused agricultural entrepreneurship interventions. A block sugar farm is operated as one agribusiness unit.

This approach makes sugarcane production more viable for smallholder farmers and presents an opportunity for agricultural and agrarian reform credit. A single block farm of 30 hectares would require financing of PHP 2.1 million per cropping cycle at PHP 70,000 production cost per hectare. Given the total areas planted to sugar cane, the potential financing requirement of the industry is estimated at PHP 29.5 billion. Since the block farms are functioning as an agribusiness unit, the key value-added interventions can be channelled through it. More importantly, the value chain linkages are further strengthened through focused technical services (pre and post-harvest), volume purchases and sales.

Financing block sugar farming cooperatives is one of the priority areas of BPI. There is indeed a tremendous opportunity for applying the financing framework in this particular sector, with the support of the strategic partners of the Bank in this sector which are the agribusiness partners (sugar mills) and the government agencies.

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

Although the multi-stakeholder collaboration approach in providing access to credit is essential in boosting the agriculture sector, the problem goes beyond just availability of financing. More important is the agricultural policy reforms in the Philippines that will address issues that prevent smallholder farmers from maximizing their productivity such as rural infrastructure, modernization of agricultural technologies, and the capacity to manage resources, most particularly credit funds.

Given the role of the private financial institutions in providing agriculture and agrarian reform credit, there is a need to strengthen crop insurance and agricultural credit guarantee to encourage more banks to lend to this high-risk sector. Increasing PCIC's capitalization

so that it can provide more insurance cover to farmers is urgently needed. Since agricultural credit guarantee protects the loans extended by banks to the farmers, expanding the coverage of the agricultural credit guarantee program of the DA-AGFP to include more private financial institutions like BPI should be highly encouraged.

The demand for agriculture products will continue to increase as the Philippine economy and population grow. Improving the productivity of smallholder farmers is urgently needed since it will impact food self-sufficiency and will improve the viability of the agriculture sector. Improved agricultural productivity will not just encourage more participation of the banking sector in agricultural and agrarian reform credit but will also increase farm incomes and, effectively contribute in poverty reduction.

Along with these opportunities are the emerging challenges of making smallholder farmers' sectors competitive and better integrated in the ASEAN Economic Community (AEC). Improved access to credit is therefore a tool in enhancing smallholder farmers' productivity for them to participate competitively in the global economy. With the global consumers' preference shifting to sustainably-produced agricultural products, improved access to credit could empower smallholder farmers to implement sustainable production systems to meet this growing global demand.

It is imperative for the AEC to encourage more solutions-oriented collaborations and to create enabling environments that will allow improved access to credit and value-chain inclusion for the smallholder farmers. In a nutshell, the policy environment should focus on providing proper safeguards in order to protect the smallholder farmers' sector from stresses caused by market instability, environmental shocks (e.g. climate change), technological breakthroughs and the rise of global value chains.

6.5

ADOPTING MOBILE TECHNOLOGY TO ENHANCE AGRICULTURE PRODUCTIVITY AND EFFICIENCY

Lead Contributors: Malavika Bambawale and Ng Poh Khai, Accenture

For the first time in a generation, digital technologies are enabling farmers to achieve a quantum leap forward in their crop-yielding performance. These technologies make it possible to collect and analyse huge amounts of critical data, making a farm's field operations more insight-driven and potentially more productive and efficient. Among the many new digital technologies, mobile technology has one of the highest potentials due to its yield-enhancing capabilities and low associated costs.

The following sections discuss four main types of services provided by mobile technology to agricultural producers, while illustrating their implementation with global and regional examples. These services are namely (1) agricultural information services; (2) access to financial services; (3) access to marketplace services; and, (4) improving supply chain efficiency and traceability. Provision of agricultural information looks at "pushing" good practice cultivation and husbandry information via mobile devices to farmers seeking to improve their agricultural productivity. This information includes appropriate crop input use, weather forecasts, new cultivation techniques or responses to particular farming issues and market prices. Providing farmers access to financial services enables financing of inputs, provision of tailored insurance products and even facilitating payments to suppliers or workers. Accessing marketplace services

provides platforms for the sale of agriculture products and purchase of inputs. This allows all parties, big or small, to transact and increase the transparency of deals, as well as the quality of record-keeping. The supply chain services links farmers more strongly into their supply chains, enabling improvements in logistics and traceability, as well as supporting audits and quality controls.

Governments play a key role in paving the way for many of these mobile services through policy incentives and public-private partnerships. A more concerted effort between governments and industry is needed for effective mobile services to be rolled out. Some recommendations in this regard are provided at the end of the chapter.

MOBILE TECHNOLOGY SERVICES FOR AGRICULTURAL PRODUCERS

Agricultural Information Services

The World Bank's Rural Development Strategy defines smallholders as farmers with a low asset base operating less than 2 hectares of cropland. Many of these farmers live in remote areas and have low levels of literacy. Hence, they generally still follow old and traditional agricultural practices and have limited or no access to information that can help increase their crop yield. This information could be transmitted via mobile technology, including

latest agricultural practices, market prices & demands, and weather forecasts.

There has been rapid market growth in the provision of agricultural information services for farmers in both Africa and Asia. This is encouraged by an increasing number of providers operating with a wide diversity of business models, ranging from network providers (e.g. Vodafone, Airtel, etc.), to governments, NGOs, input companies and specialist domestic players (e.g. India's RML).

An example of how farmers benefit from these services is through access to weather forecasts. Weather forecast information includes rainfall predictions, temperature variations, pests and disease alerts and early warning of extreme

conditions such as storms or floods. Based on this inputs farmers make informed decisions on irrigation requirements, crop management timeline (e.g. sowing, harvesting, fertiliser application, etc.) best responses to particular issues (e.g. a pest infestation). Further examples of agricultural information and how farmers can benefit are summarised in Table 9.

The agricultural community can gain from mobile services information in many ways. First, it increases agriculture productivity and aids in moving towards the goal of food adequacy. This is due to better planning, management and control of the farm operations. Along with improved market knowledge, better agricultural practices increase farmers' profits and improve their livelihoods, making farming a more

Category	Type of Information	Benefit to Farmers
Weather	<ul style="list-style-type: none"> • Rainfall and temperature predictions • Alerts on pest and disease outbreaks • Early warning of extreme weather conditions 	<ul style="list-style-type: none"> • Better timing to plant and harvest • Better application of fertilizer, pesticides and irrigation • Protecting lives and property in case of extreme events
Crop Harvesting Techniques	<ul style="list-style-type: none"> • Probabilities of seasonal rainfall and temperature condition • Seasonal climate variables targeted to particular agricultural risk • Historical variability of climate change data • Best practice techniques to maximise yield 	<ul style="list-style-type: none"> • Selecting crops and its varieties • Intensity of input use for fertilizers and pesticides • Intensifying and diversifying crops and their varieties • Achieve best possible yield and price
Dosage Guidance	<ul style="list-style-type: none"> • Conservation of rain water for future use • Historical trends in rainfall and temperature • Historical changes in extreme events • Level and type of fertiliser, pesticide or fungicide to apply 	<ul style="list-style-type: none"> • Investment in agricultural equipment • Changing farming systems • Decision on when to farm • Most cost effective use of inputs

Table 9: Mobile technology-enabled agricultural information and their benefits to farmers

attractive career choice and reducing migration. With improved environmental practices, the environment and farm worker health will also benefit due to less damage to the soil and water as well as fewer toxic chemical accidents.

Sharing agricultural information via mobile technology also maximises the efficiency of use of limited resources. Training provided to farmers by mobile technology has a lower cost than face-to-face programs and can be more flexible and tailored to farmers' availability. Besides, mobile technology makes it easier to provide many types of content (e.g. for multiple crops and livestock), greatly enhancing the teaching and learning possibilities and opportunities. Resources such as specialists and IT systems can be shared and accessed from a centralised location, ultimately maximizing their use. Agronomists and other specialists no longer need to travel extensively in consultancy or even research, as information can be shared or gathered over mobile telecommunications. Time can be put to greater use, rather than wasted on inefficient travels or countless repeated sharing sessions.

There are many examples of how mobile services have assisted farmers worldwide. In Turkey, Vodafone increased the productivity of 350,000 farmers by providing agriculture information via SMS text messages to subscribers. The customised alerts include information on weather, crop diseases and infection risk and agricultural rules and regulations. The service is provided in partnership with Tarimsalpazarlama.com, which also offers training sessions for subscribers on sustainable agriculture and awareness about water use and wastage.

In India, Reuters Market Light provides farmers with customised weather forecasts and agricultural news via SMS in the local language. Through the first ever agricultural information scratch card, they enable anyone to benefit from the information, regardless of phone or mobile operator. Ossian Agro Automation's remote irrigation pump management takes it

even further by allowing 10,000 Indian farmers to remotely monitor and control their irrigation needs through a mobile device.

In Africa, mShamba links farmers with crop researchers, meteorological stations and veterinary scientists to increase their farm yields. Farmers receive the latest information on agricultural techniques and better manage their farm records in an automated database, capable of sending them short messages on crop planting and maintenance.

Financial Services

Mobile money services have expanded rapidly worldwide in the last 5 years and are now available in 61 per cent of the world's developing countries, according to GSM Association. Agriculture is regarded as an important sector for mobile money services in rural areas as it provides the livelihood for 70 per cent of the world's poor population. The global finance demand from smallholder farmers was estimated to be USD450 billion in 2012 but only 2 per cent of this is met currently. With emerging markets having a large proportion of its GDP and workforce in agriculture, this indicates a huge potential for mobile money service providers to generate new growth and differentiation opportunities.

In countries where agriculture is dominated by a few large value chains, mobile network operators can decrease transaction and distribution costs to farmers by replacing inefficient cash transactions with the use of mobile wallets. Mobile money services also serve as an easy, safe and secure method for their purchase and sale transactions. They also provide an easy way to keep accurate financial records, enabling better year-on-year planning.

Using mobile services to improve access to financial resources have been adopted by countries heavily involved in agriculture such as India, Kenya and Zambia. India's PayMate's mobile credit solution, mKCC, transited from

traditional money services to providing mobile insurance, mobile credit and savings services. They enabled more than 7,000 farmers to access loans in a convenient and affordable manner.

In Kenya, Syngenta launched Kilimo Salama, a crop insurance system to reduce the burden of weather and other risks for small maize and wheat farmers. They can insure their farm inputs against drought and excess rain to shield themselves from significant financial losses.

Zambia's Mobile Transactions collaborated with Dunavant to develop an e-payment scheme to accelerate payment to their 70,000 cotton farmers in order to discourage them from selling to others and maintain their supply chain. Mobile Transactions also enable farmers to receive pre-paid mobile vouchers which is more secure than paper vouchers and can be used as instant payment to agro dealers to purchase inputs.

Marketplace Services

One of the major challenges farmers face is the lack of marketplace information. Most farmers depend on word-of-mouth information from a limited number of extension officers, peers and middlemen. Farmers also suffer from poor market infrastructure and unfair trading systems forcing them to accept low prices from middlemen, all of which inhibit them from obtaining a better income.

Market information systems providing real time market price updates for agricultural items can easily fill in this information gap. These systems allow farmers to understand current market conditions and make sound decisions to produce higher-yield crops and increase their income. Buy and sell transactions can also be pre-arranged, and farmers also enjoy better visibility on their future income, as well as better records of previous years' performance.

In Africa, there are several examples of mobile services acting as platforms for farmers

to access markets directly. Vodafone Egypt developed Forsa, a mobile bartering platform, for agricultural workers in rural communities to exchange goods and services through online adverts. It provides low-income workers a low-cost way to advertise their skills, and connects local people with each other easily by reducing travel time.

In Tanzania, mobile network operator Tigo developed Tigo Kilimo as a service to offer farmers relevant, timely and actionable information via mobile phones. In addition to agronomic practices on major crops and weather forecasts, it also provides market price information to help small farmers determine the best market to sell their crops.

In Uganda, a partnership between Google, MTN Uganda and AppLab released Google Trader, a mobile application that matches buyers and sellers of agricultural produce and commodities. Through this application, smallholder farmers are able to broaden their trading networks and reduce their transaction costs.

Services to Improve Supply Chain Efficiency and Traceability

In recent times, there has been growing market pressure on agriculture-related companies to improve the traceability of their supply chain activities in an accurate and timely manner. Consumers worldwide are more interested in, and better informed of, the safety, ethics and sustainability of their food products. Thanks to an increasing access to social media and digital communications technology, consumers are better able to respond vocally when their expectations are not met.

The market is also adding pressure due to higher incidence of food-related health hazards and increasing concern of their impacts on human food chains and the environment. Notable examples include India's ban of Maggi products in 2015, Ireland's pork dioxin recall in 2008,

China's melamine-tainted milk scandal in 2008 and global recalls of beef supplies due to Bovine Spongiform Encephalopathy (or commonly known as mad cow disease) in 2007.

The design and implementation of traceable supply chains from farm to end-consumers has become an important part of the overall food assurance system, along with the assessment and auditing of supplier ethics and sustainability performance. Many food producers have turned to improving their traceability to sustain a competitive advantage. It has been realised that the benefits not only include better product quality and food safety, but also extend to improvements in operational performance and inventory optimisation.

South Africa's Saco Systems uses radio-frequency identification technology to tag livestock with re-usable chips in order to export them according to European standards. Information stored is recorded by veterinarians and include inoculation date, location and medicine type. The information can subsequently be downloaded to a database, which can be read at any off-loading point during delivery.

Vodafone worked with Ndumberi dairy farmers in Kenya to create a mobile based supply chain tracking and receipting system to provide accurate records of milk volumes and better visibility of the product to farmers, thereby reducing the incidence of theft significantly.

In India, the Government initiated Grapenet, a web-based system to monitor grape exports to Europe to control pesticide residue, achieve product standardization and facilitate pallet tracking through the various stages of sampling, testing, certification and packing.

Lipton tea sources Rainforest Alliance certified tea that meets high social and environmental standards. In Turkey, where it has more than 15,000 tea suppliers, the process of auditing farmers to monitor their standards was a

cumbersome system requiring filling out paper-based records and retyping them into a central system. A new auditing application called ECOTAB developed together with Vodafone eliminated this paper-based system by allowing auditors to use tablet devices and directly upload audit data into a central system.

CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

Several examples of similar technologies and platforms are found in ASEAN. In Indonesia, LISA is a social networking tool linking farmers and agricultural experts for knowledge sharing of best practices in crop management. Through Andara Link Mobile, farmers can also settle financial transactions via a mobile device. Furthermore, in order to increase supply chain management, the Institut Teknologi Bandung developed SAPA Mobile, which is a mobile based supply chain and information management system that integrates a large number of small-holder farmers. These farmers are connected to commercial supply chains facilitating mutually beneficial partnerships. It also provides technical information, and recommends best practices in real time.

The Philippines' Council for Agriculture, Aquatic and Natural Resources Research and Development facilitates quick information dispatch via mobile SMS technology with the aim of increasing and accelerating farmers' access to agricultural information. Also in the Philippines, in 2015 The International Rice Research Institute (IRRI), together with the Department of Agriculture (DA), created a service called the Rice Crop Manager (RCM) to provide information and site-specific recommendations to rice farmers over the web as well as over mobile phones using SMS. Initially only about 20 per cent of the 150,000 farmers registered on the RCM listed mobile numbers on the database. However, given the increased yields of on average 300 kg per hectare from the use of RCM in several regions, IRRI and DA have recently partnered

with Smart Communications to offer low-cost mobile packages to farmers for the purpose of sharing knowledge on crop management.

Last but not least, in Cambodia, CAMIS provides updated marketplace information to increase visibility of prices.

Based on Accenture's experience, there are four key enablers of mobile technology adoption in the agriculture sector. They are:

1. Availability of public and private sector financing for projects. Often funding for the development of such services is lacking as there is an unproven business case and uncertain future revenue flows
2. Availability and growth of mobile technologies and platforms. Having mobile platforms in place and available to entrepreneurs vastly encourages the development of services such as information provision, marketplace exchanges and the like
3. Mobile network coverage to ensure connectivity of rural farmers. Patchy mobile connectivity for remote farms is the biggest roadblock to the adoption of such services
4. Regulations that facilitate financial services access for all. Complex regulatory frameworks for the provision of new financial products and microfinancing may stall the development of mobile money

In view of these challenges, there is more that can and should be done to scale up the usage of mobile services among the agriculture community. Governments, NGOs and mobile service providers should collaborate to promote development, visibility and updating of mobile systems in rural areas. Examples include:

- Ensure the content integrity and support the development of locally-relevant content

- Regulate emerging technologies to protect users
- Collaborate with multiple stakeholders to identify the most cost-effective solutions in maintaining agricultural mobile services' operations
- Support mobile service providers and logistics companies to develop better mobile and storage infrastructure in rural areas for all
- Examine how current regulations are acting as barriers to access financial services and work with other stakeholders to create innovative solutions

This chapter has highlighted four main ways through which mobile services can improve the overall productivity and efficiency of agricultural production. They are agriculture information services; access to financial services; access to marketplace services; and, improving supply chain efficiency and traceability. The provision of mobile services through various platforms attempts to close out inefficiencies within traditional agriculture practices.

While the potential benefits are clear, close collaboration and partnership between key stakeholders will still be required to strengthen and improve current platforms and technologies, and hence realise them. Governments together with the private sector and other stakeholders can take the lead to remove barriers inhibiting uptake and bring current implementations one step further.

6.6

UPLIFTING THE RURAL ECONOMY WITH SEED TECHNOLOGY: THE CASE OF CORN PRODUCTION IN THE PHILIPPINES

Lead Contributor: Monsanto Company

In recent years, Southeast Asia and the world saw the rise of the Philippines as one of the fastest growing economies in Asia. With a 6.7 per cent growth in GDP, the country was recognized as the fourth fastest in the world in 2015. But as the Philippines moves towards a “tiger economy” status, many continue to scrutinize its development as a majority of the country’s population still lives in poverty. According to the Asian Development Bank, the Philippines lags behind its Southeast Asian neighbours in poverty reduction, with higher agricultural productivity being a major key to inclusive development in the Philippines. Two-thirds of poor Filipinos reside in rural areas and depend predominantly on agricultural employment and incomes. Thus it is imperative that innovative policies are implemented that promote development of the agricultural sector in a sustainable manner to alleviate poverty and develop a sustainable food production system in the Philippines.

According to 2013 statistics, the country’s gross value added in agriculture and fishing grew by 0.90 per cent to USD 29.1 million. Of this percentage, 0.03 points were attributed to the corn industry. Corn is the second most important crop in the Philippines next to rice, with close to 2 million Filipino farmers depending on corn as a major source of livelihood. In terms of consumption, white corn is the main staple for 14 million

Filipinos in central and southern Philippines; it is also used as raw material for processed foods and industrial products. Yellow corn, on the other hand, is also grown as a food source but it is mostly utilized as a main ingredient in livestock and poultry feeds and most recently as a bio fuel source. However, while the socio-economic contribution of the corn industry is known, policy-related issues continue to negatively impact the industry and limit its capacity for a more sustainable intensification of production. Given the importance of corn as both a food and feed crop in the Philippines, we believe that innovative policies that bring new technology to Philippine corn farmers and provide improved access to markets are needed if the overall goal of poverty alleviation and sustainable food security is to be achieved.

IMPACT OF NEW CORN SEED TECHNOLOGY IN THE PHILIPPINES

In the last 40 years, agricultural policies and programs facilitated the introduction of new corn technologies by the Philippine government and the private sector. These included the introduction of high yielding hybrid corn as well as high yielding corn from modern breeding and biotechnology. These policies resulted in marked improvements in the sustainable intensification of corn production, especially

after the development of hybrid yellow grain corn in the 1980s and genetically modified (GM) or biotech yellow corn in 2002.

The government began implementing programs to improve corn production in the country in the 1970s. In 1974, two years after the development of protein-enriched corn in the United States, the then Ministry of Agriculture launched *Masaganang Maisan* (Abundant Cornfields), the corn banner program until 1986. In 1987 renewed research and extension activities resulted in the development of high-yield, disease-resistant open-pollinated (OP) corn varieties that brought benefits to the countryside.

To cope with the increased demand for yellow corn from the poultry-livestock sector in 1989-1990, the Department of Agriculture (DA) implemented its Corn Production Enhancement Program, which provided farmers with improved OP and hybrid varieties, as well as fertilizer support. Through executive order, President Corason Aquino established the National Committee on Biosafety in the Philippines (NCBP), which set guidelines on the importation, transport and use of GM organisms in the country. Among the provisions of the Agriculture and Fisheries Modernization Act of 1997 was directing the DA to coordinate with the NCBP in formulating and implementing field trial directions and regulations for the commercial use of GM crops.

In 2002, the DA administrative order on the “Rules and Regulations for the Importation and Release into the Environment of Plants and Plant Products Derived from the Use of Modern Biotechnology” facilitated the commercial release of biotech corn into the Philippine market.

All of these policies from 1975 to 2000 made a positive contribution to the sustainable intensification of corn production and poverty alleviation. A study published in 2009 by SIKAP/STRIVE Foundation, analyzed the productivity and sustainability trends of the improvements

in corn production in order to evaluate the relevance of the introduced corn technologies to economic growth. The study results highlight the continued improvement in productivity from 1975 to 2009 as these new technologies were made available to farmers.

The SIKAP/STRIVE study highlighted the trends by designating the technology introduction periods as follows:

1. 1975-1980: OP Varieties
2. 1980-1995: Hybrid Yellow Corn Varieties
3. 1995-2002: UPLB Institute of Plant Breeding Hybrid Yellow Corn with Downy Mildew Resistance
4. 2002-2005: MON 810 with Asian Corn Borer Resistance - GM
5. 2005-2009: MON 810 x NK 603 with Round-Up Herbicide Tolerance – GM

It is well-noted that while average yields for white corn was consistently low, biotech yellow corn yields increased through each period (see Figure 2). A similar study on corn productivity by Gonzales and Lapiña in 2003 indicated that yellow corn yields had an annual rate of 4.9 per cent over a 17-year period beginning in 1985.

RESOURCE USE EFFICIENCY AND SUSTAINABLE PRODUCTION

Productivity is a critical factor in achieving food security and improving the livelihood of small farmers, but increasingly, farming systems are being challenged to use resources more efficiently in a more sustainable way. As land, water, energy, fertilizer become limited, resource use efficiency is a critical component of sustainable food production systems. The SIKAP/STRIVE study also assessed if increased production had been attained with improved efficiency in the use of resources – land, water,

YELLOW AND WHITE CORN PRODUCTION IN THE PHILIPPINES FROM 1975 TILL TODAY

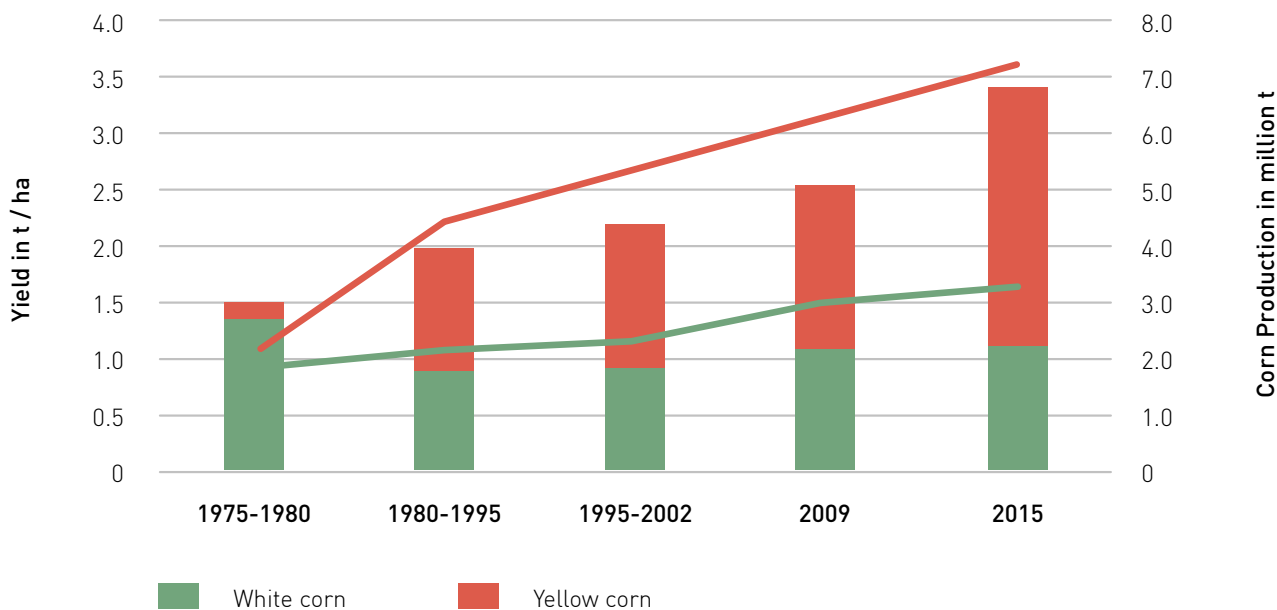


Figure 2: Evolution of corn production in the Philippines (yearly average) from STRIVE, Monsanto

energy, fertilizers, labour and farm chemicals. The study demonstrated that in addition to increased productivity, these new corn technologies significantly improved the efficiency of resource utilization. Less land, less fertilizer, less pesticides were used to produce one ton of corn in 2009 than was needed in 1988.

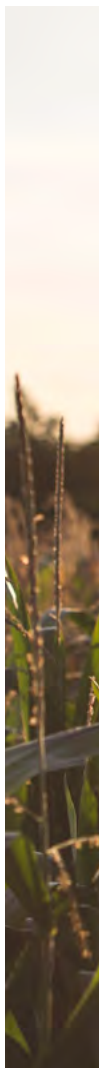
THE CORN INDUSTRY IN THE PHILIPPINES 2010-2015

Policies allowing the use of biotech corn seeds in the Philippines continue to provide significant improvements in sustainable intensification of corn production. Additional biotech corn seeds were approved for propagation by the DA Bureau of Plant Industry from 2010 to 2015. A study by Clive James et. al. released in 2015 found that adoption of biotech corn by Filipino farmers increased at an average of 5 per cent per year since the crop was first planted. The study further noted that as of 2014 there was an estimated 415,000 Filipino farmers growing biotech corn up from 397,500 the previous year. It was also observed that the area occupied by Bt/HT corn is 761,000 hectares or 92 per cent

of the total biotech corn hectares in the country, indicating that Filipino farmers preferred the stacked traits over single trait crops.

In the 10 years (2003-2013) that biotech corn in the Philippines was adopted, the estimated farm level economic benefit has reached USD470 million (PHP 22.4 billion). The net national impact of biotech corn on farm income for 2013 alone was estimated at USD92 million (PHP 4.4 billion). In addition, benefits of biotech corn to the environment have also been documented. North Philippine provinces cultivating biotech corn have high populations of flower bugs, beetles and spiders, insects that are beneficial to farm crops.

The Philippines is now ranked fourth corn producer in Asia growing a total of 2.6 million hectares of corn, ahead of Viet Nam with 1.2 million and Thailand with 1 million hectares. It is also the only country in the region to approve a major biotech feed crop, making it the 12th biggest grower of biotech crops in the world. Self-sufficiency in corn was achieved by the Philippines for the first time in 2012 and it has



been exporting corn silage to South Korea since 2013. In 2014, the DA announced that the government is pushing for corn to be the main crop for trade, and position the country to be a major exporter of the crop in Southeast Asia after 2015. With this plan the DA is investing heavily on infrastructure and more postharvest facilities and looking to expand corn cultivation areas in the country to meet the growing demand from the livestock and poultry feed industries, as well as align with the ASEAN Free Trade Area agreements.

It is significant to note, however, that droughts caused by the recent El Niño episode in the southern Pacific region has damaged an estimated 304,104 metric tonnes of crops in the Philippines, valued at USD89.8 million, between August 2015 and February 2016. The country is

expected to experience intensifying droughts in the years to come but long-term plans to mitigate the impact have not yet been put in place by the government.

The Philippines' corn sector took the brunt of the damage with 195,694 tonnes of production lost, amounting to USD50.4 million. About 133,480 hectares of land planted with corn were affected by the recent El Niño, but only 86,000 hectares have a chance of recovery. Data from the DA also revealed that 101,553 farmers tilling 194,056 hectares of land were affected by the drought. The DA is looking to irrigation intervention, crop shifting using short gestation crops, information campaign and rehabilitation of vulnerable areas as among the measures being implemented to mitigate the effects of the drought.



CONCLUSIONS AND RECOMMENDATIONS FOR ASEAN

Literature referenced in this chapter suggests that new corn production technologies and agriculture policies have resulted in improvements in achieving sustainable food security in the face of changing climate. Despite this progress, recent socio-economic and policy-related challenges are having a negative impact on sustainable intensification of corn production in the Philippines. The country will be hard-put to attain its goal of inclusive growth if its developmental agenda and policies do not resume focus on its agriculture sector which has the capacity to contribute more to GDP growth for the country, and yet it is the industry where the poorest of the poor can be found. The data presented here show that agricultural policies that promote investment in production technology can achieve positive results in sustainable agriculture systems. However, it is also clear that continued innovation in agricultural technology and innovation in agricultural policy is needed if the Philippines is to achieve a sustainable and secure food production system.

General recommendations to promote sustainable intensification of corn production across ASEAN would include:

- Advocate policies that promote sustained investments in agricultural research and development by both government and private sector organizations. Agricultural research investment by the public sector has been in steady decline since the 1980's despite it having one of the highest returns on investment
- Support research and development projects that have direct impact on the income-generating capabilities of resource-poor farmer, including researches on high yielding crops from modern breeding that respond to the unique challenges of the local environment instead of opening up more lands for cultivation (and environmental impact)
- Enhance adoption of high yielding crops among small-scale and resource-poor farmers by providing them with training, technical assistance, credit and creating policies that would incentivize their adoption and uptake of biotech crops
- Provide substantial investments in infrastructure, distribution systems, post-harvest facilities, and grain marketing to ensure farmers have access to markets and markets have access to farmers
- Encourage trade policy that facilitates the free, unrestricted import and export of agricultural goods

7

CONCLUSION



This white paper serves as a call for public and private sectors to increase cooperation so that a more efficient, resilient, inclusive, and ultimately sustainable agricultural sector may be shaped in ASEAN. Business and NGOs provide their perspectives and propose avenues

to policy makers on how agriculture in ASEAN can transform itself to ensure economic growth, social equity and environmental sustainability. It serves as basis for further discussion and for devising concrete actions at national and regional levels.

First, we have touched on global trends and recent international commitments such as UNFCCC's Climate Change agreement signed during COP21 and the United Nations' Sustainable Development Goals. Their possible consequences on ASEAN are shown, including the need to adopt climate-smart agricultural policies, the urgency of deforestation-free supply chains and landscape restoration policies, as well as financing mechanisms for climate-smart land use.

Further, the central role of agriculture in many economies in ASEAN has been highlighted in several parts of this paper, and concrete recommendations provided to governments to actively engage the private sector in promoting inclusive agribusiness models, investment in R&D and joint governance structures within the overarching framework of ASEAN Vision 2025.

Data from the Rice Bowl Index has illustrated the way forward to increase the robustness of food security in Indonesia, Viet Nam, Philippines and Thailand, where agriculture is a major contributor to national GDP and employment.

More than anywhere else in the world, smallholder farmers are the backbone of the agricultural sector in ASEAN. The case has been made that multi-stakeholder partnerships are fundamental to overcome current inefficiencies such as low levels of farmer aggregation, informal land tenure and difficulties to access technology and financial services. No single entity can address all of these challenges.

The need for regulatory harmonization of crop protection technology and labelling standards across ASEAN has also been particularly noted as these will enhance farmers' competitiveness, protect human health and the environment and achieve higher quality products.

Recommendations include the adoption of a scientific approach to product evaluation and approval, the necessity to share competencies, best practices and to launch anti-counterfeiting initiatives.

Agriculture is vulnerable to climate change, especially in ASEAN. To build resilience in the system, a 5-step framework has been proposed that helps identify the necessary measures at regional and national level.

Lastly, six case studies and best practices from the real world have been presented in this report. They form the basis of our recommendations.

- Adoption of a landscape approach to environmental conservation, with examples of multi-stakeholder cooperation for capacity building of smallholder farmers and rural communities
- A roadmap to successful public-private partnerships as a means to enhance smallholders' agriculture
- A financing framework rooted in multi-stakeholder collaboration to grant access to affordable credit among smallholders
- How mobile technologies facilitate farmer's access to information, financial services and improve supply chain efficiency and traceability
- How new seed technology can boost agricultural productivity

Creating the enabling framework to scale up these business solutions is fundamental to move towards an efficient agricultural sector that strengthens economies in ASEAN.

Disclaimer

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The White Paper entitled "Efficient Agriculture, Stronger Economies in ASEAN" is an integrated, holistic approach to sustainable agriculture aiming at adding objectivity, clarity and transparency to agriculture policy planning and decision making. It is a process open for the benefit of any governmental, regional or municipal authority, as well as any business, that wish to adopt it and put into practice.

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business solutions for a sustainable world

BCSD Singapore

10 Collyer Quay
#10-01 Ocean
Financial Centre
Singapore 049315
Singapore

Tel. (+65) 6611 7796
Email: info@bcsd.org.sg
Website: www.bcsd.org.sg

Indonesia BCSD

Menara Duta Building
7th Floor Wing B
Jl. HR. Rasuna Said B-9
Jakarta 12910
Indonesia

Tel (+6221) 5290 1941
Email : info@ibcsd.or.id
Website: www.ibcsd.or.id

PBE

1510 Tycoon Center
Pearl Drive, Ortigas
Pasig City 1605
The Philippines

Tel (+63) 2 635 3670
Email: inbox@thepbe.org
Website: www.thepbe.org

Viet Nam BCSD

4th Floor
9 Dao Duy Anh Street
Hanoi
Viet Nam

Tel: (+84) 4 3577 2700
Email: haiph@vcci.com.vn
Website: www.vbcsd.vn