



A farmer carries produce to a local market in Lam Dong province, Vietnam. Credit: Tran Thiet Dung/Oxfam

# HARMLESS HARVEST

How sustainable agriculture can help ASEAN countries adapt to a changing climate

A better way of growing food is the best bet against climate change for Southeast Asia's small-scale food producers. Sustainable agriculture — agriculture that can meet the needs of present and future generations, ensures the efficient production of safe, high-quality agricultural products in a way that protects the natural environment, and improves on the economic conditions of farmers and local communities — offers the best chances for countries belonging to the Association of Southeast Asian Nations (ASEAN) to deal with climate change.

By scaling-up sustainable agriculture practices across the region, ASEAN can help feed its peoples and support the livelihoods of small-scale food producers, and help curb greenhouse gas emissions to push back the impending catastrophe.

# SUMMARY

Agriculture is a way of life in Southeast Asia. It is the source of food and livelihoods for millions of families and provides raw materials for industries. Cycles of planting and harvesting have nurtured many cultures and traditions across the region for millennia.

However, productivity in the agricultural sector is under threat from climate change. Temperatures are decreasing rice yields. Rising sea levels are causing salinisation in countries such as Vietnam and Indonesia. Extreme weather events are leading to intense floods and droughts.<sup>1</sup>

Climate change is undermining food production and endangering the livelihoods of small-scale farmers and fisherfolk, both women and men. It is making food harder to grow and secure, and pushing more people into poverty.

Women's burdens will worsen because of climate change. Responsible for gathering or preparing food for the family, they will find food more scarce and expensive because of extreme weather events.

The recently released report of the Intergovernmental Panel on Climate Change (IPCC) forecasts that climate change will become more severe, affecting agriculture and efforts to curb poverty and hunger. Without global action on climate change, there will be nearly 50 million more people at risk of hunger in the region by 2020.

Unfortunately, funds and technologies to help small-scale farmers and fisherfolk to prepare for climate change (climate adaptation) are hard to come by.

Recently, agriculture has been found to be an increasing contributor of greenhouse gas emissions (GHGs). Initiatives such as 'climate smart agriculture' aim to reduce the emissions (climate mitigation) of the sector. However, these initiatives can take a toll on the food security, livelihoods, and rights of small-scale farmers and fisherfolk; on the use of indigenous farming technologies and knowledge; and on biodiversity.

At the global climate talks under the United Nations Framework Convention on Climate Change (UNFCCC), developing countries, who are already feeling the effects of climate change, insist that adaptation should be the focus of climate action, and not mitigation.

Oxfam believes that it is mainly large-scale agricultural companies and richer, industrialised countries that should be responsible for reducing greenhouse gas emissions in the agricultural sector. Small-scale producers from developing countries should instead be supported to adapt to climate change and meet food security requirements. The Association of Southeast Asian Nations (ASEAN), a coalition of ten countries in Southeast Asia, must safeguard agriculture because majority of ASEAN peoples depend on it.

This policy brief asserts that ASEAN can help poor farmers and fisherfolk in the region adapt to climate change through programmes promoting sustainable agriculture and agro-ecology. It calls on ASEAN to use existing regional platforms such as the ASEAN Climate Change Initiative (ACCI) and the ASEAN Multi-Sectoral Framework on Climate Change: Agriculture, Fisheries and Forestry towards Food Security (AFCC) to bring countries to work together on climate change. ASEAN can maximize the effectiveness of these platforms by adopting the following recommendations:

- 1. Support the scaling up of gendered, inclusive sustainable agricultural (GISA) practices.** This means championing sustainable agricultural practices, which function both as adaptation and mitigation. ASEAN must ensure that these programmes are informed by an accurate understanding of the impacts of climate change on poor women food producers, who are often left out of development projects. One programme that ASEAN can scale up is System of Rice Intensification (SRI), which is gaining ground in several countries.
- 2. Develop a regional knowledge hub for climate adaptation and mitigation practices in agriculture.** This includes creating a cross-country database that tracks climate change impacts in agriculture, documenting effective policies and practice on climate adaptation and climate resilience, and developing a core of experts—from the academic world, government and civil society groups—who can assist in sharing practices and knowledge.
- 3. Help build the capacity of Member States to implement sustainable agricultural practices and agro-ecology** by holding cross-country knowledge and information sharing, farmers' exchange programmes, trainings, and documentation of best practices.
- 4. Create an ASEAN fund to support climate action in agriculture,** especially programmes on agro-ecology and sustainable agriculture. Government pledges to the Green Climate Fund can help to fund this programmeme.

# 1 INTRODUCTION: WHY AGRICULTURE MATTERS

Agriculture is the main source of food and livelihood for millions of poor families across Southeast Asia. It is a major contributor to economic output, accounting for about one third of the Gross Domestic Product (GDP) of Myanmar (39.9%), Lao PDR (30%) and Cambodia (28%) in 2010.<sup>2</sup> It provides employment to more than sixty percent (60.3%) of the labor force in Cambodia, close to half (49.5%) of the labor force in Vietnam, and more than one third of the labor force in Thailand (41.3%), Indonesia (38.3%) and the Philippines (33.6%) in 2010.<sup>3</sup>

Agriculture is also an important source of trade revenues for many countries in Southeast Asia. The region is a key producer and exporter of palm oil, crude rubber, rice, sugar, shrimps, and fruits like banana and pineapples.<sup>4</sup> In 2011, agricultural exports accounted for almost one third of the export income of Myanmar (29.3%), and more than 10% of the export receipts of Indonesia (16%), Lao PDR (12.8%), Malaysia (13.3%), Philippines (10.7%) and Vietnam (13.7%).<sup>5</sup>

Increasing demand for food will boost emerging producers such as Vietnam, Indonesia and Myanmar for rice, palm oil and aquaculture in coming decades.<sup>6</sup>

More importantly, large segments of the poorest people in the region are in rural areas which live off the bounty of land and sea. Climate impacts on agriculture have far-reaching effects on the lives of these people, and can seriously undermine initiatives against hunger and poverty. This makes agriculture an important focus and locus of poverty reduction and climate adaptation.

## 2 THE IMPACT OF CLIMATE CHANGE ON AGRICULTURE

Southeast Asia is already in the grip of climate change: temperature in the region has been increasing by 0.14 - 0.20 degrees centigrade per decade since the 1960s;<sup>7</sup> sea level has risen at a rate of 1-3 mm per year;<sup>8</sup> rainfall during storms and tropical cyclones increased by 10 mm per decade, with variations across countries.<sup>9</sup>

All these have devastating impacts on agriculture.

Increases in temperature are linked to declining crop yields. A study undertaken by the International Rice Research Institute (IRRI) shows that the rise in night temperature as a result of global warming has led to a drop in rice yield—10% for every 1% rise in the minimum temperature during growing season.<sup>10</sup> Since rice is a major Southeast Asian staple, a drop in rice yield translates to diminished trade opportunities, a negative impact on livelihoods, and less food for consumption.

Droughts also lead to agricultural losses and lower food production. In some parts of Southeast Asia, rain has consistently been below average since 2009, spurring droughts in Cambodia, Lao PDR, Thailand, Myanmar and Vietnam. The average yield in drought-prone areas is lower by 17% to 40% compared to the average yield in areas that are least affected by droughts.<sup>11</sup> Droughts have also been linked to increased pest and disease infestation.<sup>12</sup>

Unfortunately, many farms do not have irrigation facilities. Only 54% of ricelands in rice-producing countries in ASEAN have irrigation services. In countries like Cambodia, Lao PDR, Myanmar, and even Thailand, the situation is much worse—only 1/4 of ricelands in these countries have irrigation facilities. Because of this, millions of farmers in the region have little choice but to rely on rainfall as the main source of water for crop cultivation. This makes them especially vulnerable to droughts and water scarcity.

Rising sea levels also pose problems for agriculture, causing seawater to seep into agricultural lands as well as into groundwater sources. In Indonesia, almost 15% of total rice output is estimated to be affected by increased soil salinity.<sup>13</sup> In Vietnam, soil salinisation affects about 100,000 hectares of agricultural lands in four provinces, namely Ben Tre, Tra Vinh, Tien Giang, and Ca Mau in the Mekong Delta region.<sup>14</sup>

The increasing frequency and intensity of extreme weather events also exerts a heavy toll on agriculture, and its millions of stakeholders. Tropical cyclones and storms wipe out crops and leave many farmers in debt. In Cambodia, intense floods and droughts accounted for 90% of rice production losses from 1996 to 2001.<sup>15</sup> Flooding leads to soil erosion and decreased soil productivity. In many cases, it also sweeps away seedlings and planting materials, making it difficult for farmers to recover and plant for the next season.

## 2.1 WORSENING HUNGER AND POVERTY

The impacts of climate change in Southeast Asia's agricultural sector are expected to intensify if the world is not able to make significant advances in climate adaptation and mitigation. At present, there are 64.5 million hungry people in the region. It is projected that climate change will put around 49 million more people in the Asia/Pacific region at risk of hunger by 2020.<sup>16</sup>

The Fifth Assessment Report of the IPCC (AR5) notes that Vietnam, one of the world's largest producers and exporters of rice, is in danger of having 7% of its agricultural lands submerged as a result of rising sea levels.<sup>17</sup> Saltwater intrusion is also threatening rice production in Myanmar.<sup>18</sup> Studies indicate the vulnerability of the rice sector in the region to changing climate patterns.<sup>19</sup>

The effect of climate change on rice production can skew global rice supply and prices because five out of the world's top ten rice producers and suppliers—Indonesia, Vietnam, Thailand, Myanmar and the Philippines—are in Southeast Asia.<sup>20</sup> During the rice price crises of 2008, Thailand and Vietnam accounted for 51% of total rice exports.<sup>21</sup> Any reduction in the rice production of these countries will in return reduce the world rice supply, and raise rice prices. Countries that are both producers and importers of rice, such as Indonesia, are most at risk.

The IPCC report forecasts that climate change will also affect the fisheries sector, especially in Vietnam and Cambodia.<sup>22</sup> Increases in temperature, ocean acidification, and impacts on coral reefs are expected to result to fish migration, decreases in fish size, and fish deaths.<sup>23</sup> Changes in rainfall may increase run off from sewage and agricultural fertilizers, and result to increased algal blooms ('red tides') and fish kills.<sup>24</sup>

These changes will be devastating for the livelihoods of families along Southeast Asia's coastlines—and on the region's food security. Fishery products are an important source of protein in the region. In Cambodia, more than one third (37%) of people's protein consumption comes from fish.<sup>25</sup> In Vietnam and in Myanmar, an average person consumes 14.6 kilograms and 21.02 kilograms, respectively, of fishery products per year.<sup>26</sup>

The forestry sector, which is a source of food and income for food gatherers and indigenous communities in various countries in the region, is also vulnerable to precipitation and temperature changes.<sup>27</sup> The IPCC report notes that in Indonesia, fires associated with droughts are expected to worsen vulnerabilities in the agriculture and forestry sectors.<sup>28</sup>

Overall, the IPCC finds that the effect of climate change on agriculture and coastal areas can be expected to result in a mean drop of 2.2% in the GDP of Indonesia, the Philippines, Thailand and Vietnam in 2100.<sup>29</sup> This only pertains to market losses and does not factor in non-market impacts such as those on health and eco-systems. When these impacts are considered, the potential decline in economic output can be as much as 5.7% of their GDP. Climate change can dampen the economic growth of countries in ASEAN.<sup>30</sup>

## 2.2 WOMEN BEAR THE BRUNT OF CLIMATE CHANGE

In Southeast Asia, as in many parts of the world, women play a major role in putting food on the table. They work closely with men in growing food. They plant vegetable gardens and take care of livestock and poultry in their backyards, which the families consume or are sold in the market. They borrow money for production capital. Women are also in charge of managing the family budget, often stretching what little they have to be able to feed the family, send the children to school, and look after the family's health.

Climate change exacerbates the burdens of women. Climate-related crop losses will leave women with less money to buy food and cover household expenses. These losses will also prevent them from meeting payment obligations to creditors, which limits their chances for borrowing capital at fair prices for the next planting season. Because women are primarily responsible for taking care of children, non-farm climate impacts such as the spread of vector-borne diseases will add to their burdens.

Therefore, it is crucial that climate adaptation projects are designed to consider the specific needs and situation of women. For instance, distributing vegetable seeds and farm animals to women will go a long way in helping them secure food for their families. Providing training on how to avoid or prevent the spread of vector-borne diseases will improve the health of the whole household.



Sitti Rahmah belongs to Pita Aksi, a group of women organic farmers from Piutusunggu village in the South Sulawesi Province, in Indonesia. Pita Aksi received an award from the government for helping to promote food security. Credit: Oxfam

# 3 CLIMATE ADAPTATION IN AGRICULTURE

The actual and forecasted impacts of climate change on agriculture and on food production shine the light on the need to help small-scale farmers in the region adapt to this global problem. Many studies have shown that appropriate adaptation techniques can go a long way in minimizing the costs and impacts of climate change on agricultural production, and on farmers and fisherfolk. A study commissioned by the Asian Development Bank (ADB) notes that expenditures for adaptation in agriculture and coastal areas equivalent to 0.2% of GDP will lead to future benefits amounting to 1.9% of GDP, as a result of avoided climate impacts.<sup>31</sup>

In Southeast Asia, farmers and fisherfolk are adapting to climate change by using indigenous knowledge and practices. Farmers use age-old techniques of changing planting schedules, adjusting farm management practices and planting different varieties to cope with storms, typhoons and droughts. Fisherfolk plant mangroves to protect coastal areas from storm surges.

However, they find that these practices and techniques are not always enough to help them cope with changing climate patterns. They are confounded by extreme weather events that now occur too frequently and more intensely. Moreover, slow onset climate impacts<sup>32</sup> such as rising sea levels and increases in temperature require innovative and strategic responses by governments and other institutions.

Farmers need early warning systems and timely and accurate climate information to help them better anticipate extreme weather events. In the Philippines, Rice Watch and Action Network, a partner of Oxfam, disseminates climate forecast and localized weather data to farmers through its Climate-resiliency Field School (CrFS), helping them to decide when or when not to plant, and to prepare for storms and droughts.<sup>33</sup>

Farmers also require proper infrastructure and support. They need irrigation facilities, especially in times of drought. They require water drainage systems to manage floods. They need protected seed banks so that they can resume planting even when their crops and seedlings are wiped out by floods and storms. They must also be able to access credit facilities and insurance to stave off debt, and to capital to allow them to plant again when their crops are destroyed. They need research and extension services focusing on climate adaptation.

These services are not only important for climate change adaptation (CCA); they are also essential for agricultural growth and development, in general.

The inability of governments to provide agricultural services, which can put poor farmers and fisherfolk in a better position to cope with climate change, is called adaptation deficit. Many developing countries suffer from this deficit.

### 3.1 THE COST OF ADAPTATION FOR AGRICULTURE

Estimates of the cost of adaptation in developing countries vary. Oxfam estimates the cost of adaptation in developing countries at a minimum of USD 100 billion per year.<sup>34</sup> The World Bank in 2010 placed the cost of adaptation at USD 70-100 billion by 2050.<sup>35</sup> The UNEP Adaptation Report released in December 2014 finds that the cost of climate adaptation in developing countries is two to three times higher than the World Bank estimate of 70-100 Billion USD.<sup>36</sup>

Global estimates place adaptation cost in agriculture at USD 11.3-12.6 billion per annum. The International Institute for Environment and Development (IIED) says that this estimate, though reasonable, is most likely low.<sup>37</sup> Indeed, in Southeast Asia alone, the ADB estimates the adaptation cost for agriculture and coastal areas for four countries, namely Thailand, the Philippines, Vietnam and Indonesia at USD 5 billion per year by 2020.<sup>38</sup>

What is clear is that available funds for adaptation, while increasing, are still far below what is needed. According to Climate Funds Update, approved funding for climate adaptation in developing countries from 2003 to 2013 amounted to only USD 2.8 billion—less than one fourth of the USD 10.9 billion fund allocated by the German government to address the damage wrought by the flood which affected the southern and eastern parts of Germany in 2013.<sup>39</sup> Considering available estimates of adaptation funding requirements, which range from 4 billion<sup>40</sup> to USD 450 billion<sup>41</sup> per year, this USD 2.8 billion is a proverbial drop in the bucket. The cost of adaptation will also rise if the world fails to reduce greenhouse gas emissions. This is why it is vitally important that countries adopt an ambitious climate agreement by 2015.

### 3.2 ADAPTATION DEFICIT

Although pledges for climate adaptation are increasing, the process of unlocking these funds to support the adaptation of developing countries is not always smooth or easy. For instance, of the total pledge of USD 323.05 million to the Adaptation Fund, only USD 186.48 million had actually been deposited at the end of 2013. Of this, only USD 166.36 million was approved for release, and only USD 29.4 million had actually been disbursed.<sup>42</sup> Thus, as of end-2013, only 15% of the deposited Adaptation Fund supported climate adaptation in developing countries. Table 1 below shows the status of the different funds for adaptation.

**TABLE 1: Adaptation Fund: Comparison of Pledges and Disbursement**

Fund	Pledge	Deposit	Approval	Disbursement	Disbursement as a percentage of deposit
Adaptation Fund	323.05	186.48	166.36	29.14	15.6
Least Developed Country Fund	536.65	435.46	286.73	126.63	29
Special Climate Change Fund	241.61	196.4	147.25	100.25	51
Pilot Programme for Climate Resilience	1119	804.8	317.48	8	0.71
Global Climate Change Alliance (GCCA)	385.36	365.36	296.81	130.99	34

Source: Adapted from Climate Finance Thematic Briefing: Adaptation Finance, Climate Funds Update, November 2012

## 4 CLIMATE MITIGATION IN AGRICULTURE

Agriculture accounts for 14% of total greenhouse gas emissions.<sup>43</sup> This is the same level as emissions from the industry and transport sectors. It does not factor in greenhouse gases generated by land use changes, 75% of which are linked to agriculture.<sup>44</sup> Land use change, such as when grasslands or forest areas are cleared to give way to farming, accounts for 18% of global greenhouse gas emissions.

In 2007, the IPCC reported that agricultural emissions from 1990s to 2005 have risen by almost 17%<sup>45</sup> and the bulk of this increase came from regions composed primarily of developing countries.<sup>46</sup> However, this trend must be viewed in the context of total and historical greenhouse gas emissions. Many developing countries, which are now suffering the impacts of climate change, are not responsible for the massive accumulation of climate change-inducing greenhouse gases.

Carbon emissions of ASEAN Member States in 2010 ranged from 1,874 kilotons (Laos PDR) to 433,989 kilotons (Indonesia). These levels of emissions are very small when compared to emissions of other countries like the United States, which is at 5,433,057 kilotons during the same year. The highest emitter, Indonesia, emits less than 10 per cent the carbon emissions of the United States<sup>47</sup>. This comparison is based on recent emissions. The contrast in emissions is infinitely more glaring when one factors in historical emissions (see Table 2).

**TABLE 2: Greenhouse Gas Emissions of ASEAN and Selected Countries**

Country	Total GHG Emissions in 2010 (kt)	Per Capita Emissions
Brunei	9,160	22.9
United States	5,433,057	17.6
Russia	1,740,776	12.2
Japan	1,170,715	9.2
Malaysia	216,804	7.7
China	8,286,892	6.2
Thailand	295,282	4.4
Singapore	13,250	2.7
Indonesia	433,989	1.8
Vietnam	150,230	1.7
Philippines	81,591	0.9
Cambodia	4,180	0.3
Lao	1,874	0.3
Myanmar	8,995	0.2

Source: World Bank database

Oxfam believes that climate action in agriculture should focus on helping small-scale food producers, especially in developing countries, adapt to climate change and that reductions in carbon emissions should be the responsibility of large-scale industrial agriculture. Oxfam also calls on big food companies, through its Behind the Brands campaign, to ensure that their value chains do not exacerbate, but mitigate, climate change. The campaign aims to hold big companies accountable for what happens in their supply chains—including how much they are

doing to reduce their carbon footprint—by providing people who buy and use their products information on their agricultural sourcing policies.<sup>48</sup>

## 4.1 MITIGATION INITIATIVES IN AGRICULTURE

There are varied ways to reduce greenhouse gas emissions in agriculture. Some of these practices are consistent with sustainable farming methods. For instance, reducing reliance on fertilizers, pesticides and other inputs, refraining from the burning of farm residues, effective management of water resources, agro-forestry and the restoration of degraded lands through the application of composts are considered as sustainable farming practices. Many small farmers across Southeast Asia have been using these methods for a long time. One such example of these practices is the System of Rice Intensification (SRI) (see Box 1).

Other practices are much more recent and involve external interventions, such as the introduction of new crop varieties, precision farming, and the conversion of farmlands to grasslands, among others.

In general, the IPCC identifies seven broad categories of mitigation measures in agriculture in Table 3:

**TABLE 3: Mitigation Measures in Agriculture**

Mitigation Measures in Agriculture	Examples
Cropland management	Agronomy (e.g. reduced reliance on fertilizers, pesticides and other inputs) Nutrient management Tillage/residue management (e.g. avoiding burning of farm residue) Water management (irrigation, drainage) Agro-forestry Set-aside, land-use change
Grazing land management/pasture improvement	Grazing intensity Increased productivity (e.g. fertilizations) Nutrient management Species introduction
Management of organic soils	Avoid drainage of wetlands
Restoration of degraded lands	Erosion control, organic amendments, nutrient amendments (e.g. application of composts)
Livestock Management	Improved feeding practices Specific agents and dietary additives Longer term structural management changes and animal breeding
Manure/biosolid management	Improved storage and handling Anaerobic digestion More efficient use as nutrient source
Bio-energy	Energy crops, solid, liquid, biogas, residue

Source: Chapter 8 Mitigation in Agriculture, AR4, and IPCC

Oxfam believes that climate mitigation initiatives must not be undertaken at the expense of the food security and livelihoods of poor people in developing countries.

## 4.2 CLIMATE SMART AGRICULTURE

In 2010, the Food and Agricultural Organization (FAO) presented the concept of 'climate smart agriculture' (CSA) during the Hague Conference on Agriculture, Food Security and Climate Change. Climate smart agriculture is meant to respond to the challenge of achieving food security in a world threatened by climate change.<sup>49</sup>

CSA has three pillars:

1. Increasing agricultural productivity and incomes
2. Adapting and building resilience to climate change, and
3. Reducing and/or removing greenhouse gas emissions.

A Global Alliance on Climate Smart Agriculture, composed of governments, private sector and civil society groups, was launched during the United Nations Secretary General Climate Summit on September 23, 2014 in New York. Its members are bound by the common goal of promoting climate smart agriculture. The Alliance's Framework Document has been criticized by civil society groups on several grounds:

- Its vague definition of CSA and lack of metrics to evaluate the scale and added value of its impact;
- The lack of membership criteria or strong social and environmental safeguards to avoid members using the Alliance brand to greenwash questionable agricultural approaches;
- The lack of deep or consistent participation by farmer organizations and civil society, especially from low-income or highly climate-vulnerable countries;
- The lack of clear differentiation between the roles and responsibilities of large- and small-scale farmers (especially with regard to mitigation and sequestration).<sup>50</sup>

Further, there is concern that CSA might put agriculture on the carbon market. For instance, soil carbon sequestration through the conversion of farmlands to grasslands creates incentives for the private sector to secure farmlands specifically for this purpose. This can have a grave impact on farmers' access to land, and consequently on food production and on farmers' incomes. It can increase the potential for land grabs, especially in developing countries where farmers' land rights are not secure, and where there are ineffective or absent government rules to regulate private sector investments.<sup>51</sup>

Promoting the use of crop varieties on the basis that they have maximum carbon sequestration potential can also negatively affect local biodiversity, as well as the diet and nutrition of communities.

Project developers, and not small farmers, might also be the main beneficiaries of CSA initiatives. The Institute for Agriculture and Trade Policy, referring to the World Bank-supported Kenya Agricultural Carbon Project, notes that "half of the monetary benefits from the proposed offset credits would be absorbed by project developers as 'transaction costs', with miniscule returns to the farmers who would be implementing the project."<sup>52</sup>

# 5 WHY ASEAN NEEDS SUSTAINABLE AGRICULTURE AND AGRO-ECOLOGY

**Sustainable agriculture and agro-ecology help farmers adapt to climate change in a way that also reduces greenhouse gas emissions.**

Sustainable agriculture is defined as “the efficient production of safe, high quality agricultural products, in a way that protects and improves the natural environment, the social and economic conditions of farmers, their employees and local communities, and safeguards the health and welfare of all farmed species.”<sup>53</sup> Practices that address both mitigation and adaptation in agriculture are consistent with sustainable agricultural principles. Sustainable farming practices such as reducing reliance on chemical inputs, composting, crop diversification, better water management, and the rehabilitation of degraded soils, also qualify as important climate mitigation and adaptation.

In the same way, the key principles of agro-ecology complement climate mitigation and adaptation goals and initiatives<sup>54</sup>:

- Enhancing the recycling of biomass, optimizing nutrient availability, and balancing nutrient flow;
- Securing favourable soil conditions for plant growth, particularly by managing organic matter and enhancing soil activity;
- Minimizing losses due to flows of sunlight, air, and water by way of micro-climate management, water harvesting, and soil management through increased soil cover;
- Enhancing species and genetic diversification of the agro-ecosystem;
- Enhancing beneficial biological interactions and synergies among components of agro-biodiversity and the surroundings, thus promoting key ecological processes and functions.

System of Rice Intensification (SRI) (Box 1) offers a clear example of how sustainable and agro-ecologically sound practices can help farmers adapt to climate change, while enabling them to support climate mitigation objectives.

Sustainable agriculture and agro-ecology are holistic, and consider factors that are essential to building people’s resilience.

Sustainable agriculture covers not only the physical and technical aspects of farming but its economic, social and environmental considerations as well. Sustainable agriculture depends on the interplay of these aspects.

For instance, if farmers do not own the land they till or have robust land rights, then they have less power to decide what types of farming technology to use. If government policies on insurance are skewed so that these only support the use of hybrid seeds, then farmers are discouraged from using and experimenting with traditional seed varieties that can help enhance agricultural sustainability. If farmers continue to use intensive chemical-based farming, then they are jeopardizing the long-term productivity of their land.

Sustainable agriculture and agro-ecology provide a viable alternative to industrial-type agriculture. Sustainable agriculture is partly in response to the realization that intensive

chemical-based farming, which boosted agricultural production during the early years of the Green Revolution, can lead to environmental degradation.

It is as an alternative to mono-cropping and plantation-type agriculture that strip the soil of its nutrients, reduce biodiversity and compromise the long-term sustainability of agricultural production. In a world challenged by climate change, natural resources must flourish continuously to help continue producing food and generate incomes for small-scale farmers and fisherfolk.

### **Box 1: System of Rice Intensification (SRI)**



The System of Rice Intensification (SRI) is an agro-ecological approach to rice farming that focuses on the efficient management of plants, soils, water and nutrients in order to increase rice output and the productivity of land, labor, water and capital. It was developed in Madagascar in the 1950s and has since been adopted in 51 countries.

Various studies from all over the world document how the application of SRI principles and practices helps increase rice yield, reduce input costs, and improve farmers' income. Oxfam has promoted SRI in 12 countries in Asia, West Africa and Latin America since 2000. In Asia, Oxfam works with partners in helping more than 1.5 million smallholder farmers in Cambodia, Vietnam and Sri Lanka apply SRI principles in producing the staple crop.

In Vietnam, Oxfam started working with partners in promoting the use of SRI in the lower Mekong basin in 2006.<sup>55</sup> Farmers who practiced SRI increased their income by USD 200-300 per hectare.<sup>56</sup> This encouraged others to start applying SRI principles in their farms. By 2011, more than 1 million farmers (equivalent to around 10% of the national farming population) are adopting this approach. According to the Plant Protection Department of the Vietnamese Ministry of Agriculture and Rural development, SRI principles are now being applied in 16% of ricelands in the Northern part of Vietnam and 6% of total ricelands in the country.

Oxfam also promoted the use of SRI in Cambodia through its partners. Farmers report that they were able to increase yield by as much as 68% and their income by USD 339 per hectare as a result of adopting this approach.

Apart from improved rice yields and farmers' income, the application of SRI also results in positive environmental impacts such as improved soil fertility, efficient use of natural resources, and enhanced agro-biodiversity. It also has positive social benefits such as increasing farmers' empowerment, freeing up women's time and reducing risk and exposure to health hazards.

In a world challenged by climate change, SRI provides a way for farmers to help adapt to climate change while enabling them to reduce greenhouse gas emissions from rice farming. Applying SRI principles results in plants that are resilient to increases in temperature and extreme weather events like storms and droughts. Farmers also report SRI-grown rice plants are more resistant to common diseases and insect pests. Moreover, adoption of SRI practices and improved farmer collaboration in adopting SRI lead to better seed, water and plant management generally, and enable farmers to better anticipate and manage climate change risks.<sup>57</sup> The Vietnamese government, noting the positive effects of applying SRI, has recognized its potential in promoting climate resilience.

SRI leads to lower greenhouse gas emissions, particularly methane.<sup>58</sup> Many of the practices identified by IPCC as effective in helping reduce greenhouse gas emissions in agriculture—reducing chemical inputs, better water management (as opposed to the conventional method of continuous flooding rice paddies)—are similar or complementary to the range of SRI farming practices.

## 5.1 HOW CAN ASEAN HELP SCALE UP CLIMATE ADAPTATION AND MITIGATION IN AGRICULTURE?

The good news is that ASEAN already has in place two key platforms on climate change.

The first is the ASEAN Climate Initiative (ACCI), which serves as its over-all framework on climate change. The ACCI sets the direction for regional cooperation on climate change, including positioning ASEAN in the global climate talks. An ASEAN Working Group on Climate Change was created to implement the ACCI.

The second platform is the ASEAN Multi-Sectoral Framework on Climate Change: Agriculture and Forestry Towards Food Security (AFCC). The AFCC is more focused on the links between food security, agricultural production and climate change. Its goal is to “contribute to food security through sustainable, efficient and effective use of land, forest, water and aquatic resources by minimizing the risks and impacts of, and the contributions to, climate change.” AFCC is expected to help coordinate the development of adaptation and mitigation strategies among ASEAN Member States. It is also envisioned to foster cooperation on the implementation of integrated climate adaptation and mitigation measures in the agricultural sector.

AFCC Components	Strategic Thrusts
<p><b>Component 1</b></p> <p>Integration of climate change mitigation and adaptation strategies into the economic and social development policy framework</p>	<p>Assess the impacts of climate change and risks for Agriculture, Fisheries, Livestock and Forestry and contributions of those sectors to climate change</p> <p>Assess environmental impacts and risks, specifically on biological diversity</p> <p>Assess the socio-economic impacts and risks of climate change, and identify the most vulnerable and priority geographic areas and communities for climate change adaptation and mitigation</p> <p>Formulate food security measures to address and respond to climate change to enhance sustainable development and strengthen livelihoods</p> <p>Incorporate climate change adaptation and mitigation measures and strategies into national development strategies, policies and programmes</p>
<p><b>Component 2</b></p> <p>Cooperation on the implementation of adaptation and mitigation measures</p>	<p>Strengthen land and water-use planning at national and sub-national levels</p> <p>Cooperate on the promotion of integrated adaptation and mitigation of agricultural production systems including crops and livestock management</p> <p>Cooperate on the promotion of adaptation and mitigation in forestry</p> <p>Cooperate on the promotion of adaptation and mitigation in fisheries</p> <p>Foster co-benefit approaches integrating environmental concerns such as biodiversity conservation into climate change-related measures</p>
<p><b>Component 3</b></p> <p>Strengthening of national and regional knowledge sharing, communication and networking on climate change and food security</p>	<p>Synergize databases and information systems related to climate change and food security</p> <p>Strengthen national and regional cooperation, coordination, consultation and communication on the impacts of and response to climate change on agriculture, fisheries, livestock and forestry towards food security</p> <p>Strive for coordinated or common positions on climate change and food security</p> <p>Strengthen regional partnerships and coordination with ASEAN partners on climate change and food security</p>
<p><b>Component 4</b></p> <p>Developing a more comprehensive multi-sectoral strategic framework and a roadmap for implementation</p>	<p>Foster closer collaboration with the environment, energy, mining, health or infrastructure sectors</p>

AFCC presents opportunities for scaling up sustainable agriculture. Many civil society groups, including farmers' groups, have rich experiences in promoting and practicing sustainable agriculture. ASEAN can work with these groups in piloting, replicating and scaling up sustainable agriculture across the region. Additionally, it can tap the growing global interest in agro-ecology to help deliver regional programmes that benefit small-scale farmers and fisherfolk.

## 6 CONCLUSIONS AND RECOMMENDATIONS

The lives and livelihoods of small-scale farmers and fisherfolk hang in the balance because of climate change. Governments, civil society, donors and ASEAN must help them prepare for and reduce greenhouse gas emissions responsible for climate change.

ASEAN countries must push for the global climate negotiations under the UNFCCC to deliver an agreement at whose heart lies the poorest and most vulnerable.

As global leaders sign an agreement in Paris in 2015, they must at the same time dramatically reduce emissions before 2020. Both actions are essential to achieving the international goal of limiting global warming to 2°C (or the 1.5°C that many countries rightly demand), beyond which there is much higher risk of disasters and adaptation may become impossible. Achieving the required level of emissions reductions means ambitious contributions from all countries and increased support from developed to developing countries for their implementation.

Negotiations under the UNFCCC must also result in greater funding for adaptation, both in the near term (pre-2020), and under the new global agreement.

The Green Climate Fund (GCF) Board, during its 6th Meeting in Bali, has decided that the Fund aims for a 50:50 balance between mitigation and adaptation. Developed nations must pledge funds for the GCF to help developing nations cope with climate change.

These measures will help to scale up and implement some of the following recommendations of this paper:

### **For ASEAN**

The fact that ASEAN has already created necessary platforms, such as the ACCI and the AFCC, to promote better regional coordination and cooperation on climate change, is a good starting point for regional climate action. ASEAN can maximize these platforms by adopting the following recommendations.

1. Support the scaling up of gendered, inclusive sustainable agricultural (GISA) practices. This means championing sustainable agricultural practices, which function both as adaptation and mitigation. ASEAN must ensure that these programmes are informed by an accurate understanding of the impacts of climate change on poor women food producers, who are often left out of development projects.

One programme that ASEAN can scale up is the System of Rice Intensification (SRI), which is gaining ground in several ASEAN countries.

2. Develop a regional knowledge hub for climate adaptation and climate mitigation practices in agriculture, with a built-in system for information sharing. This includes creating a cross-country database that tracks climate change impacts in agriculture, documents effective policies and practice on climate adaptation and climate resilience, and develops a core of experts—from the academic world, government and civil society groups—who can assist in sharing knowledge and practices.

3. Help build the capacity of Member States to implement sustainable agricultural practices and agro-ecology through cross-country knowledge and information sharing, farmers' exchange programmes, regional training workshops, and documentation of best practices.
4. Create an ASEAN fund for climate adaptation and mitigation in agriculture, with particular emphasis on supporting regional programmes on agro-ecology and sustainable agriculture.

### **For national governments in Southeast Asia**

1. Establish or strengthen national policies and programmes to promote sustainable agriculture as part of government action on climate change. National governments can provide a range of support and incentives to help and encourage farmers to adopt sustainable and agro-ecologically sound farming practices. These include providing extension services, credit support and market assistance, among others.
2. Ensure the participation of small-scale farmers and fisherfolk and civil society in the process of developing national policies and programmes for sustainable agriculture and climate adaptation.
3. Push for the adoption of regional programmes on climate adaptation and sustainable agriculture, including those mentioned above, through existing ASEAN platforms and venues such as the ACCI and AFCC.

### **For civil society**

1. Continue building evidence and generating lessons on the value of adopting sustainable agriculture. This can be done by thoroughly documenting the experiences and learning of farmers and farming communities that are already practicing sustainable agriculture and agro-ecology, and how these support climate adaptation and mitigation goals.
2. Work with farmers' and other stakeholders' groups in constantly engaging national governments to increase support for climate adaptation, including promoting the use of sustainable agriculture and agro-ecology at the local, national and regional level.

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