ASEAN BIODIVERSITY OUTLOOK 2

ASEAN CENTRE FOR BIODIVERSITY

POLICY BRIEF SERIES

January 2019

Photo by Erwin Mascarinas

Agricultural Biodiversity:

Conserving genetic diversity to enhance and sustain agricultural productivity

Understanding the state of agricultural biodiversity, identifying the pressures, and suggesting ways to respond to such pressures are essential to achieving Aichi Biodiversity Target 13, which aims to develop and implement strategies to minimize genetic erosion and safeguard genetic diversity. Consequently, this would contribute to accomplishing other Aichi Biodiversity Targets, i.e. sustainable production and consumption (Target 4), sustainably managed agriculture (including aquaculture and forestry) (Target 7) and fully integrated and respected traditional knowledge, innovations, practices, and customary use of biological resources (Target 18).

The ASEAN region grows many of the world's most important crops and is one of the most productive in the world. In the next 50 years, the current population of 639 million people in the region is expected to reach 800 million (United Nations, 2015). To meet this rising demand would require technological advancements in food production methods. Development and production of high-yielding crop varieties, as well as new breeds of livestock, are therefore intensified to meet the growing demands for food. Meeting these demands will only be possible if genetic diversity of crops and animals, as well as their wild relatives, is conserved (Sajise, 2015).

In the ASEAN region, striking a balance between increasing production for its significantly increasing population and conserving the rich biodiversity and the ecosystem services essential to agriculture is a major challenge. Likewise, competition between demands on agriculture and pressures on biodiversity is inevitable.

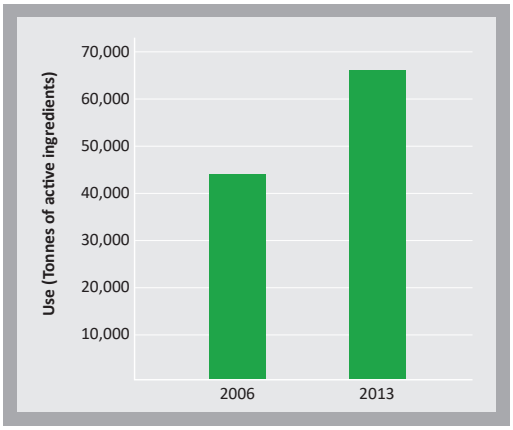
Threats to genetic diversity of crops and livestock

Genetic erosion. The AMS national reports indicate that recent introduction of new, modern, and high yielding varieties is one of the causes of genetic erosion of native crop varieties. Genetic diversity of crops provide breeders and farmers with the raw material required to sustain and improve their crops. Once native crop varieties have been completely replaced by modern varieties, the unique combination of genetic diversity is unavailable to breeders; resulting to a decrease in the total number of different varieties grown and/or cultivars grown by farmers becoming increasingly similar to each other. Replacement of traditional livestock breeds by exotic breeds was reported by AMS through the Food and Agriculture Organization's (FAO) Second Report on the State of the World's Animal Genetic Resources for Food and Agriculture as one of the

causes of genetic erosion in animal genetic resources.

Conversion of agricultural lands. The demand for agricultural land is in direct competition with the increasing land requirements of urban populations. As urban population increases in the region, the proportion of arable area to total agricultural area decreases. Viet Nam reports that, on average, approximately 0.43 percent of its agricultural land is lost annually due to urbanization and industrialization such as the conversion of agricultural lands into golf courses. In Thailand, the steady increase in urban population results in farm lands in the cities being converted to residential and industrial areas.

Decline in pollination services. The ASEAN region is among the top producers and exporters of crops that are pollinator-dependent. Moreover, pollinators provide livelihood opportunities, such as beekeeping, particularly to rural communities (IPBES, 2016). Thus, a decline in pollination services reduces the production of crops that are pollinator-dependent. Identified threats to pollinators are land-use change, intensive agricultural management and pesticide use, environmental pollution, invasive alien species, pathogens, and climate change. In the ASEAN region, data from FAO Statistics Division show that the use of pesticides is increasing, making pollinator species vulnerable to its harmful effects.



Pesticide Use in the ASEAN, 2006–2013
Source: FAOSTAT. Retrieved from http://faostat3.fao.org/home/E on 14 June 2016.

Invasive Alien Species. ASEAN Member States share many common characteristics such as climate, vegetation types, environment, and others. Thus, countries in the region share many noxious weeds such as *Mimosa pigra* (Catclaw mimosa), *Mikania micrantha* (Mile-a-minute) and *Chromolaena odorata* (Siam weed) that affect crops and pasture production.

Agrobiodiversity terminologies

Agrobiodiversity – or agricultural biodiversity is a broad term that includes all components of biodiversity of relevance to food and agriculture, and all components of biodiversity that constitute agroecosystems: the variety and variability of animals, plants, and microorganisms, at the genetic, species, and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure, and processes.

Genetic erosion – the loss of genetic diversity including the loss of individual genes and the loss of particular combinations of genes such as those manifested in locally adopted landraces.

Landrace – a dynamic population(s) of a cultivated plant that has historical origin, distinct identity and lacks formal crop improvement, as well as often being genetically diverse, locally adapted and associated with traditional farming systems.

***Ex situ* conservation** – a conservation method that entails the removal of germplasm resources (seed, pollen, sperm, and individual organisms) from their original habitat or natural environment. Keeping components of biodiversity alive outside of their original habitat or natural environment.

***In situ* conservation** – a conservation method that attempts to preserve the genetic integrity of gene resources by conserving them within the original habitat or natural environment.

Germplasm – living tissue from which new plants can be grown. It can be a seed or another plant part – a leaf, a piece of stem, pollen or even just a few cells that can be turned into a whole plant.

Arable land – land under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (for less than five years).

Photo by Rita Dela Cruz

Call for Action

1. Strengthen *ex situ* and *in situ* conservation to increase accessions of genetic resources in gene banks, wildlife parks, nature reserves, and botanical gardens.

2. Provide incentives to smallholder farmers that adopt agro-ecological practices such as application of compost, crop rotation, and integrated pest management that enhance *in situ* conservation of genetic diversity of crops.

3. Provide access to important information such as *ex situ* accessions, *in situ* best practices and status and trends of pollinators. Such information must be stored in a common information sharing platform such as the ASEAN Clearing House Mechanism.

4. Establish ASEAN Regionally Important Agro-Ecological Heritage Systems (ARIAHS) to address the need to conserve and protect agricultural heritage systems distinct to ASEAN countries and provide a platform to recognize agricultural heritage systems that are proven to be sustainable despite increasing modernization of agricultural production. ARIAHS will promote organic farming and other agro-ecological farming practices such as crop rotation and crops and livestock integration.

5. Improve the ASEAN policy framework for agricultural biodiversity and craft strong regional policies that will provide incentives and capacity building for farmers to adopt agro-ecological farming practices, champion best practices, and support the establishment of ARIAHS.

References

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PRESSURES

- Genetic erosion
- Conversion of agricultural lands
- Decline in pollination services
- Invasive Alien Species

STATE

- 54 local breeds
- 10 endangered
- 5 extinct
- 71 local breeds
- 1 endangered
- 52 local breeds
- 3 endangered
- 3 extinct
- Increased production through high-yielding varieties and breeds
- Agricultural area
  1990: 1.07M sq km
  2013: 1.31M sq km
- Forest area
  1990: 2.41M sq km
  2013: 2.11M sq km
- Urban population
  1961: 42M
  2013: 283M
- % Arable area
  1990: 64
  2013: 53
- Increased use of pesticides
  2006: 42,773 tonnes
  2013: 64,311 tonnes

Ways Forward

Strengthen *ex situ* and *in situ* conservation

- Increased accessions of crop and livestock genetic resources in gene banks

Make crucial information available

- *Ex situ* accessions
- *In situ* best practices
- Status and trends of pollinators

Develop/establish ASEAN Regionally Important Agro-Ecological Heritage Systems (ARIAHS)

Improve the ASEAN policy framework for agricultural biodiversity