Agricultural Innovation for Sustainable Agriculture Food Systems

Glenn B. Gregorio

COVID-19 Effects on Biodiversity: Science Education Reimagined
Impact of COVID-19 pandemic on agricultural production in Southeast Asia (Gregorio and Ancog, June 2020)

- Disruptions in agriculture food systems create supply and demand shocks on economic performance and food security.
- C-19 pandemic reduce vol. of production by 3.11% or 17.03M tons due to decline in agricultural farm labor affecting 100.77M people.
- C-19 cause 1.4% decline in GDP of the SEA, equivalent to 3.76B USD.
Food security remains a challenge in SEA

Data Source: The Intelligence Unit, The Economist

Global Food Security Index (GFSI) in SEA, 2015-2019
ATTAIN
Accelerating Transformation Through Agricultural INnovation

PRESENT

FARMER
Existing
Old mindset: Farming is production.

New Farmer
New mindset: Farming is sustainable agribusiness.

MINDSET
Embrace Disruptive AgTech

AGRO-ECOLOGICAL SYSTEM
Ecosystem Thinking
Circular Value Chain

PRODUCTS/SERVICES
Future-proof products and services with high-efficiency and low ecological footprint; Agriculture 4.0. Next Generation ARD leaders

KEY PARTNERS
Government acts as an enabler supported by strong academe-industry-government interconnectivity collaboration

MINDSET
Empower Next Generation Agri Graduates

VALUE CHAIN THINKING
Value Chain Thinking Product-centric Analog

NEEDS/OPPORTUNITIES
Bridge divides Promote harmony

SEARCA
Mindset change, leadership, accelerated transformation, new finance system, new innovative methods and operations, new markets and business models, transformed networks, new technologies

PRESENT TO FUTURE
Accelerated transformation through agricultural innovations in education and collective learning, research and thought leadership, and emerging innovations management and implementation
### Challenges and Opportunities

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Genetic erosion</td>
<td>1. Source of genetic material for improving crops, resistance to pest &amp; diseases, and climate change adaptation</td>
</tr>
<tr>
<td>2. Climate change</td>
<td>2. Natural way of managing pests and diseases</td>
</tr>
<tr>
<td>3. Invasive species and decline in pollination services</td>
<td>3. Outsmartering climate change with more crop options</td>
</tr>
<tr>
<td>4. Unregulated conversion of agricultural lands</td>
<td>4. Contribute to health and nutrition</td>
</tr>
<tr>
<td>5. Knowledge gaps</td>
<td>5. Sustain soil health, food and habitat for important pollinators and natural pest predators</td>
</tr>
<tr>
<td>6. Research &amp; Devt support</td>
<td>6. Contribute to maintaining cultural identity and traditional knowledge</td>
</tr>
<tr>
<td>7. Migration to urban areas</td>
<td>7. Institutionalize policies to prevent land degradation and promote land restoration programs</td>
</tr>
<tr>
<td></td>
<td>8. Understand agrobiodiversity needs to be conserved, the system and components and their relationships</td>
</tr>
</tbody>
</table>
Agriculture is a major driver of biodiversity loss but making it sustainable through agricultural innovations promotes and enriches biodiversity to ensure high quantity and quality, and sustainability of environmental goods and services.

Metrics to attain agricultural productivity and biodiversity conservation must be: **PRODUCTIVITY, STABILITY, SUSTAINABILITY, EQUITABILITY**

Appreciating that human well-being is underpinned by biodiversity-rich agricultural food systems would be critical in wielding holistic agricultural innovations across the food supply chain.
Inter-linkages between Biodiversity ✤ Agro-Biodiversity ✤ Agri-innovations

<table>
<thead>
<tr>
<th>Biodiversity</th>
<th>Agro-Biodiversity</th>
<th>Agri-Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystem</td>
<td>Plants and Animals for food, nutrition, and consumption</td>
<td>Landscape jurisdictional approach, farm clustering, ridge-to-reef, circular value chains, conservation agriculture, urban agriculture, climate smart villeges</td>
</tr>
<tr>
<td>Species</td>
<td>Varieties, breeds, Biotypes</td>
<td>Good Agricultural Practices, Climate smart species/var, land-use planning, traditional varieties conservation</td>
</tr>
<tr>
<td>Genetic</td>
<td>Agro-ecosystems</td>
<td>Genetic breeding stocks, in-situ and ex-situ conservation, gene banking, heirloom, designer genes</td>
</tr>
</tbody>
</table>
Academe-Industry-Government (AIG) Interconnectivity Model: Action Points for the PRODUCTION SECTOR

• Supporting local capacity toward being self-sufficient through well-planned production and post-production systems.

• Promoting incentive systems to support innovation studies and activities to improve production and post-production, increase efficiency, and promotion of value-adding activities.

• Designing financial technologies (FinTechs) to empower farmers and rural communities.
1. As consumers are more aware of the intricate link between "plate" and "farms", responsible consumption practices and lifestyle must be actively promoted thru Lifelong Education.

2. Sustaining more targeted capacity building activities is needed to support growing interest in agriculture and biodiversity conservation.
   • Youth and women engagement needs to be strengthened.

3. At the macro level, trade policies must support food security and biodiversity conservation.

The ASEAN Economic Cooperation has been very vital in this front.
COVID-19 Effects on Biodiversity: Science Education Reimagined