Integrating Climate Change Adaptation (CCA) into Thailand’s Agricultural Sector

Agricultural Innovation for Resiliency Conference:
Common Objectives for A Successful National Climate Action Plan

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• Integrating Climate Change Adaptation (CCA) into Agricultural Development Plan
Crop Suitability and Impact Assessment

: Why do we need the sector integration of climate change adaptation (CCA)?
Crop Suitability and impact assessment

To address key policy questions:

Policy Questions:

1) What kinds of crops do have high risk to climate change (slow onset events)?

2) How much is the cost of climate change to crop productions if DO NOTHING? And How to minimize that cost?
Crop Suitability Assessment

Figure 3.2 Suitability of cassava in the current environment as assessed by Ecocrop

Figure 3.3 Suitability of maize in the current environment as assessed by Ecocrop

Figure 3.15 Suitability of rice, KDM1105 variety in the current environment as assessed by Ecocrop

Figure 3.16 Suitability of rice, other varieties in the current environment as assessed by Ecocrop

Figure 3.17 Suitability of sugarcane in the current environment as assessed by Ecocrop
Crop Suitability Assessment

Current climate suitability

<table>
<thead>
<tr>
<th>Item</th>
<th>Principal Factor</th>
<th>High suitability zone</th>
<th>Correspondence with Current cultivation area</th>
<th>Other potential factor explaining distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>Rainfall</td>
<td>Central dry area</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>Rainfall</td>
<td>Central dry area</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Rice KDML 105</td>
<td>Rainfall</td>
<td>Strip around centre</td>
<td>-</td>
<td>Water Management</td>
</tr>
<tr>
<td>Rice (others)</td>
<td>Rainfall</td>
<td>Strip around centre</td>
<td>-</td>
<td>Water Management</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>Rainfall and temperature</td>
<td>No</td>
<td>-</td>
<td>Water Management</td>
</tr>
</tbody>
</table>

- The cultivation areas of rice and sugarcane are located in LOW suitability zones while cassava and maize are located in HIGH suitability zones.
- Water management is the main reason behind rice and sugarcane distributions in LOW suitability zone.
- Vulnerability in rice and sugarcane depends on water management efficiency.

Source: CIAT (2012)
Uncertainty and changes of suitability to 2050

<table>
<thead>
<tr>
<th>Items</th>
<th>Uncertainty</th>
<th>Suitability change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>Low</td>
<td>Stable</td>
</tr>
<tr>
<td>Maize</td>
<td>Moderate</td>
<td>High and Low suitability stable</td>
</tr>
<tr>
<td>Rice KDML 105</td>
<td>High</td>
<td>High and Low suitability stable</td>
</tr>
<tr>
<td>Rice (others)</td>
<td>High</td>
<td>High and Low suitability stable</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>Low</td>
<td>Stable</td>
</tr>
<tr>
<td>Durian</td>
<td>High</td>
<td>High and Low suitability stable</td>
</tr>
<tr>
<td>Longan</td>
<td>Moderate</td>
<td>Decease</td>
</tr>
<tr>
<td>Lychee</td>
<td>Low</td>
<td>Stable</td>
</tr>
<tr>
<td>Mango</td>
<td>Low</td>
<td>Stable</td>
</tr>
<tr>
<td>Mangosteen</td>
<td>Moderate</td>
<td>High and Low suitability stable</td>
</tr>
<tr>
<td>Oil Palm</td>
<td>Moderate</td>
<td>High suitability stable</td>
</tr>
<tr>
<td>Orange</td>
<td>Low</td>
<td>Decease</td>
</tr>
<tr>
<td>Pineapple</td>
<td>Low</td>
<td>Decease</td>
</tr>
<tr>
<td>Rubber</td>
<td>Low</td>
<td>Stable</td>
</tr>
<tr>
<td>Rambutan</td>
<td>Moderate</td>
<td>High and Low suitability stable</td>
</tr>
<tr>
<td>Soybean</td>
<td>High</td>
<td>High suitability stable</td>
</tr>
</tbody>
</table>

• The suitability changes of rice and maize are random while cassava and sugarcane’s suitability will be unchanged in 2050.

• Orange, pineapple and longan are more vulnerable to climate change.

Source: CIAT (2012)
Note: Using the A1B emission scenario (A balanced emphasis on all energy sources)
Climate Change (Accumulative) Impact Estimation

<table>
<thead>
<tr>
<th>Item</th>
<th>Change in yields (2010-2050)</th>
<th>Economic Impact: Direct calculation (Thousand baht)</th>
<th>Economic Impact: Surplus analysis (Thousand baht)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassava</td>
<td>2.67%</td>
<td>277,270</td>
<td>15,002</td>
</tr>
<tr>
<td>Maize</td>
<td>-11.28%</td>
<td>-1,850,799</td>
<td>-694,636</td>
</tr>
<tr>
<td>Rice KDML 105</td>
<td>3.60%</td>
<td>651,688</td>
<td>177,867</td>
</tr>
<tr>
<td>Rice (others)</td>
<td>0.48%</td>
<td>430</td>
<td>207,900</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>-4.33%</td>
<td>-2,209,014</td>
<td>-2,493,207</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>-3,130,425</td>
<td>-2,787,074</td>
</tr>
<tr>
<td>Durian</td>
<td>-49.36%</td>
<td>-2,697,929</td>
<td>-4,372,572</td>
</tr>
<tr>
<td>Longan</td>
<td>-98.22%</td>
<td>-1,281,148</td>
<td>-5,259,612</td>
</tr>
<tr>
<td>Lychee</td>
<td>-19.07%</td>
<td>-106,586</td>
<td>-130,615</td>
</tr>
<tr>
<td>Mango</td>
<td>-0.63%</td>
<td>-894,657</td>
<td>-80,000</td>
</tr>
<tr>
<td>Mangosteen</td>
<td>-7.92%</td>
<td>-180,947</td>
<td>-64,135</td>
</tr>
<tr>
<td>Oil Palm</td>
<td>-4.80%</td>
<td>-83,024</td>
<td>-32,895</td>
</tr>
<tr>
<td>Orange</td>
<td>-13.37%</td>
<td>-57,032</td>
<td>-16,025</td>
</tr>
<tr>
<td>Pineapple</td>
<td>-17.44%</td>
<td>-374,780</td>
<td>-122,834</td>
</tr>
<tr>
<td>Rubber</td>
<td>-125.64%</td>
<td>-1,123,283</td>
<td>-1,120,898</td>
</tr>
<tr>
<td>Rambutan</td>
<td>-0.70%</td>
<td>-76,173</td>
<td>-11,713</td>
</tr>
<tr>
<td>Soybean</td>
<td>2.40%</td>
<td>116,618</td>
<td>23,228</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td>-9,889,366</td>
<td>-13,975,145</td>
</tr>
</tbody>
</table>

Source: CIAT (2012)

Note: 1 Direct calculation assumes only yield has changed in the calculations while others remain unchanged.
2 Surplus analysis measures the total change in welfare of producers and consumers. In estimation, a partial equilibrium model with dynamic prices is used.

- The total economic impact of CC is between **9.8 to 13.9 thousand million bath**
- Projected yields of **Maize and sugarcane** will decline by 11.28% and 4.33%
- Projected **rice KDML 105** yield will increase by 3.6% BUT the study from FAO (2013) indicates that projected **rice** yield will decline by between 5% and 15%.
Agriculture Strategic Plan on Climate Change (ASPCC)

2017-2021
Strategic Issues in Agriculture Strategic Plan on Climate Change (ASPCC) 2017-2021

- Adaptation for enhancing climate resilience
- Building networks and collaborations
- Enhancing competitiveness in the world market
- Technology transforms towards environmental-friendly and low carbon production
- Sustainable Development
- Agriculture Strategic Plan on Climate Change (ASPCC) 2017-2021
Conceptual framework of ASPCC 2017-2021

National Development Plan

Sustainable Agriculture with Low Carbon

Adaptation Mechanism
Mitigation Mechanism

Information, Knowledge, and Technology

People Network Regulation Cooperation Budgeting system

Awareness Security Wealthy Sustainable

Climate Change Master Plan Agricultural Development Plan
**Agriculture Strategic Plan on Climate Change (ASPCC) 2017-2021**

**Vision** “Thailand’s agriculture has climate resilience and contributes to mitigate climate change problems under the sustainable development pathways”

**Missions**
1) Raising awareness of the impacts and convey information, knowledge and technology to development parties at all levels to enhance the readiness for climate change-related policies
2) Develop the database, knowledge and technology under the cooperation from all sectors to support the adaptation to climate change
3) Participate in mitigation of greenhouse gas emissions in the level consistent to the context of the agricultural sector and enhance a sustainable low-carbon growth
4) Pushing for the integration of adaptation measures and guidelines to cope with climate change in all sectors and at all levels levels

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection, development and setting up the database, knowledge and technology to raise the awareness of climate change</td>
<td>Increasing the ability of farmers, farmer institution, and related businesses to adapt to climate change.</td>
<td>Contribution in reducing greenhouse gas emissions and develop a growth model with friendly environment.</td>
<td>Strengthening the capacity of management to cope with climate change in agriculture</td>
</tr>
</tbody>
</table>
Integrating Climate Change Adaptation (CCA) into Agricultural Development Plan
Development and CC Policy Context (Linkages)

Climate Change Plans

CC Master Plan 2015-50
(แผนแม่บทรองรับการเปลี่ยนแปลงภูมิอากาศ ปี 2558-93)

Thailand’s NDC
(การมีส่วนร่วมที่ประเทศกำหนด)

Thailand’s NAP
(แผนการปรับตัวแห่งชาติ)

Development Plans

12th National Economic and Social Development Plan 2017-2021 (แผนพัฒนาฯ ฉ.12)

Agricultural Development Plan 2017-2021 (แผนพัฒนาการเกษตรฯ)

Agricultural Climate Change Strategic Plan 2017-2021
(ยุทธศาสตร์การป.ภูมิอากาศด้านการเกษตร)

Strategic Issues: Green and Sustainable growth

Strategic Issues: Climate Resilience and Green and Sustainable growth

Climate Change Framework in Agriculture Sector

การเชื่อมโยงแนวนอน (Horizontal Link)
Driving Forces of ASPCC 2017-2021

**Force 1**
- Impact Chain Analysis / Impact assessment (i.e., CCBA)

**Force 2**
- Adaptation and Mitigation Stock-takes (options)
- Adaptation and Mitigation Priorities
- Technology and Capacity building needs assessment
**Climate Change Action Plan**

1. **S1: Database**
2. **S2: Adaptation Actions**
3. **S3: Mitigation Actions**
4. **S4: Driving Mechanism**

- **1st Review: In-dept interview**
    - Review Adaptation & Mitigation options
    - Review Draft Multi-criteria Framework (identifying tools; CCBA and MCA)
  - Consultation Meetings: June-August 2017

- **2nd Review: Stock-taking and MCA**

- **Stock-taking**

- **Prioritization**

- **Multi-criteria Framework**

- **Tools: CCBA and MCA**

- **Action Plan: Adaptation & Mitigation Options/Actions** (September-October 2017)
Agricultural Climate Change Strategic Plan (ACCSP) 2017-2021

TDRI Team

CC Action Plan Framework (Thematic/ Flagship Projects)

CC Stocktaking and CC Action Plan (Thematic Projects): Jun- Aug 2017

KU Team

Capacity building on MCA Development (The Workshop on 7 Jun. 2017)

MCA developing (Set of Criteria) During 2nd workshop in Aug 2017

UNFCC Financial and Technology Supports

NAP Adaptation options in Agriculture

MoAC’s Priorities on Climate Change Actions

More Efficient budget allocations
Impact Chain Analysis in Context of Thailand’s Agriculture

Rising GHG concentration in the atmosphere

Climate drivers
- Temperature change
- Sea Level Rise
- Precipitation change

1st Hazards
- Changing temperature & extreme heat
- Stronger storms
- Changing rainfall & extreme precipitation

2nd Hazards
- Extreme/too high temperature
- Landslide soil erosion
- Drought

Exposure
- Out of pest and disease
- Soil infertility

Fishery/aquaculture
- crops
- livestock

Risk
- Higher water temperature cause stress & weaken aquaculture
- Too high temperature can reduce growth & yield
- High temperature can cause heat stress in livestock
- Emerging diseases in animals
- Insufficient water in river/lake/pond can reduce habitat
- Inhibit growth/ delay in germination/reduce yield
- Shortage of animal foods and water animals

Impact income & quality of life & livelihood of farmers

Mission
- Increase productivity
- Increase GDP in agriculture
- Reduce production cost
- Improve farmers quality of life

Crop/livestock/damaged Fishery resource
- Higher cost of production and management

Source: TDRI
Linkages of ASPCC 2017-21 and Line-department plans
Thematic Project

“Increase resilience in the agricultural sector towards drought”

Strategic Project of ASPCC 2017-2021
(Adaptation for Enhancing CC Resilience)

THEMATIC PROJECT 1

Livestock

Upstream

Research

Information

Technology

Midstream

Physical Infrastructure

Warning/Observing

Capacity Building

Management/ Planning

Downstream

Finance

• โครงการคัดเลือกและปรับพันธุ์พืชอาหารสัตว์เพื่อรองรับการเปลี่ยนแปลงสภาพภูมิอากาศ (ก.ปศุสัตว์)

Gap 1.1

• ฐานข้อมูลเสบียงอาหารและแนวโน้มช่วงเวลา

Gap 1.2

• พัฒนาระบบเทคโนโลยีสารสนเทศเพื่อการจัดการภัยแล้งด้านพุทธิปญญา

Gap 1.4

• บ่อจรา (ก.พัฒนาที่ดิน)

• สร้างนํ้าประจําไรนาบนพื้นที่ สป. (ส.ส.ก.)

•แหล่งนํ้าชุมชน (ก.วิชาการเกษตร)

• โครงการพัฒนาสุขภาพสัตว์พัฒนาระบบป้องกันแจ้งเตือนและบรรเทาผลกระทบจากภัยธรรมชาติ (ก.ปศุสัตว์)

• ระบบสํารองคลังเสบียงอาหารเพื่อป้องกันการขาดแคลนวัตถุดิบ

Gap 1.3

• คัดเลือกพันธุ์สัตว์ที่มีประสิทธิภาพการใช้อาหารที่ดี

• การเลือกพืชอาหารสัตว์ที่เหมาะสมกับแต่ละพื้นที่

• เพิ่มประสิทธิภาพการใช้น้ําในฟาร์มเลี้ยงโคนม

Practice/ Behavior

Gap 1.3
"Increase resilience in the agricultural sector towards drought"
"Increase resilience in the agricultural sector towards drought"

**Strategy 2 of ASPCC 2017-2021**
(Adaptation for Enhancing CC Resilience)

**Thematic Project 1 (Continued)**

**Research**
- Develop fish culture systems
- Breeding fish tolerant to hot and cold conditions

**Information**
- Develop an information system for managing fishing crises
- Warn about water to help farmers plan to raise fish in ponds
- Advise on food and fishing techniques during crises
- Find backup water sources
- Control water use and maintain water levels in ponds
- Adapt fishing behavior to cope with crises in the water cycle
- Promote mixed farming (Aquaponic)

**Technology**
- Developing disease-resistant fish (EMD)

**Physical Infrastructure**
- Develop systems for continuous recycling (Recycle) which reduce water use and reduce the risk of disease in fish
- Improve fish storage in ponds during dry season

**Warning/Observing**
- Develop an information and technology platform for early warning in ponds (kg.-province)

**Capacity Building**
- Develop the capacity for farmers and fish farmers to use new fish species

**Practice/Behavior**
- Encourage farmers to use new fish species

**Finance**
- Source funding to support changes such as recycling systems, disease-resistant fish, etc.

**Upstream**
- Research
- Information

**Midstream**
- Technology
- Physical Infrastructure
- Warning/Observing

**Downstream**
- Capacity Building
- Practice/Behavior
- Finance
Mahalo !!!