Economic Data Utilization in Implementation of Adaptation Actions: Thai's Agricultural Sector

Workshop for countries of Asia-Pacific region: Advancing National Adaptation Planning and Implementation of Adaptation in Asia-Pacific (Session 2.1: Panel discussion on data utilization and management in the implementation of adaptation actions)

15-16 February 2017 | Bangkok, Thailand

Akarapon Houbcharaun (Ph.d.)

Economist

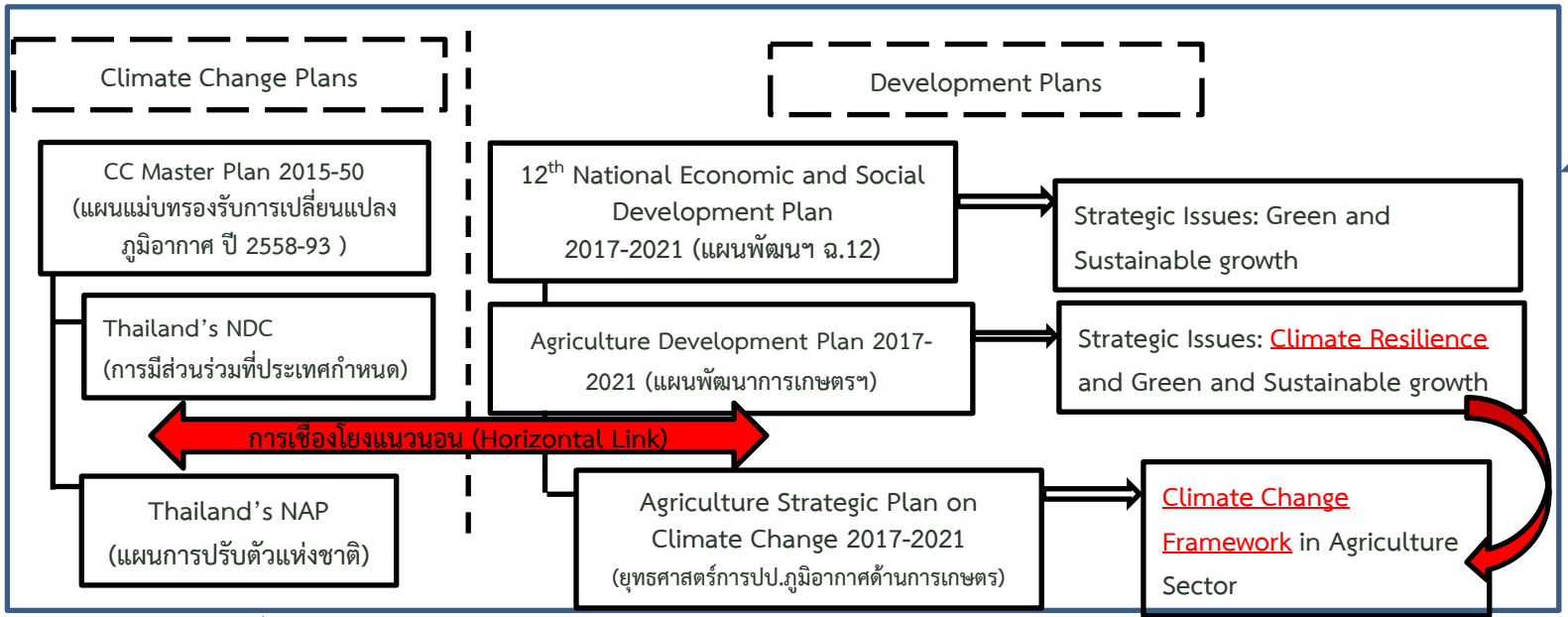
Office of Agricultural Economics

Ministry of Agriculture and Cooperatives

Email: akaraponh@gmail.com

Why is the economic data/information important for implementing adaptation actions ?

Reason 1: Policy Context (Climate Change Plans)



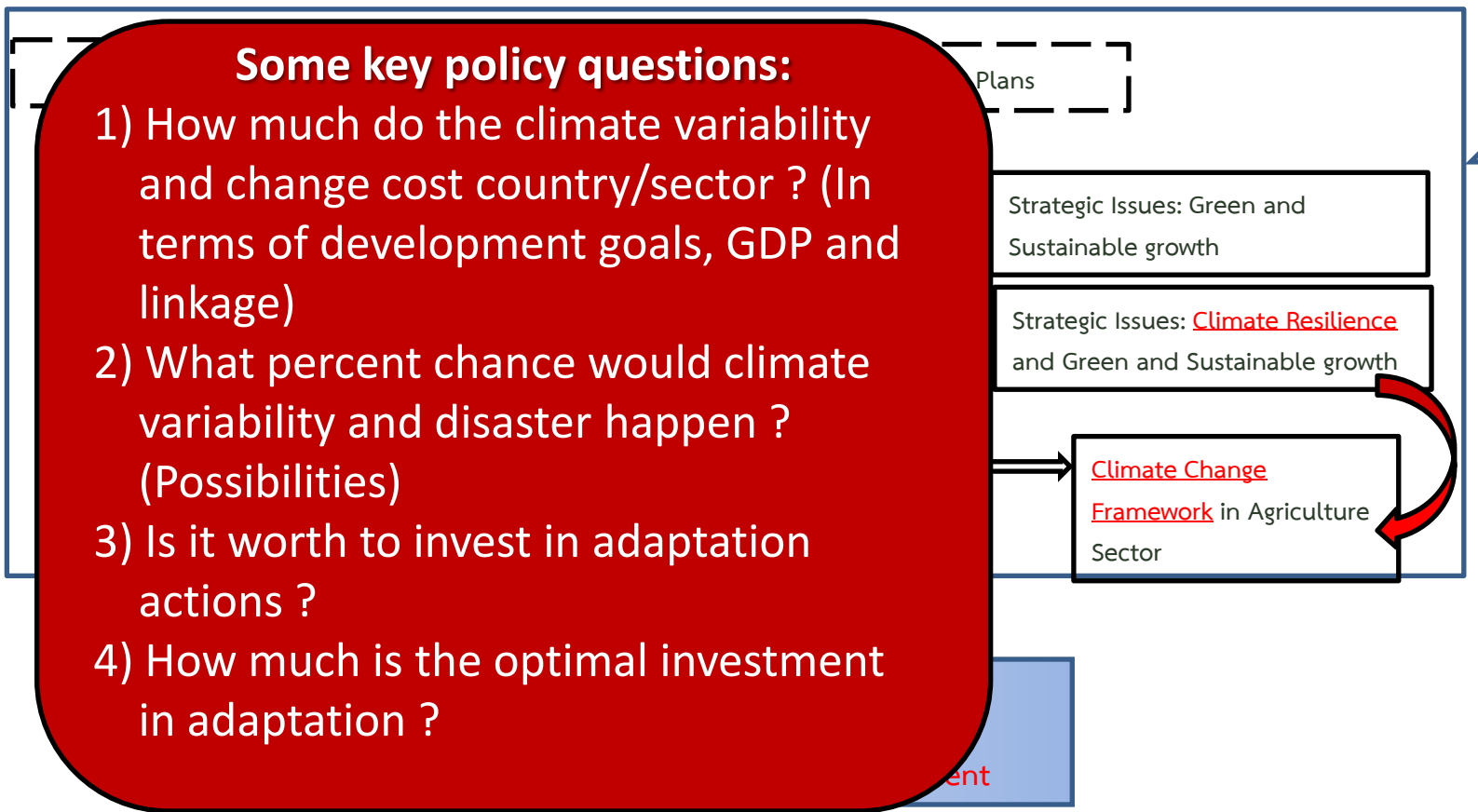
Force 1

- แผนปฏิบัติการ (Action Plan)
- Impact Chain Analysis/ Impact assessment
- Multi-criteria analysis (i.e., CCBA)

Force 2

- Adaptation and Mitigation Stock-takes (options)
- Adaptation and Mitigation Priorities
- Technology and Capacity building needs assessment

Reason 1: Policy Context (Climate Change Plans)



Some key policy questions:

1) How much do the climate variability and change cost country/sector ? (In terms of development goals, GDP and linkage)
2) What percent chance would climate variability and disaster happen ? (Possibilities)
3) Is it worth to invest in adaptation actions ?
4) How much is the optimal investment in adaptation ?

Reason 2: Farmer context

Climate conditions:
- Climate Change/ Extreme Event
- Climate Variability

(1) EWS and Impact assessment

(2) Vulnerability and Risk assessment

(3) Other economic signals i.e. Price signal

Increasing awareness

Perception/ Awareness

Agricultural Production:
-Small scale
-Plantation

Changing Behavior

Adaptation Options (Planned)

1. Agri. Insurance (weather)
2. Climate Smart Agriculture (Capacity building)
   - New Theory Agriculture
   - ……
3. Other Planned Adaptation
   - Investment in irrigation system (both small and large scale)
   - Agricultural zoning (suggested by suitability index)
4. …

Adaptation !!!

Autonomous and Planned Adaptation

Reason 2: Farmer context

Some key profit maximizing questions:

Recall: farmers always maximize income/profits

1) How much do the climate variability and change cost farmer ? (In terms of profit, income and livelihood)
2) What percent chance would climate variability and disaster happen ? (Possibilities)
3) Is it worth to invest in/ adopt new adaptation technologies/ practices ? (climate tolerance seeds and climate smart practices)

Adaptation Options (Planned)

1. Agri. Insurance (weather)
2. Climate Smart Agriculture (Capacity building)
   - New Theory Agriculture
   - ……
3. Other Planned Adaptation
   - Investment in irrigation system (both small and large scale)
   - Agricultural zoning (suggested by suitability index)
4. …

Adaptation !!!

Autonomous and Planned Adaptation

Example 1: Suitability and impact assessment

This project was conducted in 2012

To address some policy and farmers' max profit 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 ?

Farmers' max profit question:

1) Are they vulnerable to climate change (slow-onset events) ?

Vulnerability Assessment by OAE

Current climate suitability

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

Source: CIAT (2012)

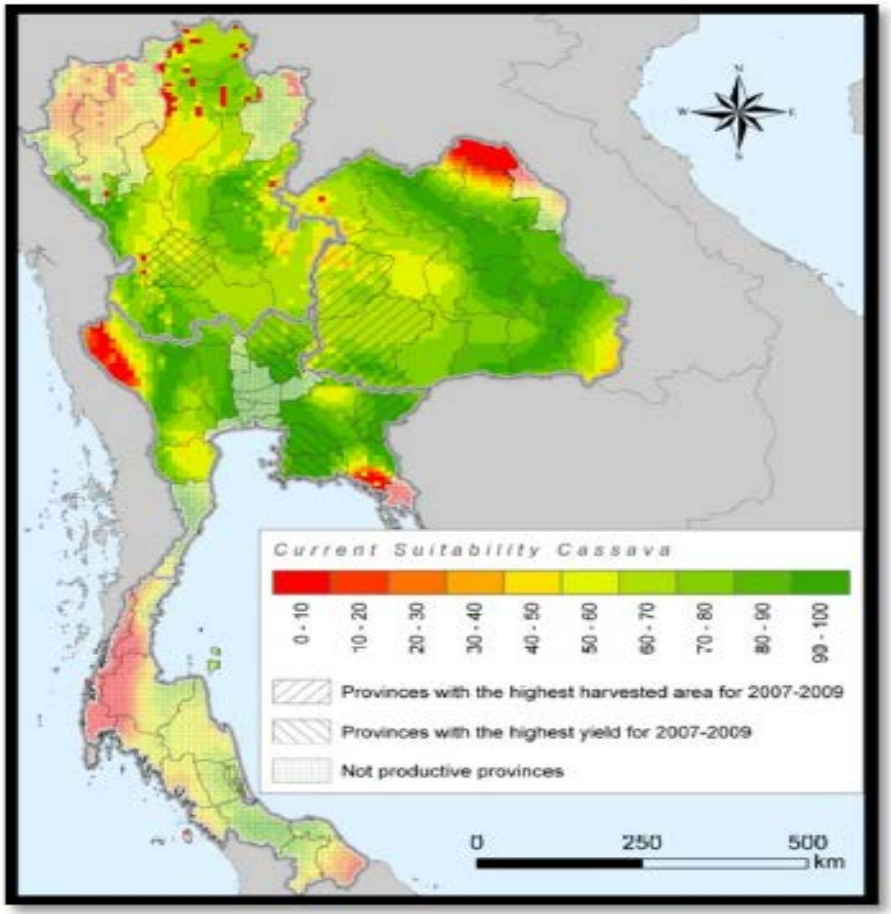


Figure 3.2 Suitability of cassava in the current environment as assessed by Ecocrop

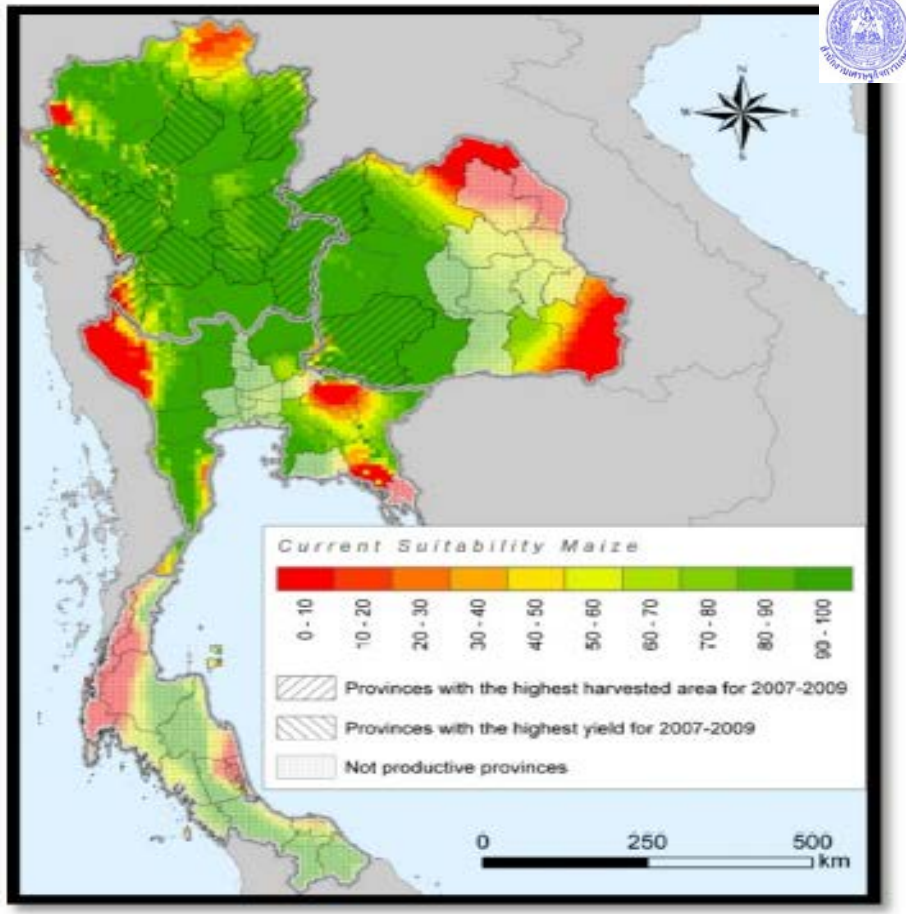


Figure 3.3 Suitability of maize in the current environment as assessed by Ecocrop

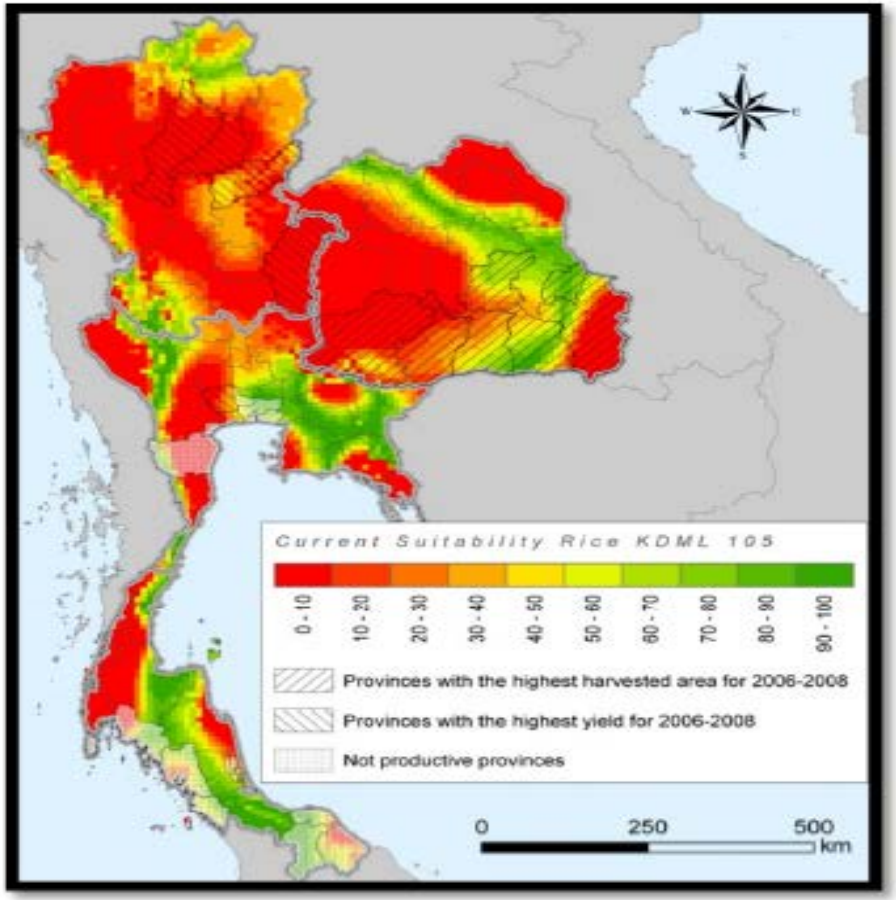


Figure 3.15 Suitability of rice, KDML105 variety in the current environment as assessed by Ecocrop

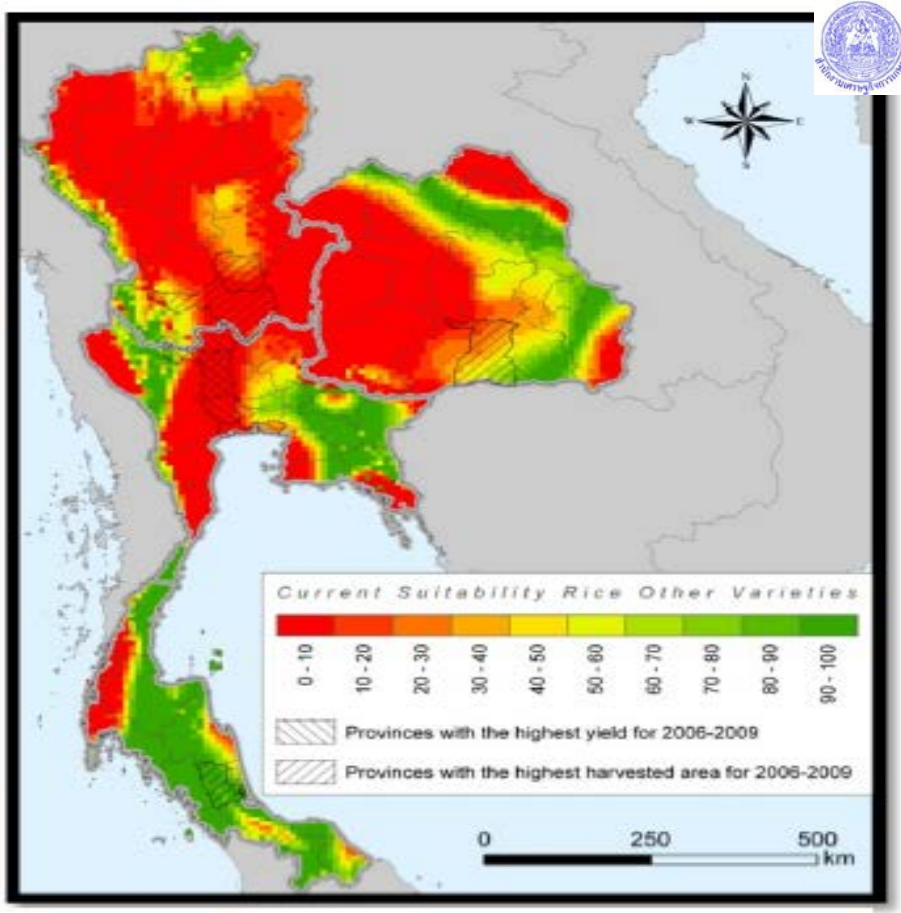


Figure 3.16 Suitability of rice, other varieties in the current environment as assessed by Ecocrop

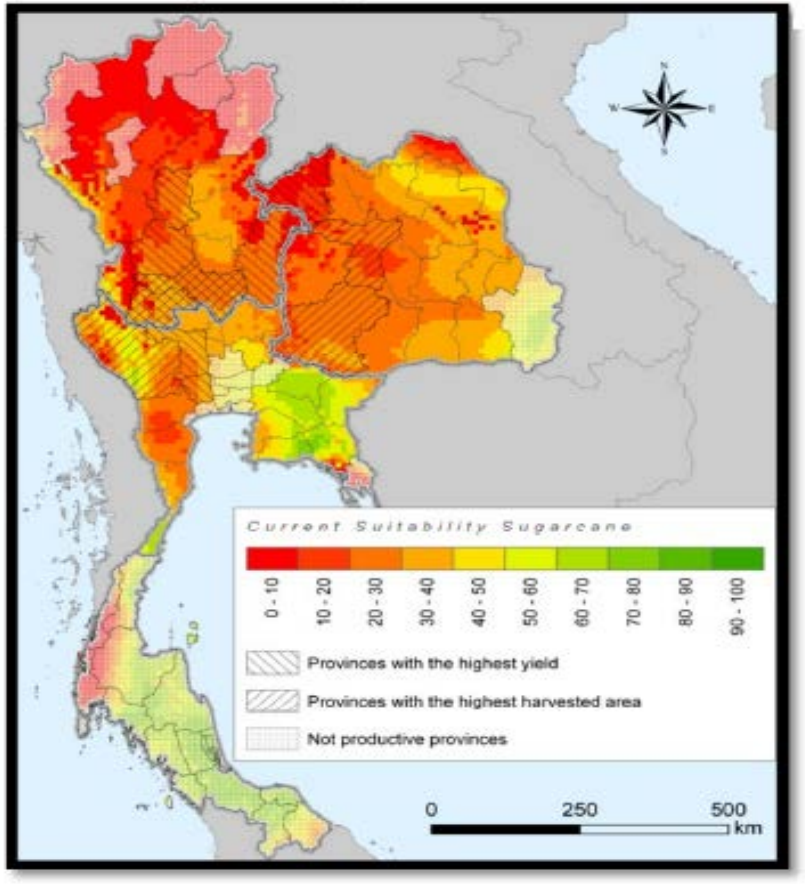


Figure 3.17 Suitability of sugarcane in the current environment as assessed by Ecocrop

Uncertainty and changes of suitability to 2050

Items	Uncertainty	Suitability change
Cassava	Low	Stable
Maize	Moderate	High and Low suitability stable
Rice KDML 105	High	High and Low suitability stable
Rice (others)	High	High and Low suitability stable
Sugarcane	Low	Stable
Durian	High	High and Low suitability stable
Longan	Moderate	Decease
Lychee	Low	Stable
Mango	Low	Stable
Mangosteen	Moderate	High and Low suitability stable
Oil Palm	Moderate	High suitability stable
Orange	Low	Decease
Pineapple	Low	Decease
Rubber	Low	Stable
Rambutan	Moderate	High and Low suitability stable
Soybean	High	High suitability stable

Source: CIAT (2012)

Note: Using the A1B emission scenario (A balanced emphasis on all energy sources)

Climatic Impact Estimation

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

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.

Example 2: Climate Change Benefit Analysis: CCBA

This project was conducted in 2014-2015

To address some policy and farmers' max profit questions:

Policy Questions:

1) Is it worth to invest in adaptation actions ?

2) How much is the optimal investment in adaptation ?

PS: PPT slides from Dr. Pawin Talerngsri (UNDP-Thailand)

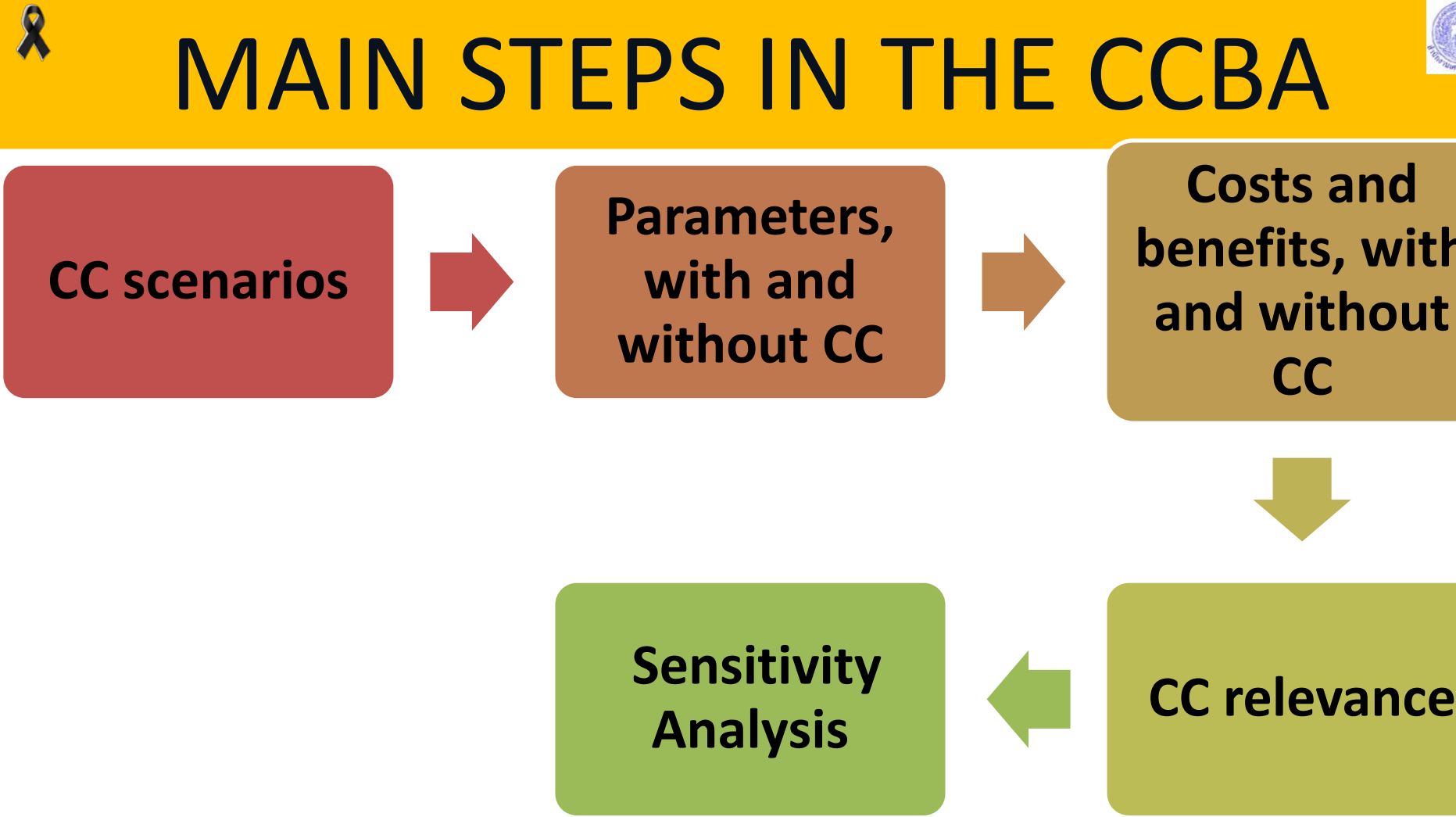
Difficulties:

1) Requiring capacity building in how to do CCBA

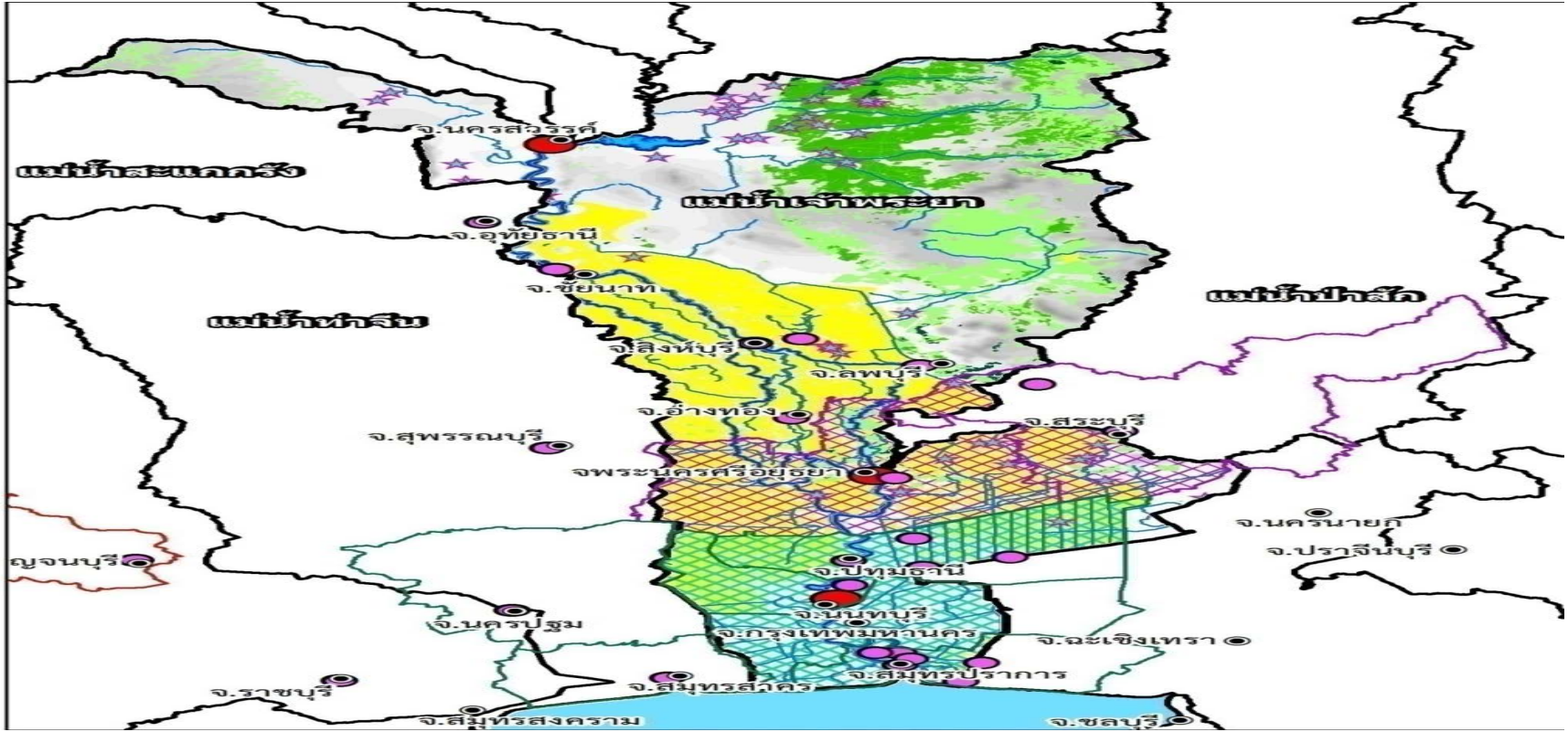
2) Requiring national budget framework for CC relevant projects in budgeting process

3) Requiring down-scaling risk and impact assessments for project appriasal

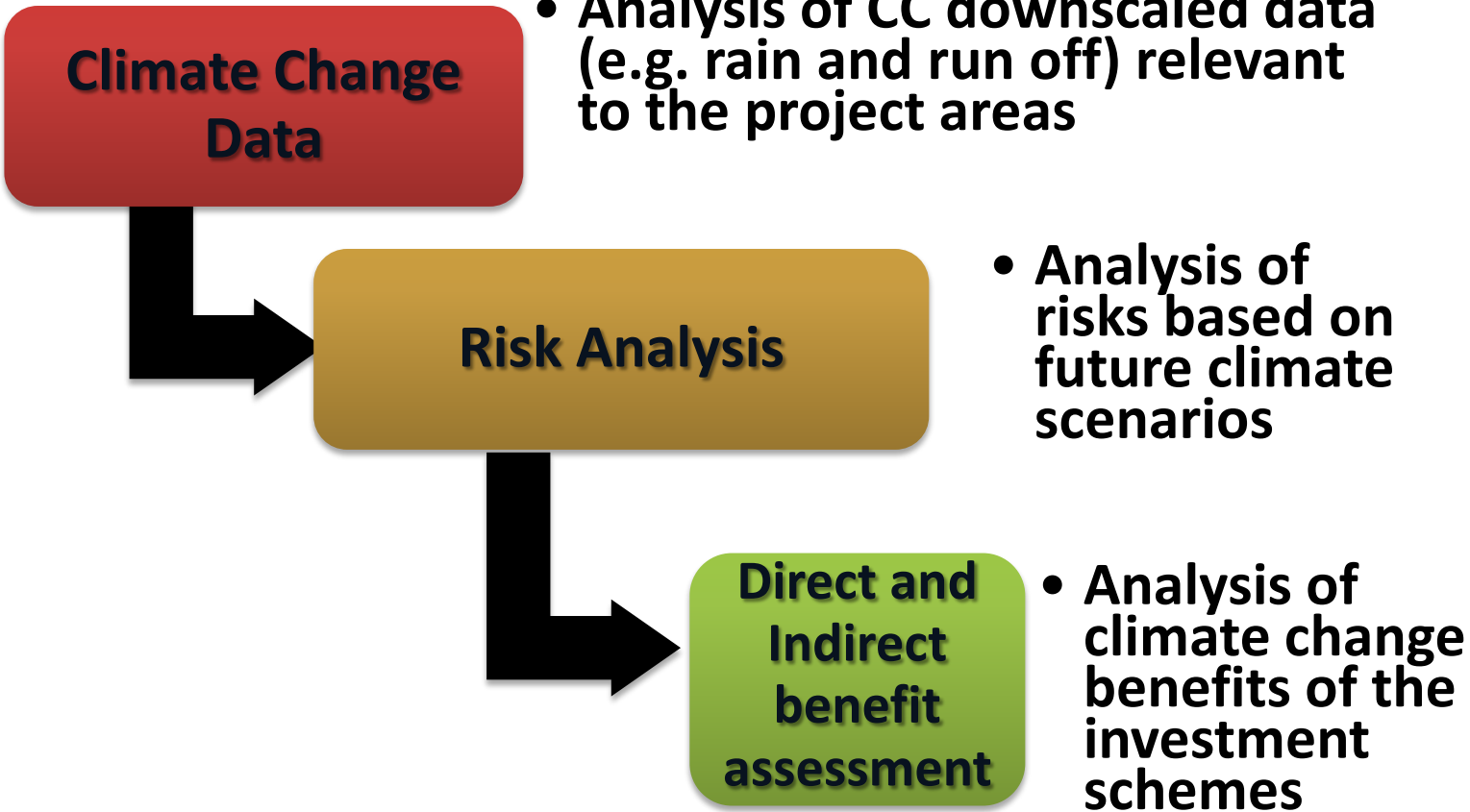
MAIN STEPS IN THE CCBA



CCBA Example: Flood Diversion Scheme

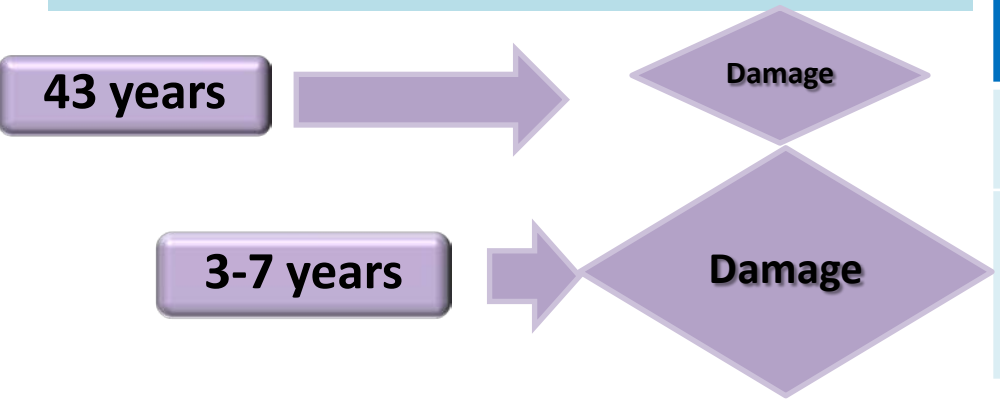


Flood Diversion Canal: Irrigation Project



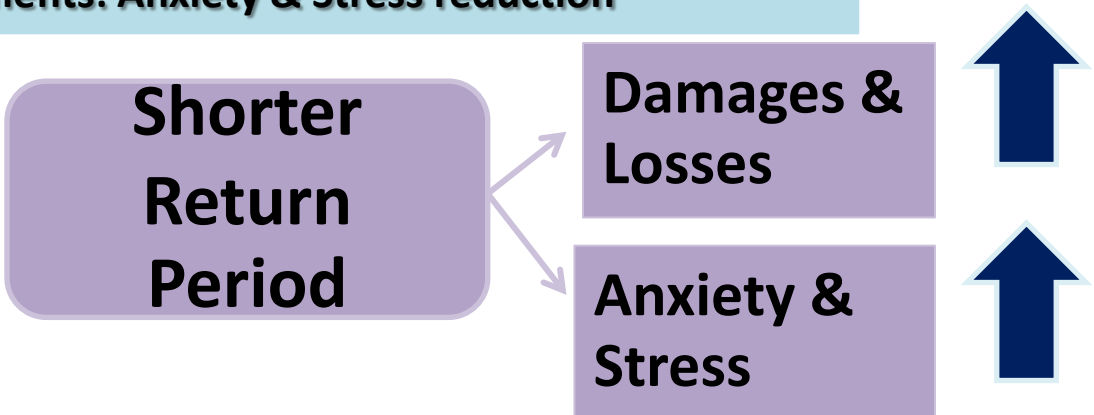
Result: Flood Diversion Canal Project

Direct Benefits: Damages and Losses



	Loss (M USD)	Flood Area (Ha)
Without Climate Change	734	265,774
With Climate Change (Changes of Return Period)	1,826	341,938

Indirect Benefits: Anxiety & Stress reduction



Direct Benefits

WITHOUT CLIMATE CHANGE

Metric	Figure
Cost	63,180 Million Baht
Benefit	77,307 Million Baht
EIRR	14.52%
NPV	14,126 Million Baht
B/C ratio	1.22

WITH CLIMATE CHANGE

Metric	Figure
Cost	63,180 Million Baht?
Benefit	294,973 million baht
EIRR	43.91%
NPV	231,793 million baht
B/C ratio	4.67

Implication for greater financing: Redesign of the scheme for climate proofed infrastructure!!!

Example 3: Water supply and crop switching

This project was conducted in 2016-2017

To address some policy and farmers' max profit questions:

Policy Questions:

1) How much does the water supply variability impact to GDP ?

2) What are the best crops (in terms of economics and bio-physical) in water-shortage year ?

Farmers' max profit question:

1) What is the best option (crops) for maximized profit in water-shortage year ?

Thank you