Adaptation initiative in Indonesia and impact assessment on agriculture

22nd AIM WS@NIES, Japan
Dec. 10, 2016

Yuji Masutomi
Ibaraki University

Collaboration with

Funded by

Background

- Mr. Abe, the prime minister of Japan, promised to support adaptation planning and actions in developing countries in his speech of the UN Climate Summit 2014
  - "Japan's Adaptation Initiative"

UN Climate Summit 2014

- Indonesia was selected as the first country where the initiative is implemented.

- A research team was organized and a research project, funded by MOEJ, has started in Jun 2015.
  - 3 years project (until Mar. 2018)

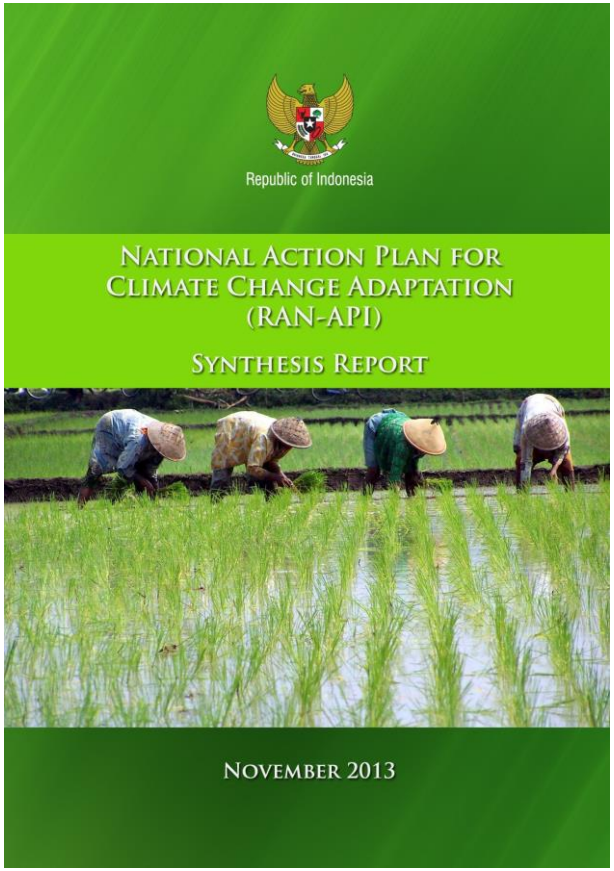
Support adaptation planning and actions

Mr. Abe

東京大学 THE UNIVERSITY OF TOKYO
茨城大学 Ibaraki University
NIPPON KOEI Challenging mind, Changing dynamics
Udayana University
INSTITUT PERTANIAN BOGOR
BOGOR AGRICULTURAL UNIVERSITY

National Adaptation Plan (NAP) in Indonesia

- The Indonesia Climate Change Adaptation Strategy and Action Plan (**RAN-API**) has been developed and launched in February 2014.
  - Identifies climate change and its impacts
  - Provides policy direction
  - Explains implementation mechanism
    - coordination and funding
    - monitoring, evaluation, review, and report
  - Pilot sites selection
    - to develop local adaptation strategy and plan



The level of climate change risks in Indonesia by region (modified from the data of ICCSR and SNC documents)

Risks	Sumatra	Java-Bali	Kalimantan	Sulawesi	Nusa Tenggara	Maluku	Papua
Decrease in water availability	M, H, VH	H, VH	L, M	H, VH	H, VH	L, M	L
Flood	H, VH	H, VH	L, M, H	L, M, H	L	L	L, M
Drought	H, VH	H, VH	L	L, M	L, M, VH	L	L
Coastal inundation	M, H	M, H, VH	M, H, VH	M, H	M, H	M, H	M, H
The spread of dengue fever	L, M, H	L, M, H	L, M	L, M	L, M	L, M	L, M, H
The spread of Malaria	L, M	L, M, H	L, M	L, M, H	L, M, H, VH	M, H	M, H, VH
The spread of Diarrhea	L, M, H	L, M, H	L, M, H	L, M, H	L, M, H	L, M, H	L, M, H, VH
Decrease in rice production	H, VH	H, VH	-	-	H, VH	-	-
Forest fires	M, H, VH	M, H	-	-	-	-	-

Note: L: Low; M: Moderate; H: High; VH: Very High

The next step is to develop Regional Adaptation Plan (RAP)

Objective and process

- Give scientific evidence on regional future CC impacts and to develop effective adaptation scenarios
  - in North Sumatra, East Java, and Bali
- Capacity building for sustainable planning and actions on adaptation
- Develop a guideline for developing regional CC adaptation strategy
  - to apply the strategy to other countries and regions

Team members

- **The University of Tokyo:**
  - ✓ Coordination of the and communication with MOEJ
  - ✓ Impacts assessment on health impact
- **National Institute for Environmental Studies (NIES):**
  - ✓ Future climate projections based on climate models
- **Ibaraki University:**
  - ✓ Impact assessments on agriculture
- **Nippon Koei:**
  - ✓ Overall coordination and guideline development
  - ✓ Impact assessments on water resources
- **Local consultants (Profs. Pasaribu and Osawa):**
  - ✓ Support and coordination of field survey etc.

Agricultural Impact Assessment by Ibaraki Univ.

Abstract of our activity

1. **Purpose**
   I. Regional assessments of climate change impacts and adaptation effects **on agriculture** in Indonesia

2. **Target provinces**
   I. Bali, North Sumatra, East Java.
      a. over Indonesia, if possible.

3. **Target crops**
   I. Rice
   II. Other crops

Today's topics

① Analyze climate-rice production relationship at Bali islands

② Develop a statistical model based on the relationship on Bali islands

③ Correlation of ENSO and IOD with monthly precipitation over Indonesia

Climate and crop data

① Climate data

- A global-scale climate data: WFEDI provided by ISI-MIP project.
  - We are trying to get down-scaled climate data from BMKG.

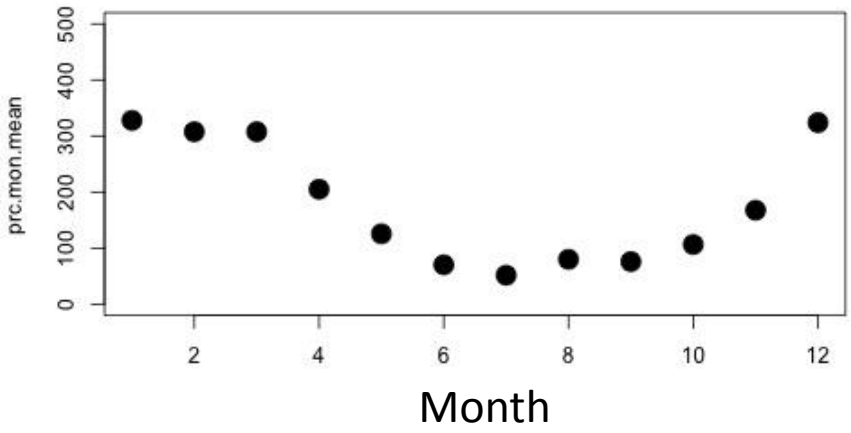
② Rice production data

- We collected rice production data at a district level from AIAT and DINAS.

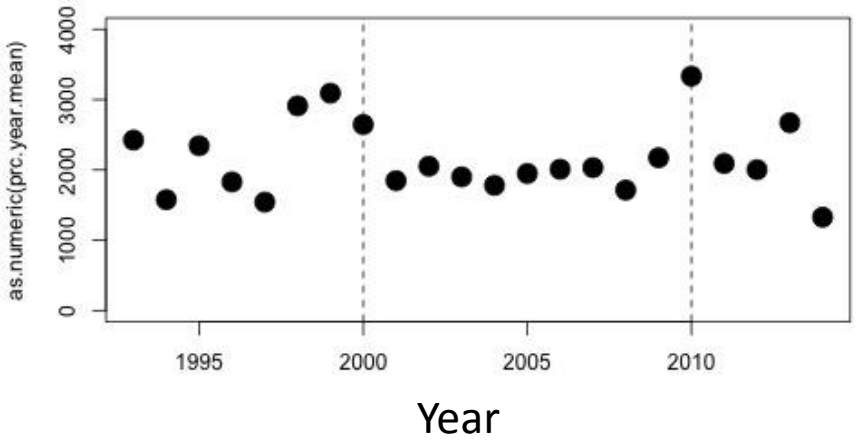
STATE	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
N Sumatra	×	×	×	×	×	×	×	×	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×
E Jawa	×	×	×	×	×	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	×
Bali	○	×	○	○	×	○	○	○	○	○	○	×	○	○	○	○	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Climate in Bali

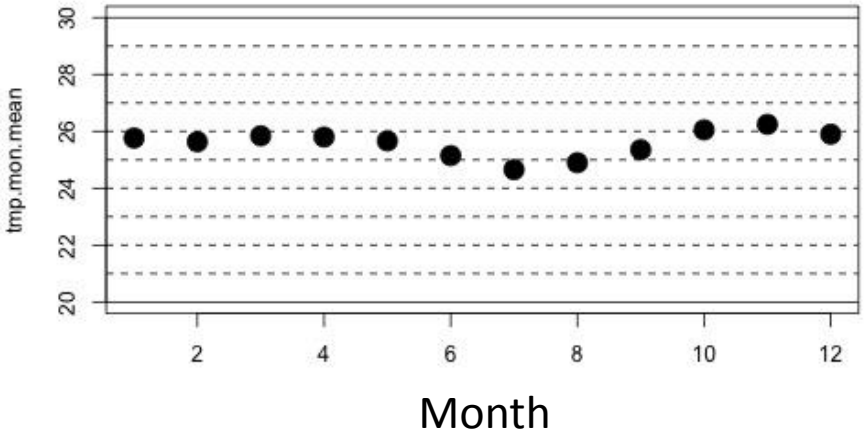
Monthly precipitation



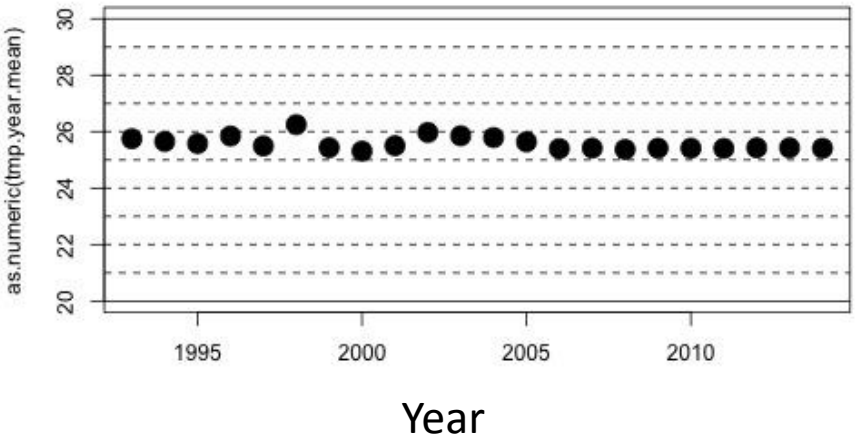
Yearly precipitation



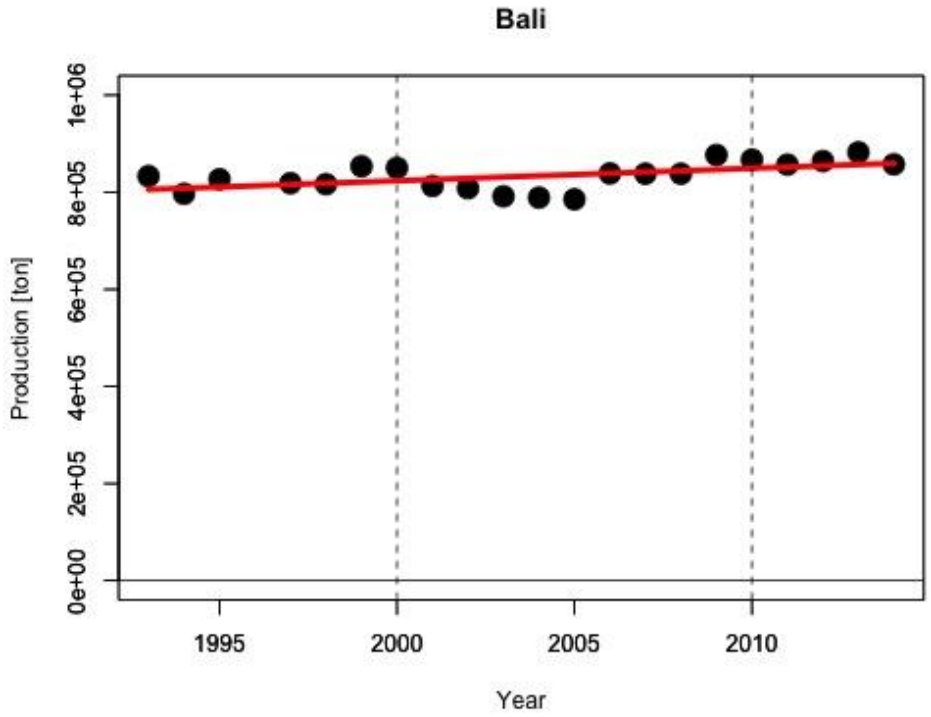
Monthly temperature

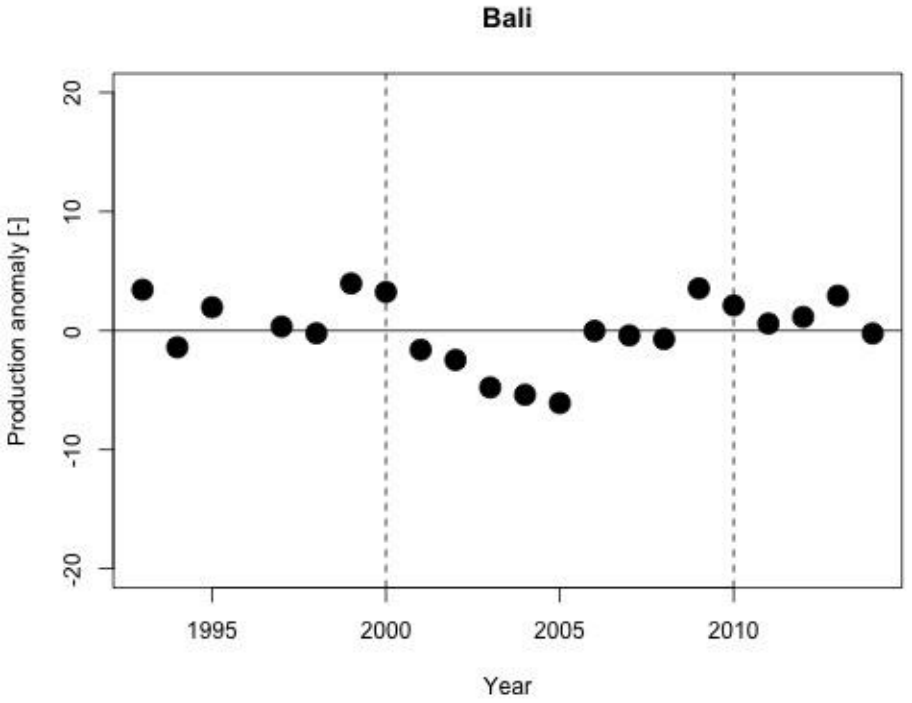


Yearly temperature

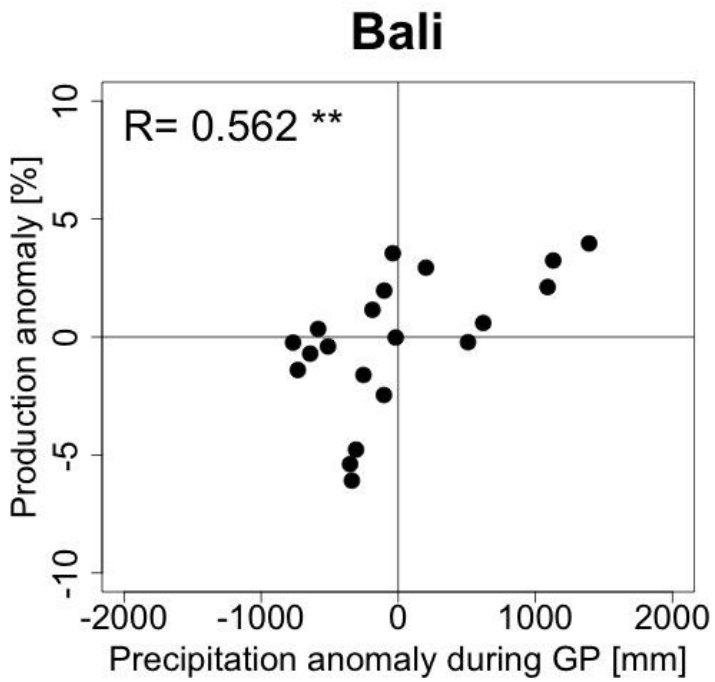


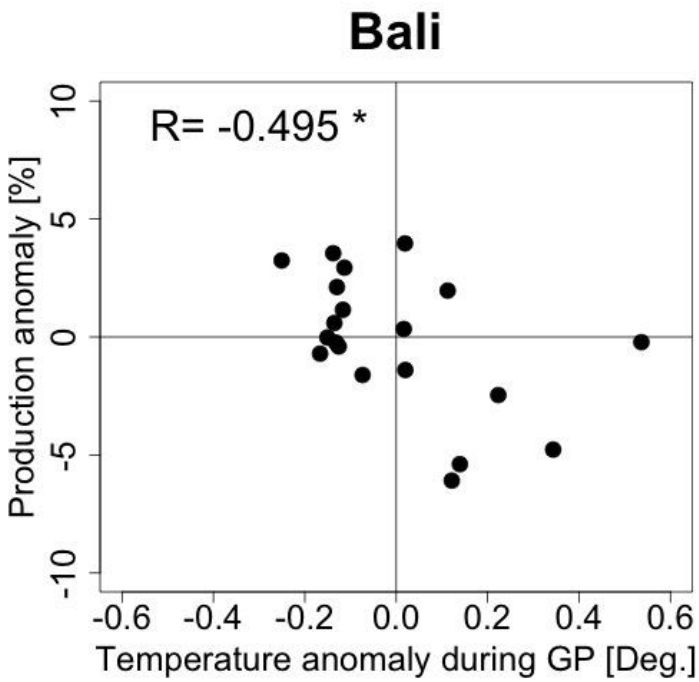
Rice production in Bali





①Analysis of climate-rice production

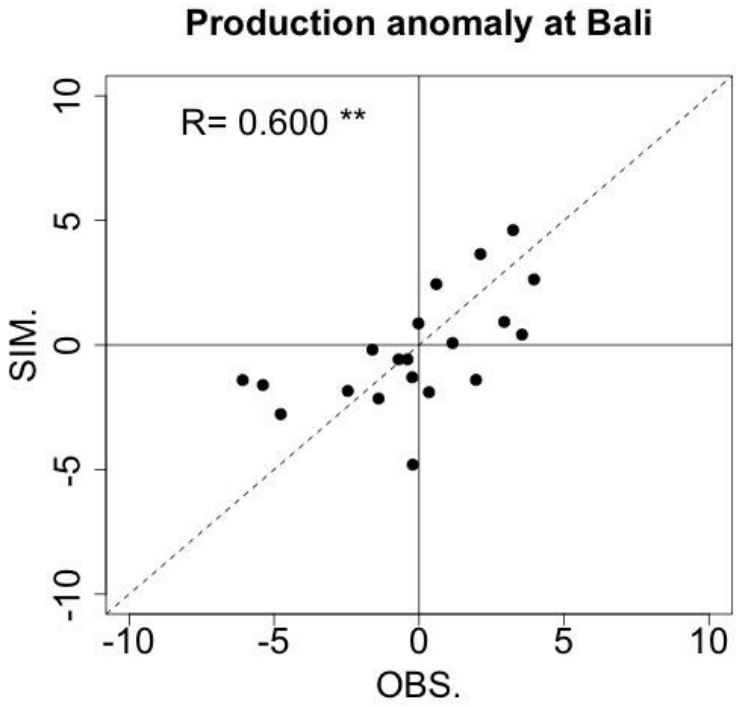




- We found that
  - ① positive correlation between precipitation and rice production
  - ② negative correlation between temperature and rice production

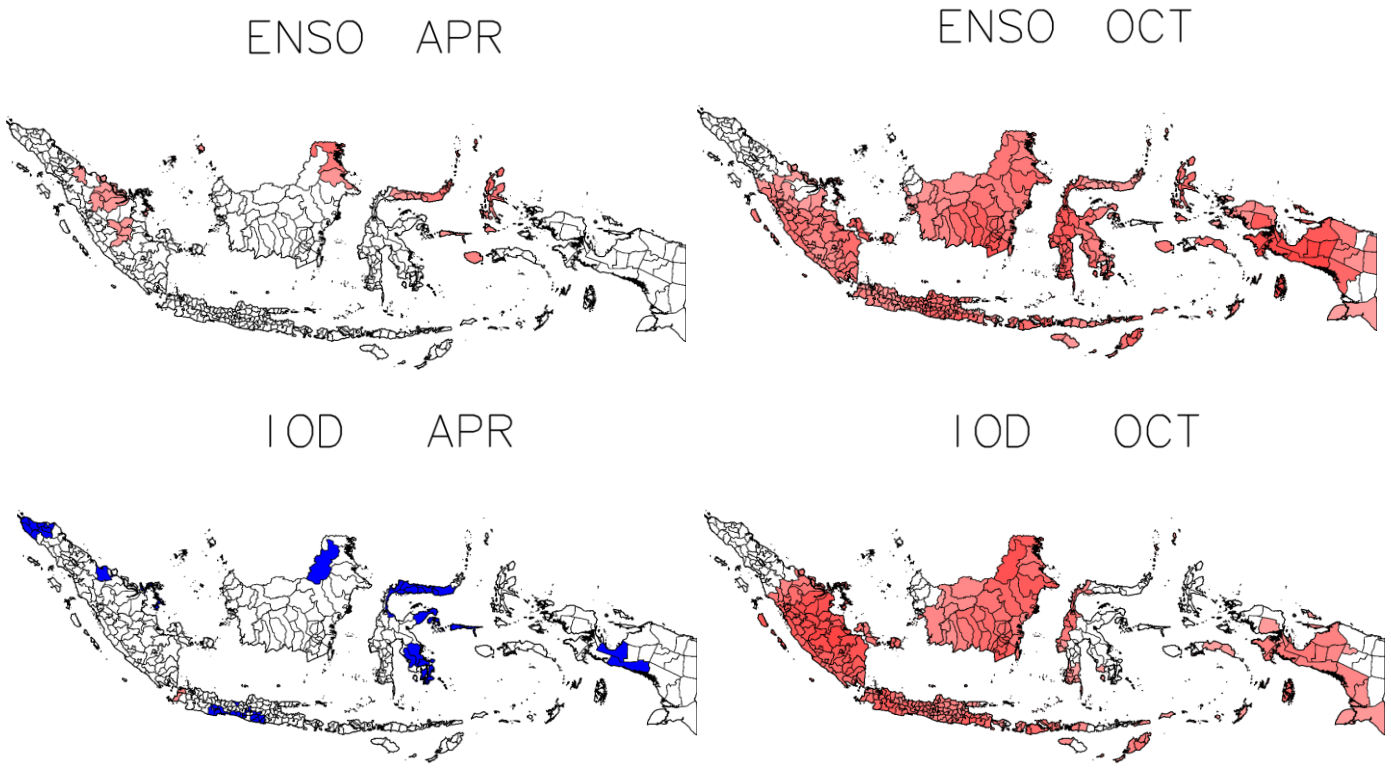
② Model development

- **Multivariable Linear Model**
  - **Pro** = a***Pre** + b***Tmp** + c



The model can accurately predict rice production using precipitation and temperature.

③Correlation of ENSO and IOD with monthly precipitation



Correlation of ENSO and IOD index with monthly precipitation (Red: negative; Blue: positive)

1. Information at a district level is useful for local policy making and adaptation
2. Using ENSO and IOD prediction, we can easily predict precipitation

Nest steps

① Climate data

- We are trying to get down-scaled climate data
- We will re-develop the model

② Impact assessment

- Using the model and **future climate projections**
- You will see it soon!

Thank you for your attention