Role of Scientific Community in Supporting Climate Resilience Agriculture Development in Indonesia

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INTRODUCTION

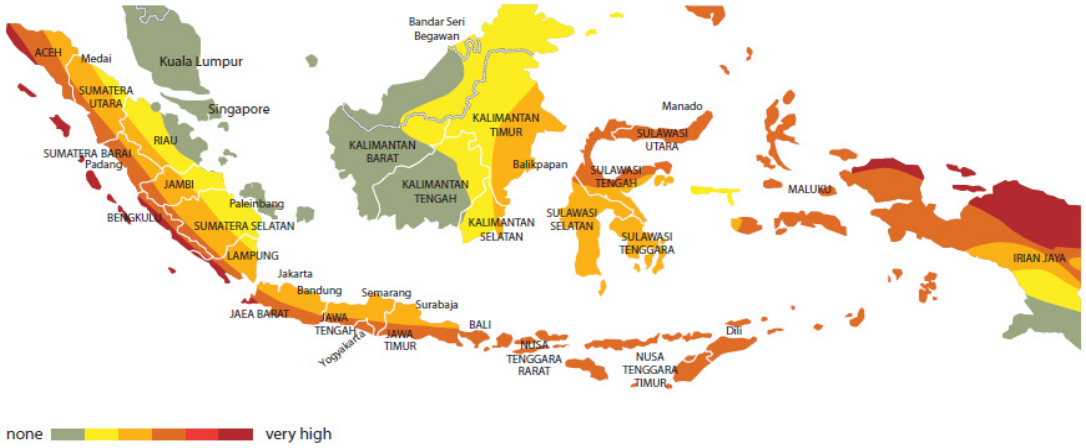
- Agriculture, particularly food crops in its many different forms and locations remains highly sensitive to climate variations. The El Nino Southern Oscillation (ENSO) phenomenon, with its associated cycles of drought and flooding events, has caused serious agriculture production drops in Indonesia
- Farmers will need to produce significantly more food on less land, with less water, using less energy, fertilizer and pesticide
- To adapt to climate change and ensure food security, major interventions are required to transform current patterns and practices of food production, distribution and consumption.
- The scientific community has an essential role to play in informing concurrent to establish climate-resilient agricultural

ROLE OF AGRICULTURAL SECTOR IN INDONESIA

- Source of food + 250 million peoples
- Provide raw materials for small and medium industries (87%)
- Contributing 14.72% of GDP
- Foreign exchange US$ 43,37 Billions
- Absorb 33.32% of total labors
- Main source of rural households income (70%)
- Contribute to reduce GHG emission Based on President Decree #. 61 & 71/2011

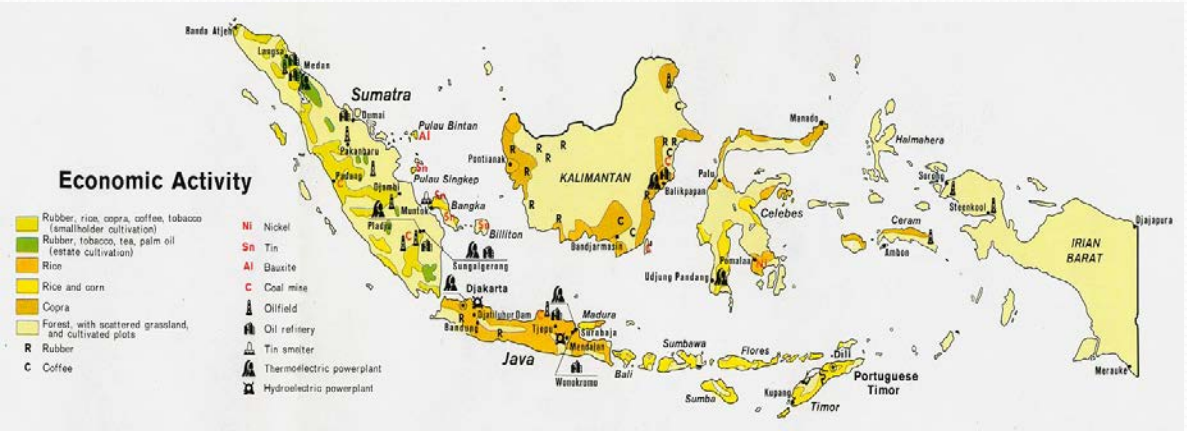
WHY INDONESIA'S AGRICULTURE IS VULNERABLE TO CLIMATE CHANGE

Figure 1: Degree of exposure to natural hazards



none very high

Source: UNOCHA, 2006



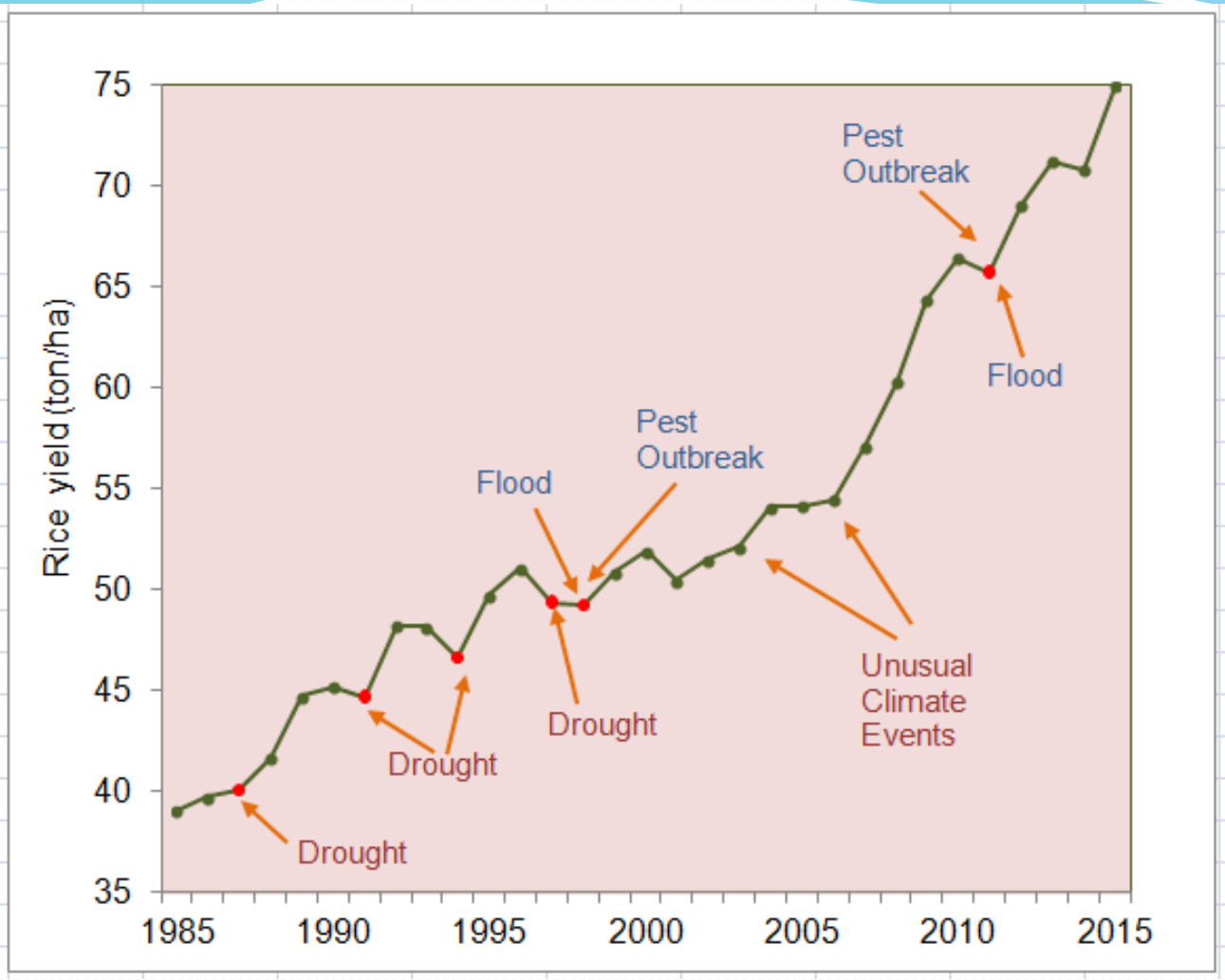
Indonesia is also one of the world's most vulnerable regions to climate change, due to its long coastlines, high concentration of population and economic activity in coastal areas.

The poor communities that live on the coast and those dependent on agriculture will greatly be affected by droughts, sea-level-rises, floods, and landslides (World Bank, 2010).

The economically productive growing areas, Java, Southern part of Sumatra, and Bali are particularly vulnerable to the effects of climate change (World Bank, 2009).

Forms of Climate Change Impacts in Agriculture

- **Continuous impact**: temperature raise, change in rainfall amount and pattern, increase salinity of ground water, change in cropping season
- **Discontinuous impacts:** Crop failures due to extreme weather conditions and increased pests and diseases infestation
- **Permanent impact**: Decreased farming areas in coastal areas due to sea level rise

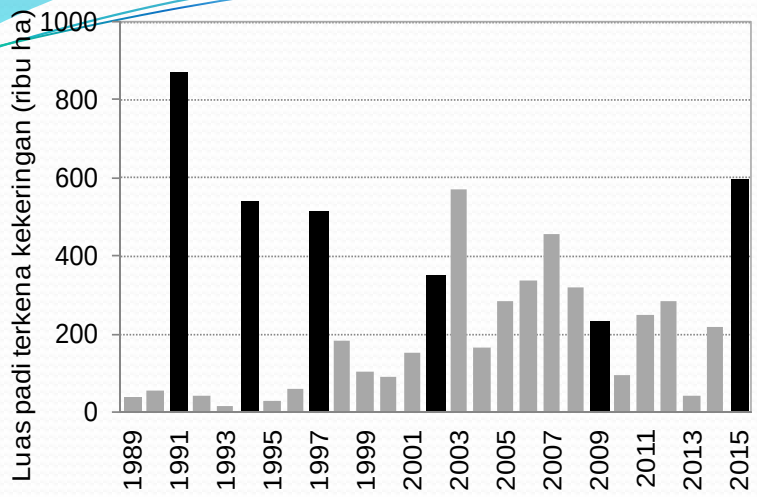


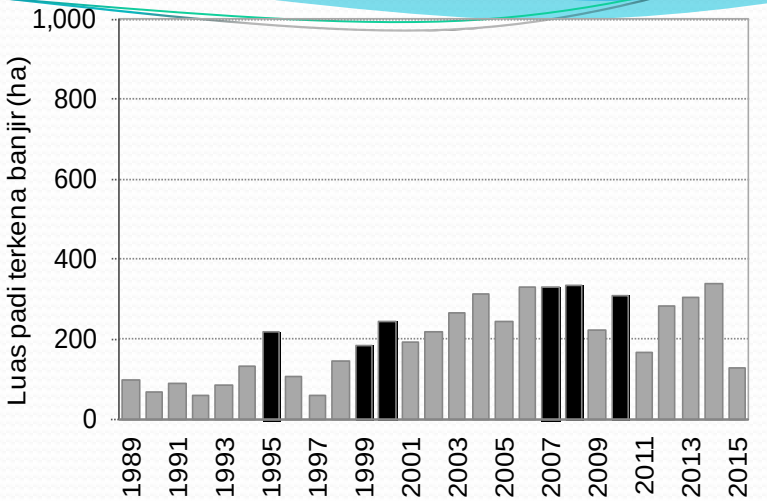
Indonesia's rice production during 1985-2015 (source : BPS)

Changes in temperature, amount of carbon dioxide (CO_2), and the frequency and intensity of extreme weather could have significant impacts on crop yields.

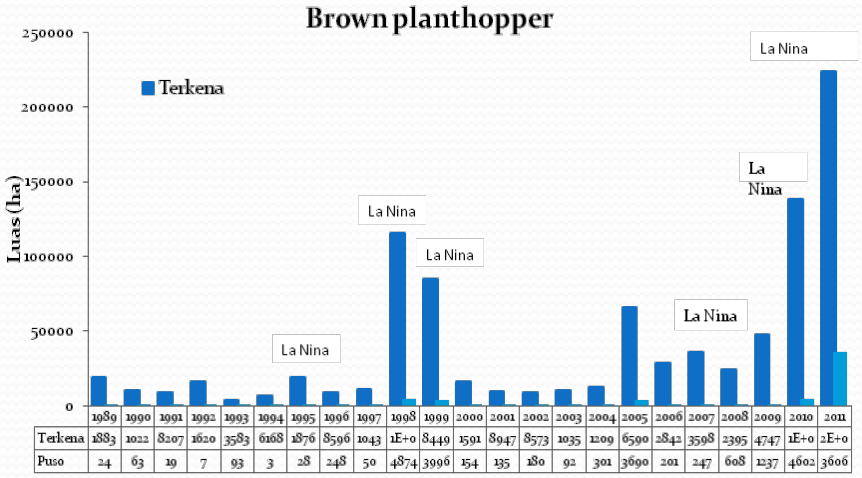
Despite technological improvements that increase rice yields, extreme weather events have caused significant yield reductions in some years.

Paddy damage areas due to drought and flood during 1989-2015

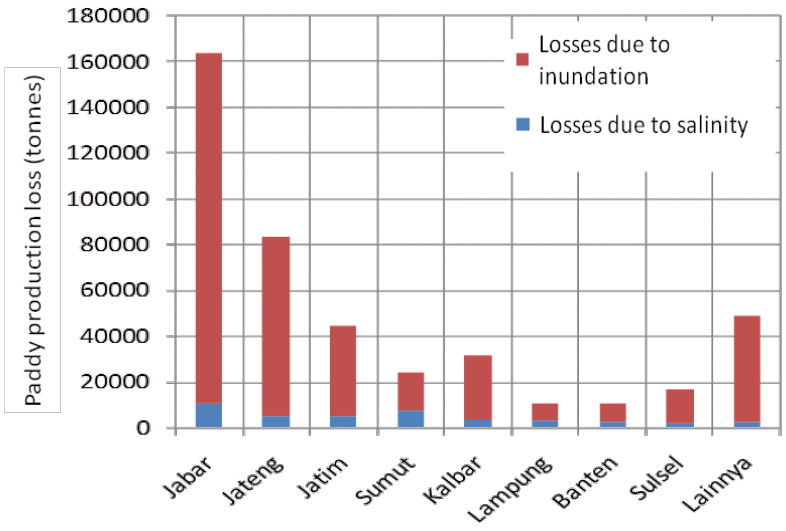




Extreme events, especially floods and droughts, can harm crops and reduce yields. For example, each of moderate and strong El Nino events, causing paddy damage area more than 500 thousands ha. The damage is less during La Nina



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Terkena	1883	1022	8207	1620	3583	6168	1876	8596	1043	1E+0	8449	1591	8947	8573	1035	1209	6590	2842	3598	2395	4747	1E+0	2E+0
Puso	24	63	19	7	93	3	28	248	50	4874	3996	154	135	180	92	301	3690	201	247	608	1237	4602	3606



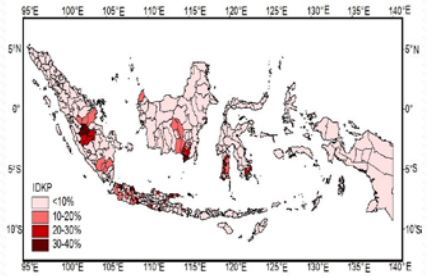
Potential rice production loss due to 1 m sea level rice (http://cigrasp.pik-potsdam.de/maps/)

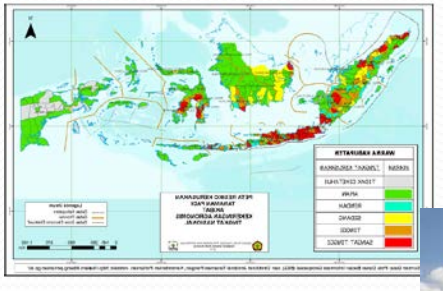
Rice production loss due to inundation and salinity (Foesrter, 2011)

Role of Scientific Community

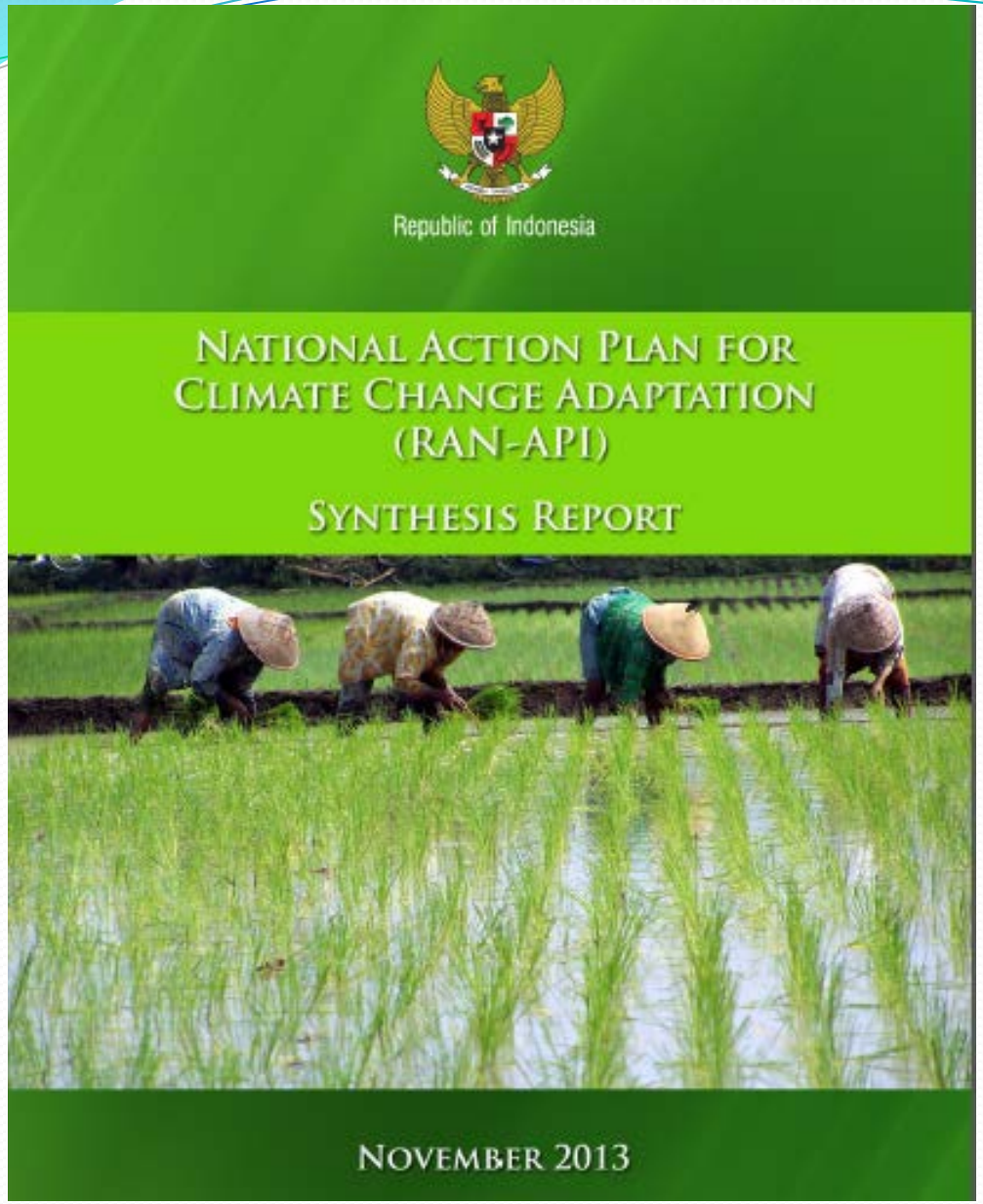
- Integrate climate resilient agriculture program into national policies
- Support evidence-based policy-making by quantifying vulnerability of agriculture to climate change and forecasting outcomes for agricultural adaptation and mitigation.
- Raising awareness of decision maker, extension workers, and farmers to address the impact of climate risk
- Develop adaptive technology to overcome climate risks

Activities of scientific community to address impact of climate risks in agriculture





1. Integrate climate resilient agriculture program into national policies



a national action plan document on adaptation to the impacts of climate change, which involves integrated coordination among all the stakeholders :
Including

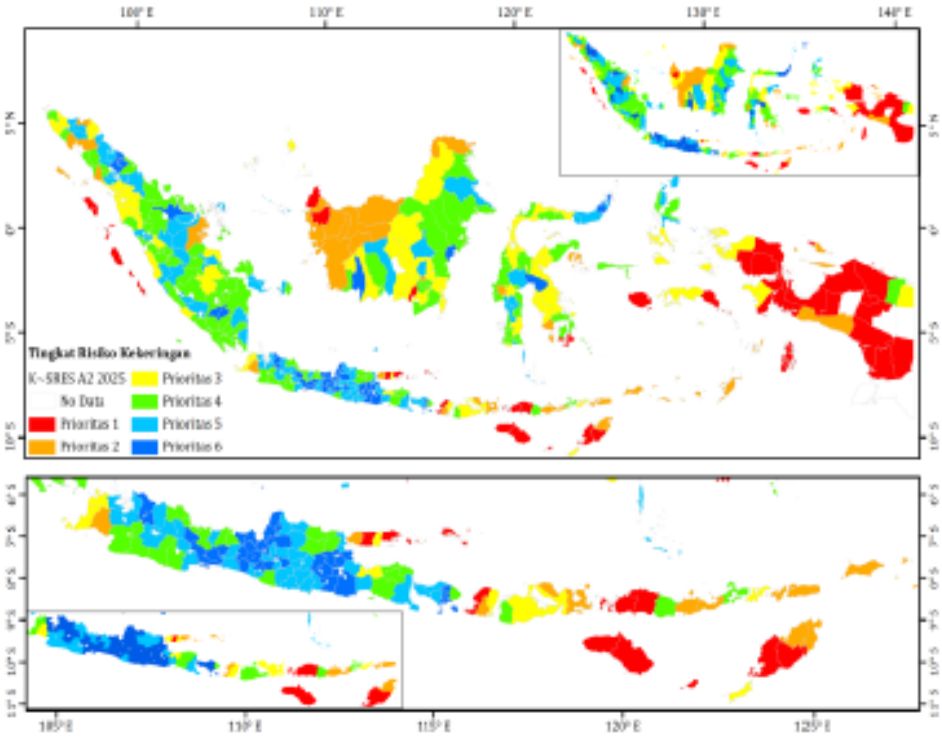
- The government agency
- Scientific community
- Civil society organizations,
- Local goverment
- Public and Private organizations

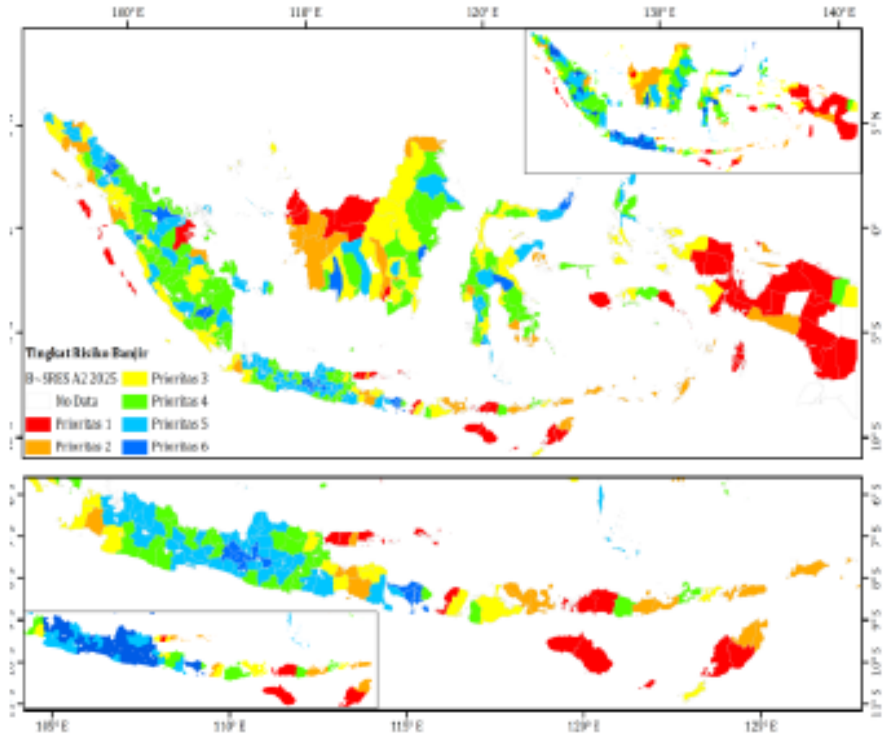
Cordinated by
National Development Planning Agency (Bappenas)

2. Mapping vulnerability of agriculture region to climate change

Agriculture Vulnerability and Risk

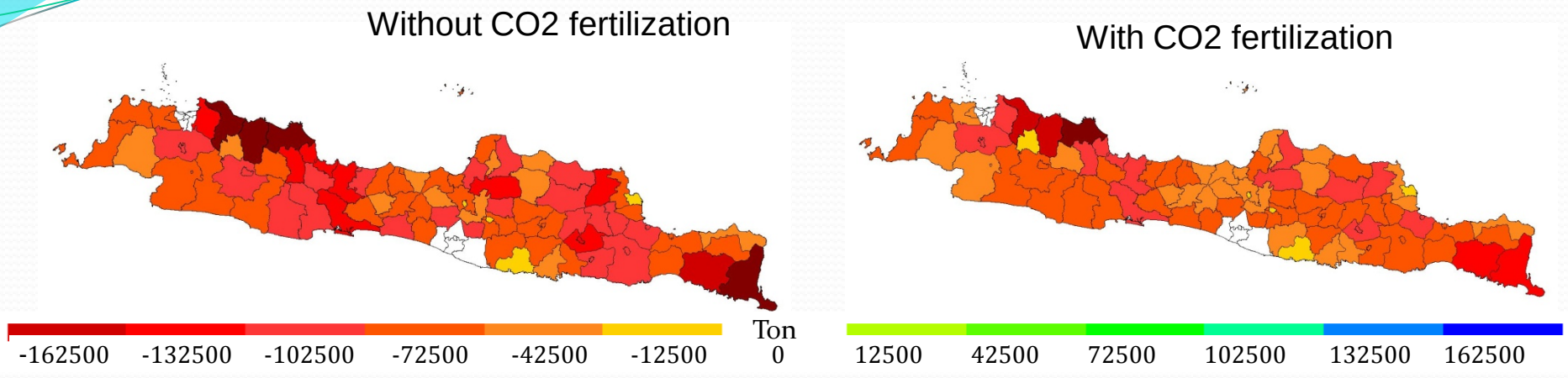
(WFP, BKP 2010 and Bappenas 2013)



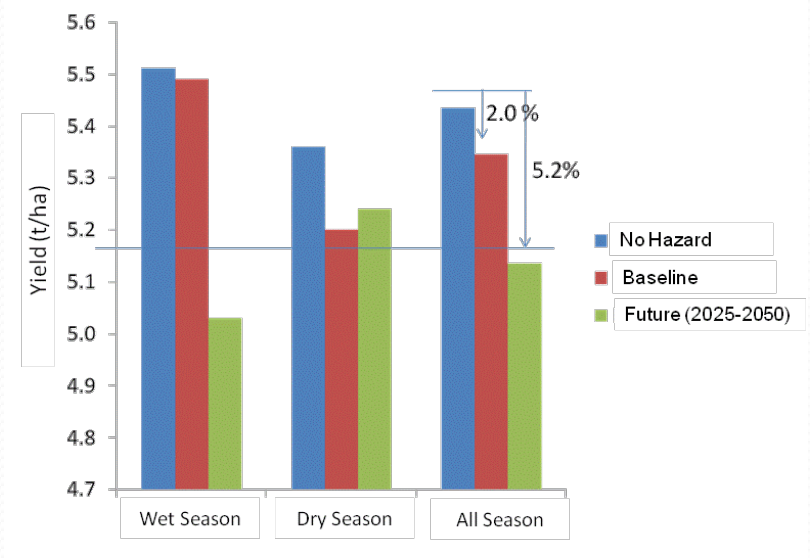


→ to guide adaptation plan and pilot into priority areas

2. Mapping vulnerability of agriculture region to climate change



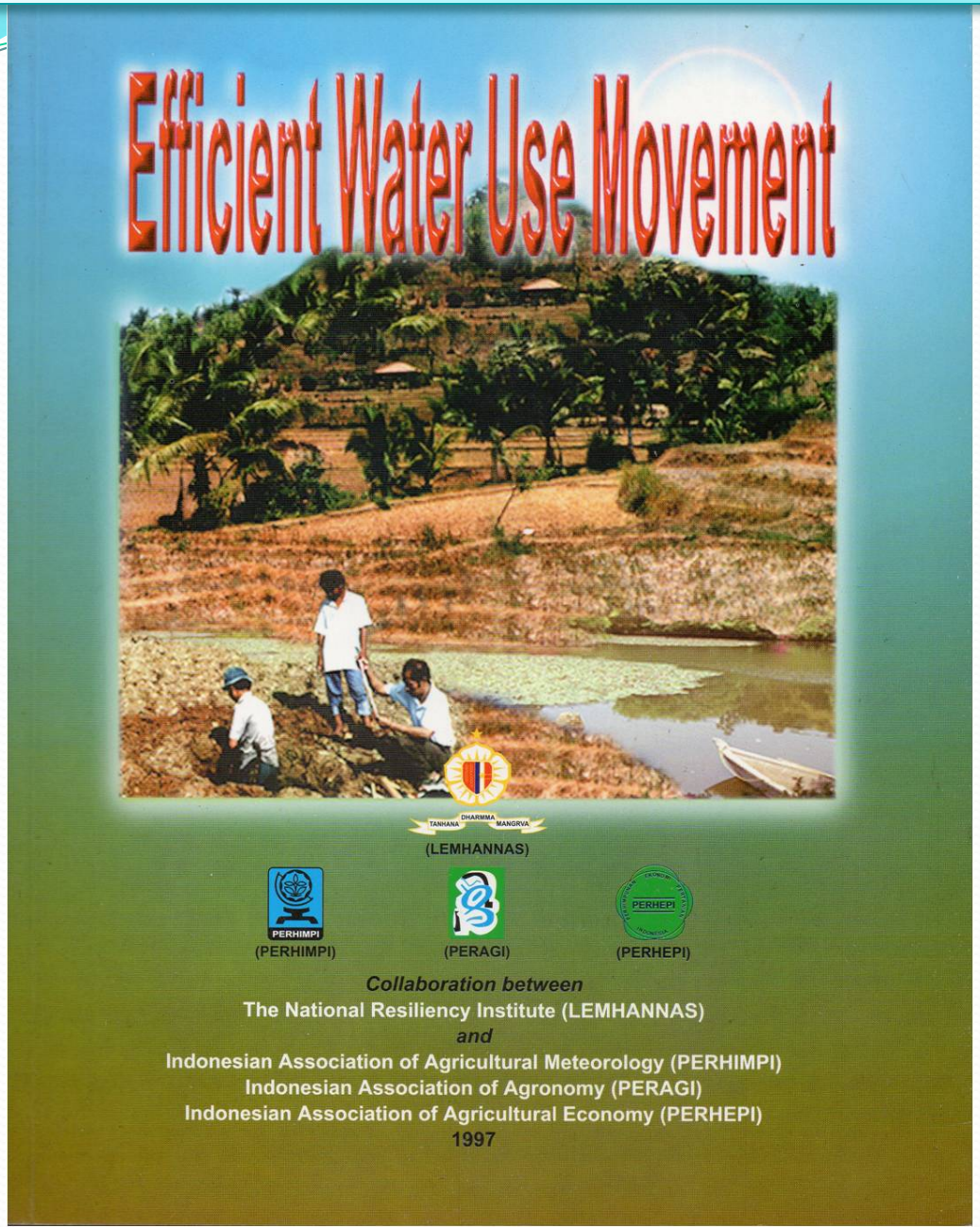
Changes in rice production by district in 2025 due to increasing temperature and CO2



Projected decrease in rice yield due to extreme climate events in Brantas watershed, East Java.

Source : CC consortium IAARD, 2010

3. Efficient Water Use Movement



Initiated by PERHIMPI collaborated with PERHEPI and PERAGI in panel discussion on " Anticipation and long term prevention of drought " held in Sukamandi 26-27 August in 1994

As concern the seriousness of drought hazard against on food security.

Approach ;

1. Startegic (side identification)
2. Tactical (prediction)
3. Operational (monitoring and adapataton)

Makassar Declaration, 19 October 2016

MoA, PERHIMPI, Ministry of Public works, BMKG, dan Farmer groups released **Makassar Declaration**

“Encourage public awareness in managing water for agriculture more effectively, efficient and to be utilized as much as possible for the prosperity of the people”.

Climate Working Group

Scientist from MoA, IPB, ITB, PERHIMPI, BMKG, government agency

- 2-3 times a year give recommendation to decision maker regarding operational adaptation strategy for the coming planting season

4. Climate Field School (CFS)

- BMKG , IPB, Ministry of Agriculture, University of Indonesia
- develop capacity of farmers in using climate information for managing climate risks.
- MoA has implemented more than 300 unit CFS since 2002-2008
- CFS Programs are considered to be a well-structured and effective vehicle to provide farmers with o gain knowledge and specific farming skills for adaptation.

5. ICCIS WEBSITE WETSEASON 2014/2015. VERSION 2.0
(www.katam.litbang.pertanian.go.id)

INTEGRATED CROPPING CALENDAR

Version 2.0

Rain Season
October 2014 - March 2015

(PS I 2014/2015 - PS II 2015)

Android Version

SMS Center:
+62 82 123 456 500
+62 8 123 565 1111

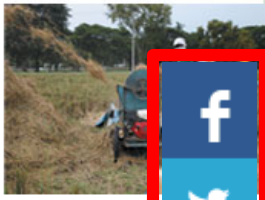
ENTER

Scan & Download

Indonesian Agency for Agricultural Research and Development
MINISTRY OF AGRICULTURE
2014







INTEGRATED CROPPING CALENDAR INFORMATION SYSTEM CONTAINS THESE INFORMA

- Estimated time and area of planting rice, maize, and soya bean
- Estimates of flood-prone areas, drought and pest attacks
- Recommended varieties and seed requirements
- Recommendations and fertilizer requirements
- Recommendations of agricultural mechanization
- Planting Info - agricultural extension centers
- Swampland Cropping Calender
- NEW Online monitoring crop conditions using CCTV
- NEW Standing Crop for Paddy Filed in Jawa and Bali Island

INFORMATION AVAILABLE AT DISTRICT LEVEL FOR ALL INDONESIA PROVINCES

New information

SCIENCE . INNOVATION . NETWORKS

BMKG LAPAN

WHAT DECISION CAN BE SUPPORTED BY ICCIS?

The guidance or tools to preparedness or planning farming activities. It provides the spatial and tabular information about:

- **Rainfall and season prediction,**
- **Start of time planting,**
- **Cropping pattern,**
- **Potential of planting area,**
- **Potential of flood and drought area,**

- **Potential of pest and disease infestation**
- **Recommendation of fertilizer,**
- **Recommendation of seed and variety**
- **Mechanization**

- **There have been information for paddy, maize and soybean for more than 7000 Sub Districts**
- **ICCIS is updated 2 times a year (February for DSP and September for WSP)**

6. Improvement of Water Resource and Irrigation Management

To cope with water scarcity problem during dry season, researchers from MoA along with local authorities have developed and introduced

- Rainfall and run off harvesting technologies,
- Drip irrigation for flat dry land area and dry climate
- Big gun sprinkler
- Farm reservoir
- Gravitation irrigation
- Cascading channel reservoir

expected to reduce drought risk and to increase planting index from 1.0 to 2.0-3.0

Channel reservoir Tampala Parangloe, Maros, West Sulawesi

Food Smart Village

FROM NOTHING TO SOMETHING :
Oebola Village – East Nusa Tenggara

FOOD SMART VILLAGE is a rural livelihood that pursue food self-sufficiency by applying innovative agriculture on the marginal land.

1. Find water
2. Use and equitable sharing
3. Work together to build the channel
4. Do not be wasteful
5. Maintain upstream
6. Intensified farming

Identification of Potential Climate and Water Resources (Watershed skace – Plot)

Water Resources exploration and exploitation

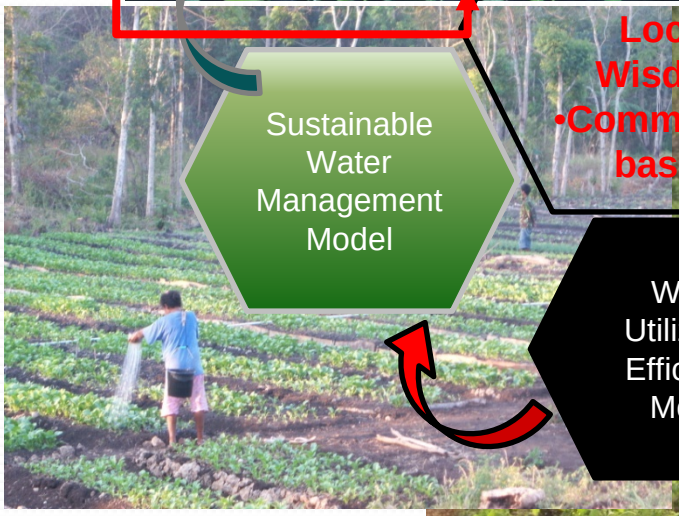
Irrigation or Drainage Network Design

Water Utilization Efficiency Model

Sustainable Water Management Model

Food Diversification Model Adaptive to Climate Change

•Tied by the Institutional
• inforced by Local Wisdom
•Community-based



AGRO INOVASI

7. Development of crop tolerance varieties to environment stresses.

Stress / Character	Varieties
Drought tolerant	Dodokan, Silugonggo, Situ Bagendit, Situ Patenggang, Limboto, Inpago 5, Inpari (1, 10, 11, 12, 13)
Very early maturing	Inpari (11, 12, dan 13)
Immersion/flood tolerant	Inpara 3, 4 and 5, Inpari 30 Ciherang–sub1
Salinity tolerant	Margasari, Dendang, Lambur, Lalan, Indragiri, Air Tenggulang, Banyuasin
Brown planthopper resistant	Inpari (2, 3, 4, 6, dan 13)
Bacterial leaf blight resistant	Inpari (1, 4, 6, dan 11)
High Temperature Tolerant (35 ^{o}C)	N22 (germplasm)
Low GHG emission varieties	IR64, Ciherang, Way Apo Buru, Inpari 1, Batanghari, Tenggulang, Banyuasin, Punggur

8. SUSTAINABLE FOOD-RESERVED GARDEN (SFRG)

SFRG aim to to strengthen food security at household levels and as an effort to reduce global warming by using household waste as planting media and utilize the home-yard as a source of family food.


Thank You