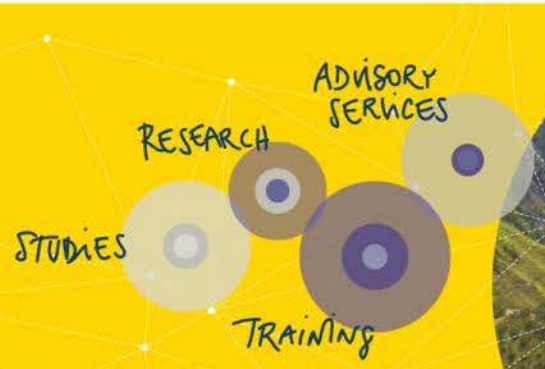
HEAVY RAIN AND SEA LEVEL RISE
Indonesian Farmers between Climate Change Adaptation and Climate Protection

Dr. Silke Stöber, SLE

22.02.2019 House of Indonesian Cultures

Brot für die Welt

Brot für die Welt – Evangelischer Entwicklungsdienst



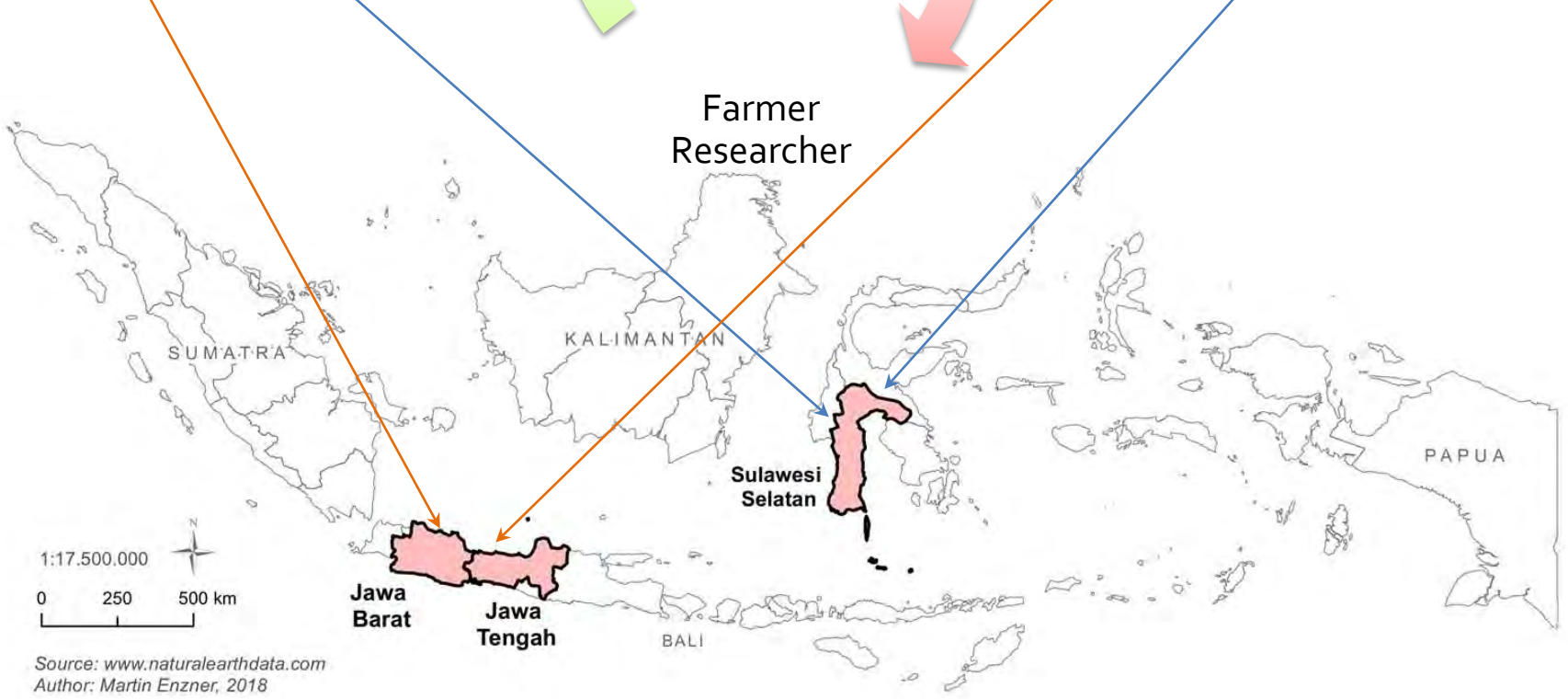
Climate resilient investigation and innovation project – South Sulawesi, West Java

CRAIIP- Climate resilient investigation and innovation project

NGO/CSO

University Reasearcher

Farmer Researcher




Mr Kustiwa Adinata
Project Manager


Mr Tandu Ramba
Project Manager

Country Program Indonesia

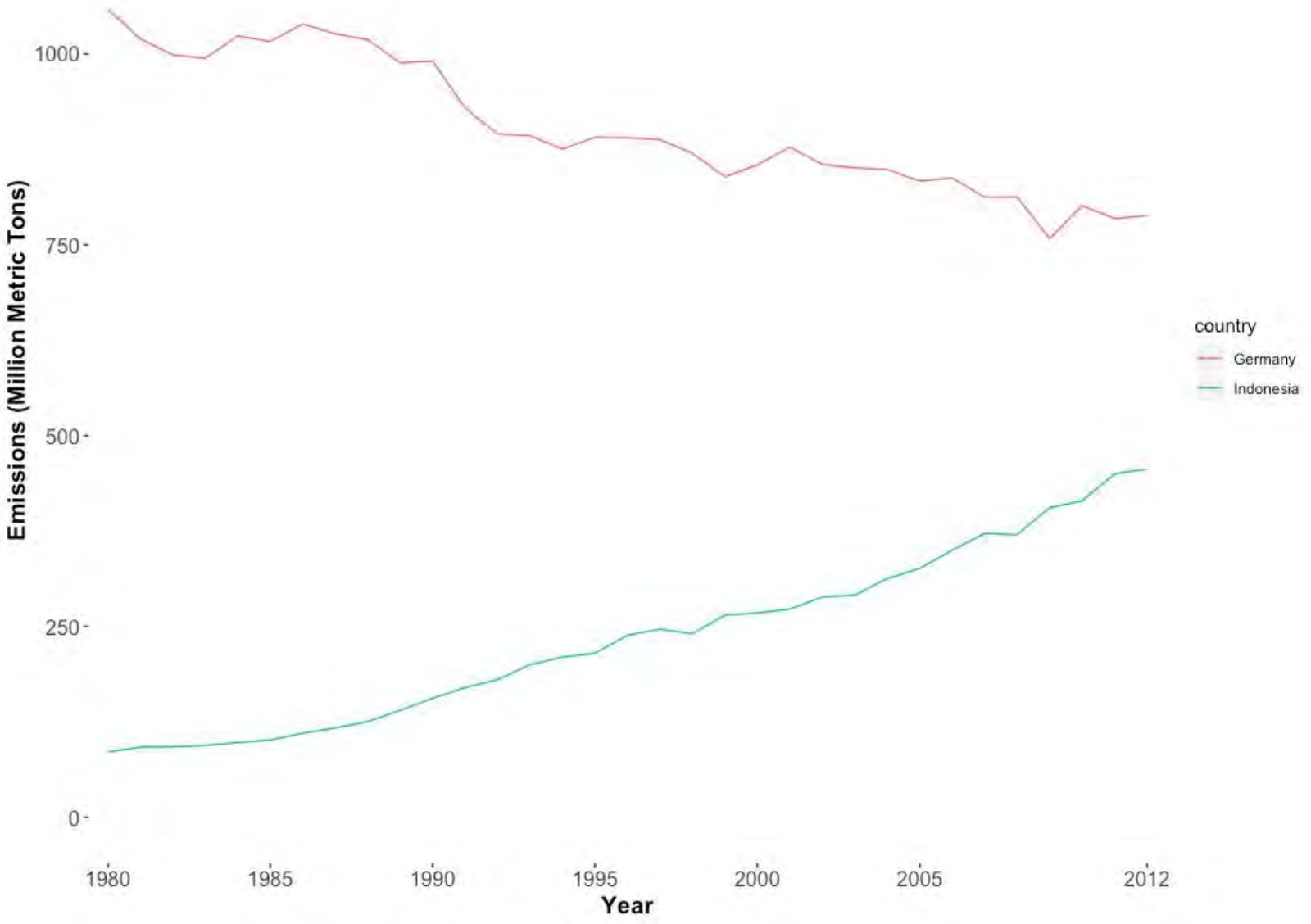
Brot für die Welt – Evangelischer Entwicklungsdienst

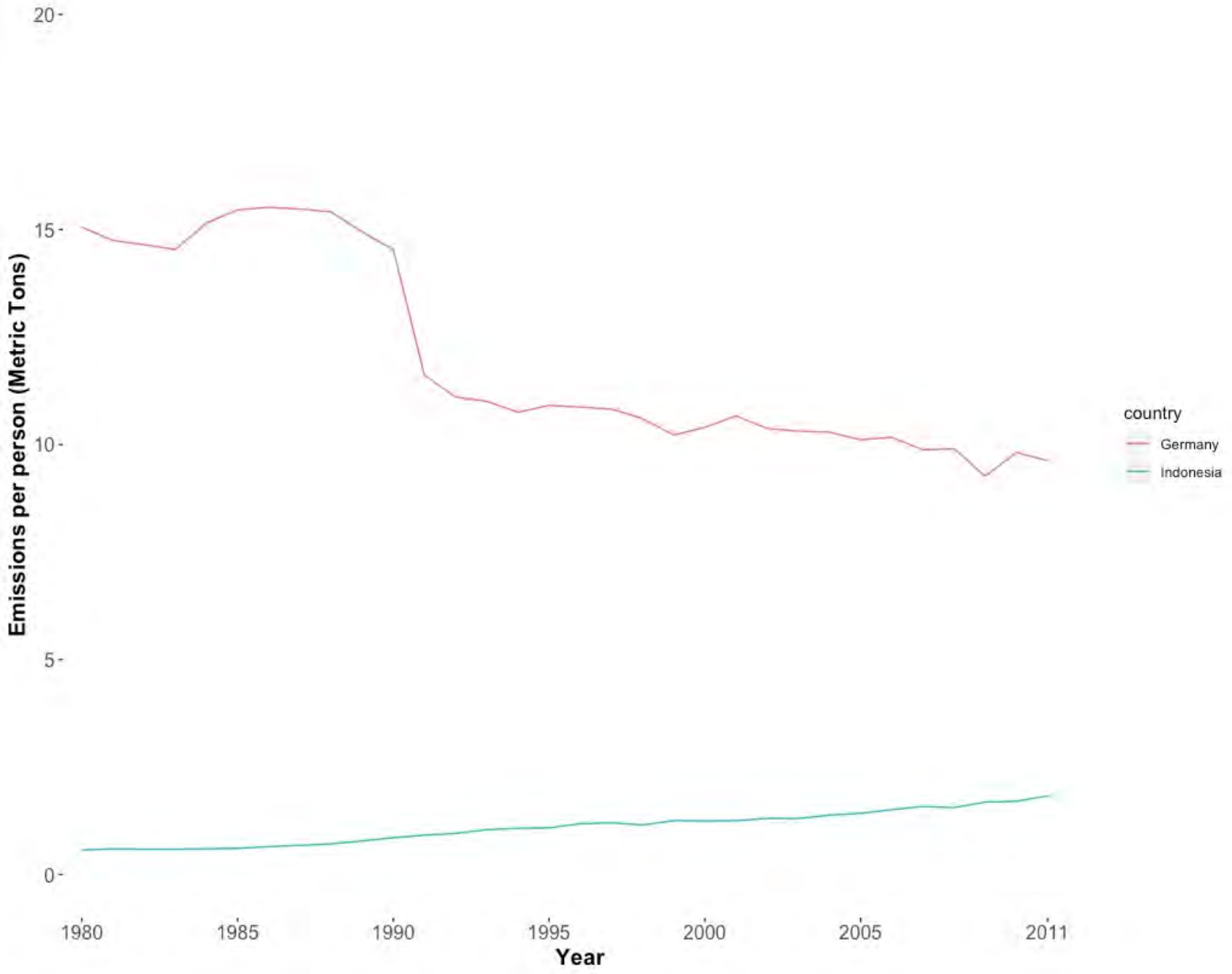
- Food security/ sustainable smallholder agriculture and forestry Climate chnage adaptation
- Natural resources management and land rights
- Strengthening of Civil society
- Women empowerment
- Primary health care , Mother and child health, HIV-AIDS/ Infectious diseases

Structure of presentation

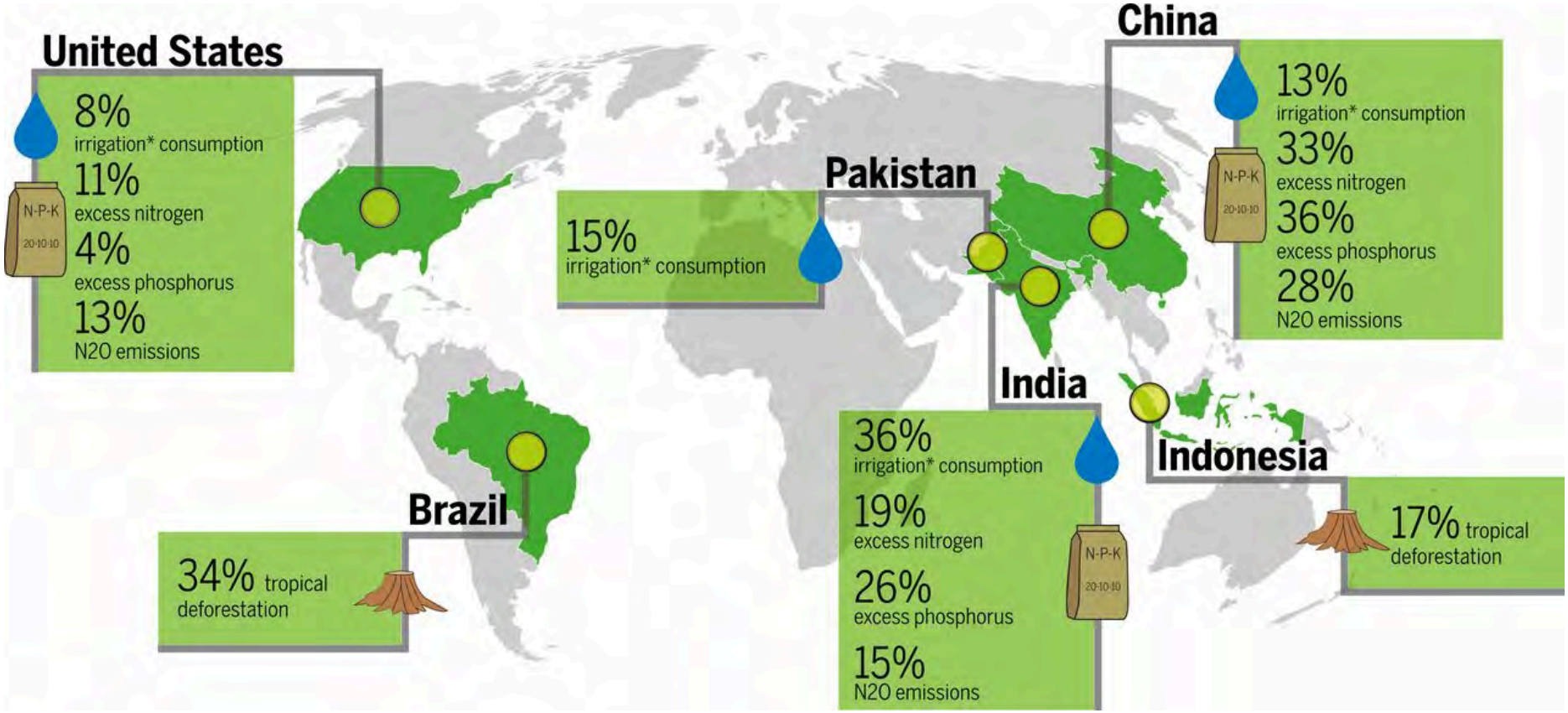
- Our partners and funders
- Causes of climate change
- Impact of climate change for farmers in Indonesia
- Agro-ecology – the cure-all solution ? Examples and challenges
- Organic farming
- Climate Field schools
- Cross-breeding and dissemination: Our key message in a short movie: Why climate-resilient agriculture matters for Indonesia?


STATE OF THE CLIMATE
IN 2017
Two main messages:
• Global temperature keeps rising
• CO2 concentration keeps rising
Special Supplement to the
Bulletin of the American Meteorological Society
Vol. 99, No. 8, August 2018
Climate change
Wildlife
Energy
Pollution
Culture
Lifestyle
More
Last year was warmest ever that didn't feature an El Niño, report finds
State of the climate report found 2017 was the third warmest with a record high sea level and destructive coral bleaching
32 WISSEN
GRAFIK: DEUTSCHLANDWETTER
Kalte Jahre, heiße Jahre
N° 479


Emissions (Million Metric Tons)
1000
750
500
250
0
1980
1985
1990
1995
2000
2005
2012
Year
country
Germany
Indonesia

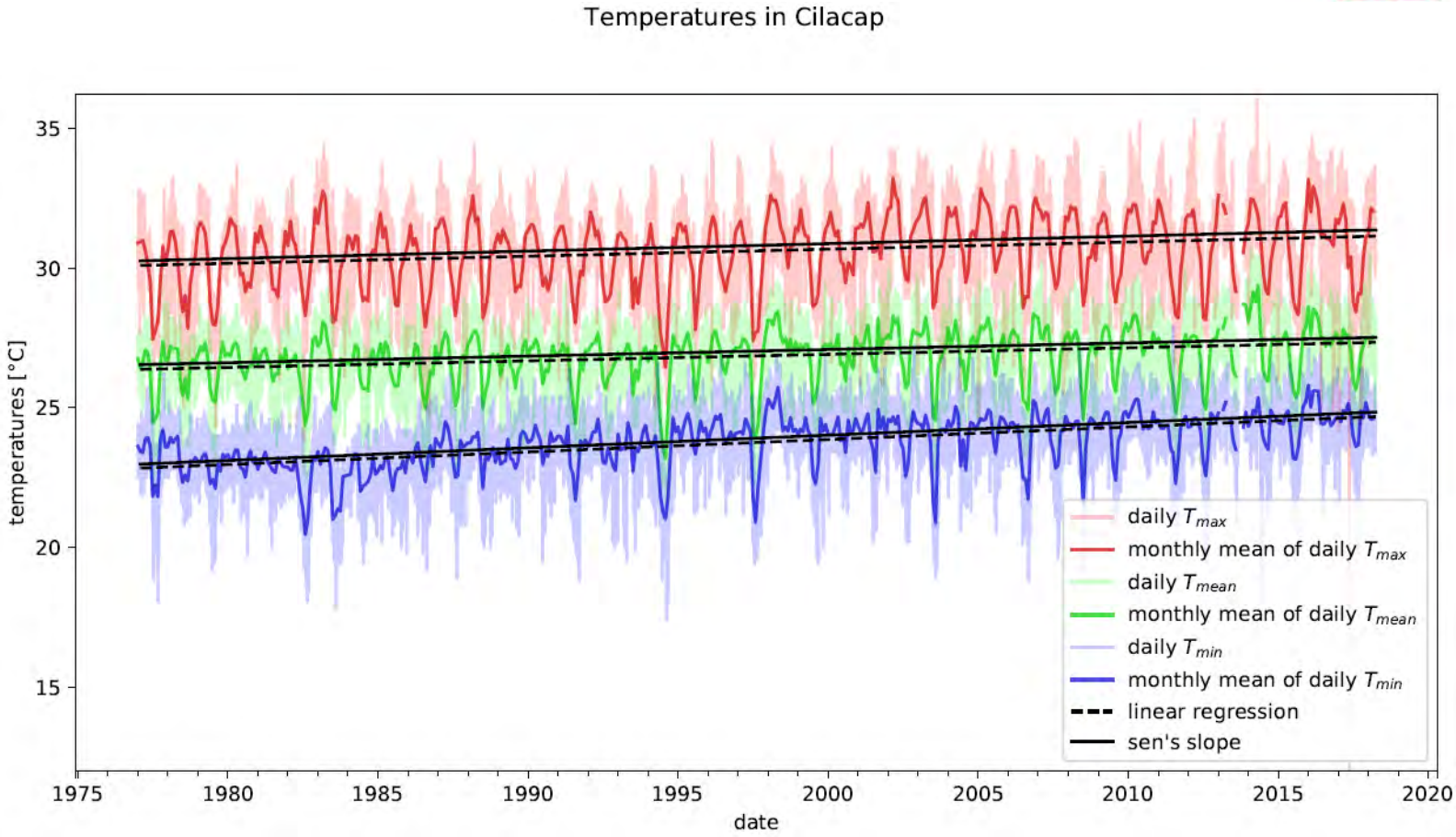

20
15
10
5
0
Emissions per person (Metric Tons)
1980
1985
1990
1995
2000
2005
2011
Year
country
Germany
Indonesia

Leverage points to reduce agriculture's effect on climate, water quality, and



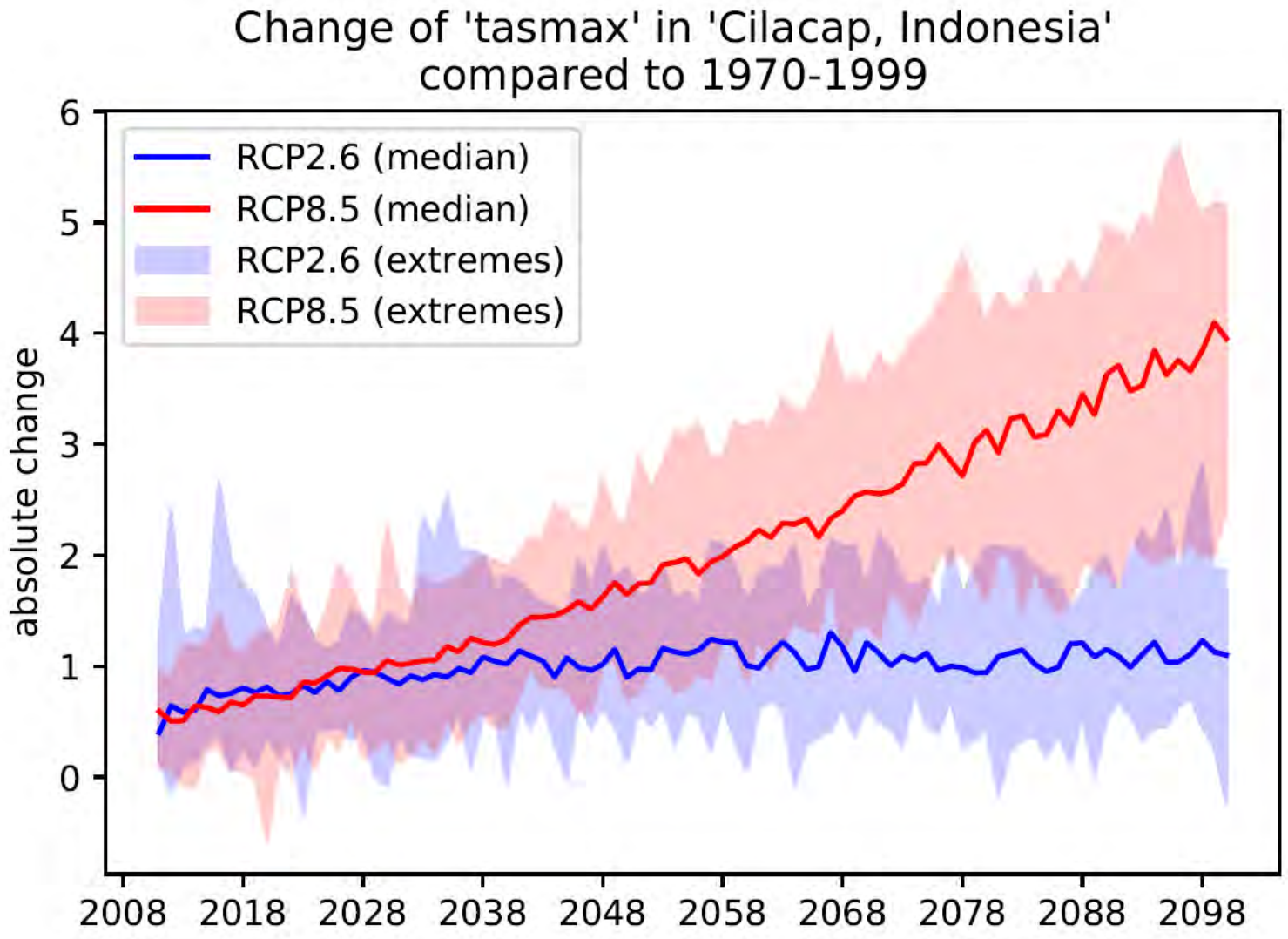
Source: Paul C. West et al. Science 2014;345:325-328

2. Climate Data Cilacap - **Temperature**

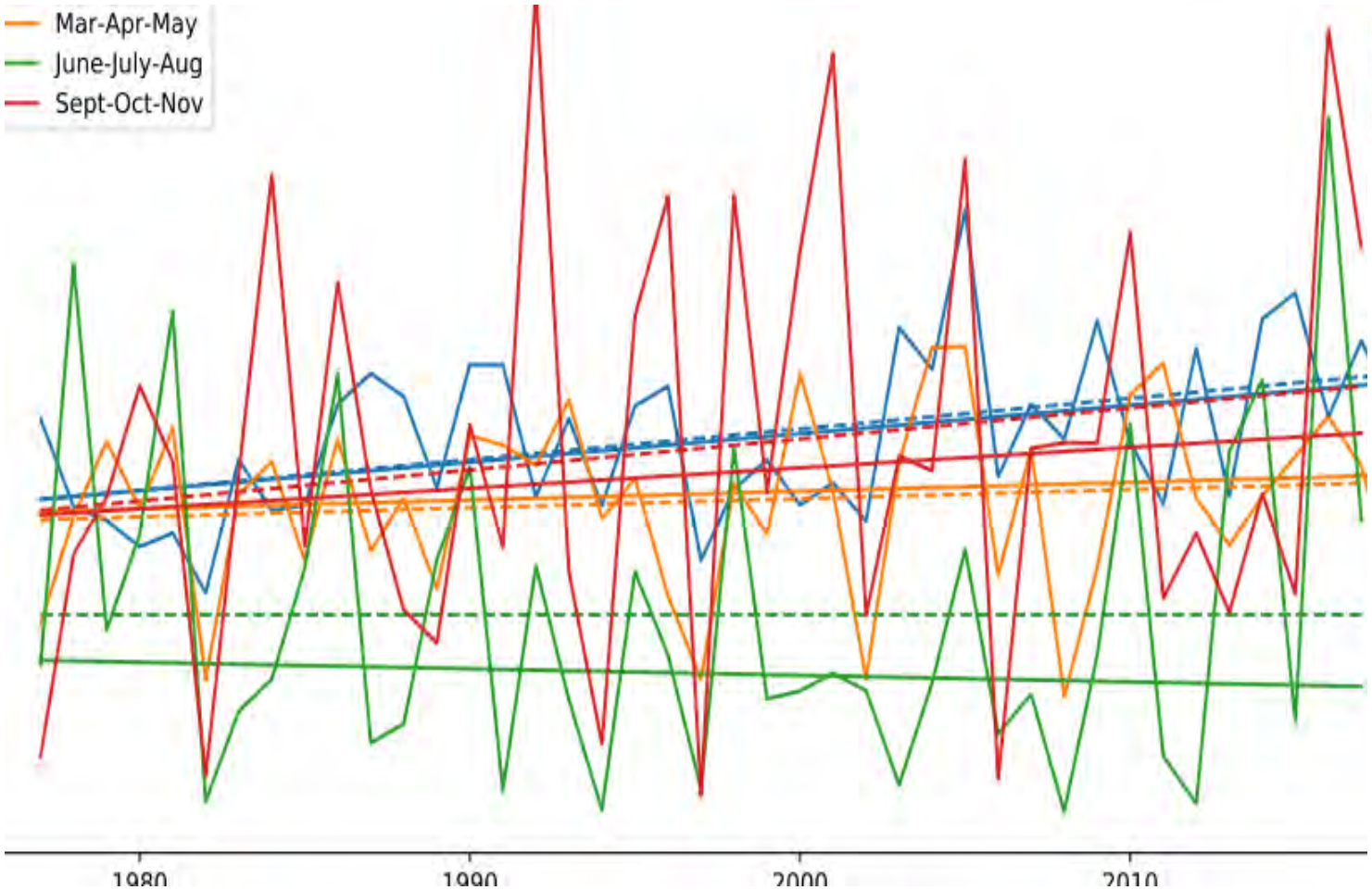


Increasing day and night time temperatures:
Tmin = +0.044 °C per year
Tmax = +0.025 °C per year
Tmean = +0.023 °C per year

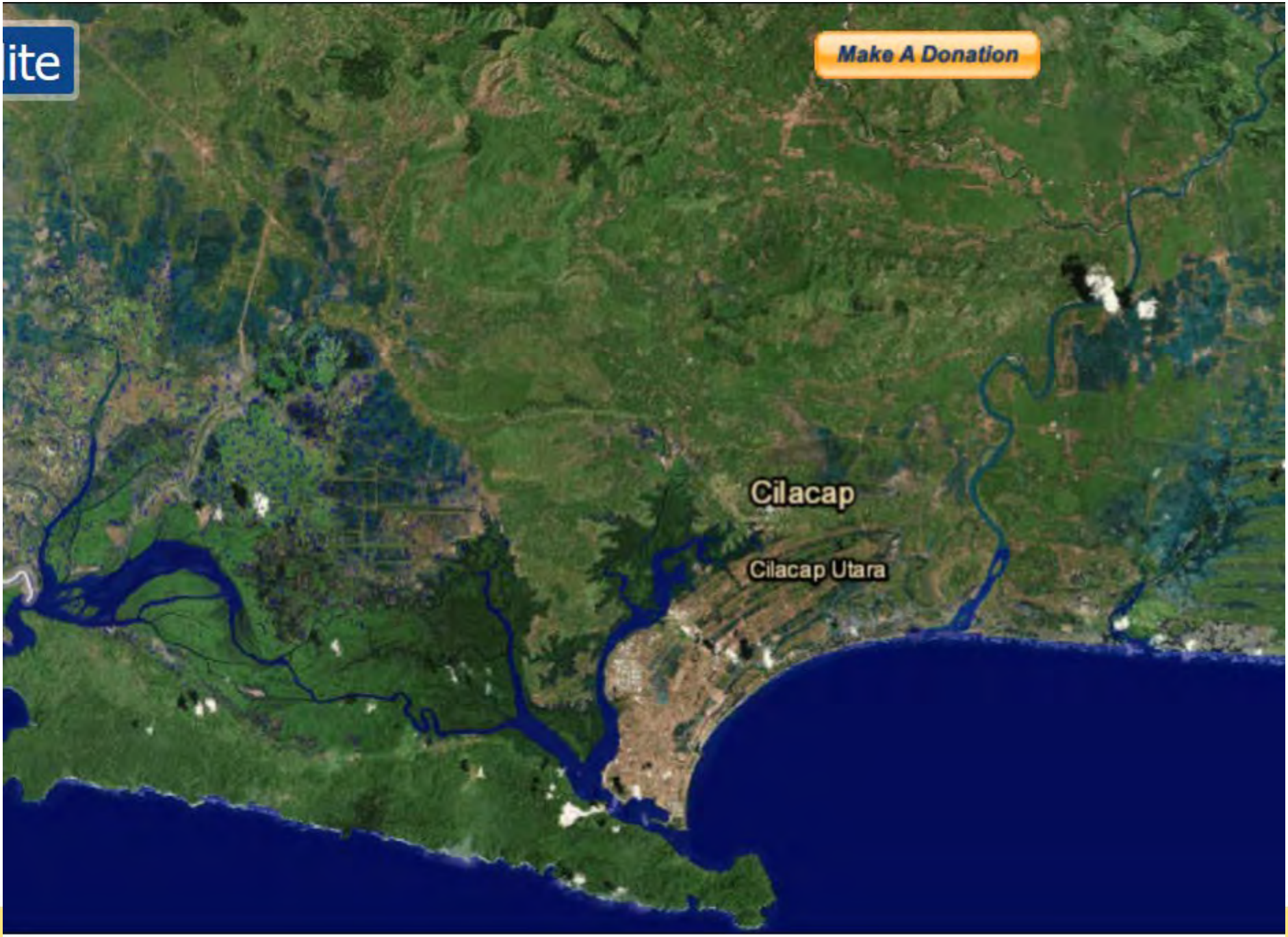
Climate projections

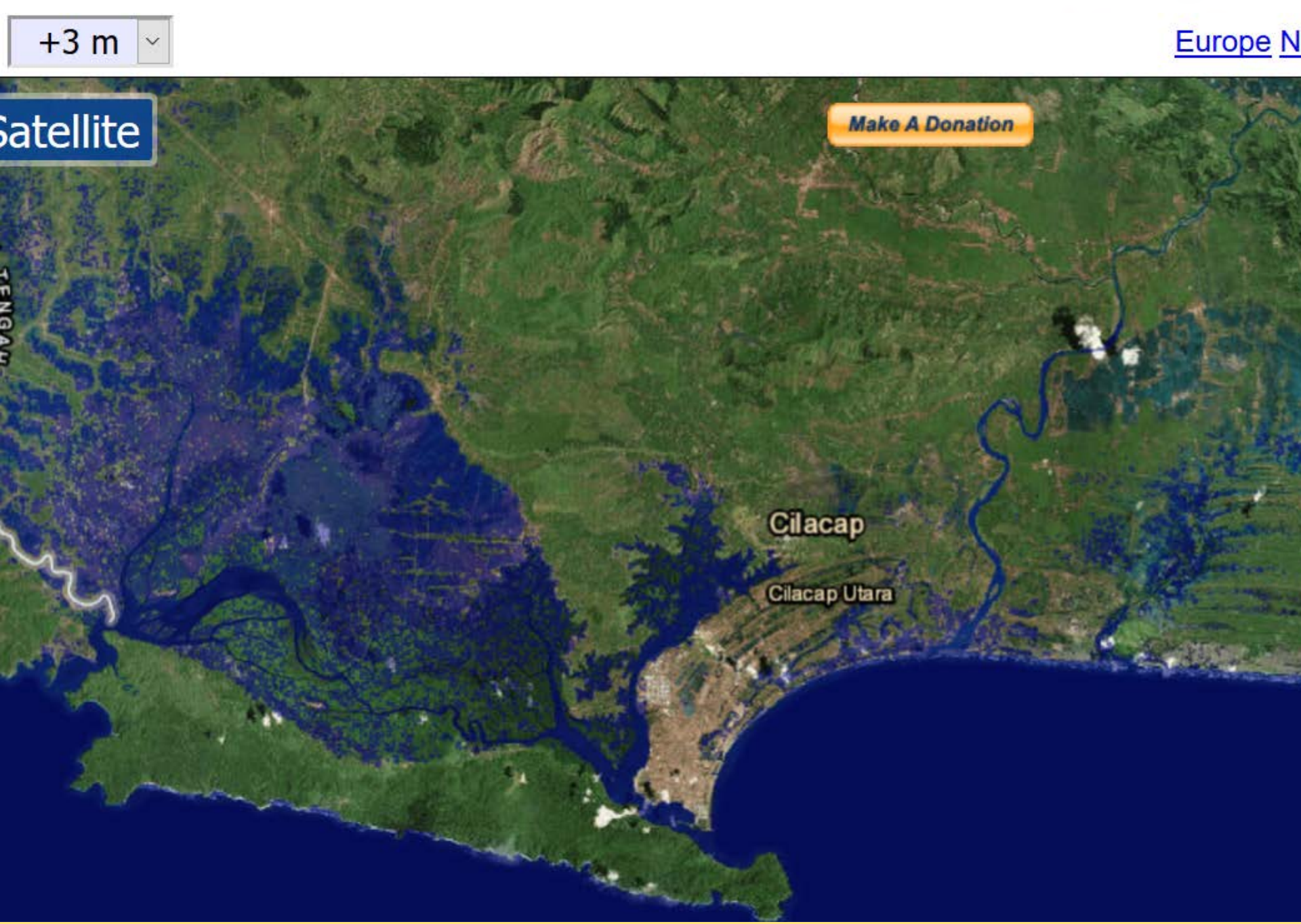


Source: Schöll (2018): ASA project; Projections of the annual temperature change (a) and precipitation change (b) relatively to the average of the basis period (1970-1999) according to 18 CMIP5 GCMs



- 2015-2017 In Cilacap and Pangandaran districts 322,476 hectares flooded, and harvest failure 77,792.


ite
Make A Donation
Cilacap
Cilacap Utara


+3 m
Europe N
Satellite
Make A Donation
Cilacap
Cilacap Utara

+7 m

Euro

January 2018 : Flooding of rice fields

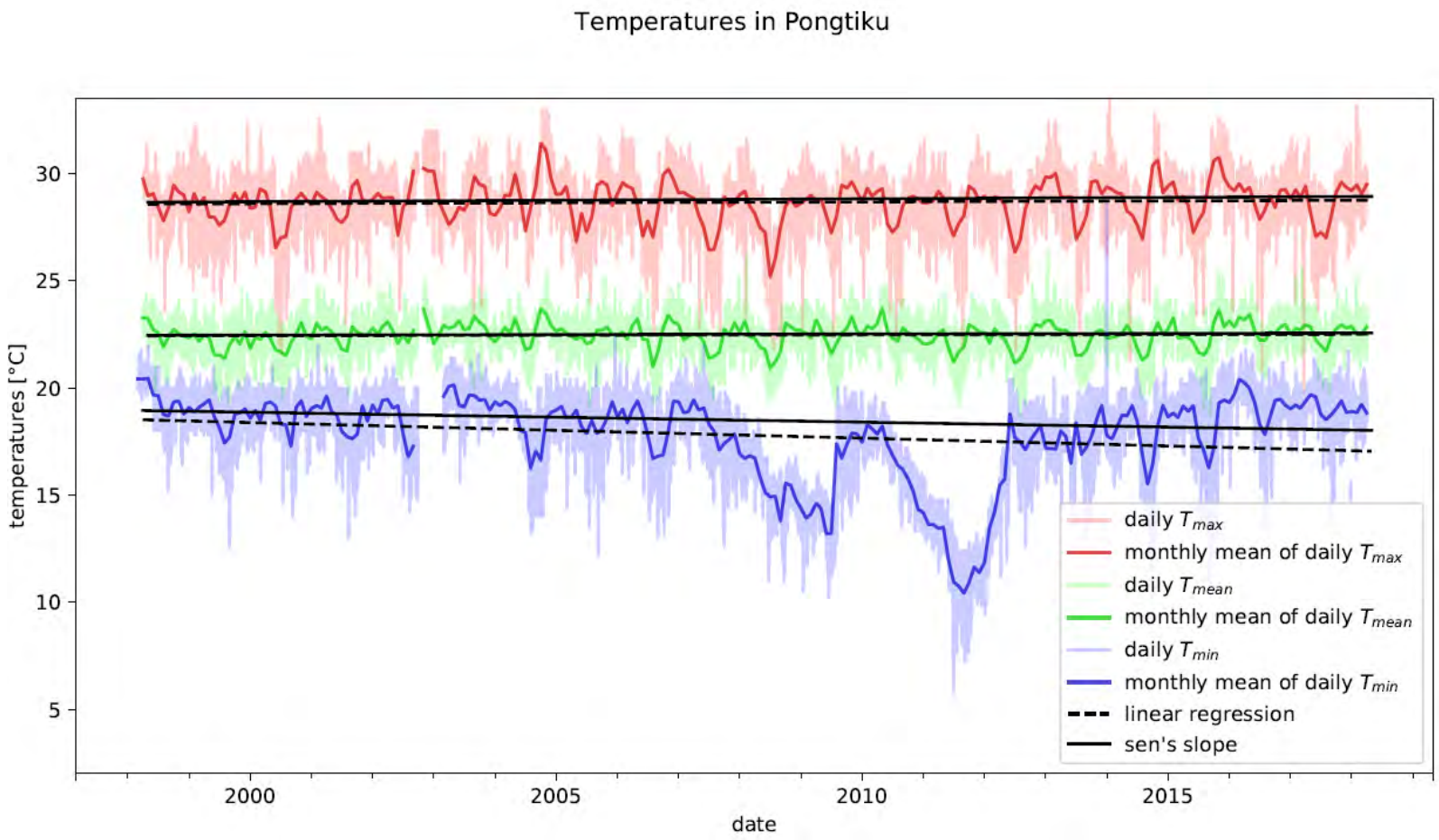
Impacts of climate change on rice and chili

Rice

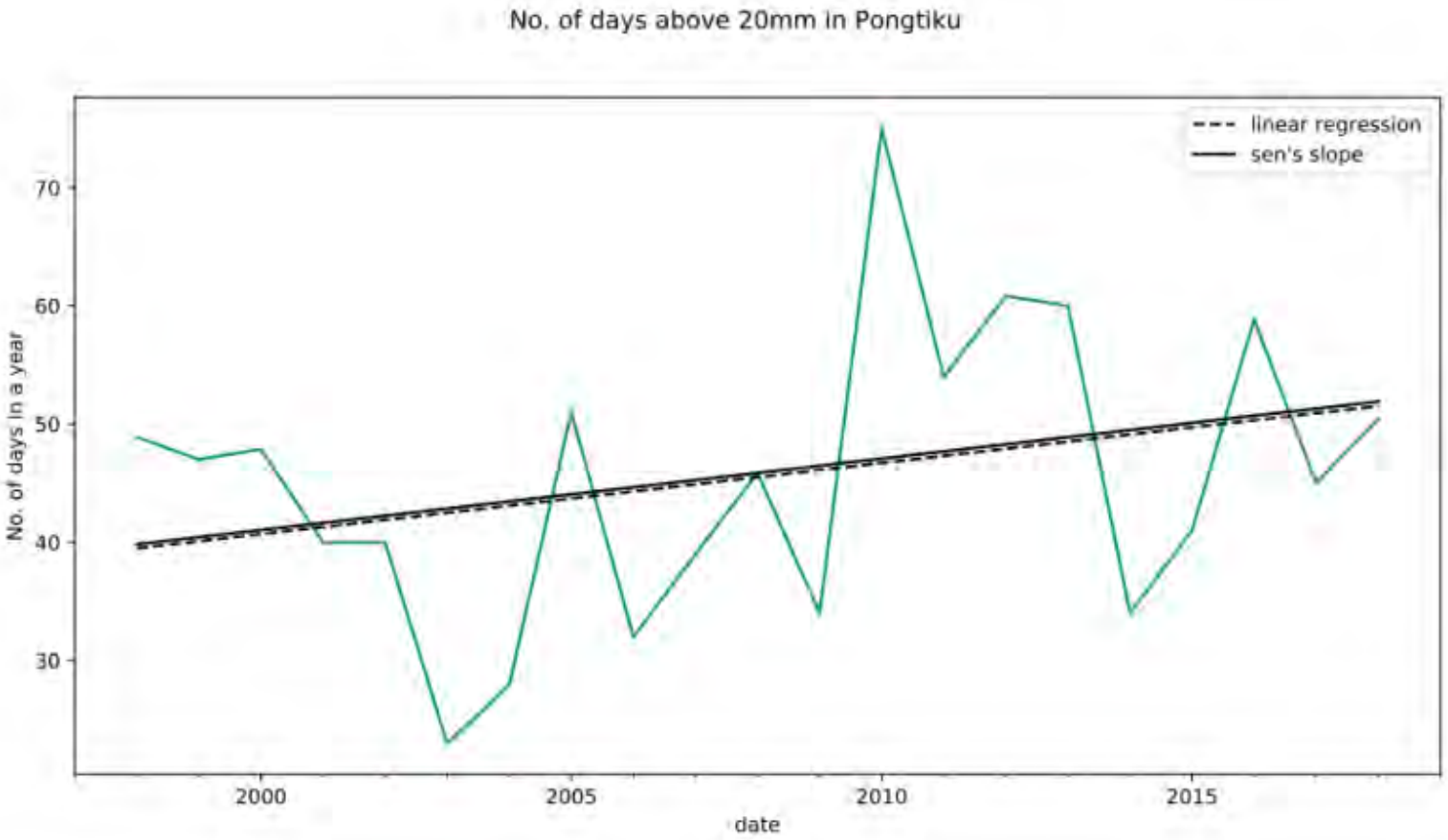
- Reduced yields
  - → **10% decrease of yield per +1°C** (Peng et al. 2004)
  - → **> 35°C is critical** (Wassmann et al. 2011)
  - → Susceptible to water stress
  - → High night time temperatures lead to sterility
  - → Salinity reduces yield up to 50% (Zeng & Shanon 2000)
- Loss of paddi land
  - → Rising sea: **waterlogging**, prolonged stagnant floods, seawater at coastlines, sustained submergence of the complete rice canopy

Iron toxicity

Climate Data Pongtiku - **Temperature**



Increasing day time temperature but not significant
Decreasing night time temperature
Tmin = -0.072 °C per year
Tmax = +0.0087 °C per year



Trend in the number of days in a year with precipitation above 20mm for Pongtiku from 1998-2018

Source: Hollburg, Landwehr, Prayoga, Schöll 2019

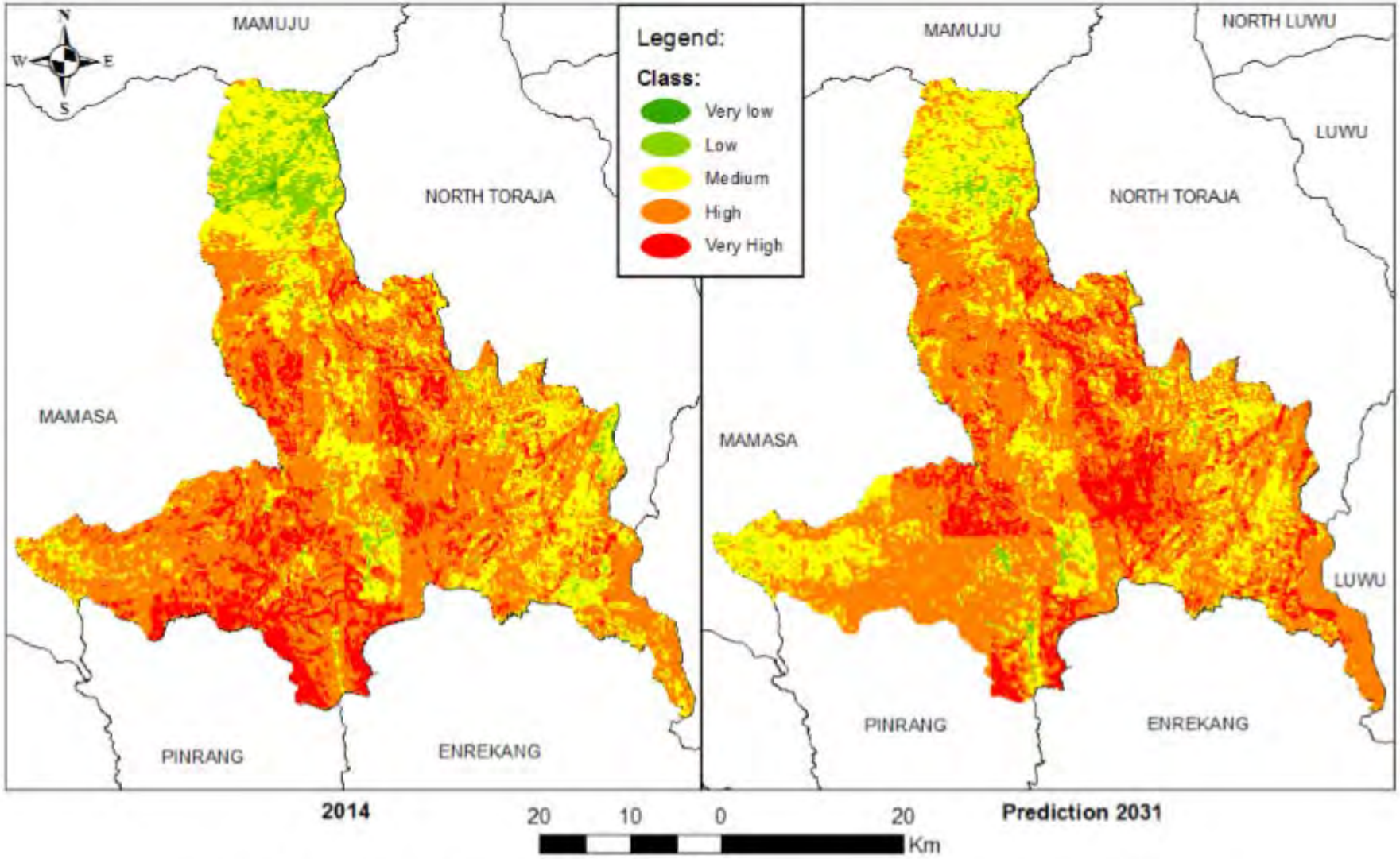


Figure 6. Maps of landslide hazard 2014 (left) and prediction 2031 (right).

Source: M Ardiansyah et al 2018 IOP Conf. Ser.: Earth Environ. Sci. 149 012033

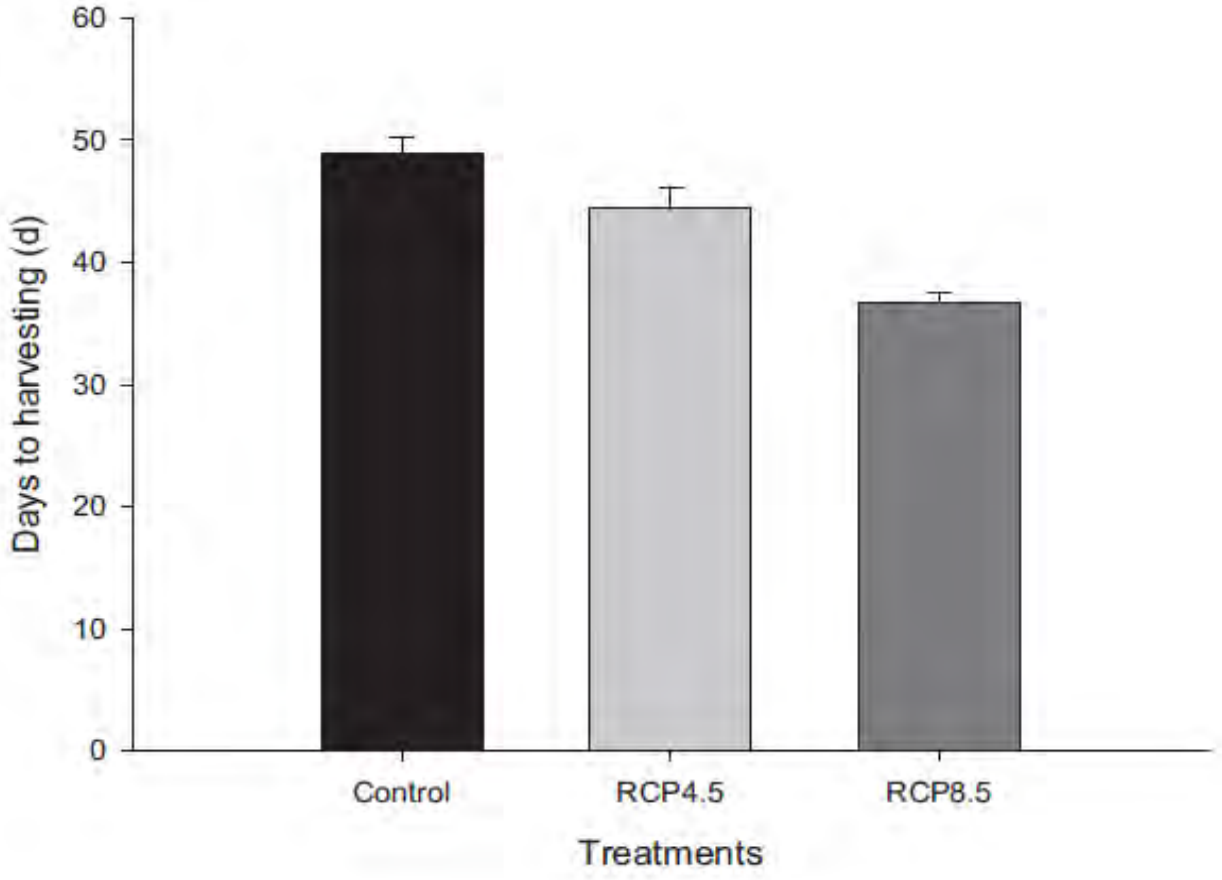
Vulnerabilities of chili farmers

- Increasing yields
  - +2°C temperature can increase yields (Sang Guy et al. 2018)
- Reduced yields
  - high temperature, chili matures fast
  - Day time temperature >34°C, night time temperature >21°C Abortion of floral buds (Erickson&Markhart 2002)
  - Higher temperature results in high number of abnormal fruits (calcium deficiency) (Sang Guy et al. 2018)
  - Excess soil moisture results in plant disease, nutrient leaching, reduced pesticide effectiveness (Akinbile&Yusoff 2011)
  - Increased occurrence of pests

Morphological characteristics of chili affected by climate change scenarios

Source: Sang Guy et al. 2018: 8

Farmers lack capacities to adapt;
Along with land use changes and unsustainable agricultural practices.



Source: Sang Guy et al. 2018

Merging knowledge systems

„Many innovations are done by farmers' hands."

„Before I do agriculture like a blind man, now I can see and understand."

Farmer researcher from Pangandaran, West Java

Merging communities of practices – Part I

Agro-ecology & local wisdom

Farmer field school

On-farm trials

Merging communities of practices Part I

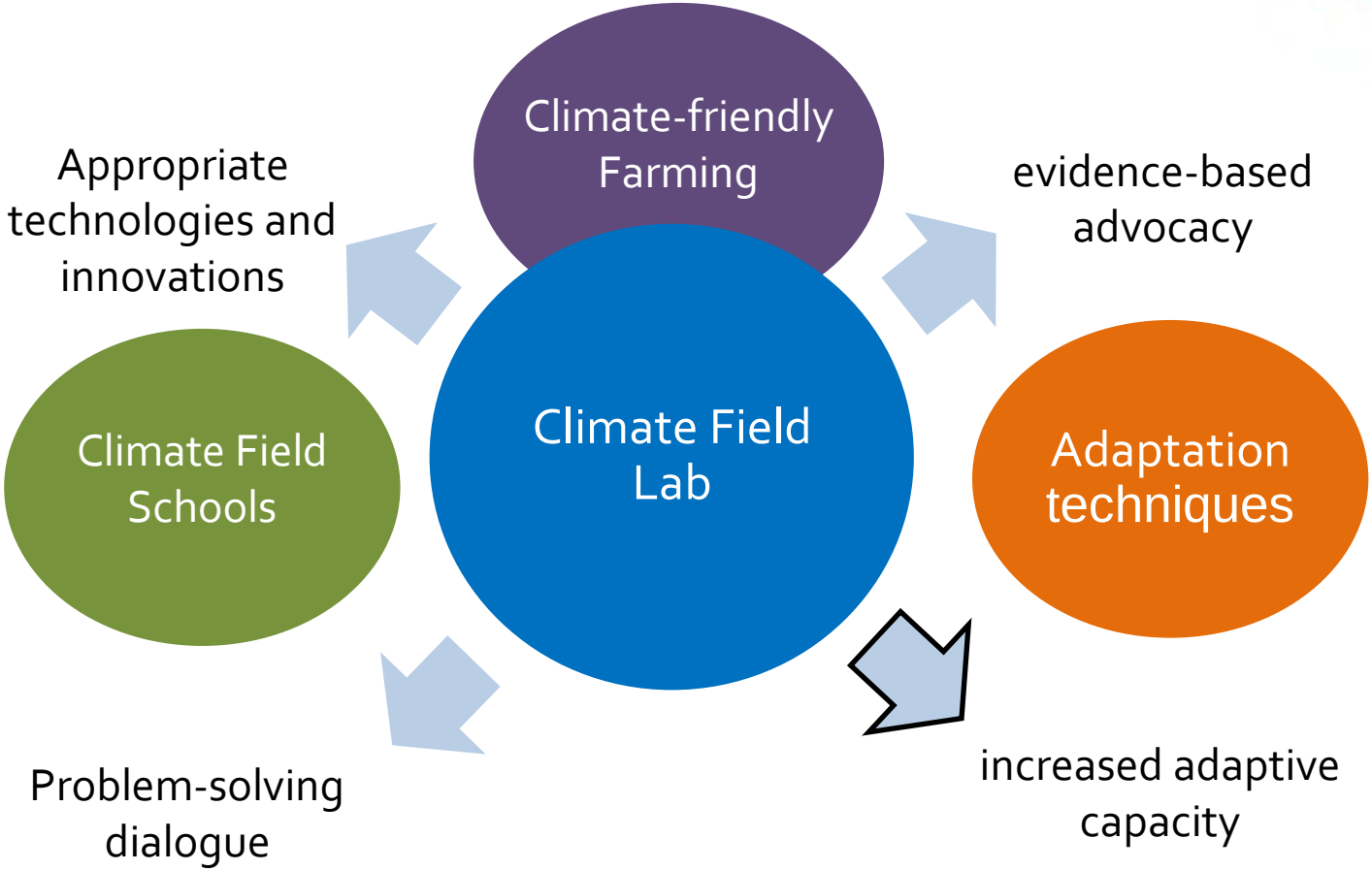
Climate-friendly Farming

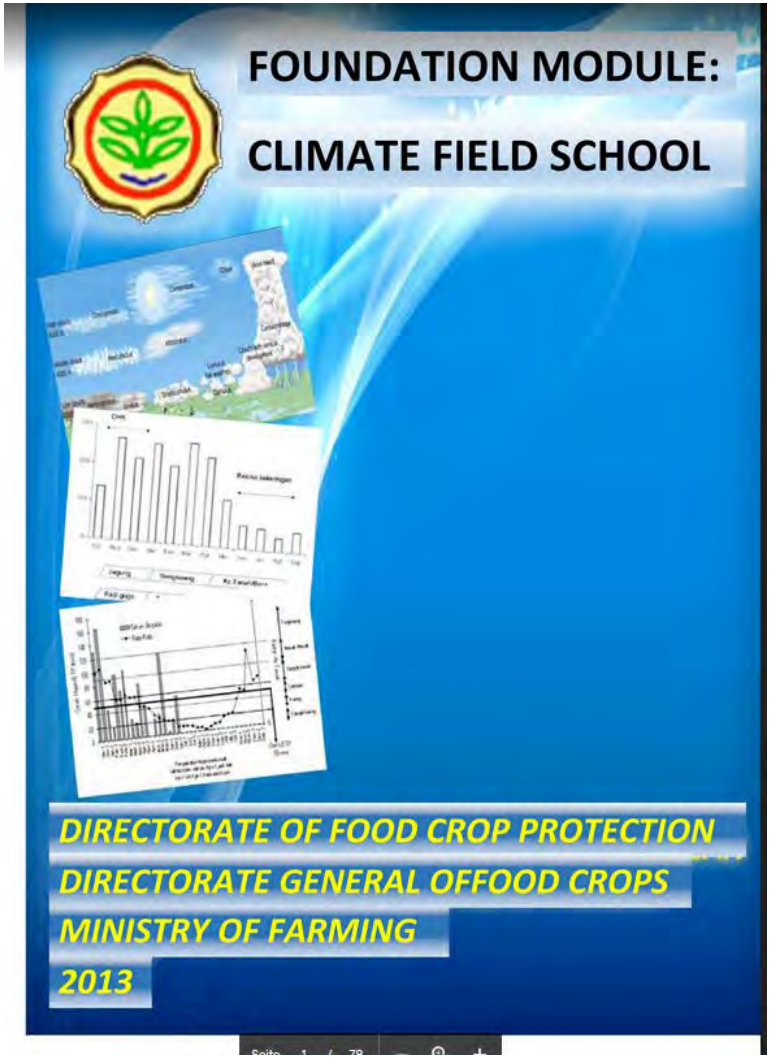
Climate Field Schools

Adaptation techniques

Is this enough to influence climate policies?

Merging communities of practices

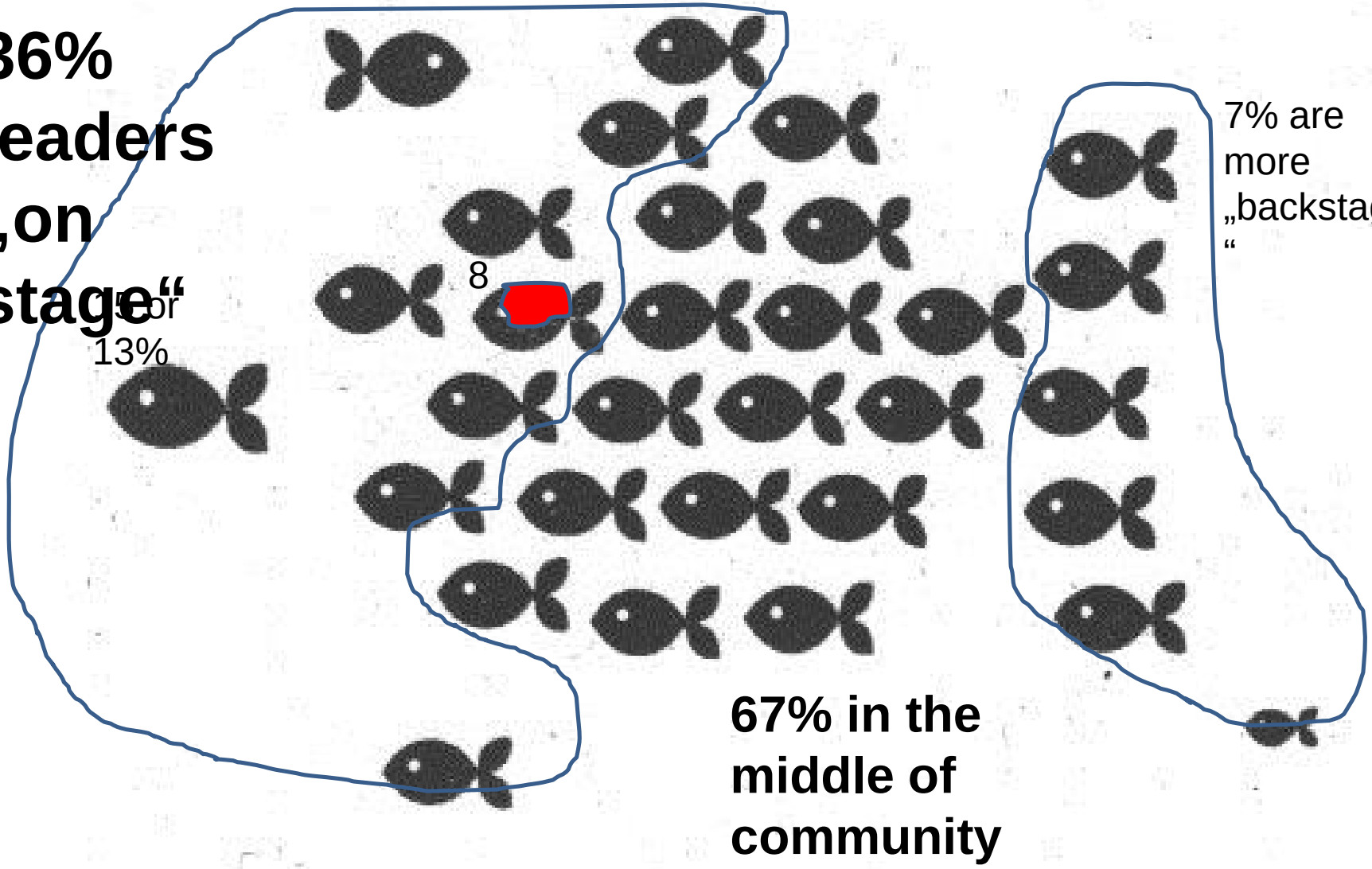



FOUNDATION MODULE:
CLIMATE FIELD SCHOOL
DIRECTORATE OF FOOD CROP PROTECTION
DIRECTORATE GENERAL OFFOOD CROPS
MINISTRY OF FARMING
2013

- Climate Field School
- Farmer researcher

Research in Chili fields


INPARA 02
U-1

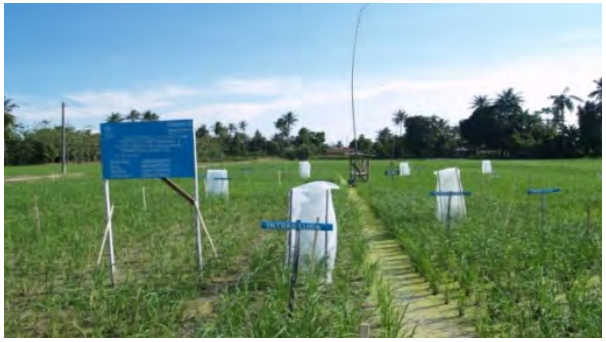


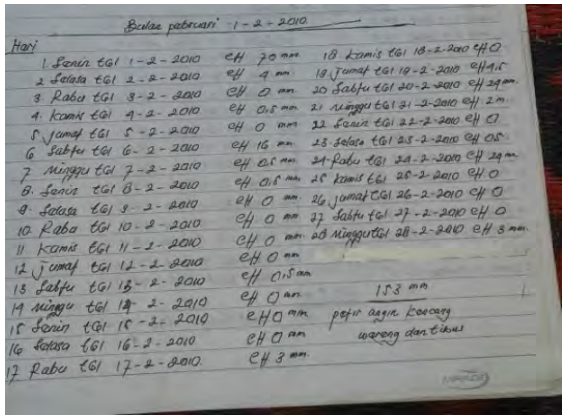
West Java: higher educated

Toraja: older than the average farmer

Strengthening Farmers' Awareness Through Climate Field School (CFS)

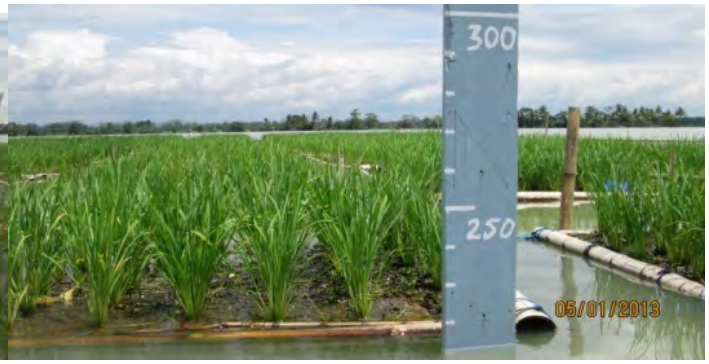
- Andragogy (adult education) Approach
- Agrometeorological learning and local prediction






IPPHTI
PROGRAM INOVASI DAN KAJIAN PERTANIAN YANG TAHAN IKLIM
(CRAIIP)
Uji Efektivitas Pupuk Hijau Azolla pinnata dan Sesbania rostrata
Pada Pertumbuhan dan Hasil Tanaman Padi Varietas Bangir, Ciherang, Inpari 34 dan Mendawak
yang Tahan salinitas dan Rendaman
Di Desa Ciganjeng Kec. Padaherang Kab. Pangandaran
Supported by :
ORISA

Adaptation Strategies



a. Floating Rice

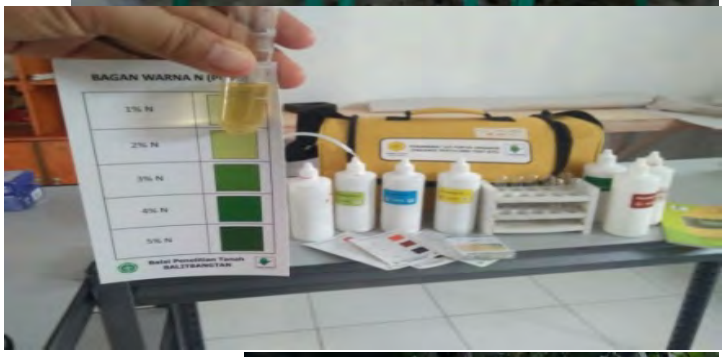
b. System of Rice Intensification (SRI)

c. Stress-tolerant rice varieties

d. Green Manure

Appropriate Technology

- Soil Ecology health simple analysis/portable lab
- Biochar and organic pesticides
- Azolla for feeding fish and ducks



What can a farmer do if the fields are getting more and more saline?

Story of Farmer family *van Wesemael*

"Saline soil" = EC > 4 dS/m (Soil Science Society of America)
Here: 8 EC

Picture source: http://www.opdemariahoeve.nl/home

Sea cabbage (crambe maritima)

Idea: from white coast Dover

Follow up: Cooperation with University (analyse nutrients)

Income: Farmer family

- Price 120 €/kg (2 M IDR)
- x 1500 kg/season = 180,000€ or 2.9 billion IDR revenue

Picture source: own 19.09.2018

Sea cabbage production process

- 1st year: growing roots outside (550,000 roots)
- 2nd year: sprouts inside
- Harvest time: 8-11 AM
- 4 months, each day 12 kg

Picture source: https://www.gastropedia.nl/artikel/zeekool-crambe-maritima/

Saline Potatoes

- Smaller and harder than normal potatoes, yield lower
- Not salty!
- Sea Water is pumped from the sea and sprayed on potatoes

Picture source: own 19.09.2018

Zouttolerante aardappel binnen Regionaal bod Proeftuin Zoet Water

Verslag van het volgen van aardappelrassen onder verschillende zoutregimes gedurende 2 groeiseizoenen

Juni 2017

Auteurs:
Guus Heselmans (Meijer); Perry de Louw (Deltares); Corstiaan Kempenaar (Meijer); Edvard Ahlrichs (Deltares); Inez Terpstra (Meijer); Joost Delsman (Deltares); Sheila Ball (Deltares); Cheryl van Kempen (Deltares); Esther van Baaren (Deltares); Jean-Pierre van Wesemael (Saeftinge Zilt)

Meijer Deltares Saeftinghe Zilt Provincie Zeeland

eration: nce and farmer

ılatie Z2014-049 in de zoute behandeling en rechts

Eretmix-System

Encarsia formosa / Eretmocerus eremicus

In conditions of fluctuating temperatures or when the tobacco and greenhouse whitefly occur together, a combined release of the whitefly parasitoids *Encarsia formosa* and *Eremocerus eremicus* is recommended. Both parasitic wasps are closely related. *E. eremicus* is lemon-colored and *E. formosa* is black.

The main advantages of a combined release are *E. formosa*'s quick population growth and *E. eremicus*'s high temperature tolerance and effectiveness on both whitefly species. Eretmix-System is applicable in protected vegetable and ornamental crops.

Relevant crops

Relevant pests and diseases

Greenhouse whitefly

Tobacco whitefly

Files

Units

Eretmix-System (50- 5.000)

Packaging: box with 20 strips of 5 cards
Contents: 100 x 50 pupae/card
Carrier: not applicable

Healthy plant

Advice Prod

You are here: Home > Biobest products > Biological pest control > Beneficial in

Phytoseiulus-System

Phytoseiulus persimilis: voracious predatory mite against spider mites

Wat is *Phytoseiulus persimilis*?

- Highly voracious predatory mite
- Efficient worldwide beneficial for the control of spider mites
- Every day, adult predatory mites devour about 20 spider mite eggs or larvae, 10 nymphs or 5 adult spider mites

What are the benefits of *Phytoseiulus persimilis*?

- Under normal circumstances, this predatory mite population will outgrow any spider mite population
- Adult females lay a lot of eggs in their lifetime
- *Phytoseiulus persimilis* can save your crops from spider mite infestations in a few days

In which crops is *Phytoseiulus persimilis* effective?

- Vegetable crops such as tomato, pepper, cucumber, runner beans and eggplant
- Fruit crops such as melon and strawberry
- Ornamental crops such as gerbera, rose and a wide range of potted plants

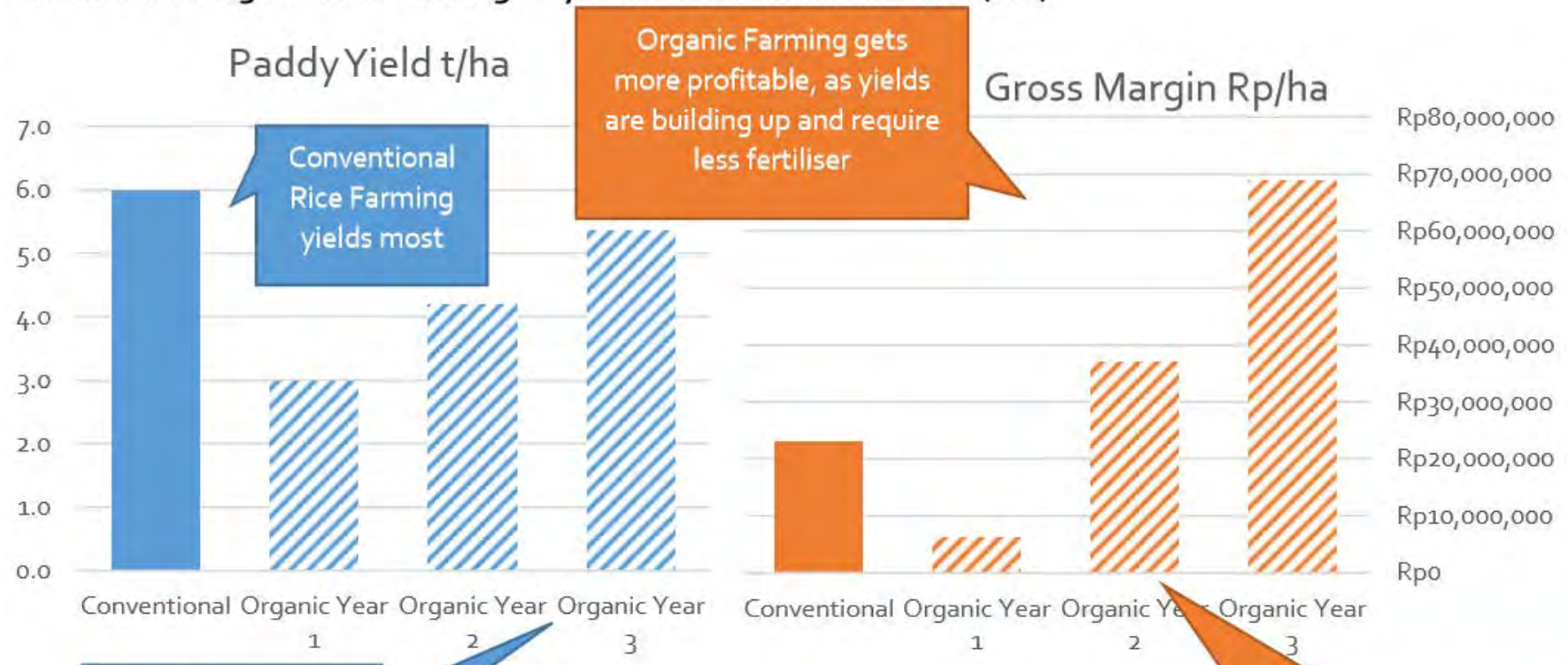
"Climate Change is a real threat to us, even a matter of survival. With increasingly ***high attacks of pests and diseases****, yields are declining. Our traditional weather rules aren't reliable anymore, making it more difficult to determine the planting season for rice and other crops. Therefore, we are required to try new practices in order to adapt better.*

Pak Cristian David, desa Buntu Datu, picture source: own

Climate change matters for us, as it impacts agriculture negatively. The temperature is higher than 15 years ago. It becomes difficult to decide on the right time of land preparation, as the onset of the rainy season is unpredictable. There are ***more pests and diseases and also a higher resistance to pesticides****. Lower yields, high chemical inputs and soil with low fertility and water holding capacity are common.*

Pak Endi and Ibu Hera,, picture source: own

Economics of Organic Rice Farming + System of Rice Intensification (SRI)



Conventional Rice Farming yields most

Organic Farming gets more profitable, as yields are building up and require less fertiliser

Organic rice almost reaches conventional yield in third year

Prices 2018 (Rp/kg)	Conventional	Organic
White rice	12,000	15,000
Red rice	14,000	25,000
Black rice	15,000	31,000

Organic Rice Farming is more profitable from second year onwards:

Better prices + lower costs through organic fertilising (only labour costs)

Indonesia Organic Alliance: 99 members (producers, traders, civil society, organizations, communities, academia
spread across 20 provinces in Indonesia. Most of the members are from Java, North Sumatra and West Kalimantan.

Government programs support organic markets
Indonesia Goes organic
1000 organic villages

Challenges Large gap between the skills of farmers (producers) to fulfill the requirements of buyers, both in terms of product types, quality and packaging.

ORGANIC MARKET

Export products organic :

1. New Zealand and China: Snakefruit (sallaca)
2. Europe (Germany) and USA: Peanuts, Groundnut, Wild Peanuts, Cassava Chips (cassava, Sallaca, dragon fruit, jackfruit), spices, cinnamon, coconut, Rice (black, red), Brown sugar, Turmeric.
3. Canada: Nutmeg.
4. England: Powder (carob, maqui berry), Chia Seed, Quinoa Seed.

Organic products most popular on **local market: Rice, Vegetables, and Fruit Vegetables**

In order to further strenghten farmers‘ capacity to adapt to climate change we would like to extend our network

- Promote organic products from smallholders in Indonesia in Indonesia and abroad: Farmer-smart Embassies and Asian fairs/events in Berlin and Europe

- **IDEA 1: International Conference for farmer researchers à la Tropentag**

- Idea 2: Farmer exhibitions in Indonesian universities with Fakultas Pertanian


CLIMATE CHANGE IMPACT IN COASTAL AREA
d'PINACAR
SAC

Idea 3: (Farmer)-smart embassies and exhibitions

https://www.youtube.com/watch?v=-otnq4aMVkI

Azolla in West Java

https://www.youtube.com/watch?v=EoeB3cCQKKI
Projekt introductory video
My simple show CRAIIP

Thank You

Terima Kasih

Kurre Sumanga’