

Asia Sub-Group Meeting of GRA PRRG

the Workshop “Rice Landscapes and Climate Change: Options for mitigation in rice-based agroecosystems and the scaling-up of climate-smart rice cultivation

13 Oktober 2018

INDONESIA COUNTRY REPORT ON

Climate change adaptation and mitigation in paddy rice

Indonesia Agency for Agriculture Research and Development – IAARD
Ministry of Agriculture



GRA-PRRG

Country overview

Current situation

**Adaptation and mitigation
on Rice in Indonesia**

Conclusion





1

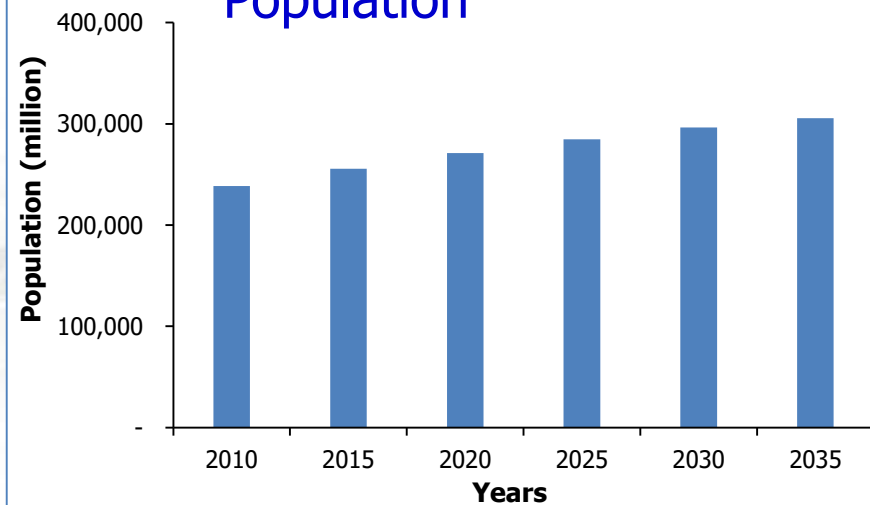
Country overview



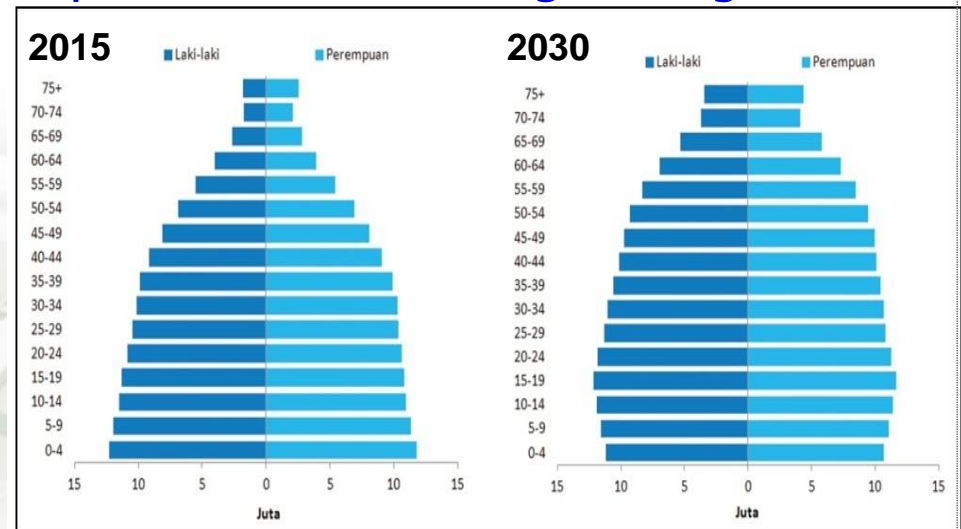
Demographics of Indonesia



Population



Population based on age and gender



Source: Statistics Indonesia, 2018

Source: Ministry of National Development Planning (2015)



Ministry of Agriculture
Indonesian Agency for Agricultural Research and Development - IAARD

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Indonesia Land resources

Indonesia's
land area:
191.1 M ha

Wetland
43.6 M ha



➔ **Non swamp** : 9.4 M ha

➔ **Swamp** (34.1 M ha)
- Tidal swamp: 8.9 M ha
- Lebak Swamp: 25.2 M ha -- (Peat : 14.9 M ha)

Dryland
144.5 M ha



➔ **Upland**
- LK TM : 37.1 M ha
- LK MA : 107.4 M ha
(LKIK : 10.7 M ha)

Others
3.1 M ha

LK TM: Non acidic soil in dryland
LK MA: Acidic soil in dryland
LKIK : Dry land in dry climate





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Current situation



Target of Indonesia food self sufficiency



How to feed the world in the future, in a sustainable way?

**Feed Indonesia
Feed The World**



World food
barn



Opportunities and Resources for Agricultural development



Solar power – renewable and sustainable energy



Agro-ecological asset and genetic resources diversity



High demand of agricultural production for food, feed and energy



Networking – national communications and international relations



The optimization of Indonesia Resources for Agricultural development

Issues	Problem solving
1. Climate change	1. Mitigation and adaptation
2. Food security and safety	2. Food diversity, enhancing of product quality and agriculture productivity
3. Global market access	3. Increasing of product innovation, product quality standard and availability
4. Competition for land and water resources	4. Optimizing of land and water resources
5. ✓ Demand vs production ✓ Food vs energy ✓ Ineffective farming system	5. Sustainable agricultural bio-industry



Rice

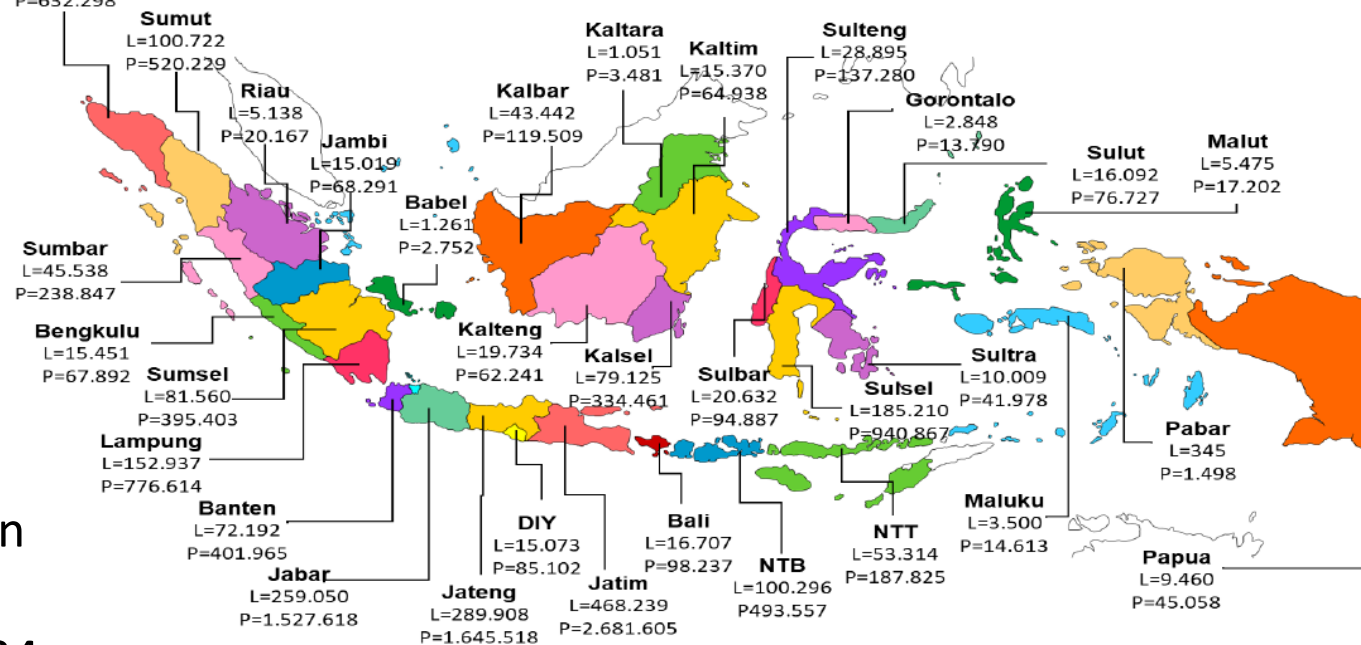


14,9%
Juta Ton

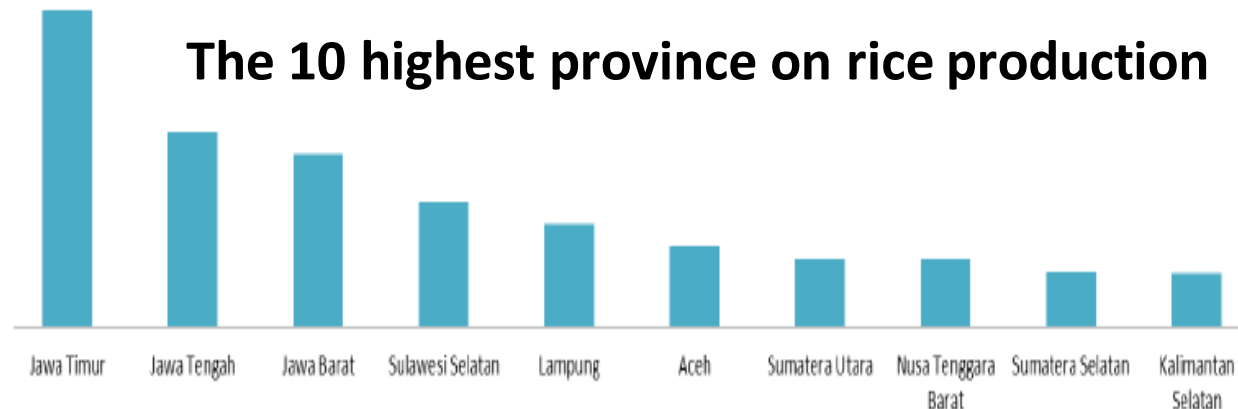
2014	2015	2016	2017*
70,84	75,39	79,35	81,38

Growth of rice cultivation areas during 2015-2017
16.39 M Ha (increase 2.34 M ha/16.65%) → Rice cultivation index 1.73% (increase 2.95%)

Target of growth rice cultivation area in 2018:
1.75 M ha → 80.08 M ton



The 10 highest province on rice production



Total of rice harvested area: 2,252,962 ha

Yield potential: 11,812,447 ton (March 2018)





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Adaptation and mitigation on Rice in Indonesia



Indonesia's commitment



- GHG emission reduction targets by **2030** are targeted at 29% (unconditional) and 38% (conditional)
- Indonesia, as an archipelagic country (\pm 17,000 island), is identified as one of the vulnerable countries → responding to the challenge of climate change is a part of priority policies for Indonesia



- Yield loss
- Pest and diseases infestation
- Flood and drought

Victim of climate change

Agricultural sector

Opportunity to reduce GHG emission

Source of GHG emissions

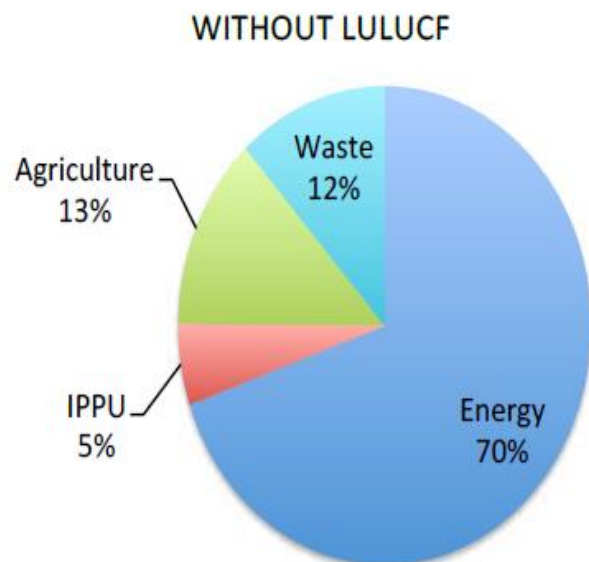
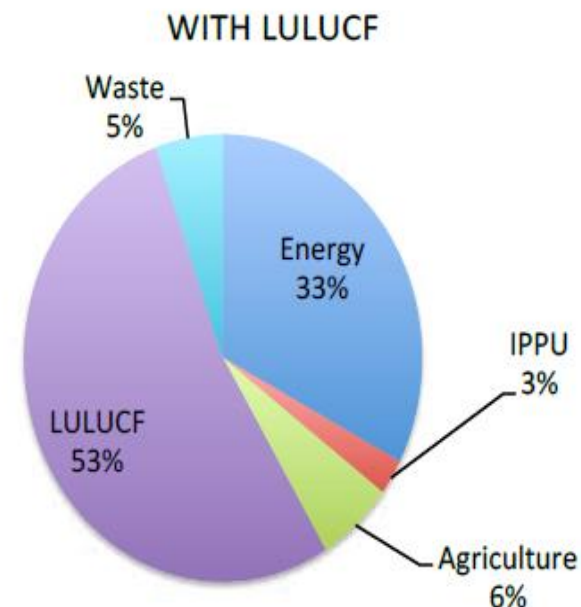
- Paddy field and livestock (CH_4 emission)
- Peatland (CO_2 emission)

- Annual crop absorb CO_2
- Land and crop management reduce CH_4 , CO_2 and N_2O emissions



National GHG Emissions in year 2000 and 2014 (Gg CO₂e)

No	Sector	Three main gases		All Gases	
		2000	2014	2000	2014
1	Energy	298,412	602,458	298,412	602,458
2	IPPU	42,610	47,449	42,883	47,489
3	Agriculture	99,717	113,440	99,717	113,441
4	LULUCF (Inc. Peat fire)	505,368	979,422	505,368	979,422
5	Waste	61,351	101,560	61,351	101,560
Total without LULUCF		502,090	864,907	502,363	864,948
Total with LULUCF & peat fire		1,007,458	1,844,329	1,007,731	1,844,370



Source: MoE, 2017



Emission reduction targets and sector contributions for achievement of target (in percentage)

Sector	Emission Reduction Target by 2020 ¹		Emission Reduction Target by 2030 ²	
	26% (Unconditional)	41% (Conditional)	29% (Unconditional)	38% (Conditional)
Forestry and peatland	87.62	87.38	59.31	60.15
Waste	6.26	6.56	1.31	2.61
Energy and Transportation	4.95	4.71	37.93	36.61
Agriculture	1.04	0.93	1.10	0.34
Industry	0.13	0.42	0.34	0.29
Total	100.00	100.00	100.00	100.00

Source: Presidential Regulation No.61/2011, ²MoEF (2016)



Adaptation actions in agricultural sector based on various studies

Sector	Adaptation Options		Source
Agriculture	Irrigation technology	7	Sumaryanto (2012); Surmaini et al.
	Improve farmer activities	3	(2010); Lamid (2011); Foerster et al.,
	Use of superior varieties	3	(2011); Sakya & Mahardhika (2010); IFC
	Climate Insurance	2	(2009); Kartikasari et al. (2015); Ruminta
	Develop varieties tolerant	2	& Handoko (2012); Syaukat (2011);
	Increasing crop productivity	2	Lassa, Mau, Li, & Frans (2014); Muslim
	Adjustment of plant season	2	(2013); Supriadi & Heryana (2011);
	Land expansion	2	Maulidah, Santoso, Subagyo, & Rifqiyyah
	Food diversification	1	(2012); Muslim (2013). Surmaini et al.
	Global partnership	1	(2010); Rachmiati et al. (2014)
	Reducing food consumption	1	
	Modification of planting media	1	
	Crop replanting	1	
	Simulation technology	1	
	Forecast harvest time	1	
	Transportation access	1	
	Climate field school	1	



**How to improve or
maintain productivity
to face CC**

Source: MoE, 2017



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VERSI 2.5

MASUK

- ESTIMASI WAKTU DAN LUAS TANAM PADI DAN PALAWIJA
- ESTIMASI WILAYAH RAWAN BANJIR, KEKERINGAN DAN SERANGAN OPT
- REKOMENDASI VARIETAS, KEBUTUHAN BENIH, PUPUK DAN ALAT MESIN PERTANIAN
- INFO TANAM - BPP
- KALENDER TANAM RAWA
- MONITORING ONLINE KONDISI TANAMAN PANGAN MENGGUNAKAN CCTV
- STANDING CROP PADI SAWAH SELURUH INDONESIA (VIP)
- PREDIKSI CURAH HUJAN DAN MUSIM BERSUMBER DARI IRI DAN IFAD (VIP)
- PETA PREDIKSI CURAH HUJAN BULANAN TINGKAT KABUPATEN (BMKG)
- INFORMASI TERSEDIA UNTUK LAHAN SAWAH IRI GASI DAN LAHAN RAWA PADA LEVEL KECAMATAN SELURUH INDONESIA

MUSIM HUJAN (MH)
OKTOBER 2016 - MARET 2017

SMS CENTER
082-123-456-400
082-123-456-500

KATAM VERSI ANDROID

PINDAI & UNDUH

BADAN PENELITIAN DAN PENGEMBANGAN PERTANIAN
KEMENTERIAN PERTANIAN

Kerjasama

Cropping calendar

Water harvesting -- embung



Asuransi Usaha Tani Padi
untuk Perlindungan Petani Padi

Petani kita mengalami kesulitan mendapatkan modal untuk pertanaman berikutnya ketika menghadapi gagal panen. Akses terhadap sumber pembiayaan juga sangat terbatas. Akibatnya, upaya mereka untuk meningkatkan keterampilan dan manajemen usaha tani padi menjadi tidak maksimal. Untuk mengatasi masalah tersebut, pemerintah meluncurkan program Asuransi Usaha Tani Padi (AUTP).

PETANI SASARAN
petani pemilik atau penggarap sawah yang berpengairan teknis, semi teknis dan sederhana

GANTI RUGI *
Rp. 6.000.000,- per hektare
dibayarkan melalui perusahaan asuransi yang telah ditunjuk (PT. Jasindo)

JANGKA WAKTU PERTANGGUNGAN
dari masa tanam sampai dengan masa panen (4 bulan)

RISIKO YANG DIJAMIN
hama, kekeringan, banjir

PREMI
per hektare, per musim tanam
Rp 36.000,- swadaya petani
Rp 144.000,- ditanggung pemerintah

* (a) umur padi > 10 hari setelah tanam
(b) luas kerusakan ≥ 75% pada setiap luas petak alami

HUMAS - Sekretariat Direktorat Jenderal Prasarana dan Sarana Pertanian

Crop insurance



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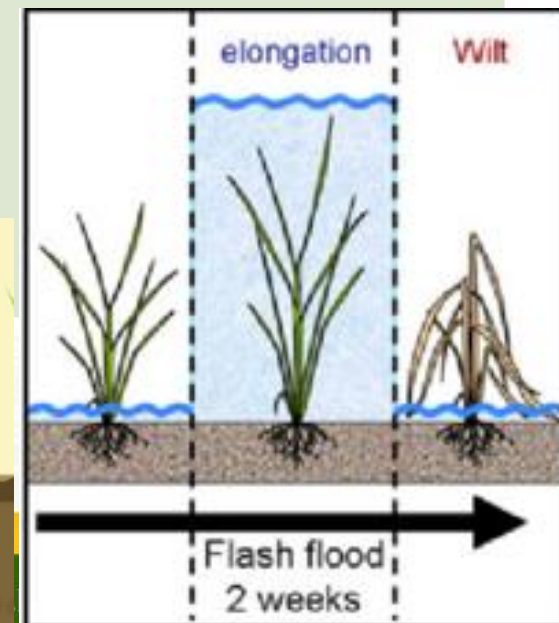
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Technologies for Climate Change Adaptation and Mitigation in Rice

Drought tolerant Rice Varieties	Flood tolerant Rice Varieties	Salinity Tolerant Rice Varieties
Inpari 18, Inpari 19, Inpari 20, Inpago 4, Inpago 5, Inpago 6, Inpago 8, Inpago Lipigo 4	Inpari 29, Inpari 30 Ciherang Sub-1, Inpara 4, Inpara 5	Inpari 34 Inpari 35



GHG mitigation from agricultural sector

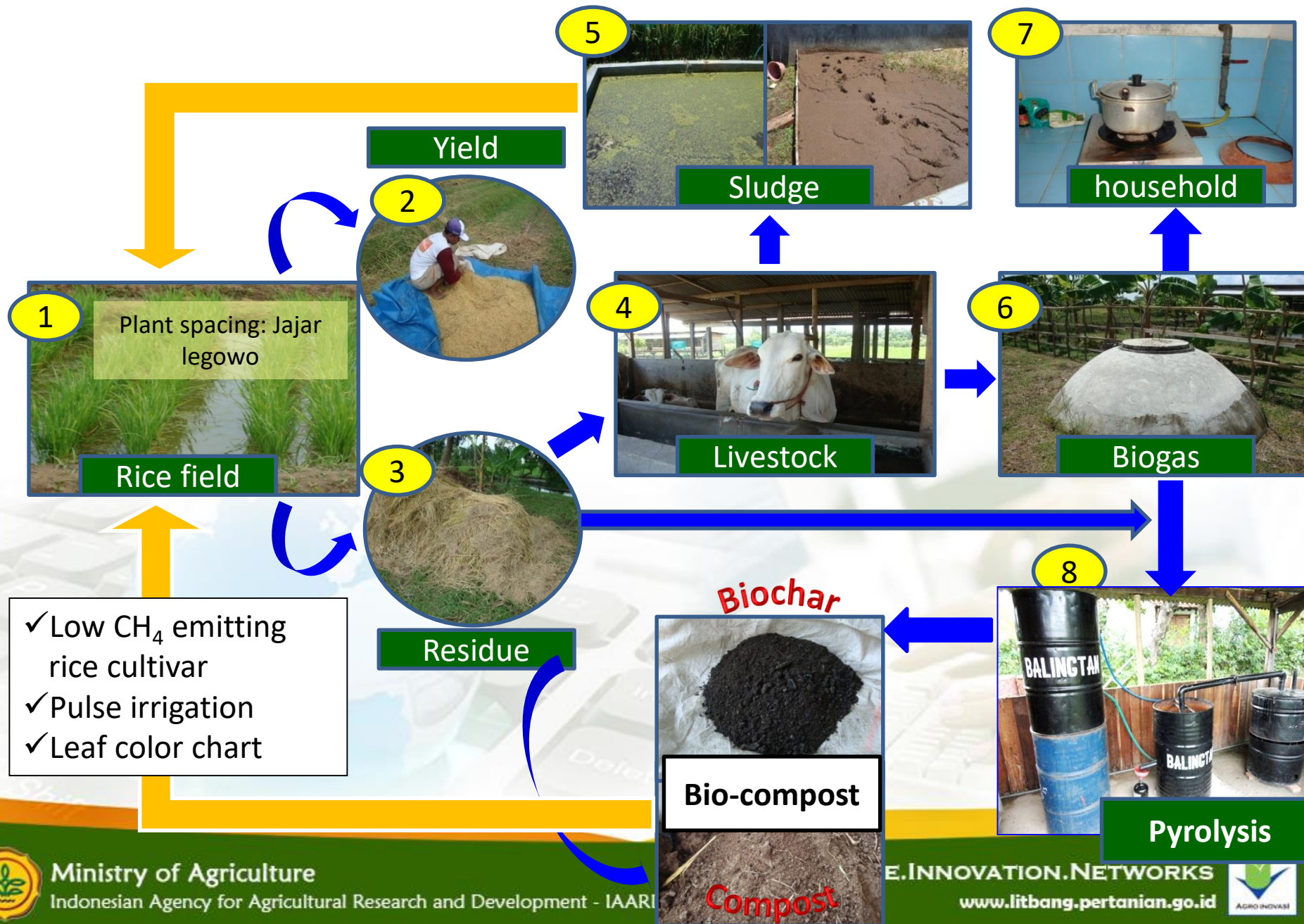


1. Production must increase!

2. Low GHG emission



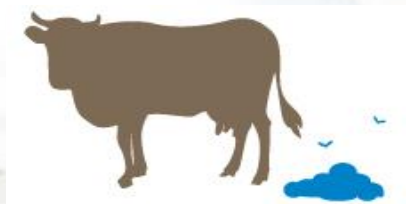
Integrated crop-livestock system



Integrated crop-livestock

Water managements	Rice varieties	Yield (t/ha)	GHG emissions (t CO ₂ -e/ha)	Emission Index (t CO ₂ -e/t yield)
CF	Ciherang	3,26	4,56	1,40
	Inpari 30	3,18	5,04	1,58
	IPB3S	3,20	4,18	1,31
Intermittent irrigation	Ciherang	3,11	2,90	0,93
	Inpari 30	3,21	2,58	0,80
	IPB3S	2,95	3,26	1,11

Intermittent irrigation reduced CH₄ emission around 30-47%



Cow dung were kept in bio-digester

Sludge production was around 2 kg/day or 730 kg/year → additional income

The profit from cattle and manure management:

1. Weight gain of the cattle
2. Biogas could reduce CH₄ emission around 1231 ton CO₂e/year
3. CH₄ capture that converted into LPG was around Rp 4.399.200,- (315 USD)



Global Warming Potential from intensive rice farming system

Treatments	GWP (t CO ₂ -eq/ha)				Total of GWP (t CO ₂ - eq/ha/year)	Yield (t/ha/year)	Index of yield/ GWP
	PS I	PS II	PS III	PS IV			
Conventional	8.3	7.9	10.6	11.5	38.4	18.8	0.49
Conventional- intermittent	4.7	5.6	7.8	7.3	25.8	20.7	0.80
ICM-continuous flooded	5.4	7.6	10.5	10.8	34.4	20.4	0.59
ICM-intermittent	3.4	4.3	8.0	6.6	22.4	20.8	0.93
SRI-intermittent	3.4	6.5	7.3	3.3	20.4	12.1	0.59
Semi SRI- intermitternt	5.2	5.9	9.0	7.7	28.9	16.9	0.58



Conclusion

- Adaptation co-benefit in paddy rice is needed to explore more in respond to handle high demand of rice and tackle climate change



Thank you, Terimakasih



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