# Indonesia rice crop monitoring and management using space technology

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Ministry of Agriculture

Paddy Production 2012 -2016 (& target 2017)
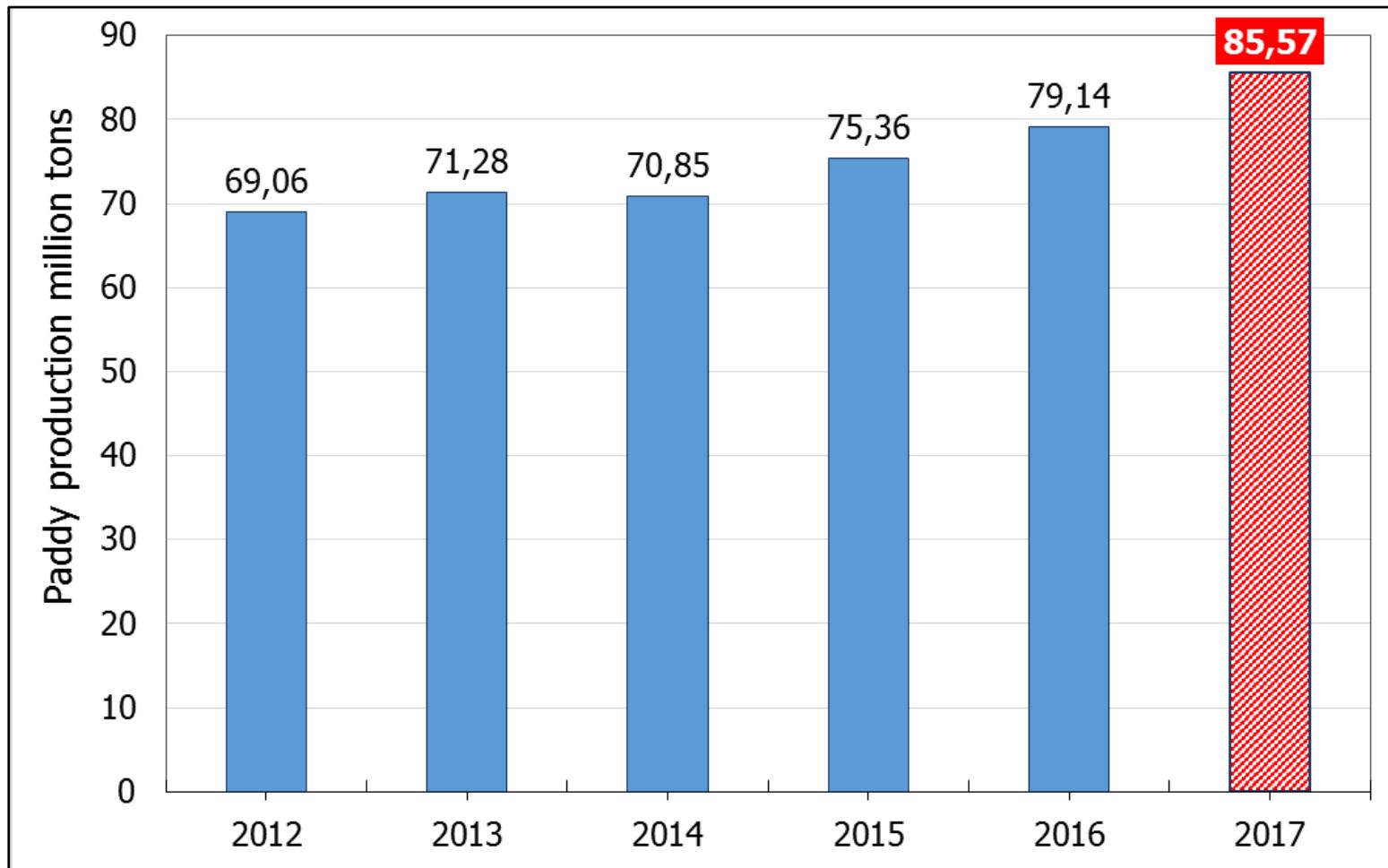
# Export-import and farmers prosperity

Import Increases, Export Decrease

66,6%
Import of corn

93%
Red Onion Import
(seed)

100%
Import of Rice

43,7%
Export of Rice
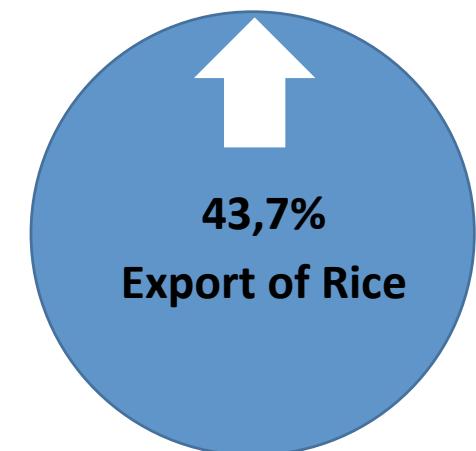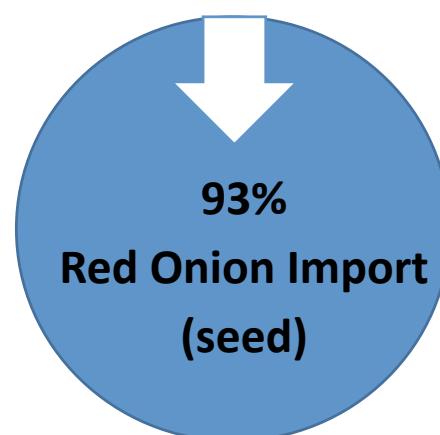
El-Nino & La-Nina Impact

	1997	1998	1999	2015	2016
Population (million people)	198.68	201.54	204.78	255.44	258.48
El-Nino/La-Nina	El-Nino	El-Nino	La-Nina	E-Nino	La-Nina
SST ANOM (oC)	2.67	2.53	-1.92	2.98	-0.72
Impact on rice imports (ton)	405,947	7,100,679	5,043,877	1,154,807	0

If no Special Effort and Anticipation 2015 El-Nino and La-Nina in 2016, with a population of 258 million extrapolation 2015/2016, Indonesia should import 16.8 million tons of rice

Agriculture Acreage in Indonesia (2009 – 2013)
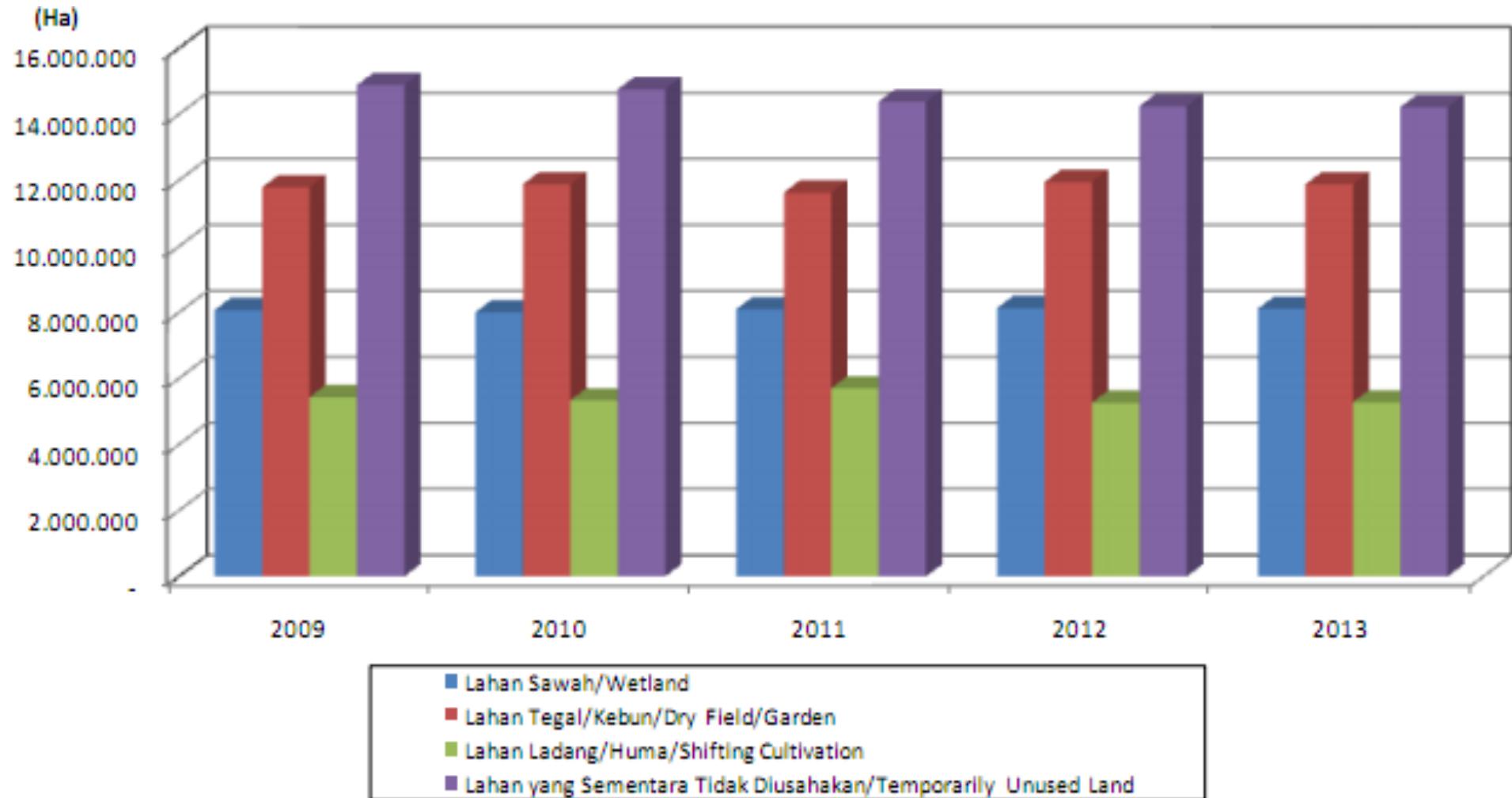
Sumber : Pusdatin (2014)

# Land Resources Availability (Million Ha)

Livestock; 0.9

Paddy; 7.5

Annual crop; 17.3

Crop; 7.4

Horticulture; 1.5

vegetable; 0.2
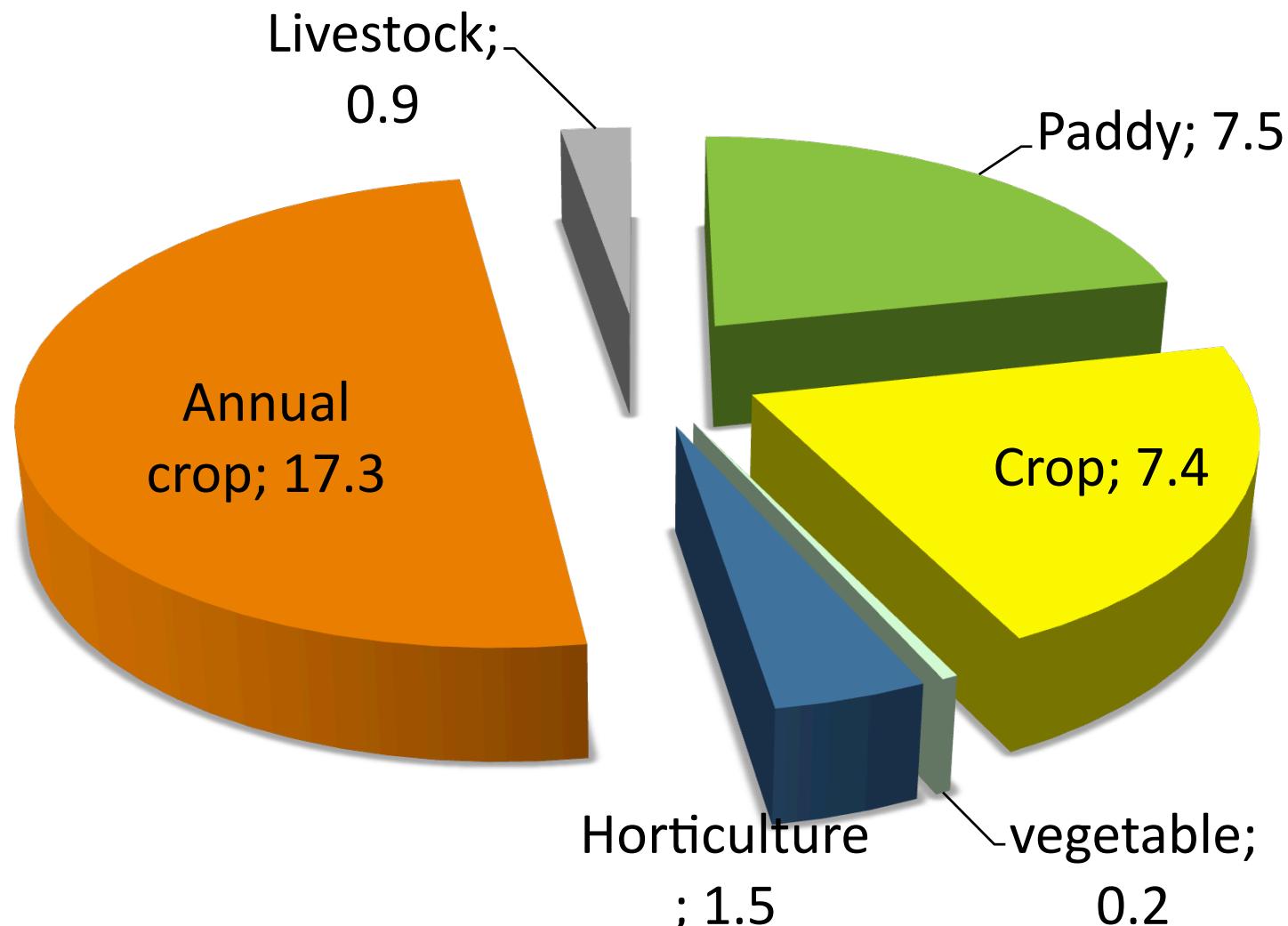
Remote Sensing for Agriculture Management
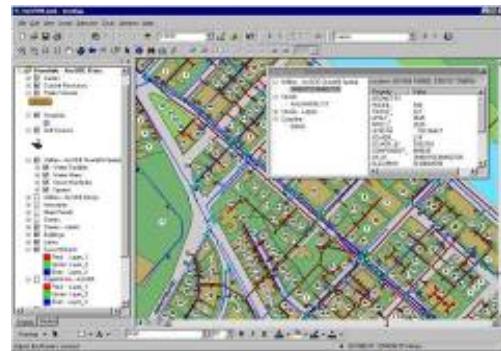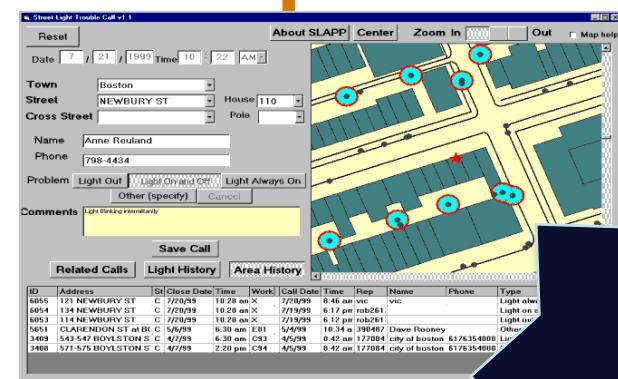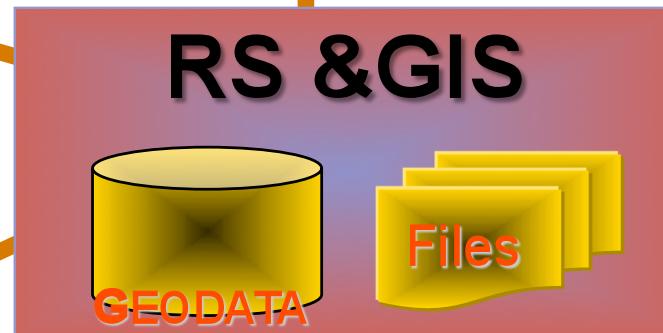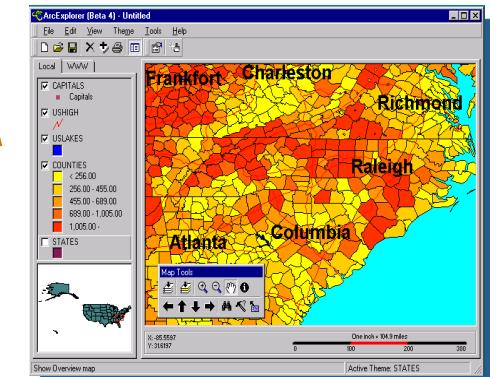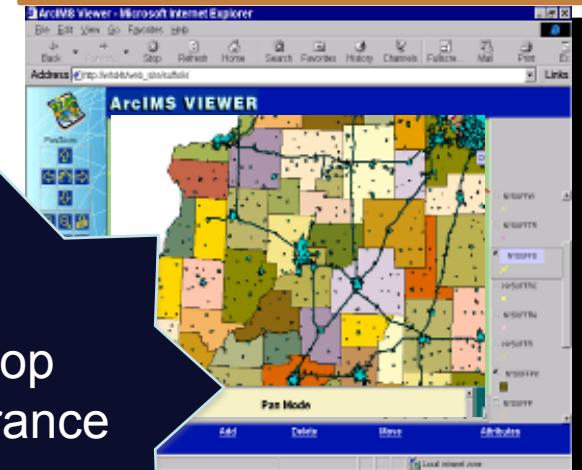
# Success Story Goals of Indonesian Remote Sensing Collaboration Activities

✱ **Close cooperation with related institutions**, both national institutions as well as international organizations with more integrated activities, involved multiple sectors from government institutions, academe, and local governments. Regional cooperation to promote utilization of results by end-users.

✱ **Improvement of human resource ability & human** network development, through research activities, trainings and workshops. Local awareness and knowledge transfer through capacity building.

✱ Enhancement of facilities, especially data transfer.

✱ **Availability of satellite data & improvement of methodology** with continuous support from provider enabling better implementation of the results.

AGRO INOVASI

KAN

Intregated Systems of Crop Monitoring Consortium
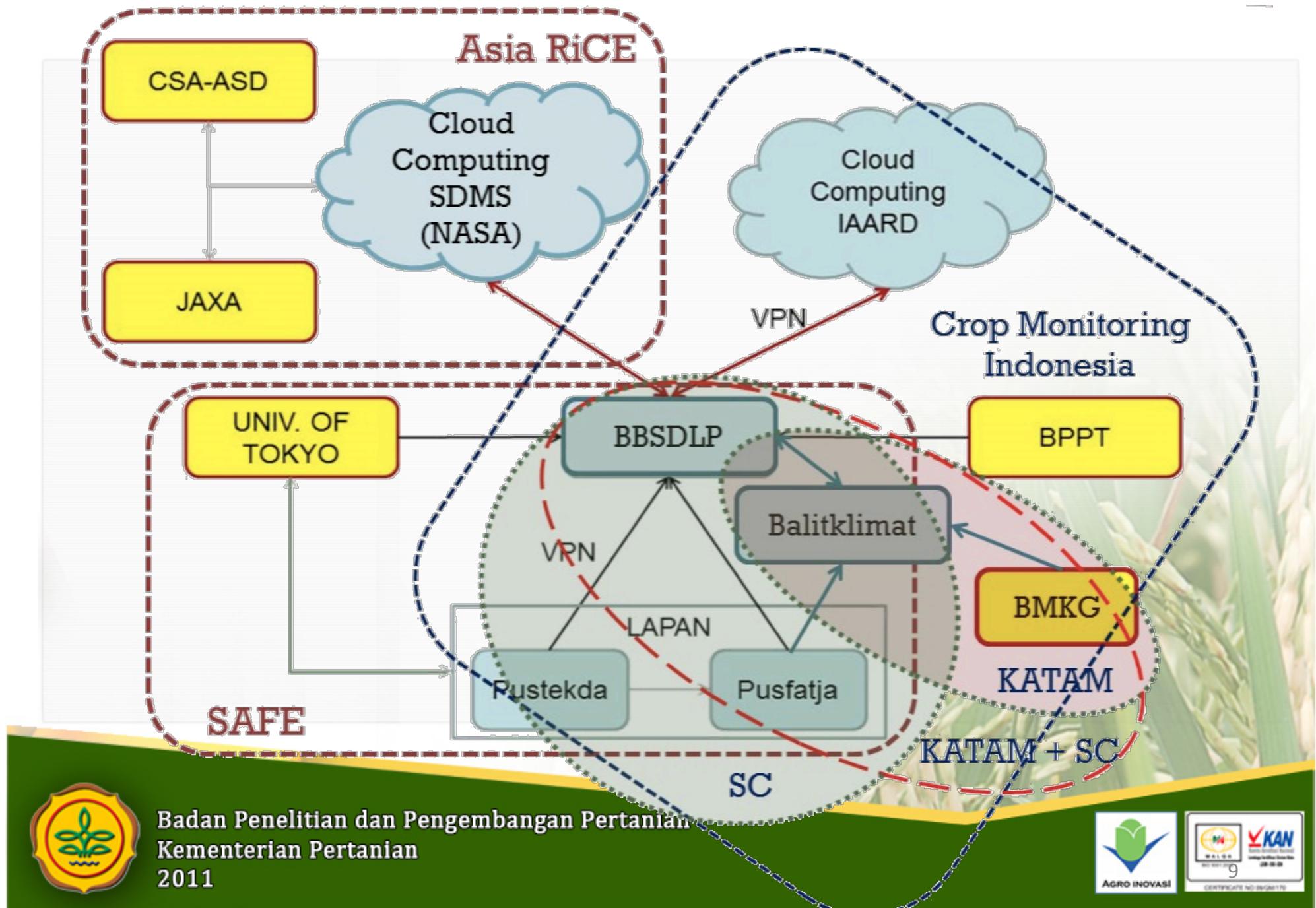
Intregated Systems for Agric. Land Resources
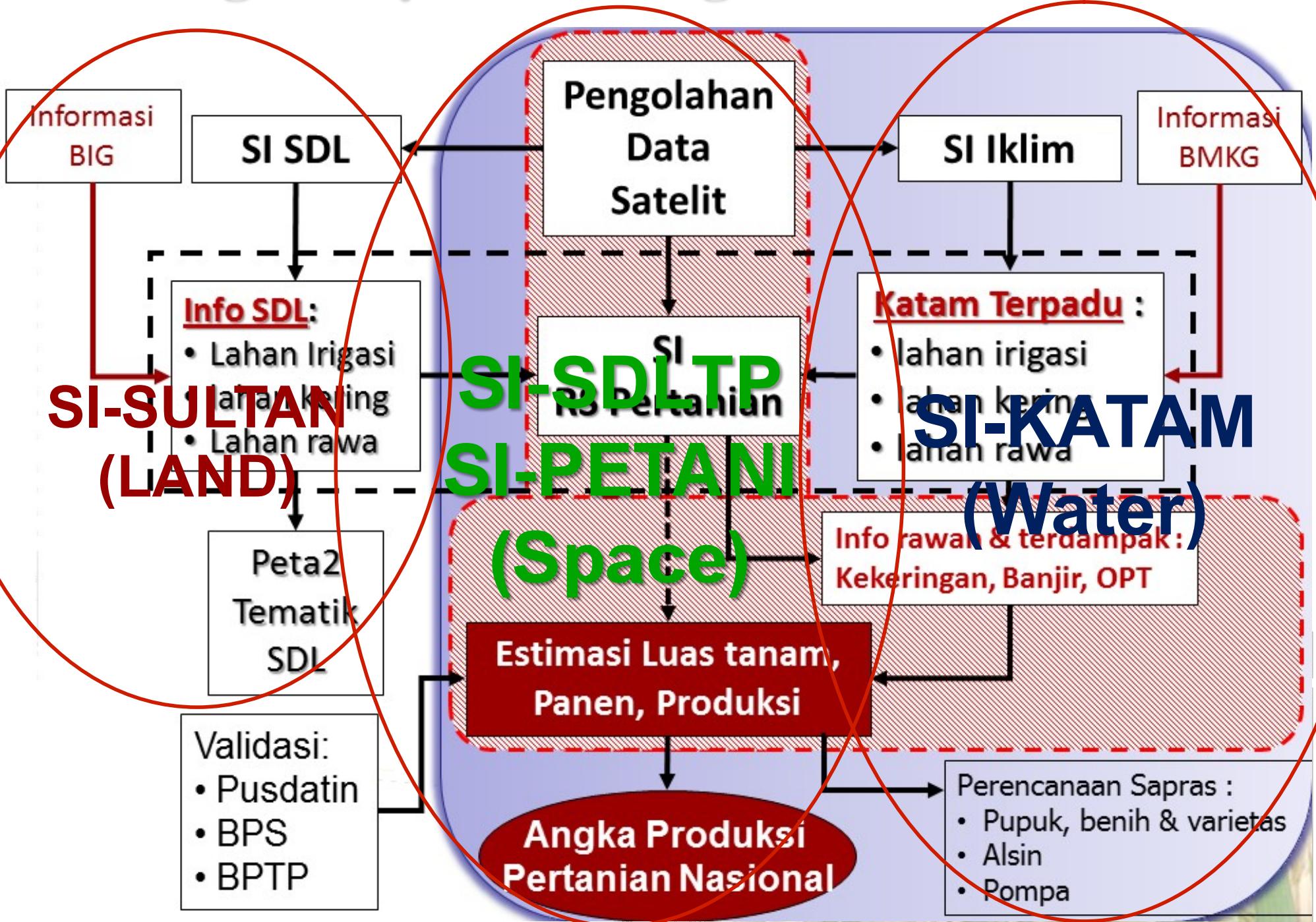
Role of RS to Support MoA Special Effort Program

1. **Standing Crop monitoring** :
   - Additional planting acreage
   - Estimation of monthly production (how much, where, when)

2. **Production facility control & management** (fertilizer, pesticide, seed, irrigation, agric. mechinery)
   - Estimation of production facility need
   - Mobilization of production facility
   - Distribution of production facility

3. **Irrigation channels monitoring & maintenance**:
   - Identification of damaged primer & secunder irrigation cannels

4. **Mobilization of Agric. products** :
   - Identification of surplus & deficit area
   - Mobilization product to supply deficit area from surplus area

PETA FASE PERTUMBUHAN PADI SAWAH IRIGASI PERIODE 30 MARET 2015 - 6 APRIL 2015 PADA WILAYAH RAWAN KEKERINGAN BERDASARKAN PREDIKSI CURAH HUJAN MK 2015 P. JAWA DAN BALI

BADAN PENELITIAN DAN PENGEMBANGAN PERTANIAN
KEMENTERIAN PERTANIAN

Legenda Umum

— Batas Provinsi
-·-·- Batas ZEE

N

0 20 40   80   120   160 Km

Simbol	Fase Pertumbuhan Tanaman	Sarana Produksi yang disiapkan
	Penggenangan	Alsin Pengolah Tanah
	Vegetatif 1	Pupuk dan Air
	Vegetatif 2	Pupuk, Air, dan Alsin Pengendali OPT dan Gulma
	Generatif 1	Air, serta Alsin Panen dan Pasca Panen
	Generatif 2	Air, serta Alsin Panen dan Pasca Panen
	Bera	Alsin Pengolah Tanah dan Air

Tingkat Rawan Kekeringan	Curah Hujan MK 2015 (mm/bulan)	
	< 60	> 60
Endemis		
Sporadis		
Potensial		
Aman		

Indeks Global

Accuracy :

MODIS Terra

- Identifying paddy growth stage : 75,00 – 91,67 %

- Estimating planted area : ≤ 82,43 %

Landsat 8 :

- Identifying growth stage & Estimating planted area : <= 82%

PROV. BANTEN
PROV. JAKARTA
PROV. JAWA TENGAH
PROV. JAWA TIMUR
PROV. YOGYAKARTA
PROV. JAWA TIMUR
PROV. BALI

0 35 70   140   210   280 Km

N

Sumber : Pengolahan Citra MODIS MARET 2015 (LAPAN), Overlay sawah endemis kekeringan dan prediksi curah hujan MK 2015 (Balitbangtan) ; website: http://katam.litbang.pertanian.go.id/

Estimation of Agricultural Production Facility Needs
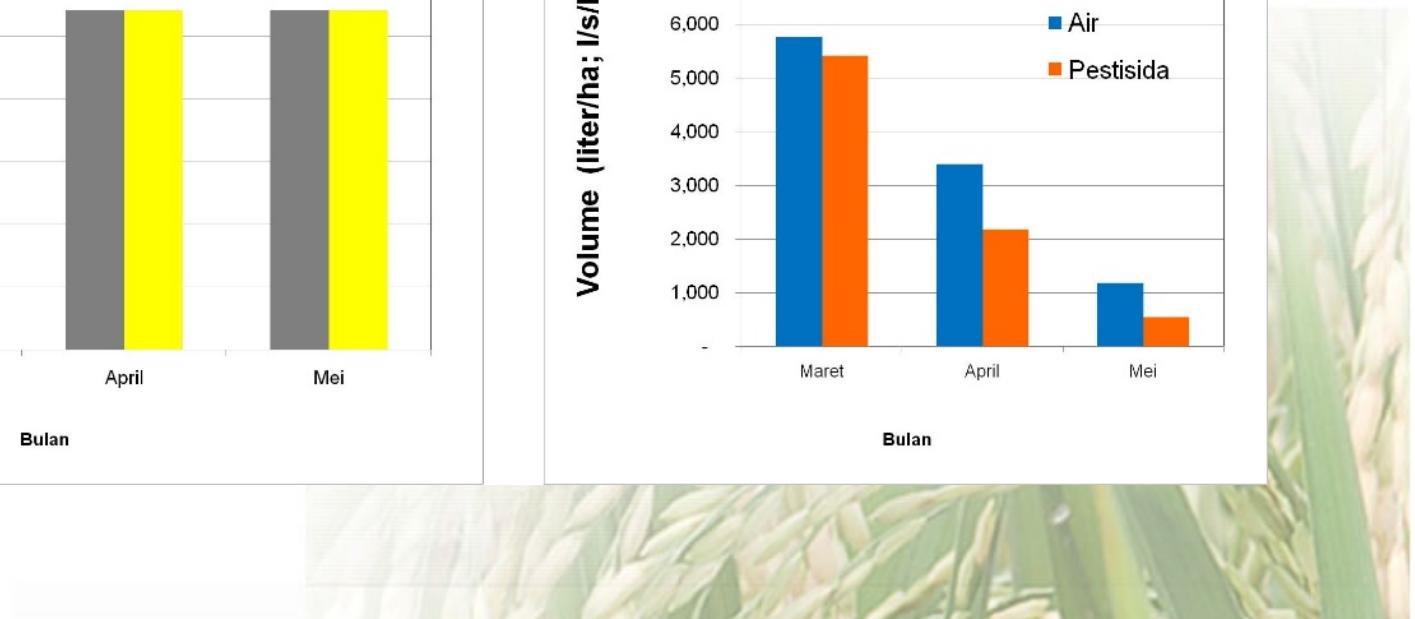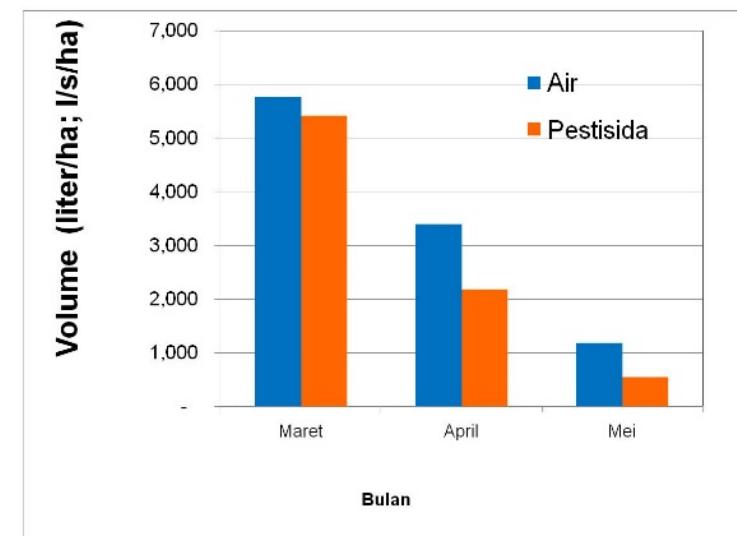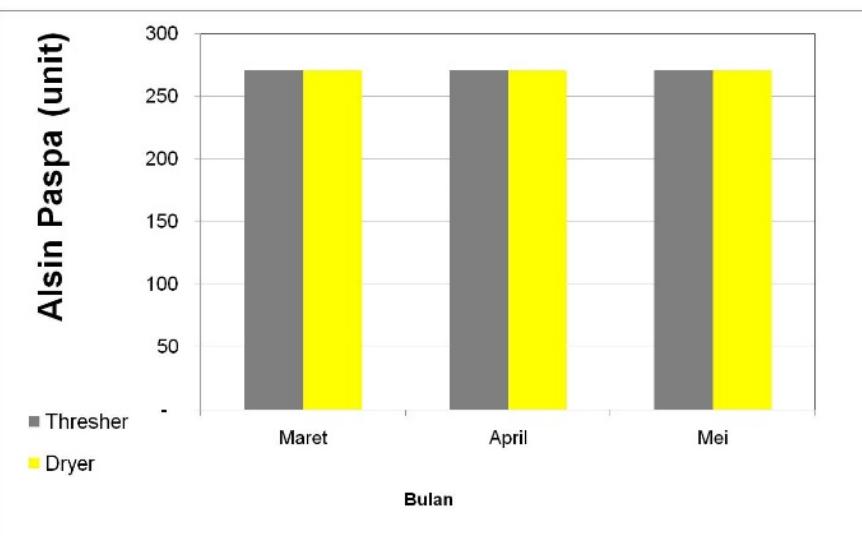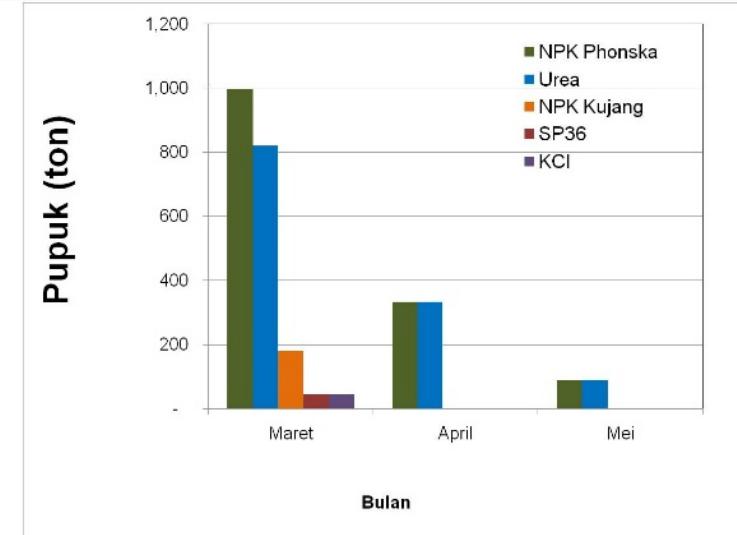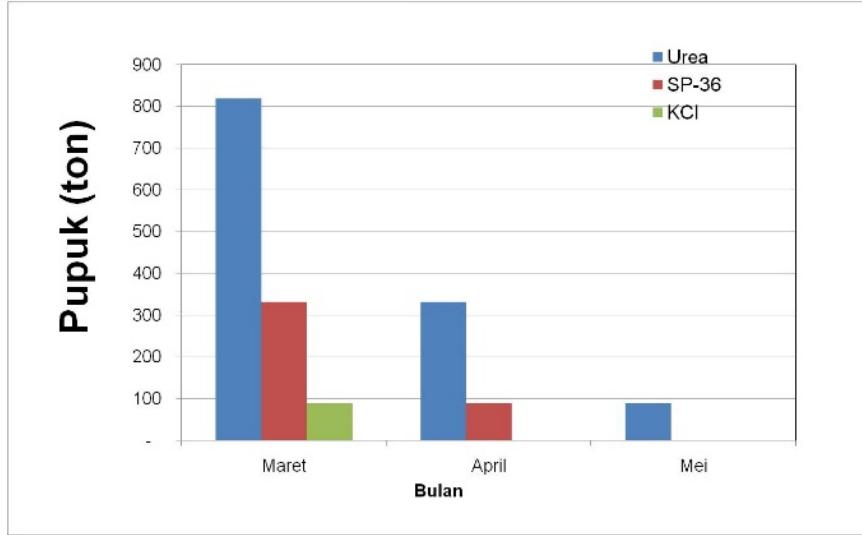
SC for Agribusiness

| Indicator	Monthly Yield Potention						
	Mar	Apr	May	Jun	Jul	preparation	Total yield
1	2	3	4	5	6	7	8
Harvested agreage (ha)	12.880	64.774	143.213	54.621	22.593	3.144	298.081
Paddy roduction (ton)	68.267	343.302	759.027	289.491	119.742	-	1.579.828
Rice (ton)	38.379	193.004	426.725	162.752	67.319	-	888.179
Rice Market Price Estimation (Rp/kg)	?	?	?	?	?		

FUTURE PLAN

INNOVATIVE TECHNOLOGY is REQUIRED
(Such as Remote Sensing)

- **Audits of existing agricultural land**

- **Optimization of existing agricultural land through the application of innovative technologies,**

- **Protection of existing land conversion to non-agricultural land**

- **Utilization of land degradation / bed / Land sub-optimal**

to accelerate the provision of geospatial information : ACCURATE, FAST, DETAILED, COMPLETE & UP TO DATE

Paddy Growth Stages Classification using ALOS-2 PALSAR (2016)
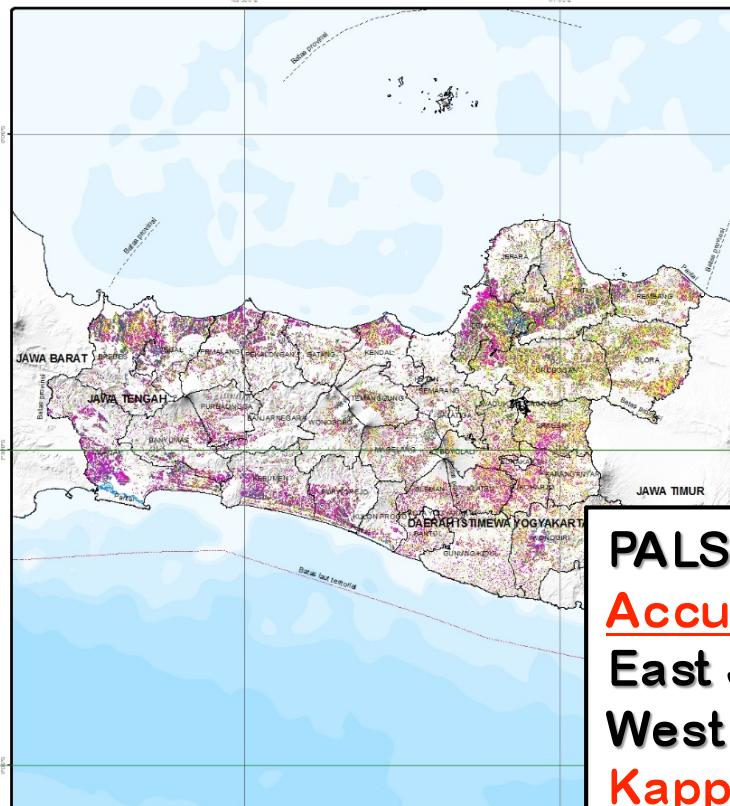
PALSAR-2 :
Accuracy :
East Java : 71 %
West Java : 76 %
Kappa Statistic :
East Java : 0.63
West Java : 0.55
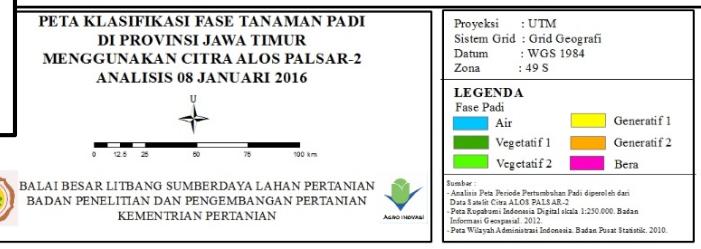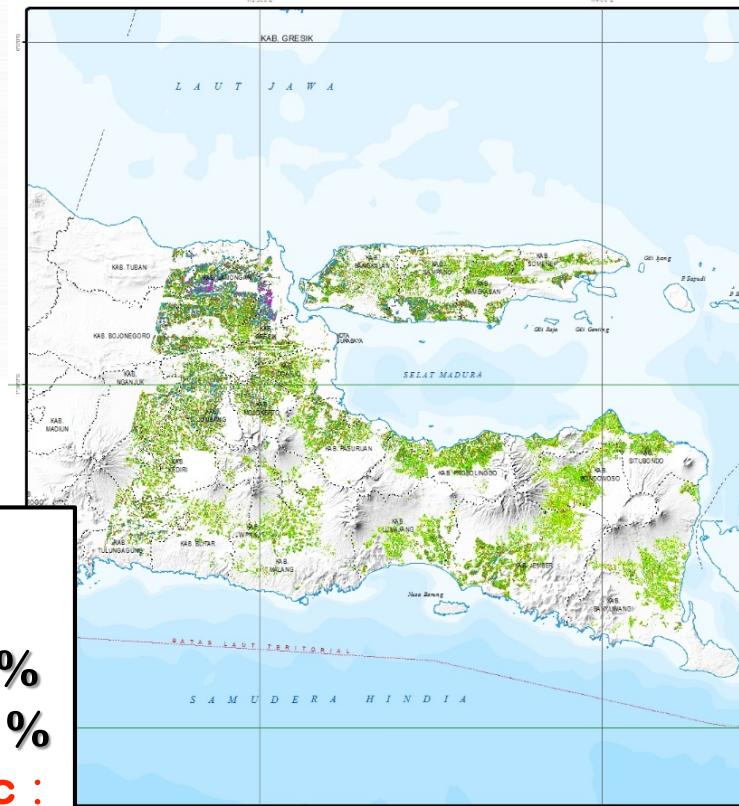
RS for Agriculture Insurance Scheme

CURRENT

Manual

Ground cek

Ground cek

Socialization:
- WG of MoA

Registration:
- Per Farmer Group
- Agric. Local Government & Insurance Company

Damage Assessment:
- Local Competent Officer

Verification & Report:
- Insurance Company

Claim:
- Insurance Company

Payment:
- Via Farmer Group

- Digital calculation insured area
- Online registration

RS & GIS

RS & GIS

Selected Ground cek

FUTURE

RS & GIS

- Increasing reliability area damage information
- Estimate damage area according to growth stages
- Reduce the cost of ground checks
- Reduce the amount of labor

Source: Shofiyati, 2014

Problems

- on time information, to improve crop management efficiency by farmers in order to increase crop yield and production estimation.

- Satellite Data Availability, especially SAR Data

- High accuracy model for crop identification

- Automatic Information system for crop analysis

Thank you
for your attention

Indonesian Agency for Agricultural Research and Development
(IAARD)
www.litbang.pertanian.go.id