Area Modelled Yield Index Insurance Pilot Project

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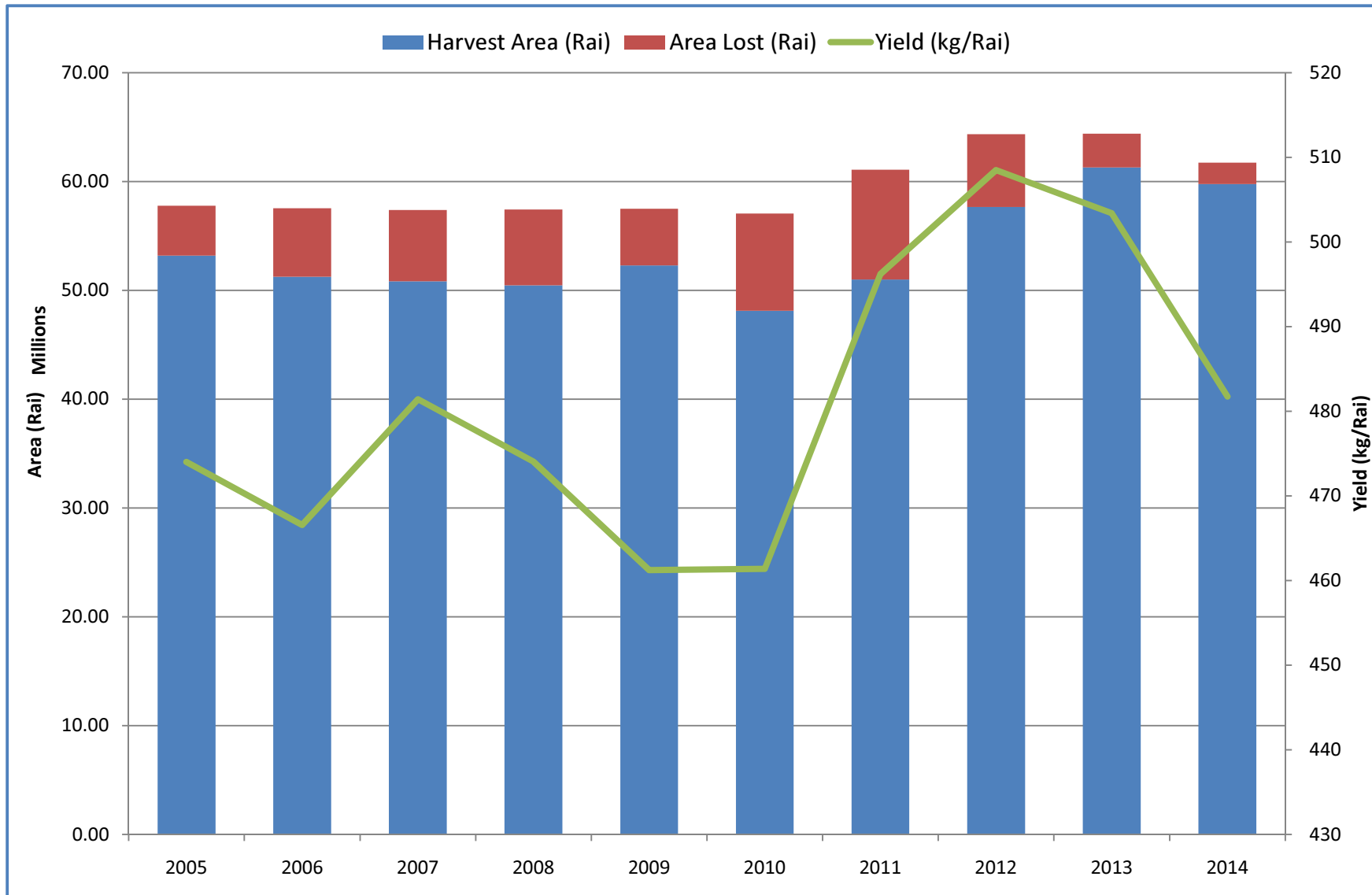
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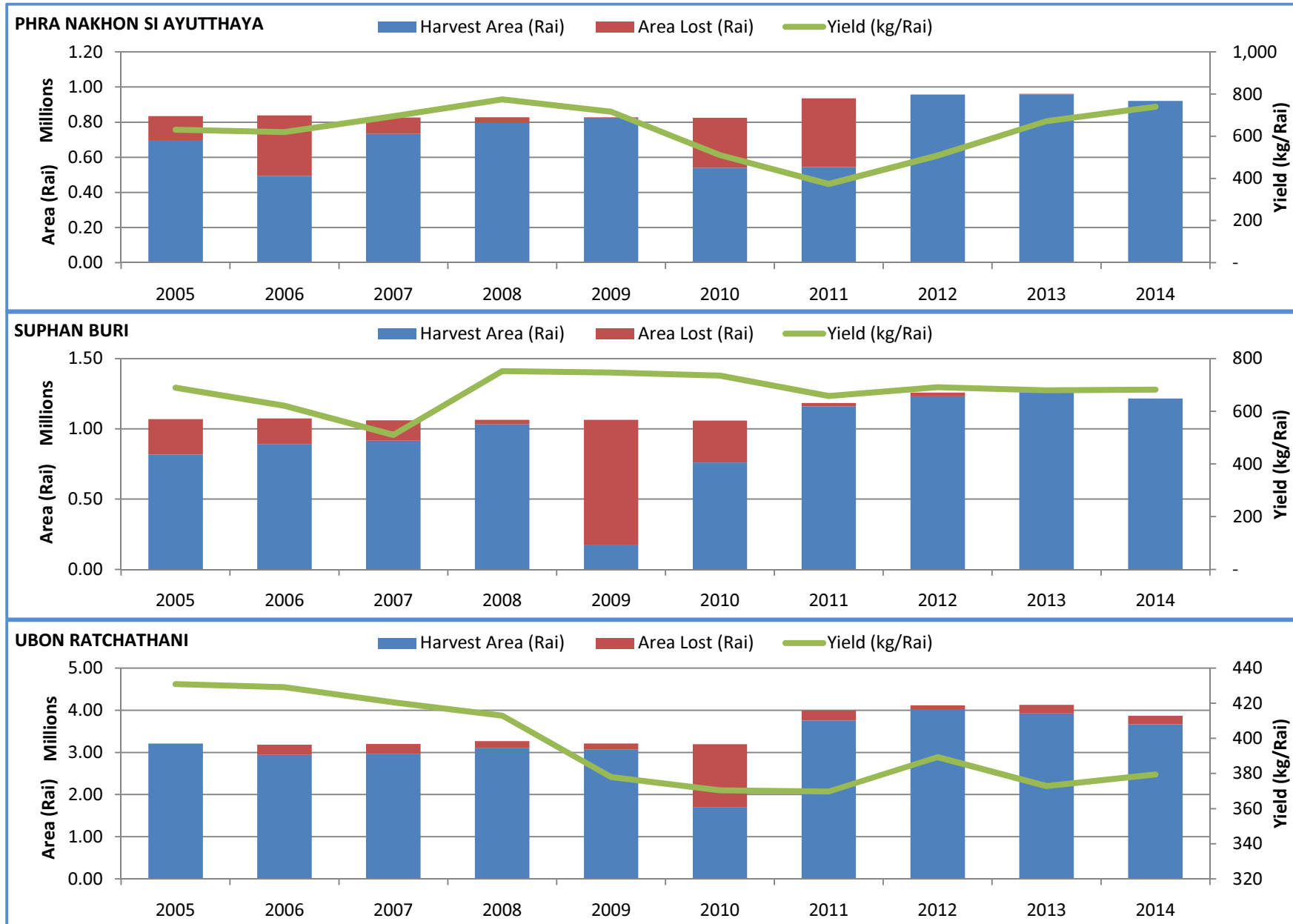
THAILAND RICE PRODUCTION & EXISTING SCHEME

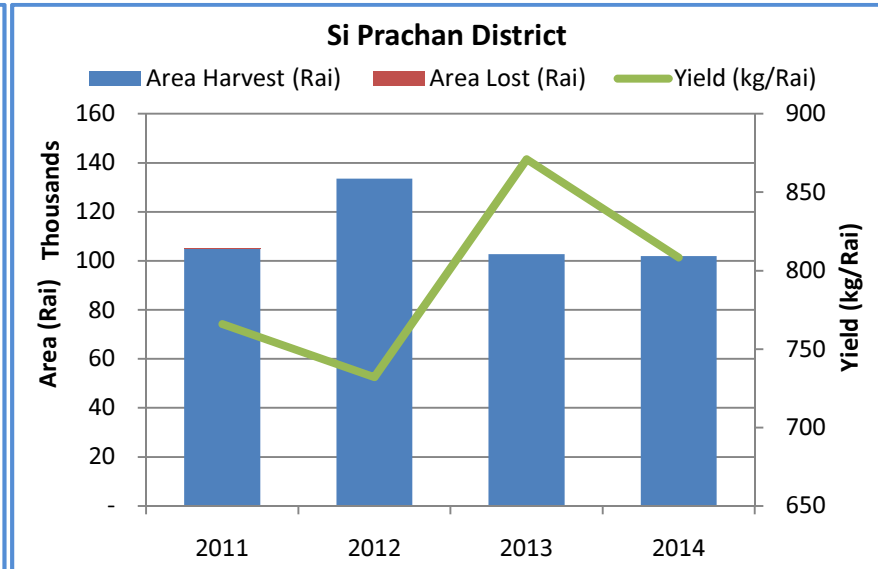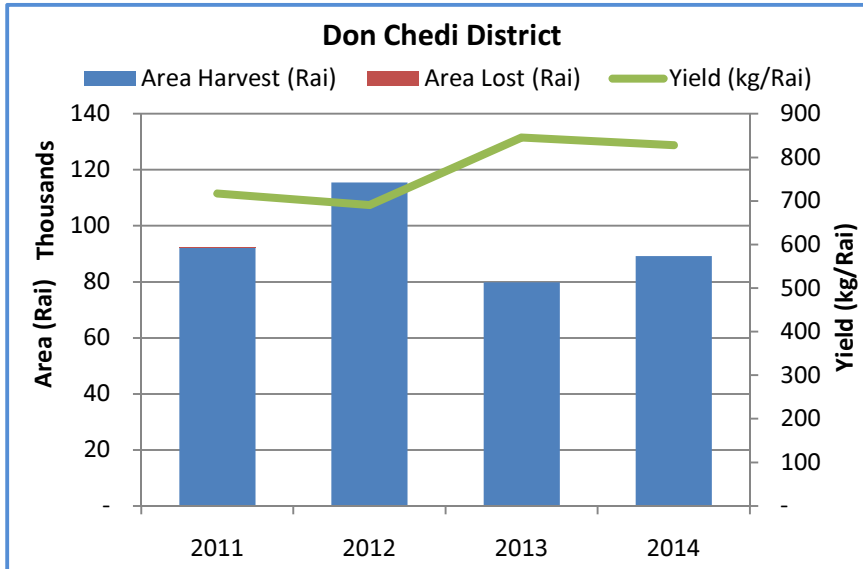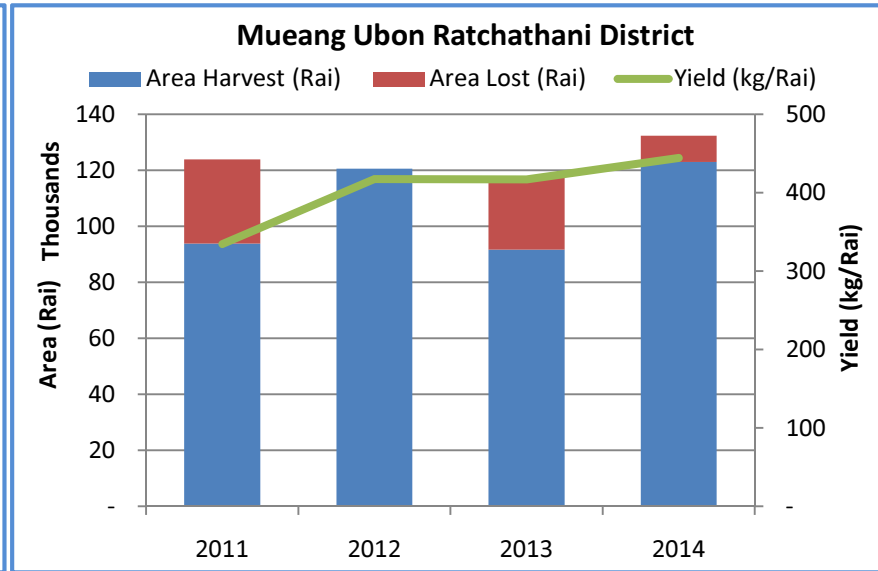# Thailand rice (FAO Data) – increasing yield but high volatility
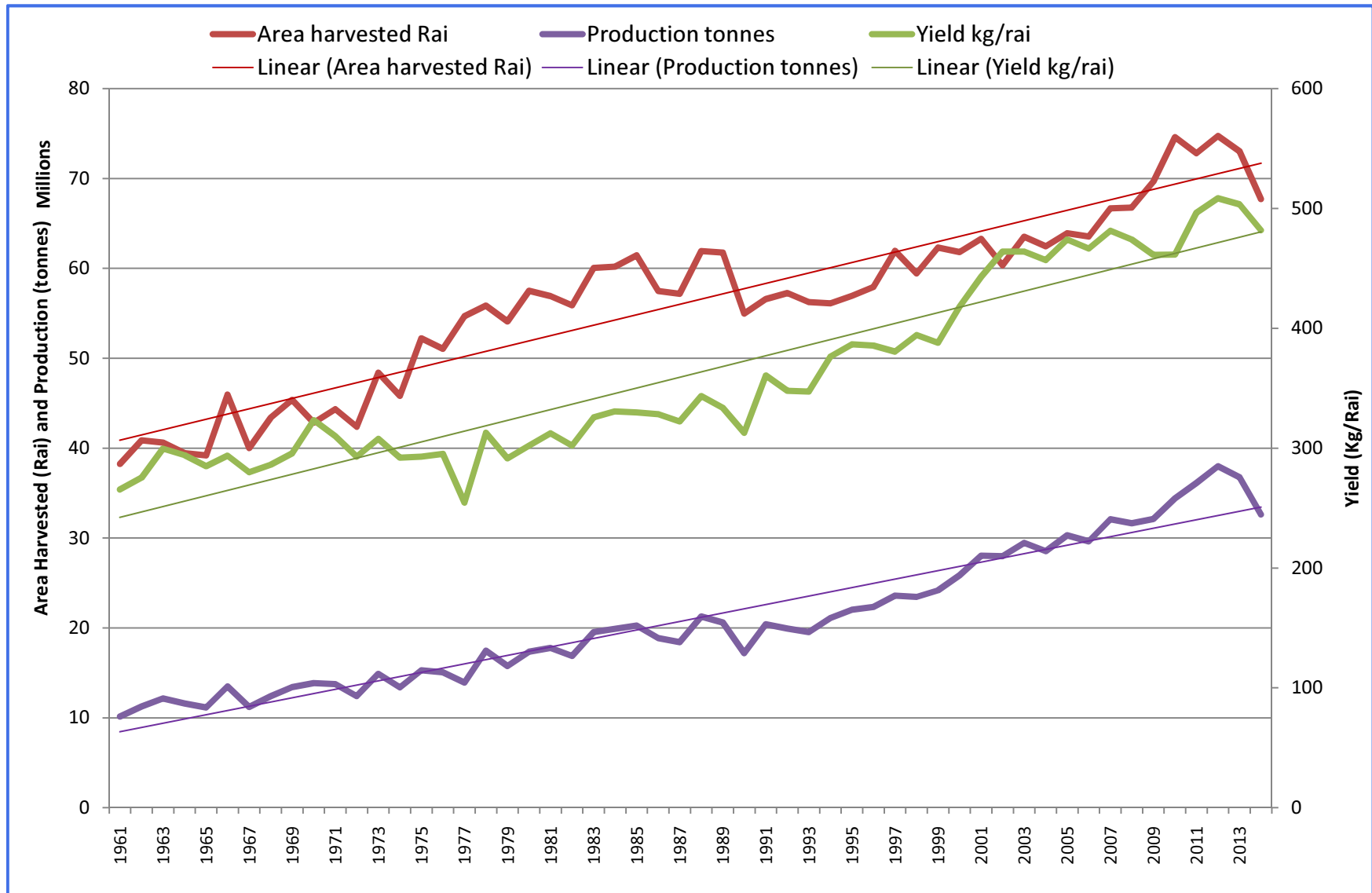
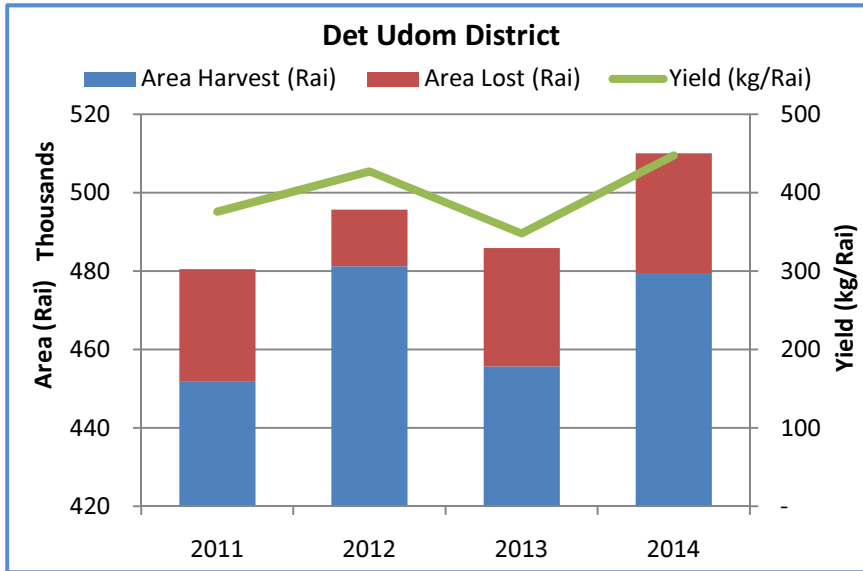National Disaster Scheme versus yield – National level

National Disaster Scheme versus yield – Provincial

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National Disaster Scheme versus yield - District

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Det Udom District

Legend: Area Harvest (Rai) · Area Lost (Rai) · Yield (kg/Rai)

Left axis: Area (Rai) Thousands (420–520)
Right axis: Yield (kg/Rai) (0–500)
Years: 2011, 2012, 2013, 2014

Mueang Ubon Ratchathani District

Legend: Area Harvest (Rai) · Area Lost (Rai) · Yield (kg/Rai)

Left axis: Area (Rai) Thousands (0–140)
Right axis: Yield (kg/Rai) (0–500)
Years: 2011, 2012, 2013, 2014

Don Chedi District

Legend: Area Harvest (Rai) · Area Lost (Rai) · Yield (kg/Rai)

Left axis: Area (Rai) Thousands (0–140)
Right axis: Yield (kg/Rai) (0–900)
Years: 2011, 2012, 2013, 2014

Si Prachan District

Legend: Area Harvest (Rai) · Area Lost (Rai) · Yield (kg/Rai)

Left axis: Area (Rai) Thousands (0–160)
Right axis: Yield (kg/Rai) (650–900)
Years: 2011, 2012, 2013, 2014

PRODUCT DEVELOPMENT

Agriculture Insurance – Considerations for product design

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How to value
- Input value
- Gross margin
- Net Present Value
- Net Sale Value

Direct to Farmer
- Credit/loans
- Input providers
- Markets/traders

How to distribute

Who is the customer(s) and what can they afford?

What to measure
- Weather
- Growth
- Yield
- Revenue

How to measure
- Modelled Yield
- Area Yield
- On-farm Yield
- Disaster Area

Where to measure
- National
- Regional
- Local Area
- On-Farm

Proposed Area Modelled Yield Index vs "Top Up" Disaster Cover

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	Area Modelled Yield Index Insurance	Top Up Disaster Cover
Historical Data	Generated at District level, consistency of collection	Tied to National Disaster Scheme data uncertainty
Pricing	Greater confidence in data reduces uncertainty loadings	High loadings for uncertainty due to variable assessment
Underwriting	No "per risk" assessments required if a "farmer"	No "per risk" assessments required if a "farmer"
Anti-selection	District outcome "de-selects" farms with poor management	Once disaster declared poorly managed farms may be over paid
Basis Risk	Difference between district yield and farm performance	Binary if no "disaster declaration" by local government
Sales window	Must close before seasonal forecasting effective	Should close before seasonal forecasting effective
Loss assessment	Fast, remote and mathematical, nil subjectivity, no loadings	Extended time and cost incurred, subjective and loads rates
Claim payment	+/- within 14 days of index closing and data checking	Function of speed of loss assessment and administration

Index Insurance – International Examples

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Country	Product	Positives	Negatives
India	Area Weather Index Insurance	• Rapid claim settlement • Symmetry of information • Transparent data	• Spatial and temporal basis risk • Limited measurable variables
	Area physical yield index insurance	• Greater sensitivity (MPCI style) • Farmer transparency of assessment	• High admin burden • Lengthy claim settlement • Asymmetry of information • Poor data quality
USA	NDVI Pasture growth index insurance	• Rapid claim settlement • Symmetry of information • Transparent data	• Pixel size basis risk • Pasture value correlation • Data costs • Changing land use
	County level loss of yield insurance	• Solves data gap for individual farmers • Lessens farm level moral hazard	• Farm level basis risk – agronomic and historical • Lengthens claim settlement • Disincentive to quality farmers
Australia	Shire modelled yield index insurance	• Replaced absent data • Data transparency & duration • Rapid claim settlement	• Spatial and temporal basis risk • Limited modelled crops • Coarseness of weather data

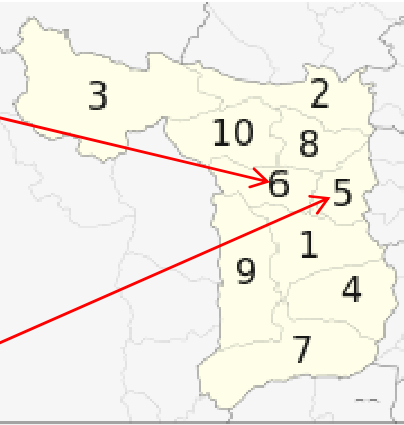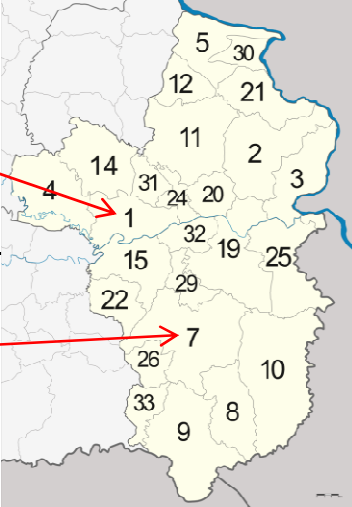# Basis Risk – Spatial, Temporal & Agronomic

Loss % 40%

Loss % 0%
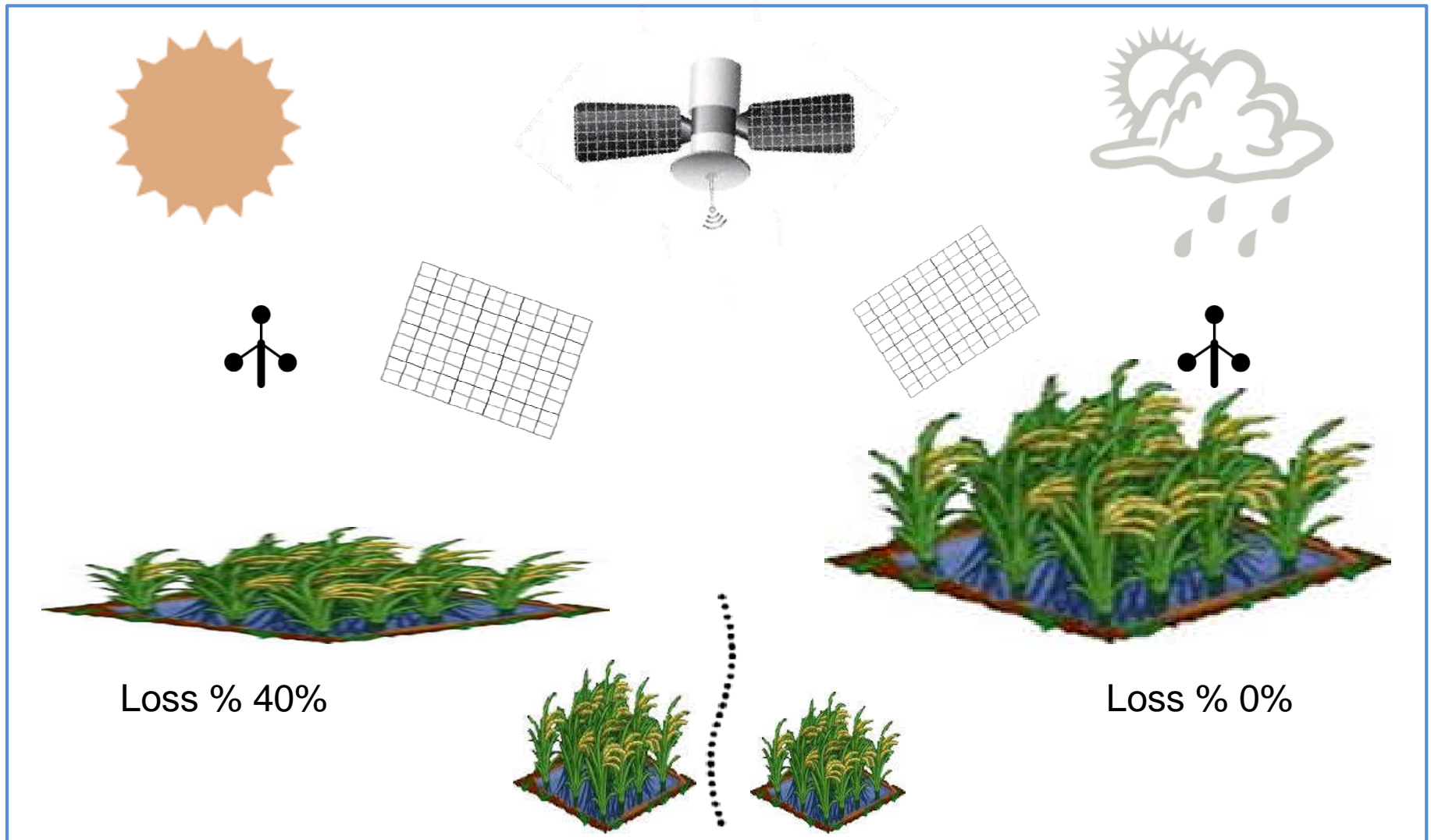
Operation of Area Modelled Yield Index Insurance

When*	What	Example
April 15	Historical average modelled yield per district shared	850 kg/Rai
	Sum insured per Rai, premium per Rai and farmer portion confirmed and shared	SI: 3,000 THB/Rai 420 / 90 THB/Rai
May 15	Sales window opens with one or more cover levels i.e.: 80% with historic payout examples	680 kg/Rai (850 X 80%)
June 15	Sales continue	
July 15	Sales close	
Dec 15	End of Season modelled yield calculated	500 kg/Rai
Dec 21	Loss of Guaranteed Yield calculated	180 kg (680 – 500)
Jan 1	Loss percentage calculated	26.47% (180 / 680)
Jan 15	Loss payments forwarded to farmers	794 THB (3,000 X 26.47%)

* Varies by Province

PROPOSED PILOT

Target Provinces & Districts

Province	Suphan Buri	Ubon Ratchathani
Districts	Don Chedi → 6 Si Prachan → 5	Muang Ubon Ratchathani → 1 Det Udom → 7

How were the Districts selected

- Preferences by FPO and BAAC (irrigated/rain-fed, 2-3 provinces)
- Availability of historical yield data on district level
- Availability of satellite-derived modelled yield data (RIICE supporting MoAC and GISTDA in processing and modelling)
- Ability to compare loss cost calculations for averages and volatility
- Ability to compare observed versus modelled yield data
- Prior ground truthing and validation of modelled data
- GIZ-BRIA area of activities and outreach to farmers

Suphan Buri	2013		2014		2015	
	Official Yield	RIICE Yield	Official Yield	RIICE Yield	Official Yield	RIICE Yield
Don Chedi	705.600	764.880	821.728	813.008	?	835.173
Si Prachan	718.400	796.320	854.080	813.760	?	820.785

Rate example for AMYII with differing coverage levels

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Sum Insured per Rai		3,000 THB			
Coverage Level		**Don Chedi**	**Si Prachan**	**Muang Ubon Ratchathani**	**Det Udom**
70%	Rate %	10.2%	10.6%	10.1%	10.6%
	Premium	306	318	303	318
	Farmer cont	36	48	34	48
	Gov't cont	270	270	270	270
80%	Rate %	13.7%	12.6%	13.6%	12.8%
	Premium	410	379	408	384
	Farmer cont	80	49	78	54
	Gov't cont	330	330	330	330
90%	Rate %	17.0%	15.9%	16.3%	16.1%
	Premium	510	477	490	483
	Farmer cont	180	147	160	153
	Gov't cont	330	330	330	330
Existing Scheme	Farmer cont	90	90	90	90
	Gov't cont	330	330	330	330

Comparison: AMYII 80% coverage versus Disaster Scheme

Legend:
- Disaster Scheme Only
- Voluntary Insurance + Disaster
- AYII + Disaster

Y-axis: "Claim" payment THB/Rai (0; 500; 1,000; 1,500; 2,000; 2,500; 3,000; 3,500; 4,000; 4,500)

X-axis: Percentage Loss of yield from average (0%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95%, 100%)

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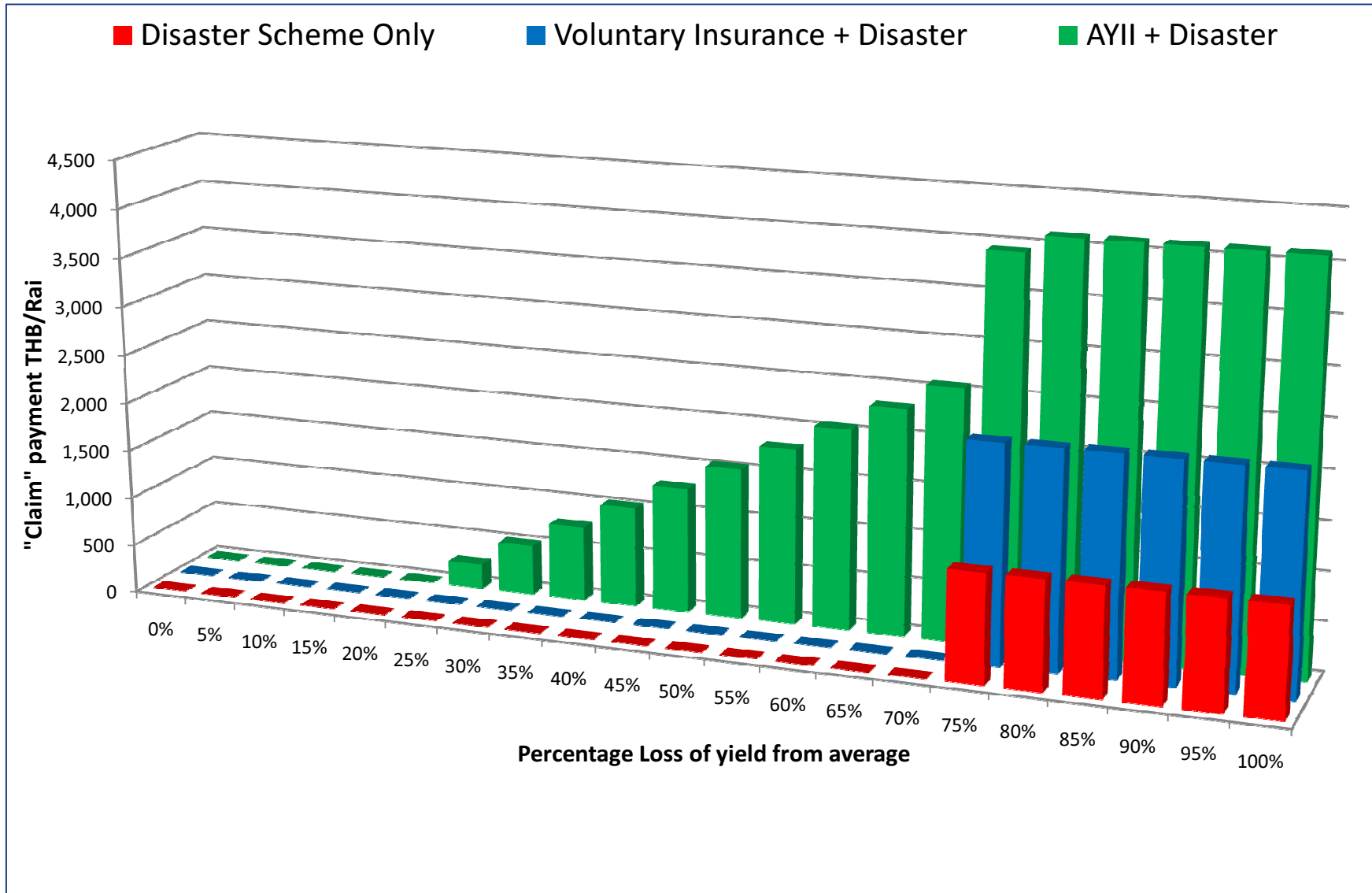
POLICY CONSTRUCTION

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AYII Product:
Granularity vs Sensitivity. From "Disaster" to "Loss of Yield"

Granularity;
from Farm &
District to
District only

Sensitivity:
from "disaster"
to partial →
total loss of
modelled yield
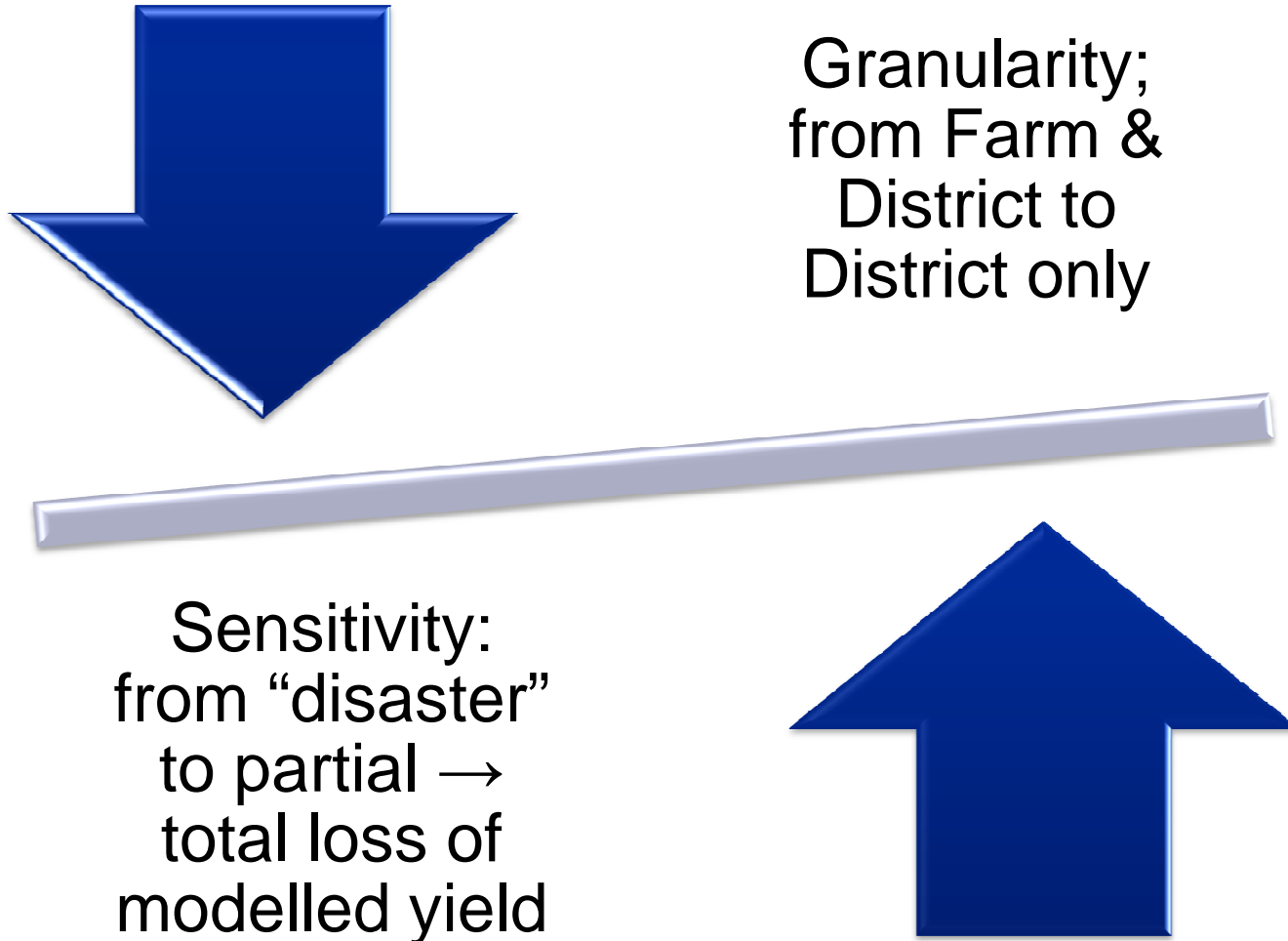
Deviation from current scheme

Data provision

Modelled yield supplied by IRRI/SARMAP

Data processing

Electronic data transfer – rapid to lead insurer

Timing of sales

Sales close off prior to season "foreseeability"
Reduce/remove asymmetry of information

Loss calculation

Timely: circa +/- 30 days after end of season yield calculation
Transparent: Average yield data and end of season data published
Rapid: mathematical exercise

Key policy operation points

Guaranteed Yield for Area (District) =

Historical average <u>Observed/Modelled</u> Yield for Area (kg per Rai)

X

Coverage Level %

i.e.: 800 kg per Rai X 80% = **640 kg per Rai**

Claim Loss Percentage for Area =

(Guaranteed Yield for Area – End of Season <u>Modelled</u> Yield for Area)

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Guaranteed Yield for Area

i.e.: (640 kg per Rai – 500 kg per Rai) ÷ 640 kg per Rai = **21.875%**

Claim payment per insured/farmer=

(Sum Insured THB per Rai X Claim Loss Percentage for Area)

X

Area (Rai) insured

i.e.: (3,000 THB per Rai X 21.875%) X 5 Rai = **3,281 THB**

Policy wording – key operative clauses & definitions

- ## Modelled Yield
  - Emphasis that on farm yield (or lack of) does not determine loss
  - The gross modelled yield is not relevant, it is the % by which a seasonal modelled yield deviates from the average that is the critical component

- ## Guaranteed Yield/Coverage Level
  - Average rolling yield X Coverage level = trigger point below which the current season modelled yield must fall below to trigger a loss

- ## End of Season Yield
  - The "area" (District) modelled yield at the end of the season incorporating weather and remote sensing data will ultimately determine the policy response

- ## Basis of Settlement
  - ((Guaranteed Yield – End of Season Yield) ÷ Guaranteed Yield) X Sum Insured per Rai

- ## Basis Risk
  - On farm crop failure may not trigger a loss if it is not representative of area result
  - Farms where crops correlate poorly with the District results should not be encouraged to buy the product

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THANK YOU