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The Use of Climate Information and Prediction in Cropping Patterns for Agricultural Field Extension Officers as an Anticipation and Mitigation of Climate Variability and Change in Indonesia

BMKG

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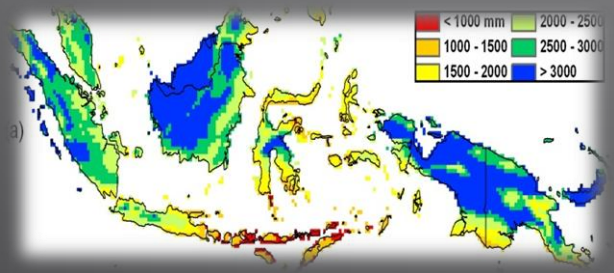
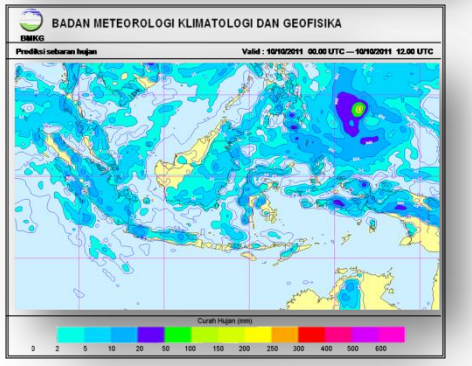


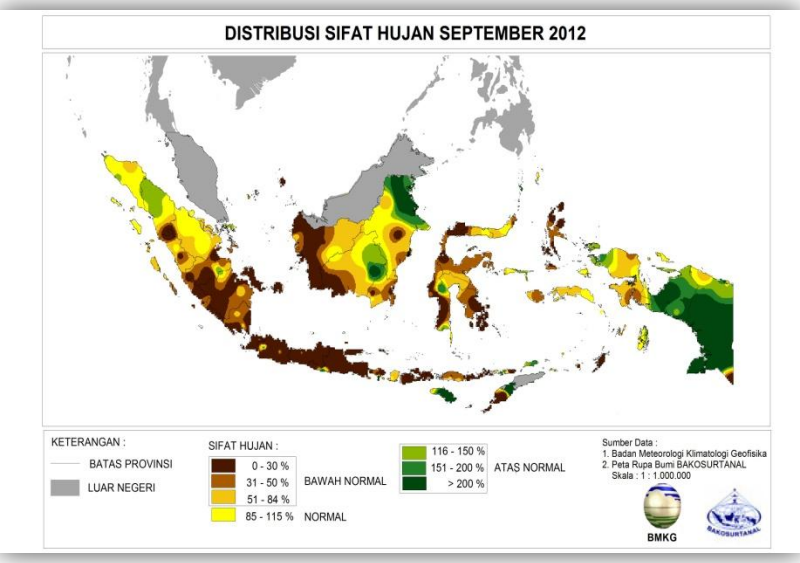
Background



- Weather and climate forecast are very important information for farmers to prepare themselves from the problem they have or would have encountered, especially with the unpredicted weather change in short term and/or to adjust the cultivation season plan in longer period. It is necessary for farmer to understand how they use the weather and climate prediction for their daily activities in planning and cultivating the plants.

Background

- Climate forecast in the form of rainfall probability which is classified into three categories : **above normal, normal** and **below normal**, will help farmers to develop plantation pattern and cultivation season calendar.



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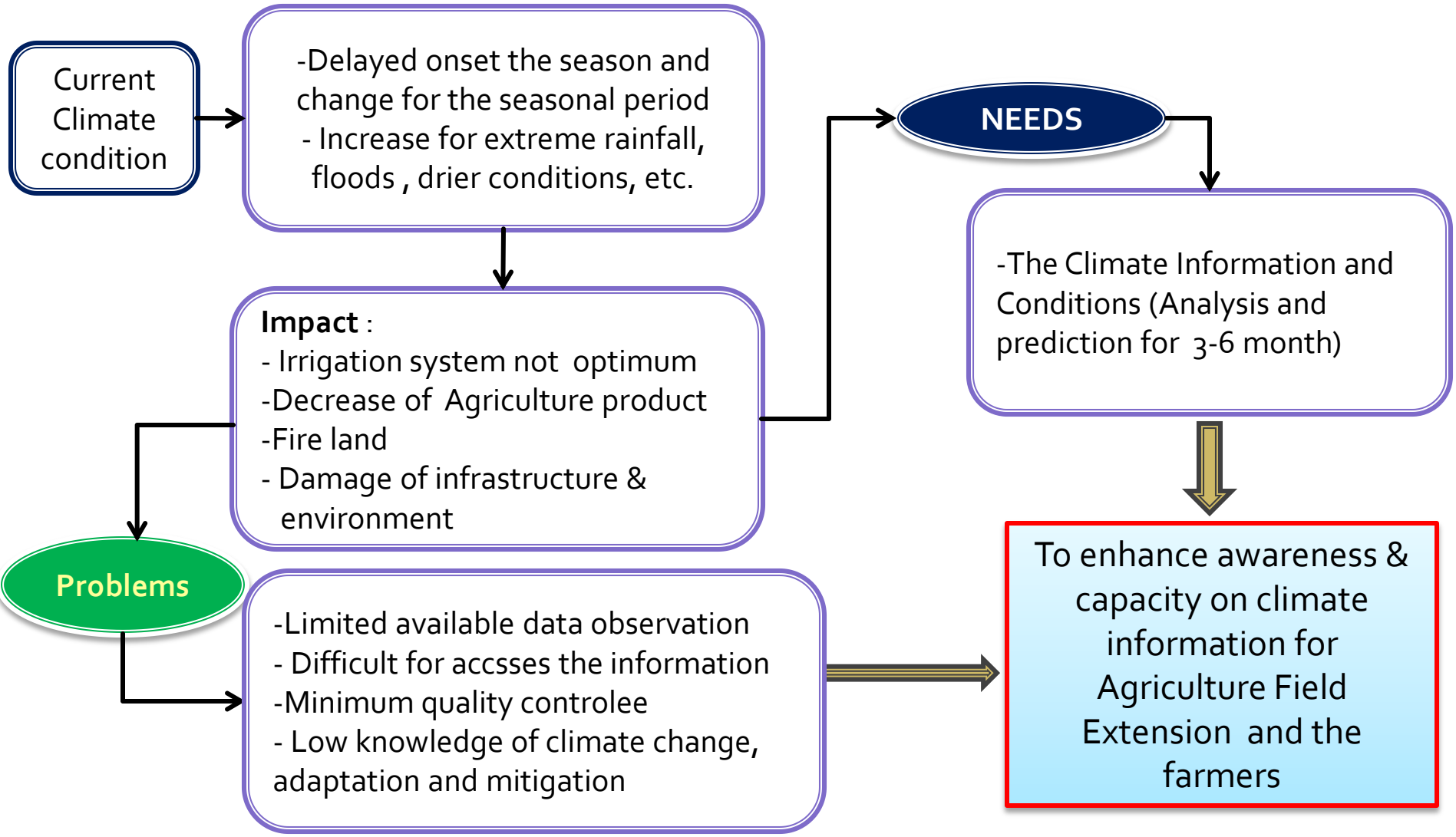
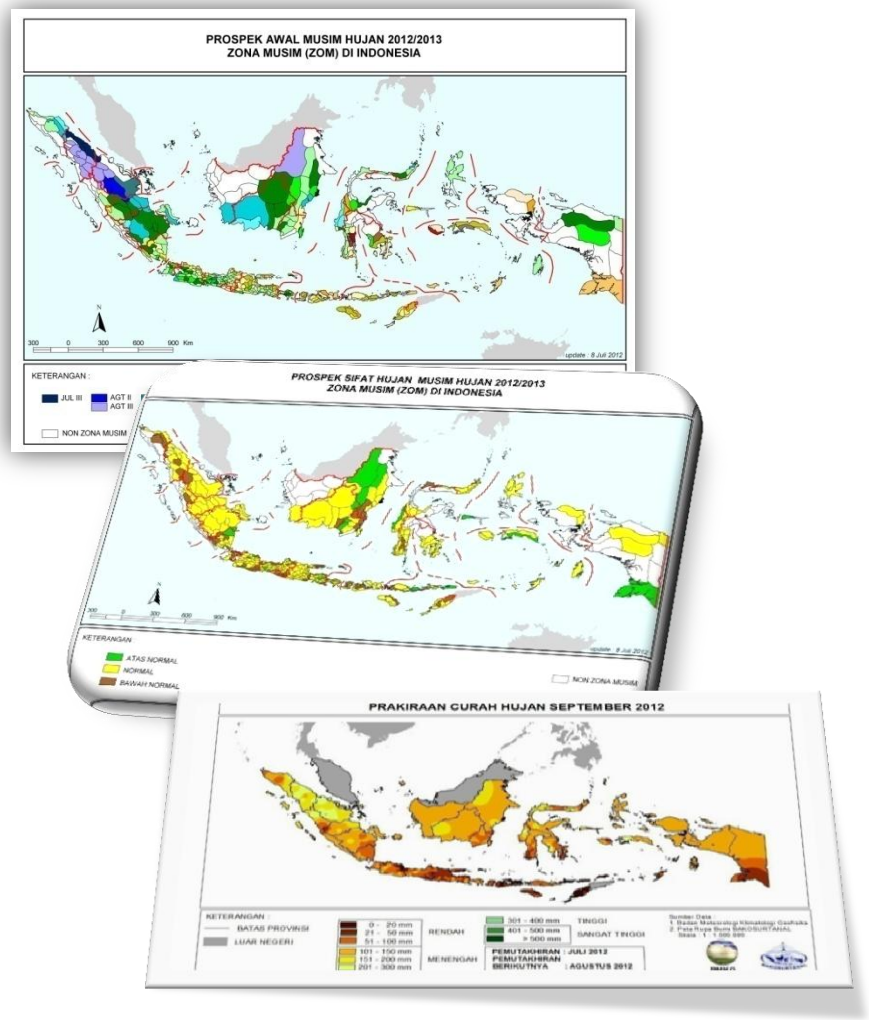

Current Climate condition
-Delayed onset the season and change for the seasonal period
- Increase for extreme rainfall, floods , drier conditions, etc.
Impact :
- Irrigation system not optimum
-Decrease of Agriculture product
-Fire land
- Damage of infrastructure & environment
NEEDS
-The Climate Information and Conditions (Analysis and prediction for 3-6 month)
Problems
-Limited available data observation
- Difficult for accsses the information
-Minimum quality controlee
- Low knowledge of climate change, adaptation and mitigation
To enhance awareness & capacity on climate information for Agriculture Field Extension and the farmers

Introduction

- Indonesian Meteorology Climatology and Geophysics Agency (BMKG) has prepared routinely the climate information which is useful to support various activities, especially in the agricultural sector
- Such information includes the forecast season (rainy and dry), monthly rain forecast, and water availability to plants, which includes various technical terms.
- This issue has not widely understood by users, so that the utilization of the information is deemed less than the maximum

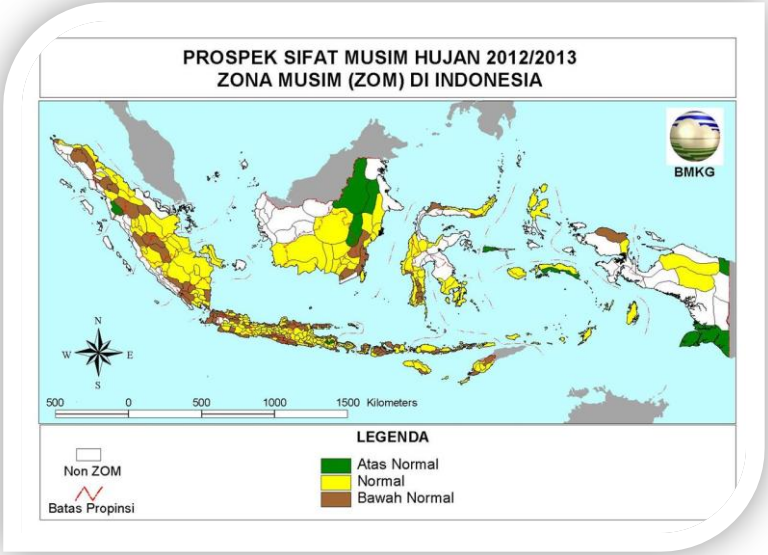


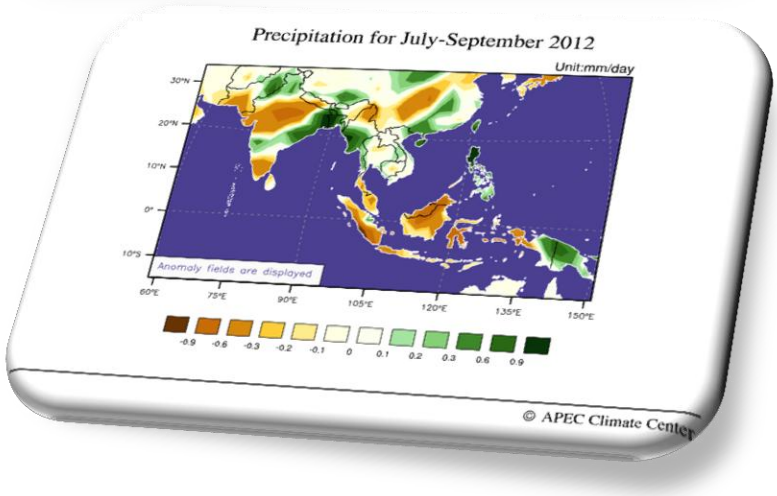
Introduction

- As an effort to improve the ability to anticipate the phenomenon of extreme climate and climate change, the general steps that can be made of them is doing the learning in the form of Climate Field School (CFS) which aims to translate climate information through a training process
- One of part of climate information application modules is to increase participants understanding on plants production in the field.
- CFS program is addressed to the officers of the Provincial and District Agriculture, Agricultural Extension Field (PPL) and the group of farmers in sub-district or village level

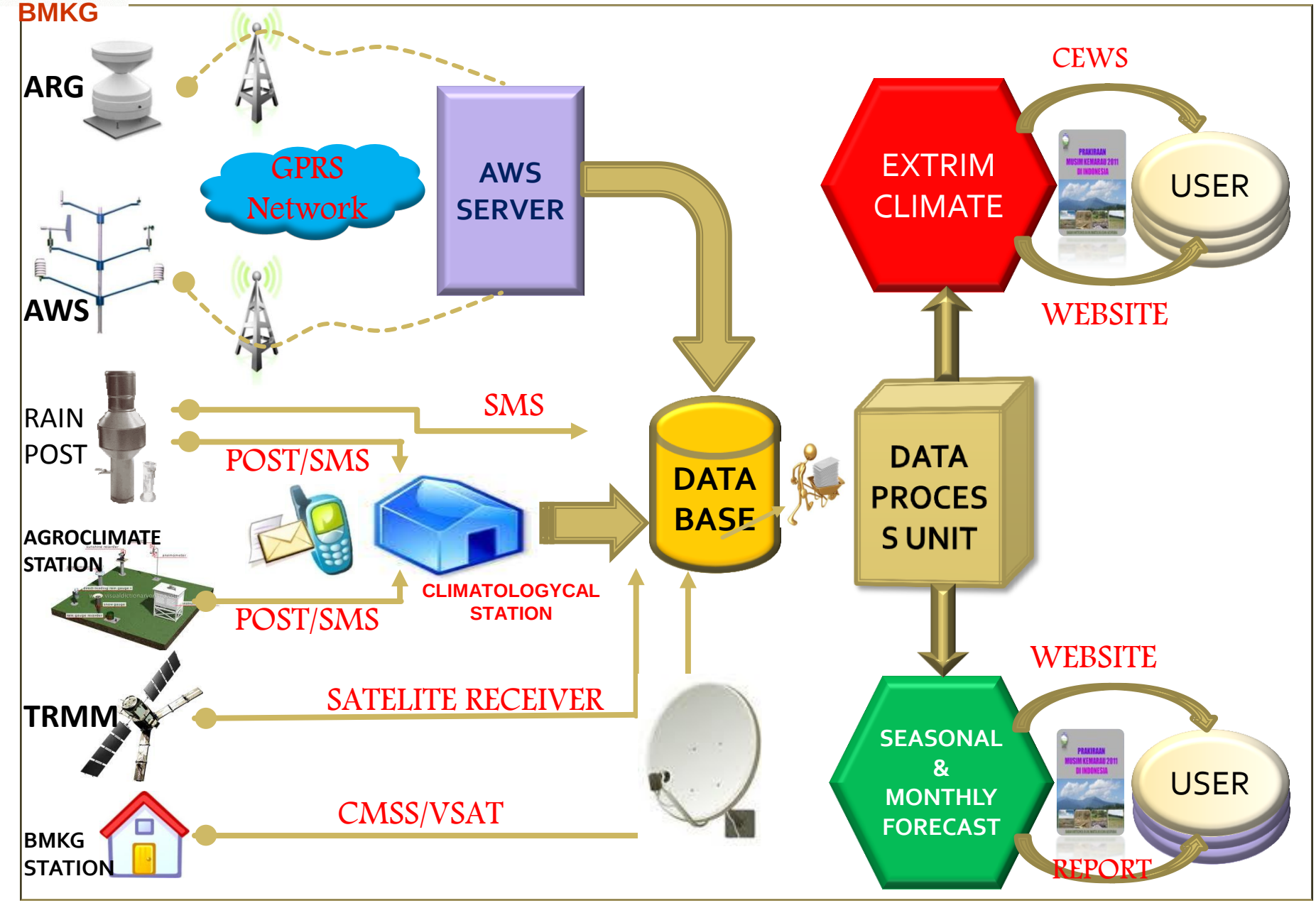
Introduction

- The BMKG produces climate information such as prediction and evaluation of monthly rainfall in addition to seasonal prediction (twice a year) every rainy and dry season
- The seasonal and monthly rainfall prediction its uses HyBMG model and ensemble mean by statistical-dynamical forecast downscaling derived from many scientific and research institutions (e.i. NOAA/NCEP, IRI, BoM, JMA/JAMSTEC, KMA/APCC, etc.)
- The purpose of this information is to provide materials for decision makers of various sectors including agriculture

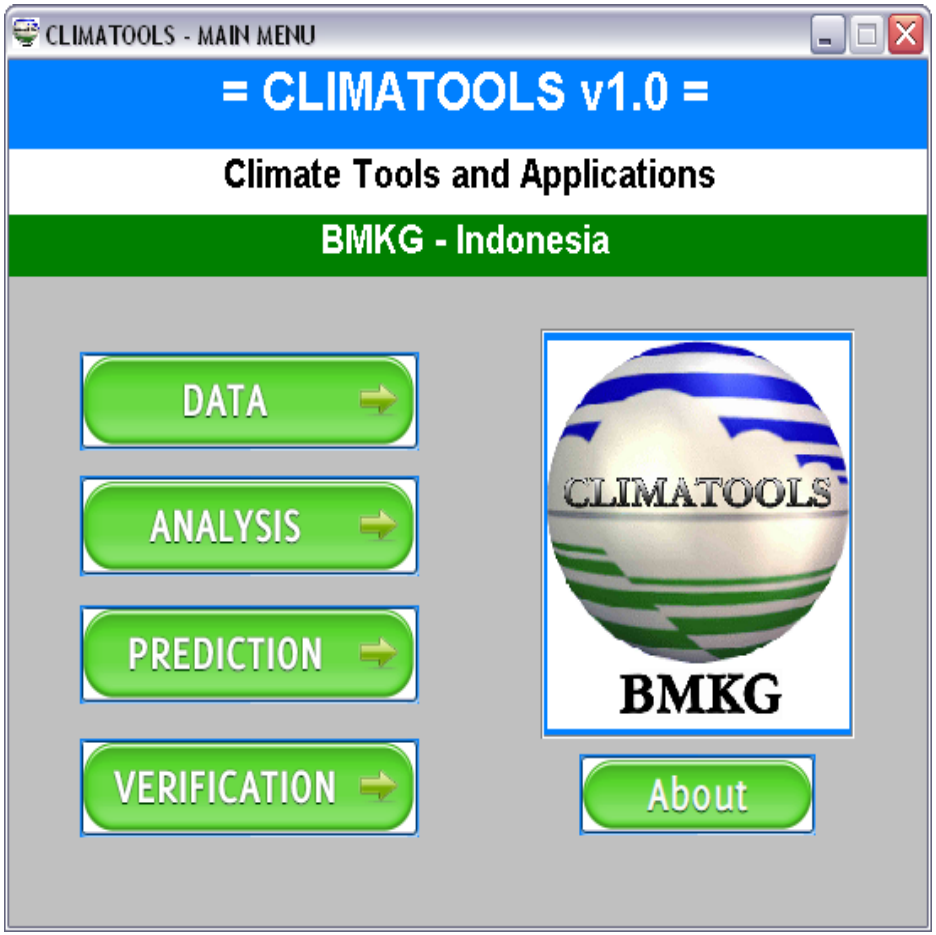




BMKG'S FLOW DISEMINATION FOR CLIMATE INFORMATION AND PREDICTION



BMKG'S CLIMATE TOOLS AND APPLICATIONS

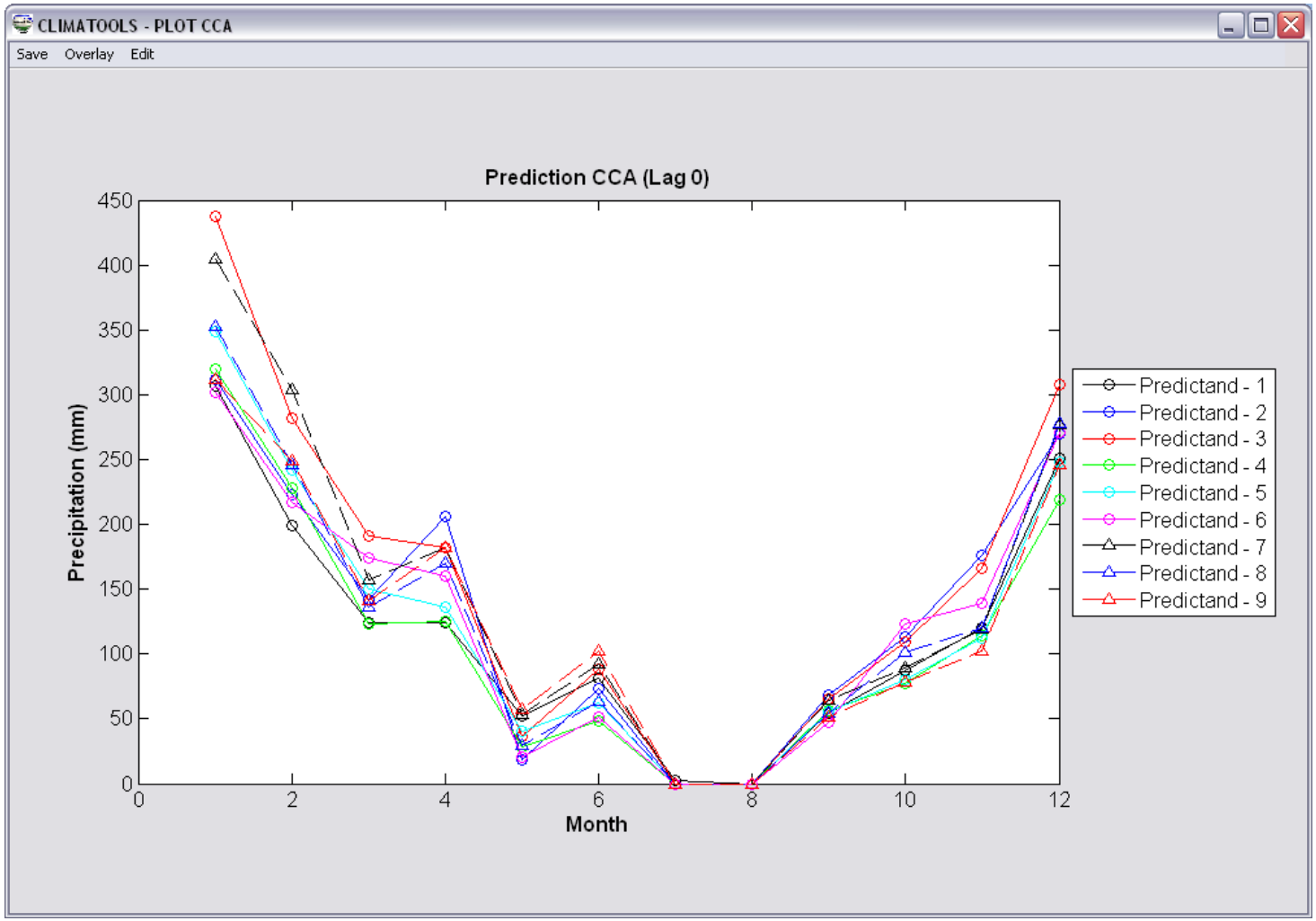


ClimaTools

ClimaTools is a statistical application for processing climate data utilizing univariate and multivariate techniques. This application has the ability to process, analyze data and make predictions and perform the verification process.

A development application and Multivariate HyBMG.

The result for monthly rainfall prediction using ClimaTools BMKG's Software



CLIMATE INFORMATION TERMINOLOGY :

THE SEASONAL FORECAST ZONE :

Known is ZOM, is an area which rainfall pattern can be distinctly distinguished between wet season and dry season. On the contrary, areas which wet and dry season are barely discernible, is called Non ZOM.

The coverage area of ZOM is not always similar with its administrative area. One ZOM can comprise of many regencies, and on the other hand, a regency may have several ZOMs.

Source: Meteorological Climatological and Geophysical Agency (BMKG)

CLIMATE INFORMATION TERMINOLOGY :

DISTRIBUTION FOR SEASONAL FORECAST ZONE (ZOM) IN INDONESIA

ISLANDS	AMOUNT OF RAINFALL TYPE	AMOUNT OF ZOM	AMOUNT OF NON ZOM	AMOUNT LOCAL ZOM
SUMATERA	79	54	25	-
JAWA	152	150	2	-
BALI	15	15	-	-
NTB	21	21	-	-
NTT	23	23	-	-
KALIMANTAN	34	22	12	-
SULAWESI	54	42	13	7
MALUKU	10	9	1	2
PAPUA	18	6	12	
INDONESIA	406	342	65	9

Source: Meteorological Climatological and Geophysical Agency (BMKG)

CLIMATE INFORMATION TERMINOLOGY :

THE RAINFALL CHARACTERISTIC :

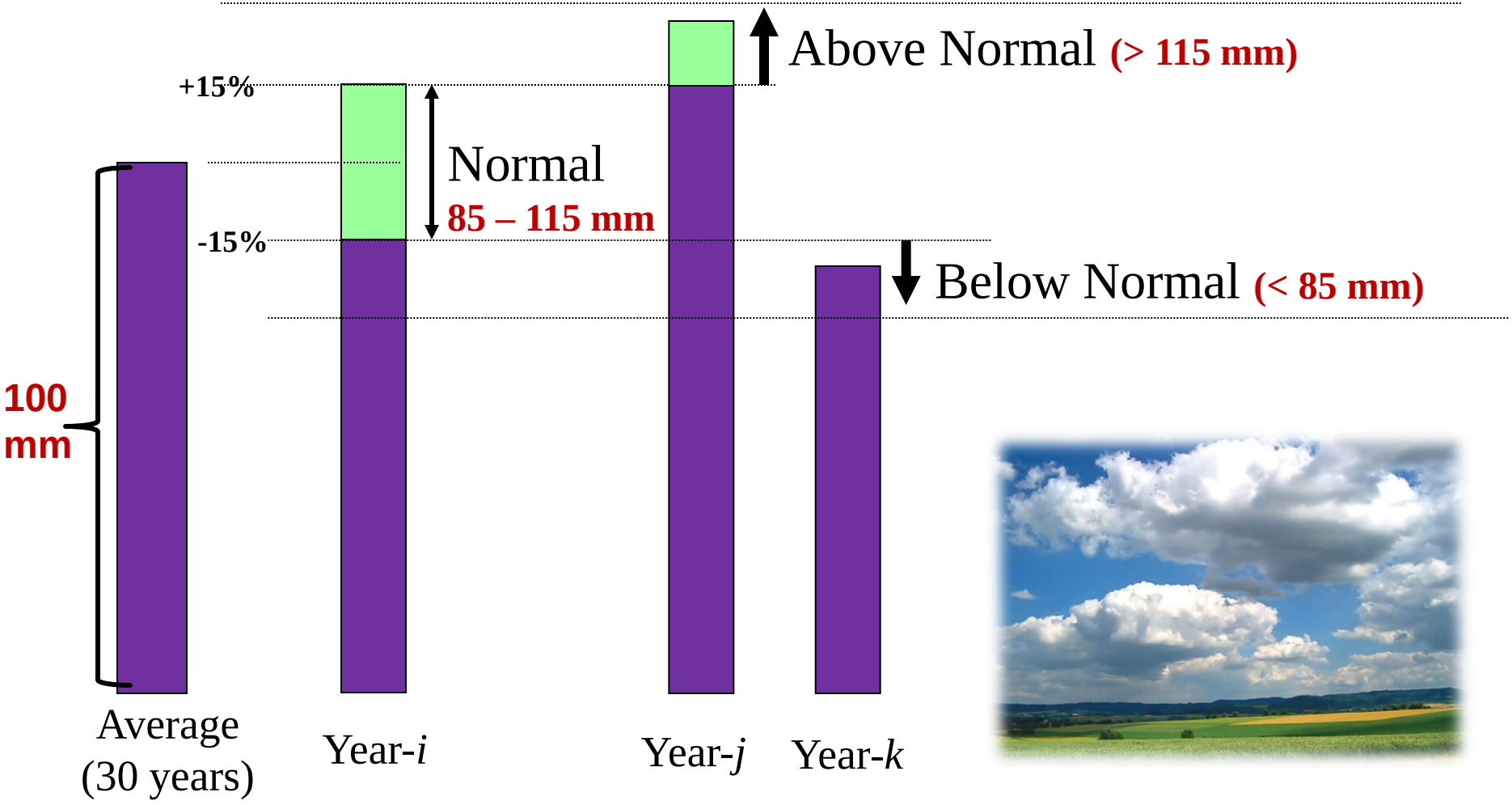
NORMAL, if the amount is ranging in the average value. The range is between 85% - 115% from the average (30 years averaged data).

ABOVE NORMAL, If the amount rainfall exceeds 115% from the average.

BELOW NORMAL, is when the amount rainfall less than 85% from the average.

Source: Meteorological Climatological and Geophysical Agency (BMKG)

CLIMATE INFORMATION TERMINOLOGY :



Source: Meteorological Climatological and Geophysical Agency (BMKG)

CLIMATE INFORMATION TERMINOLOGY :

THE ONSET OF WET SEASON **:**

The amount of rainfall in 10-day period equal 50 mm or above and continouslly for three 10-day and more.

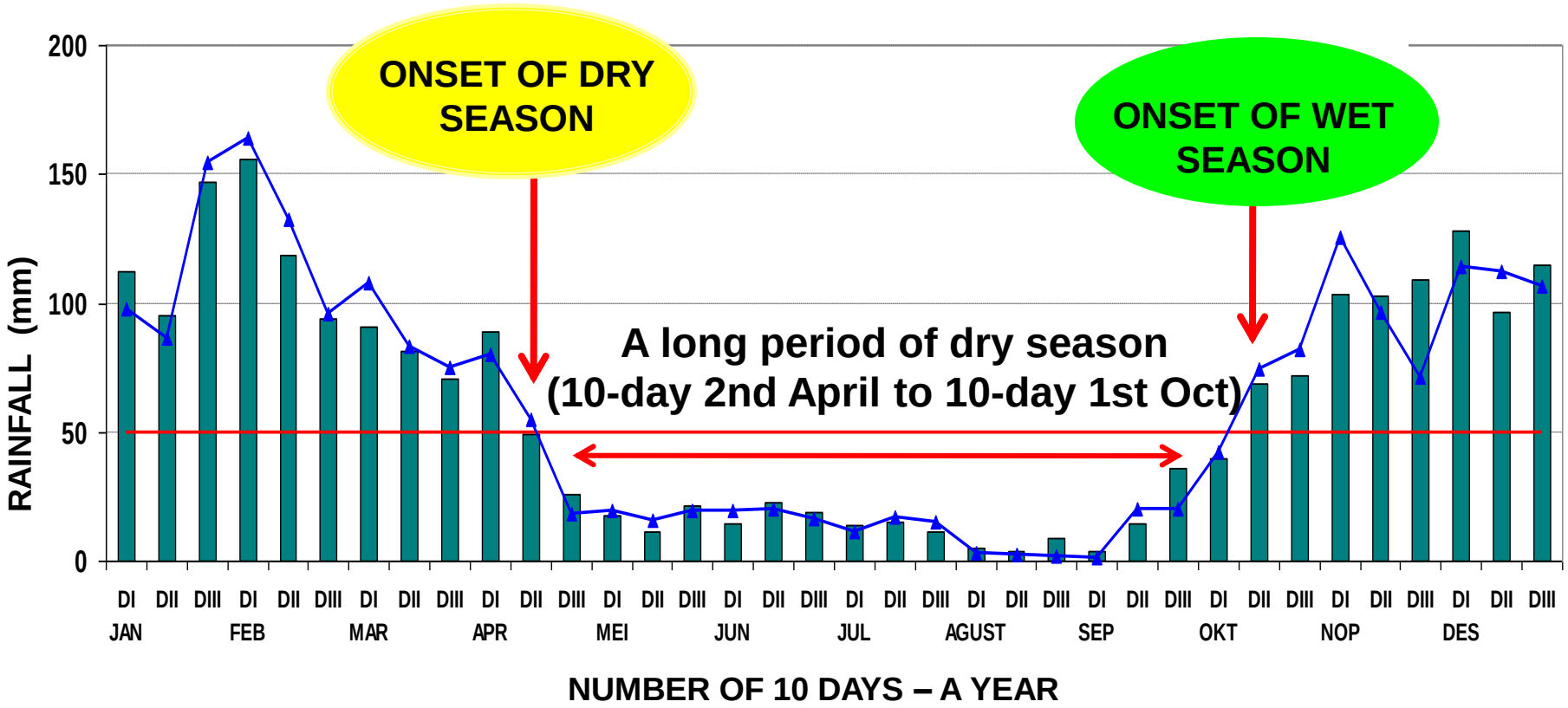
THE ONSET OF DRY SEASON **:**

The amount of rainfall in 10-day less than 50 mm and continouslly for three 10-day and more.

Source: Meteorological Climatological and Geophysical Agency (BMKG)

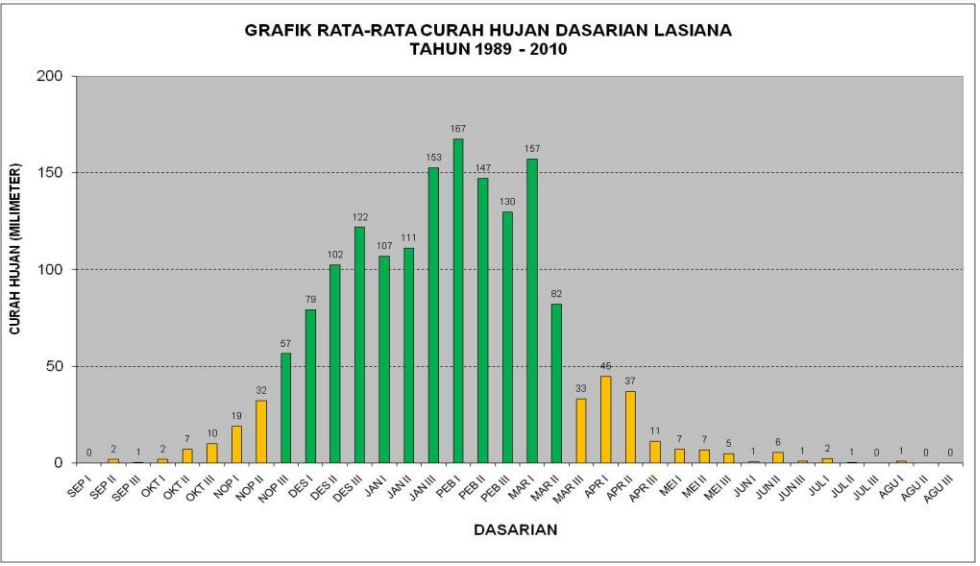
CLIMATE INFORMATION TERMINOLOGY :

Graph 10-day rainfall to determine the beginning of the dry season and the rainy season in Indonesia.

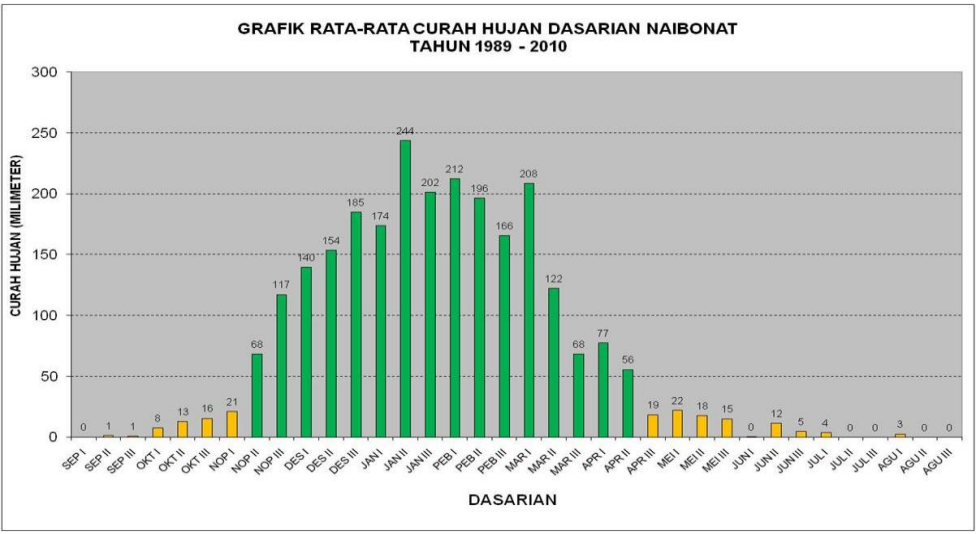


Source: Antoyo S (Karangploso Cimatological Station Malang, 2006)

Climatological Data (Rainfall) for NTT Province in East Indonesia

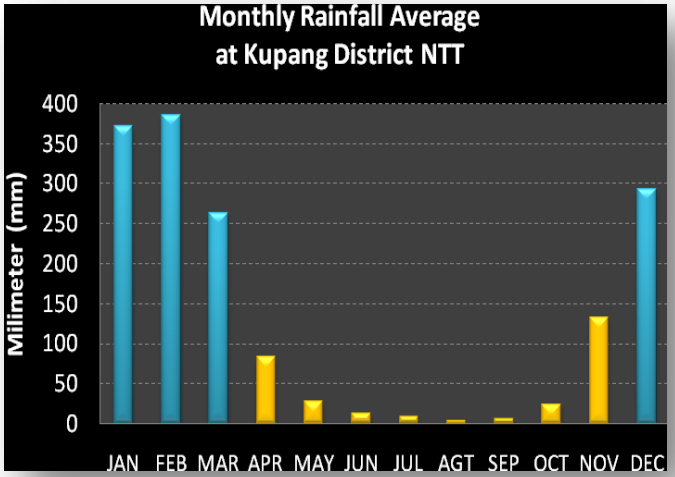


The average of 10-days rainfall at **Lasiana NTT Province** , there is information for the onset of rain season on 10-day 2nd November with 120 days for rainy period; and the onset of dry season on 10-day 3rd March with 240 days for dry period.

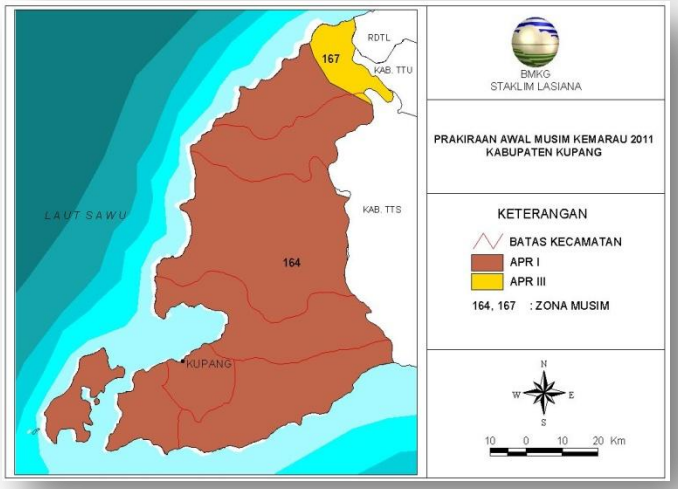


The average of 10-days rainfall at **Naibonat NTT province**, there is the onset for rain season on 10-day 2nd November with 160 days for rainy period; and the onset of dry season on 10-day 2nd April with 200 days for dry period.

INFORMATION AND CLIMATE PREDICTION IN THE LOCATION OF CFS AT KUPANG DISTRICT – NTT PROVINCE



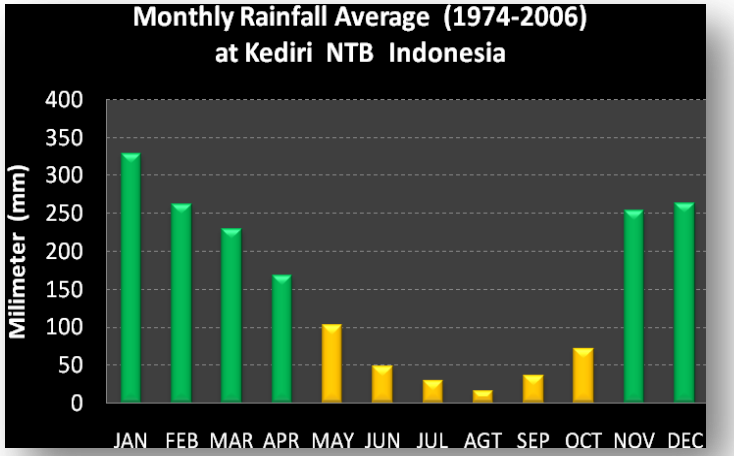
The monthly rainfall climatology, this picture describes a period of months during the dry season (yellow) and the rainy winter months (blue). In dry periods longer than a month rainy season.



This picture explains that most of Kupang is predicted to the beginning of the dry season in 10-day 2nd April, 2011. The onset of dry season comes equally from the average.

INFORMATION AND CLIMATE PREDICTION IN THE LOCATION OF CFS AT LOMBOK DISTRICT - NTB PROVINCE

The monthly rainfall climatology, this picture describes a period of months during the dry season (yellow) and the rainy winter months (blue). In dry periods equal with the rainy season periods.



This picture explains that most of Lombok is predicted to the beginning of the dry season in 10-day 1st to 2nd April, 2011. The onset of dry season came earlier than the average.

HOW THE INFORMATION FOR MONTHLY FORECAST AND SEASONAL FORECAST USED…? (in wetland)

The standard time frame of season :

Planting Season 1 (MT-1) : Rainy Season/MH (September-January)
Planting Season 2 (MT-2) : Dry Season 1/MK 1 (January-May)
Planting Season 3 (MT-3) : Dry Season 2/MK-2 (June-September)

While information from BMKG is in 2 seasons by monsoon pattern,

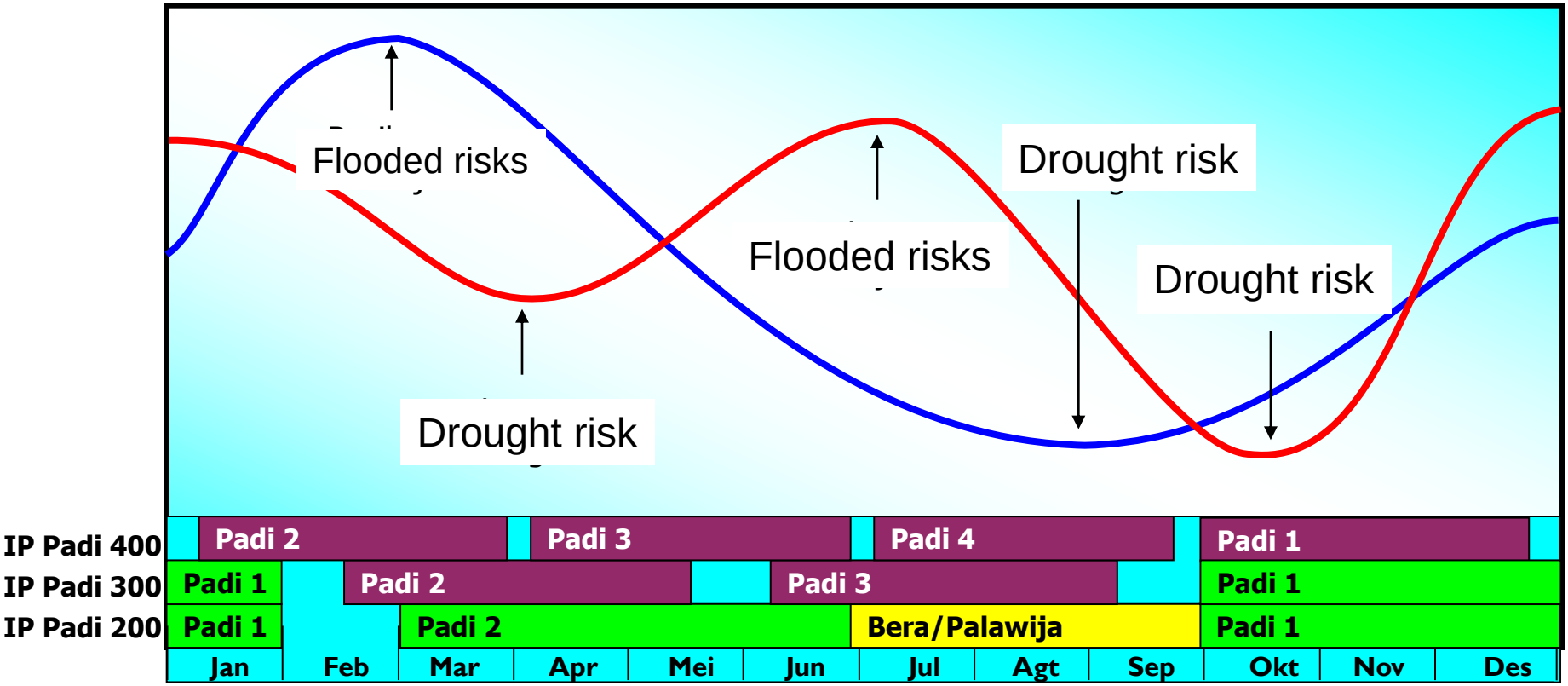
MT-1 utilizing forecasts MH (rainy season),
MT-2 utilize forecasting monthly rainfall (January-May),
MT-3 utilizing forecasts MK (dry season)

Conversion information ZOM (Seasonal Area Forecast)/ NonZOM into districts.

Changing the spatial information into information ZOM / NonZOM (for MT-2 or MK-1).

Source : IAARD (Indonesian Agency for Agricultural Research and Development)

ADAPTATION OF PLANTING PATTERN / IP PADI DEALING CHANGES IN RAINFALL PATTERNS



TECHNOLOGY SUPPORT :

1. Development VUB super early maturing, drought resistant and inundation
2. Technology management of land, water and fertilizer / nutrient
3. Plant Pest Response
4. Approach / Model PTT/ SRI

Source : IAARD (Indonesian Agency for Agricultural Research and Development)

BENEFITS INFORMATION OF MONTHLY RAIN FORECAST AND SEASONAL FORECAST

1 Is one of the MAIN INPUT in the preparation of the Integrated Information System of the Ministry of Agriculture Planting Calendar (**KATAM = KAlender TAnaM, Indonesia**)

www.katam.litbang.deptan.go.id

2 VERY IMPORTANT impact in support of the anticipated risk of failure of agriculture due to climate and pest behavior

3 VERY HELPFUL planning and implementation of the strategic program "achievement of national rice production" and other food

Source : IAARD (Indonesian Agency for Agricultural Research and Development)

BENEFITS INFORMATION OF MONTHLY RAIN FORECAST AND SEASONAL FORECAST

SEMI-DYNAMIC KATAM :

1. Based on availability of water and climate suitability
2. Three climate scenarios: La-Nina, El Nino, and Normal year

in fact, the climate fluctuates according to the season!!

DYNAMIC KATAM

INTEGRATED KATAM

Source : IAARD (Indonesian Agency for Agricultural Research and Development)

BENEFITS INFORMATION OF MONTHLY RAIN FORECAST AND SEASONAL FORECAST

The information will be generated Katam Integrated :

1. **Rainfall and early prediction of the rainy season and the dry season**
2. Beginning of the growing season
3. Cropping patterns
4. Potential plant area

→ **DYNAMIC KATAM**

5. Recommended dose of fertilizer
6. Recommended fertilizer demand
7. Recommended varieties of rice
8. Potential pest
9. Areas prone to floods and droughts

→ **INTEGRATED KATAM**

Source : IAARD (Indonesian Agency for Agricultural Research and Development)

BENEFITS INFORMATION OF MONTHLY RAIN FORECAST AND SEASONAL FORECAST

WHAT IS MAP CALENDAR OF PLANTING :

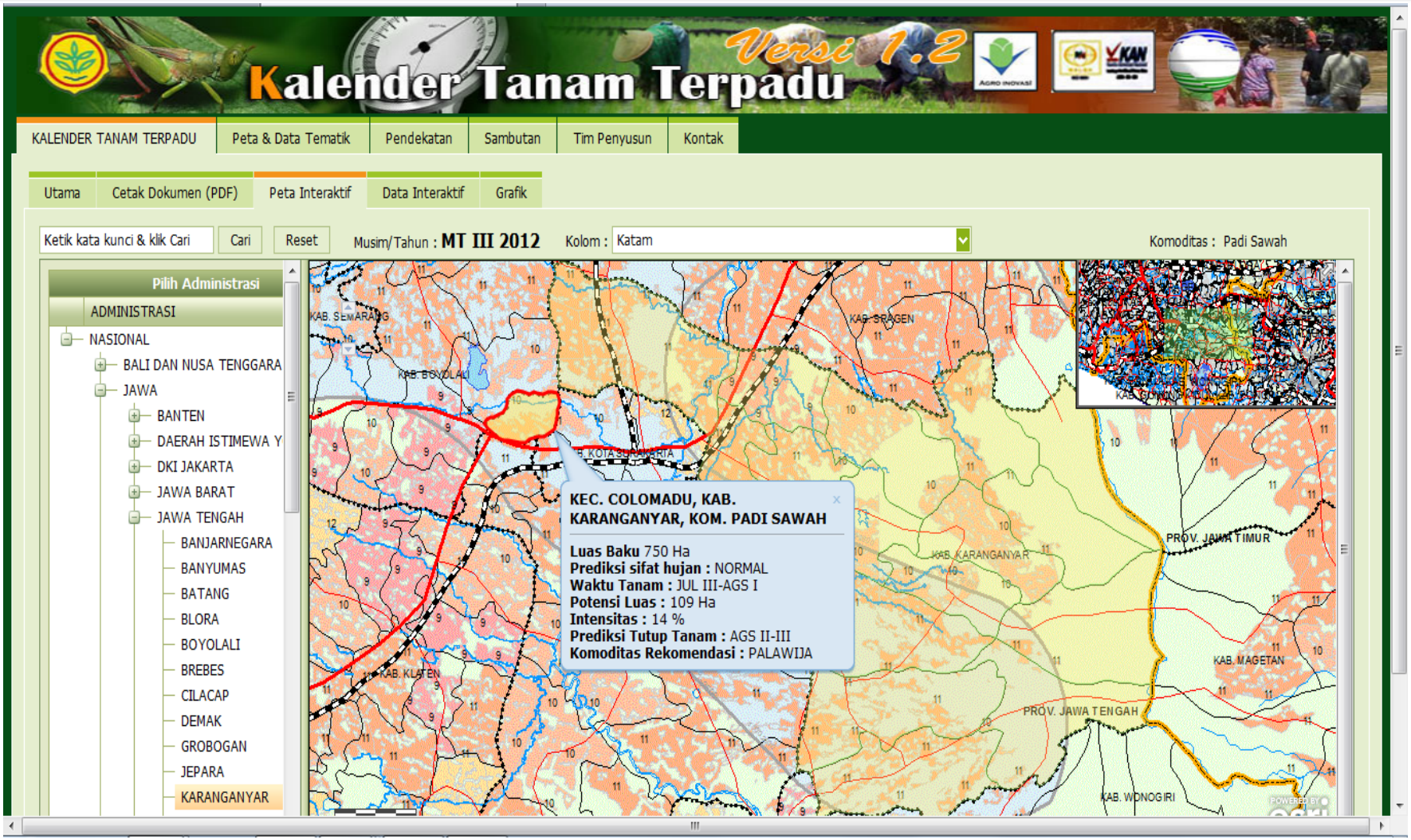
www.katam.litbang.deptan.go.id

Maps that illustrate the potential pattern and timing of planting food crops (rice and pulses) based on the **potential and the dynamics of climate** and availability of water resources, or,

Maps that provide spatial and tabular information about early planting, cropping patterns, potential planting area and crop technologies recommendation on rice fields by **variability and climate change** and soil properties

Source : IAARD (Indonesian Agency for Agricultural Research and Development)

THE PERFORMANCE OF KATAM (Planting Calendar)



Source : IAARD (Indonesian Agency for Agricultural Research and Development)

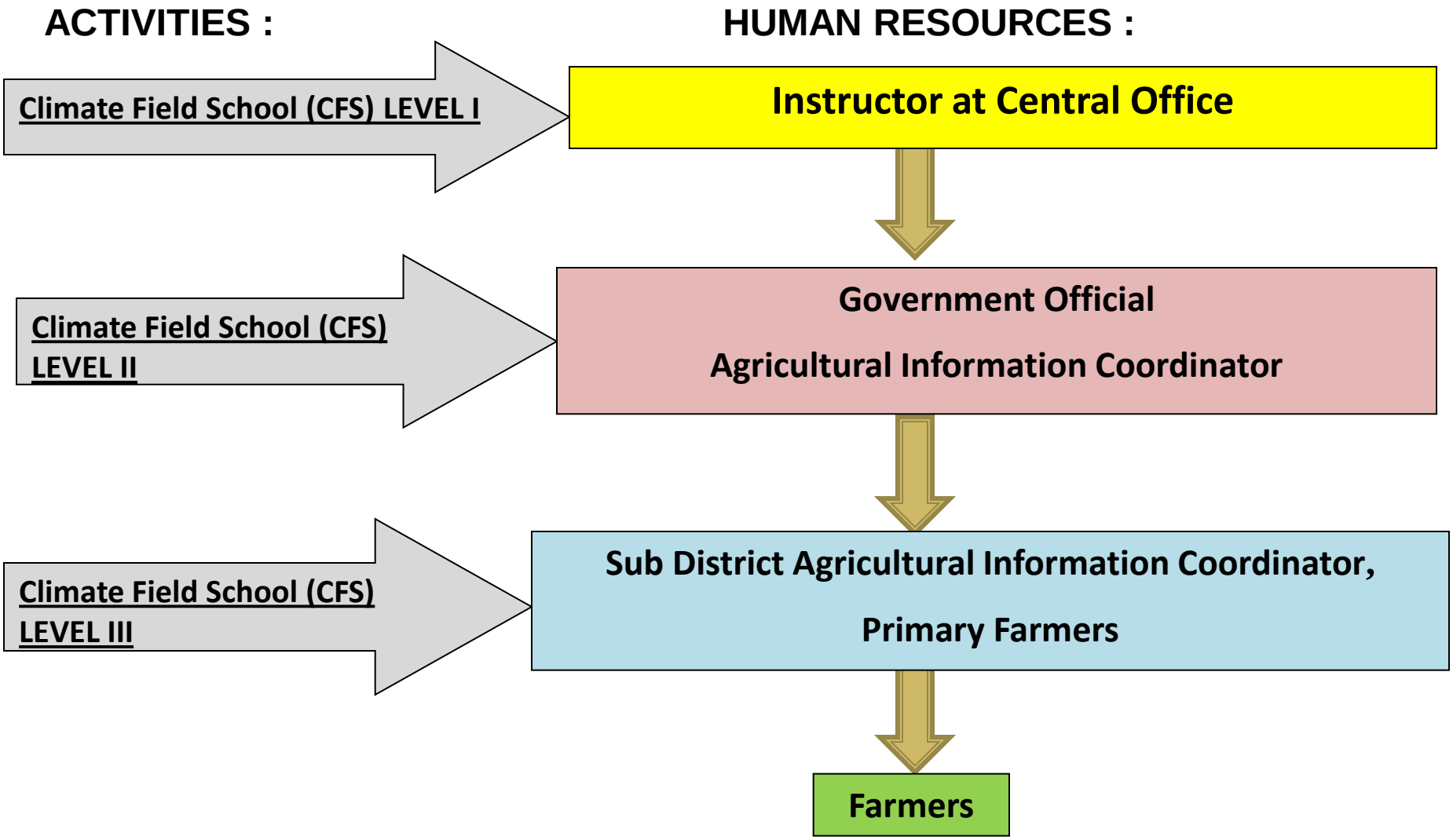
SOME ACTIVITIES OF AGRICULTURAL FIELD EXTENSION OFFICER ON CLIMATE FIELD SCHOOL (CFS) AT THE DISTRICT LEVEL IN EAST INDONESIA

Understanding Information and climate prediction

Understanding simple rain gauge calibration

Visits to the site of an integrated crop management

CLIMATE FIELD SCHOOL (CFS) IMPLEMENTATION SCHEME



CONCLUSION

1. Information and climate predictions, as predicted earlier in the season and rainfall prediction continuously published monthly by BMKG is helping the agricultural extension workers (PPL, Indonesia) to prepare for their activities in developing farmers' planting schedules and determine the cropping pattern.

2. Through the learning activities in the Climate Field School (CFS), participants were provided by information of climate in general and those related to agricultural management activities.

CONCLUSION

3. The result of the progress of Farmers group CFS participants at the Kupang and Lombok (East of Indonesia Province) shows an increased understanding of information by 78% of CFS compared before following with only about 55% of climate understanding.

4. In line with these results, in Lombok maize production reached 21 tons/ha and in Kupang 19 tons/ha of typically only about 16-17 tons/ha, this shows how important the benefits of CFS activities for the PPL and the farmers in the operations in the sector agriculture, especially in the management of cropping / planting calendar for food crops, as well as adaptation and mitigation of climate variability and change its region respectively.

CONCLUSION

With the CFS program is indirectly able to improve the livelihoods of farmers

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Thank You