Climate Adaptation Seminar

23-24 October 2012

Siem Reap, Kingdom of Cambodia

Climate Adaptation in Southeast Asia: Overview and best practices

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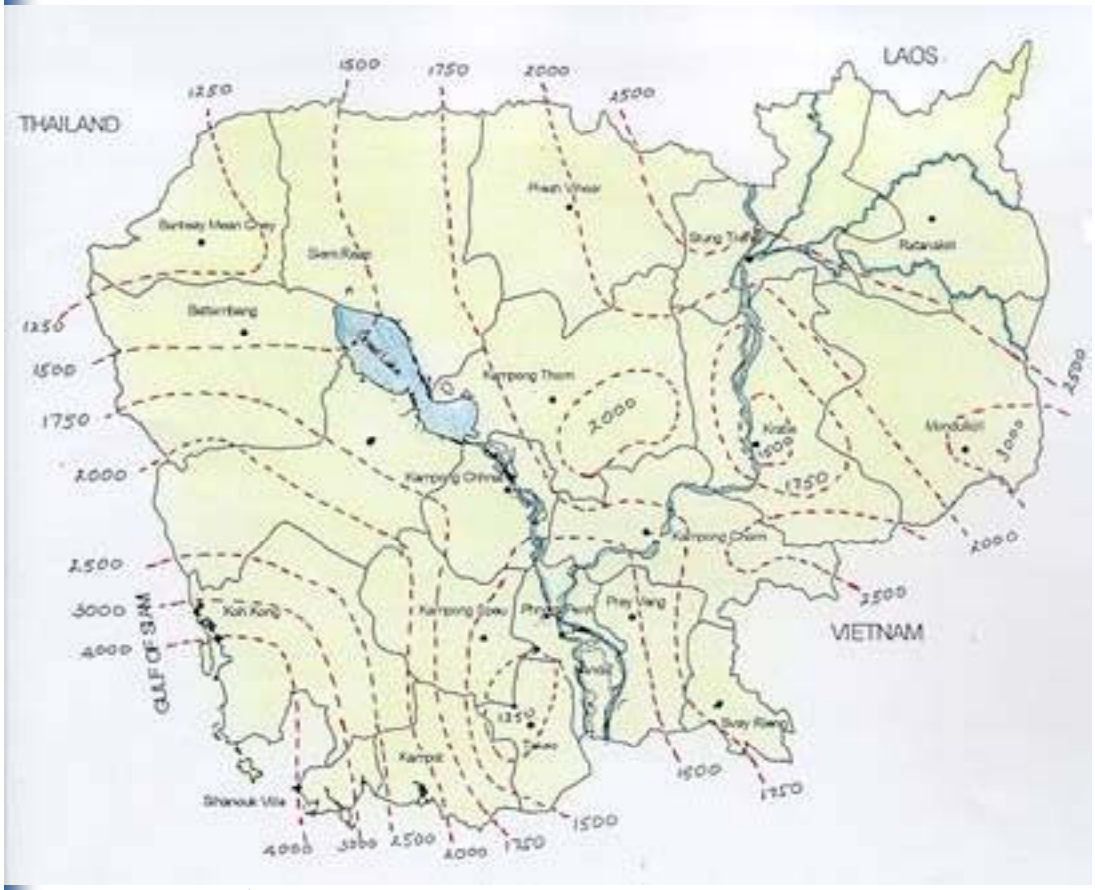
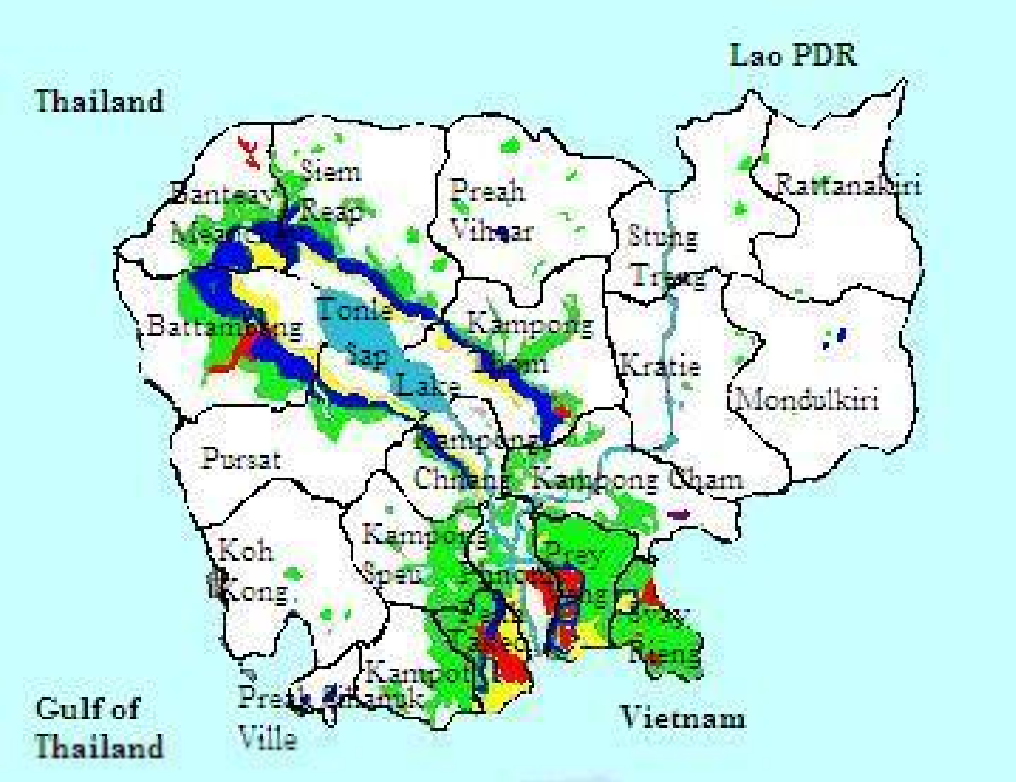
Cambodia



- Location:
  - 102° to 108°E
  - 10°to 15° N
- Monsoon climate:
  - Dry season: November – April
  - Wet season : May – October

- Rainfall: 1250 – 2500 mm
  - January : lowest
  - October : highest
- Humidity: 69 - 80%
  - March : lowest
  - September: highest
- Day length : 11h - 13h
  - December : shortest
  - June : longest
- Temperature: 23 – 33°C
  - December : lowest
  - April : highest
- Evaporation: 2230mm/year
  - September : lowest
  - March : highest

Natural Resources of Cambodia



Total area: 181,035km2

Coastal: 435 km

Island: 64

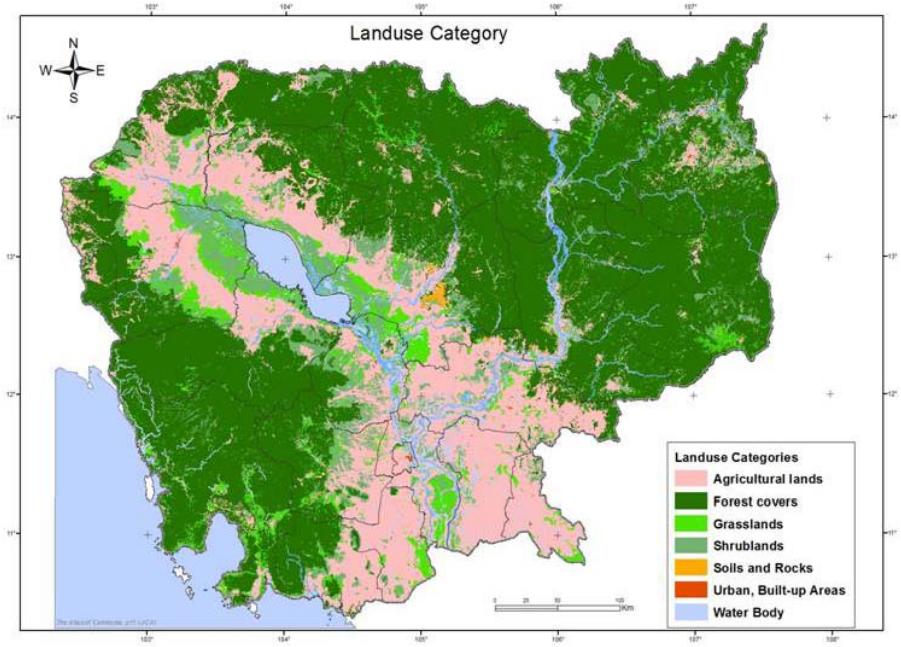
The Mekong river

The Tonle Sap lake

The Central plains

Forest mountain areas

Land use categories



Source: MPWT/JICA (2002)

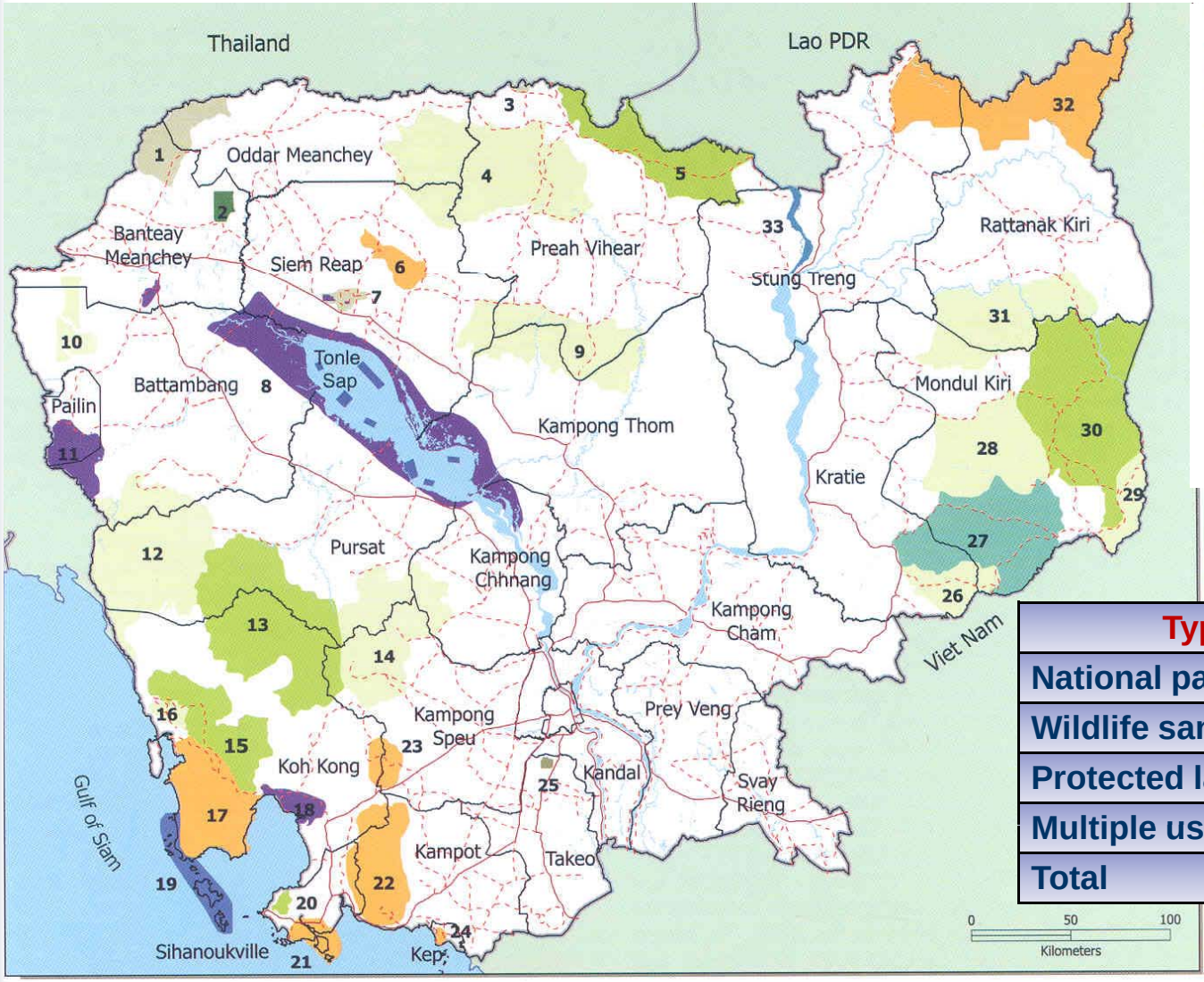
*Reported Forest Cover as being 10,864,186 ha (60%) (FA, 2006)

Land use	Area (ha)	Area (%)
Total	18,133,656	100
Agriculture	4,370,027	24
Forest cover*	10,215,094	56
Grassland	1,078,243	6
Shrub land	1,883,882	10
Soil-Rock	36,254	0.2
Urban	18,022	0.1
Water	532,133	3

Water resources

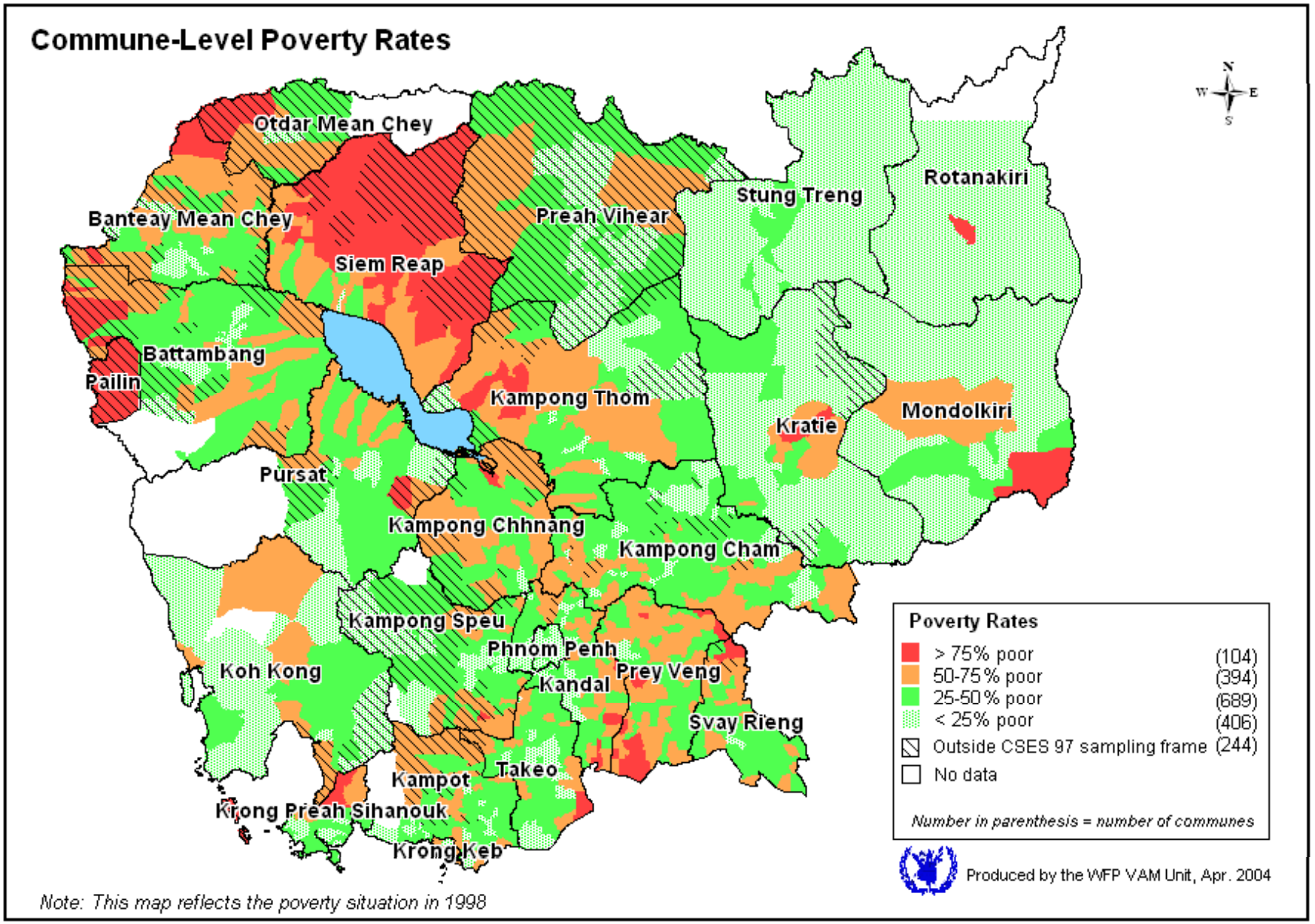
- **Three main zones:**
  - ***Mekong river systems,***
  - ***Tonle Sap biosphere reserves, and***
  - ***Coastal zone.***
- ***Wetlands designated Ramsar site in 1999 with total area of 54,600 ha:***
  - Mekong river north of Stung Treng province with an area of 14,600 ha;
  - Boeng Chmar and its associated river system and floodplain with an area of 28,000 ha;
  - Coastal wetlands of Koh Kapik and its associated islets with an area of 12,000 ha (SCW, 2006).

Protected areas
(Royal Decree: November 1, 1993)



23 Areas divided into 4 categories:

Types	Area (ha)
National parks	742,250
Wildlife sanctuaries	1,891,271
Protected landscape	97,000
Multiple use areas	403,950
Total	3,134,471


Commune-Level Poverty Rates
Otdar Mean Chey
Banteay Mean Chey
Siem Reap
Preah Vihear
Stung Treng
Rotanakiri
Battambang
Pailin
Kampong Thom
Kratie
Mondolkiri
Pursat
Kampong Chhnang
Kampong Cham
Kampong Speu
Phnom Penh
Koh Kong
Prey Veng
Kandal
Svay Rieng
Takeo
Kampot
Krong Preah Sihanouk
Krong Keb
N
W
E
S
Poverty Rates
> 75% poor (104)
50-75% poor (394)
25-50% poor (689)
< 25% poor (406)
Outside CSES 97 sampling frame (244)
No data
Number in parenthesis = number of communes
Produced by the WFP VAM Unit, Apr. 2004
Note: This map reflects the poverty situation in 1998

Natural resources and environmental management

The natural resources of Cambodia are officially under the protection of the state, as expressed in

Article 59 of the **constitution**:

"The state shall protect the environment and balance of abundant natural resources and establish a precise plan of management of land, water, air, wind, geology, ecology, ecologic system, mines, energy, petrol and gas, rocks and sand, germs, forests and forest products, wildlife, fish and aquatic resources".

MAFF: main government institution for management of natural resources

MoE: protect natural resources and prevent environmental degradation, advising relevant ministries on the conservation, development and management of natural resources.

MLMUPC: managing issues of land management, urban planning, construction, cadastre and geography.

MIME: direct and manage the industry, mines and energy sectors.

MAFF = Ministry of Agriculture, Forestry and Fisheries, MoE = Ministry of Environment,

MLMUPC = Ministry of Land Management, Urban Planning and Construction,

MIME = Ministry of Industry, Mines and Energy


27 - 5 2004

Main Agricultural Crop Production area,

(MAFF, 2009)

Crop	Area (ha)	(%)
Rice	2,615,741	82.2
Maize	163,106	5.1
Cassava	179,945	5.7
Soybean	74,413	2.3
Mungbean	45,605	1.4
Sesame	35,874	1.1
Vegetable	47,781	1.5
Peanut	18,183	0.6
Sugarcane	13,297	0.4
Sweet potato	8,246	0.3
Tobacco	9,447	0.3
Jute	397	0.0
Total	3,212,035	

Rainfed Lowland Environments

Country	Favourable	Drought prone	Drought and submergence prone	Submergence prone	Deep water [1)]
Cambodia	**10**	**29**	57	**0**	**4**
Bangladesh	**16**	**16**	**19**	30	**19**
India	**12**	51	**15**	**10**	**13**
Indonesia	58	**10**	**0**	**9**	**23**
Laos	**33**	**33**	**33**	**0**	**1**
Myanmar	41	**10**	**0**	**26**	**23**
Philippines	51	**16**	**4**	**9**	**20**
Thailand	**9**	52	**24**	**12**	**3**
Vietnam	38	**19**	**0**	32	**11**

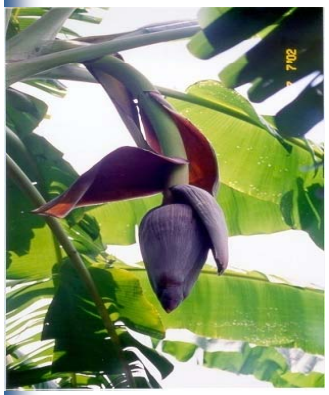
Constraints in Agriculture

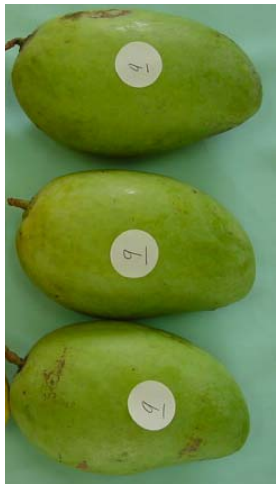
- Water
- Soil fertility
- Variety
- GQ Seed
- Pests and Diseases
- Investment in research
- Marketing

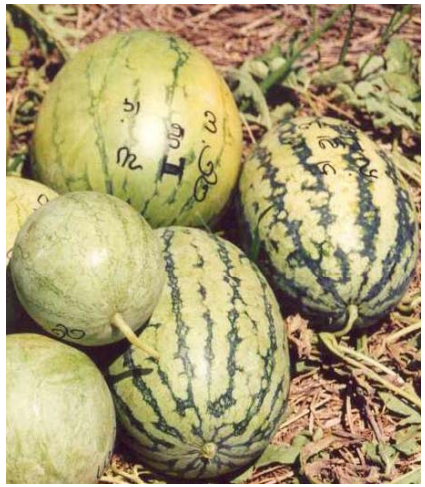
Generating skilful work force for agricultural research, extension and production.


Crops

To develop varieties of major agricultural crops for high yielding, good quality, resistance to major biotic and abiotic stresses and broad adaptation to diverse conditions.







Biotic & Abiotic stresses

- Resistance to stripe stem borer:

Resistance: Kru and IR72

Moderate : Sen Pidao and IR66

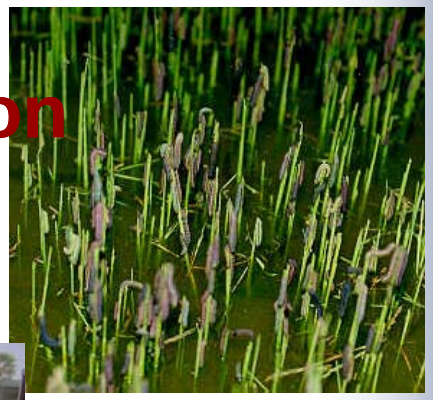
- Tolerance to moderate drought:

  CAR3 and CAR4

- Tolerance to flash flood:

  Popoul

Research for adaptation



Resistance to BPH

Moderate resistant:

IRKesar, Kru, Chul'sa and CAR12

Moderate suceptible:

IR66, Baray, Rohat, Santepheap 1, Santepheap 2, Popoul, Sarika, Phka Rumcheck, Phka Rumduol, CAR4, CAR5

Germplasm for adaptation

Accession: 2557

in 3 catalogs

Rainfed Lowland : 88.0%

Irrigated : 0.2%

Deepwater/Floating: 1.2%

Upland : 10.6%

Mild Aromatic : 10.0%

Strong Aromatic : 0.2%

Glutinous : 8.4%

Insensitive : 7.0%

Mild sensitive : 4.5%

Moderate sensitive: 30.7%

Strong sensitive : 60.1%

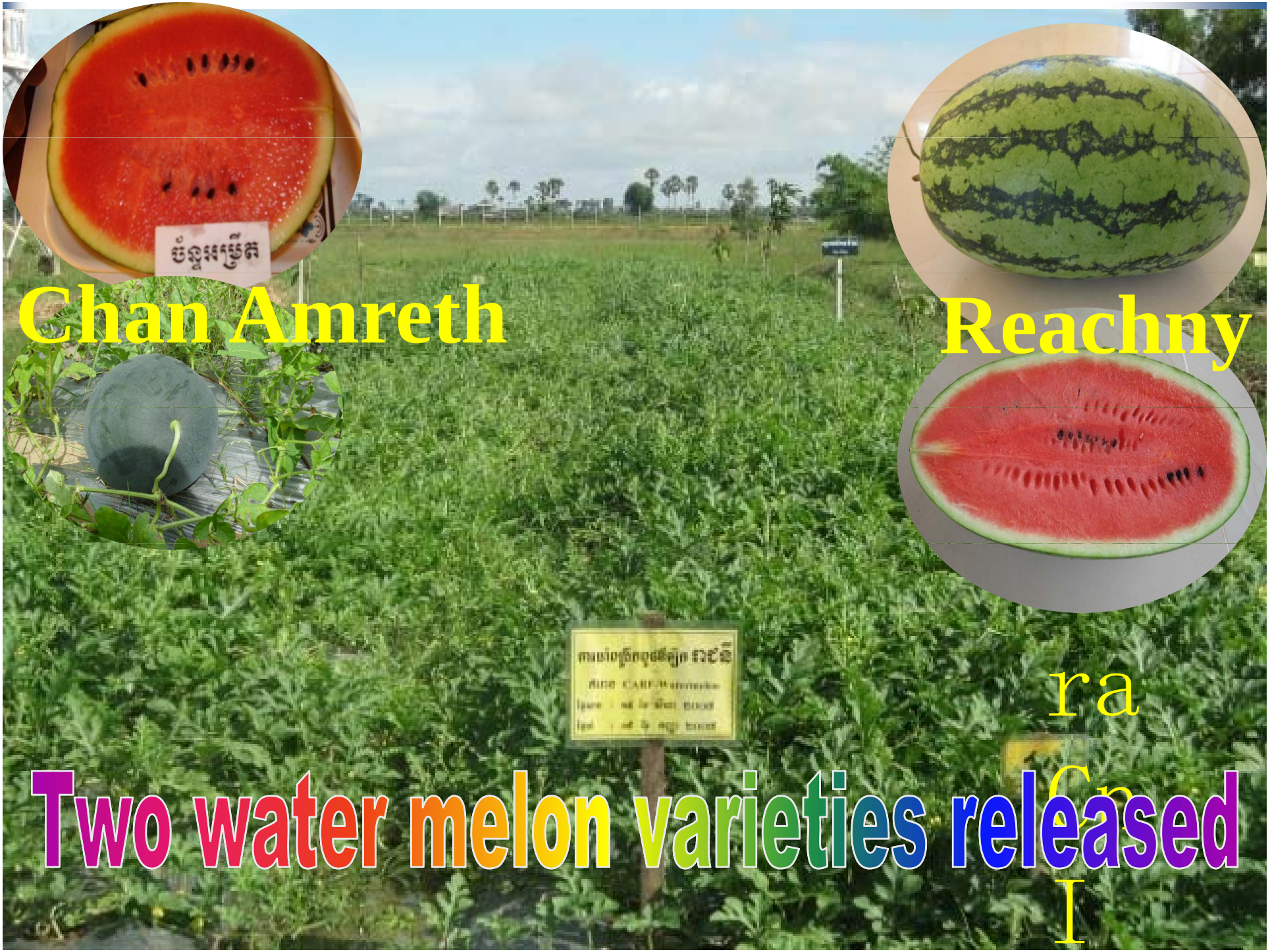
Banana Conservation:

Green house

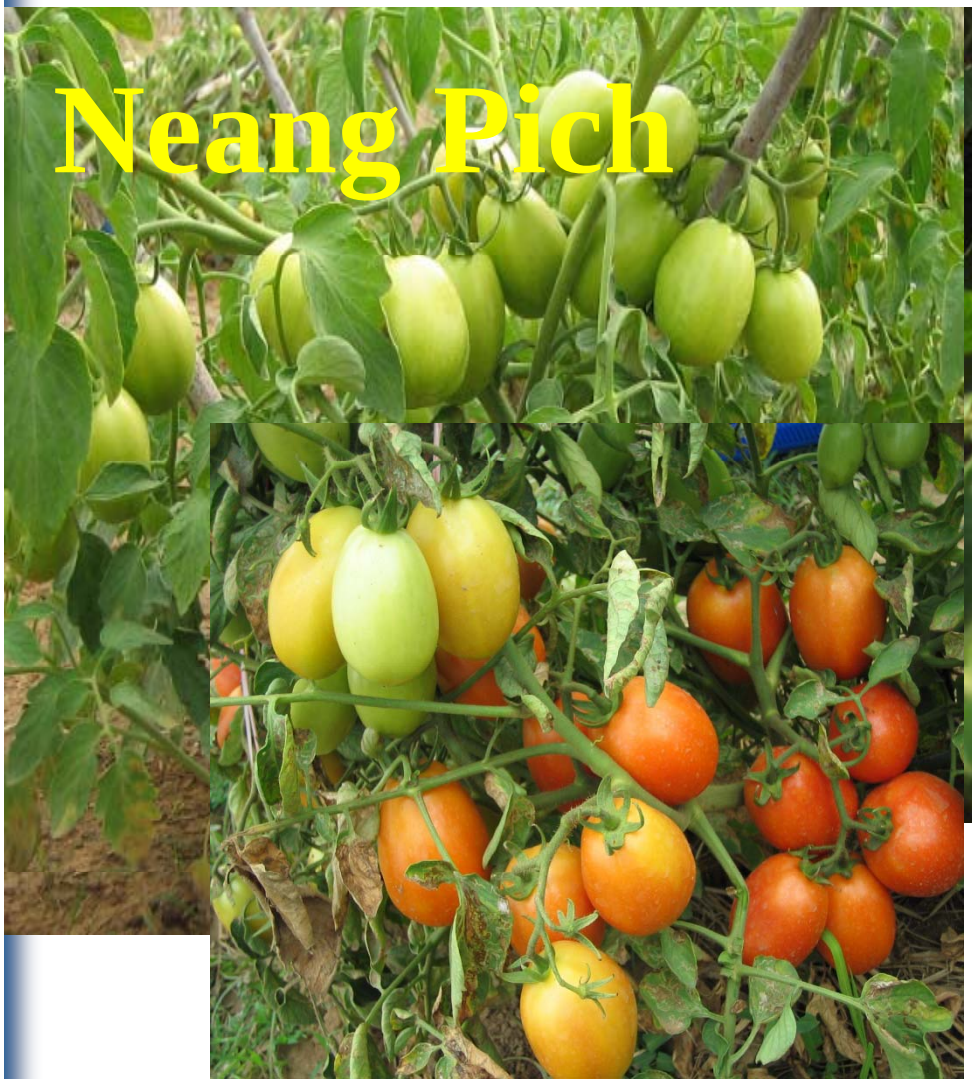
In-vitro

Germplasm for adaptation:


sC½y
Two OPV maize varieties released
e10gmgÁ1
Sar Chey
Loeung Mongkul


Chan Amreth
Reachny
ra
Two water melon varieties released
I

Two tomato varieties released



Two mango varieties released

Keo Tep

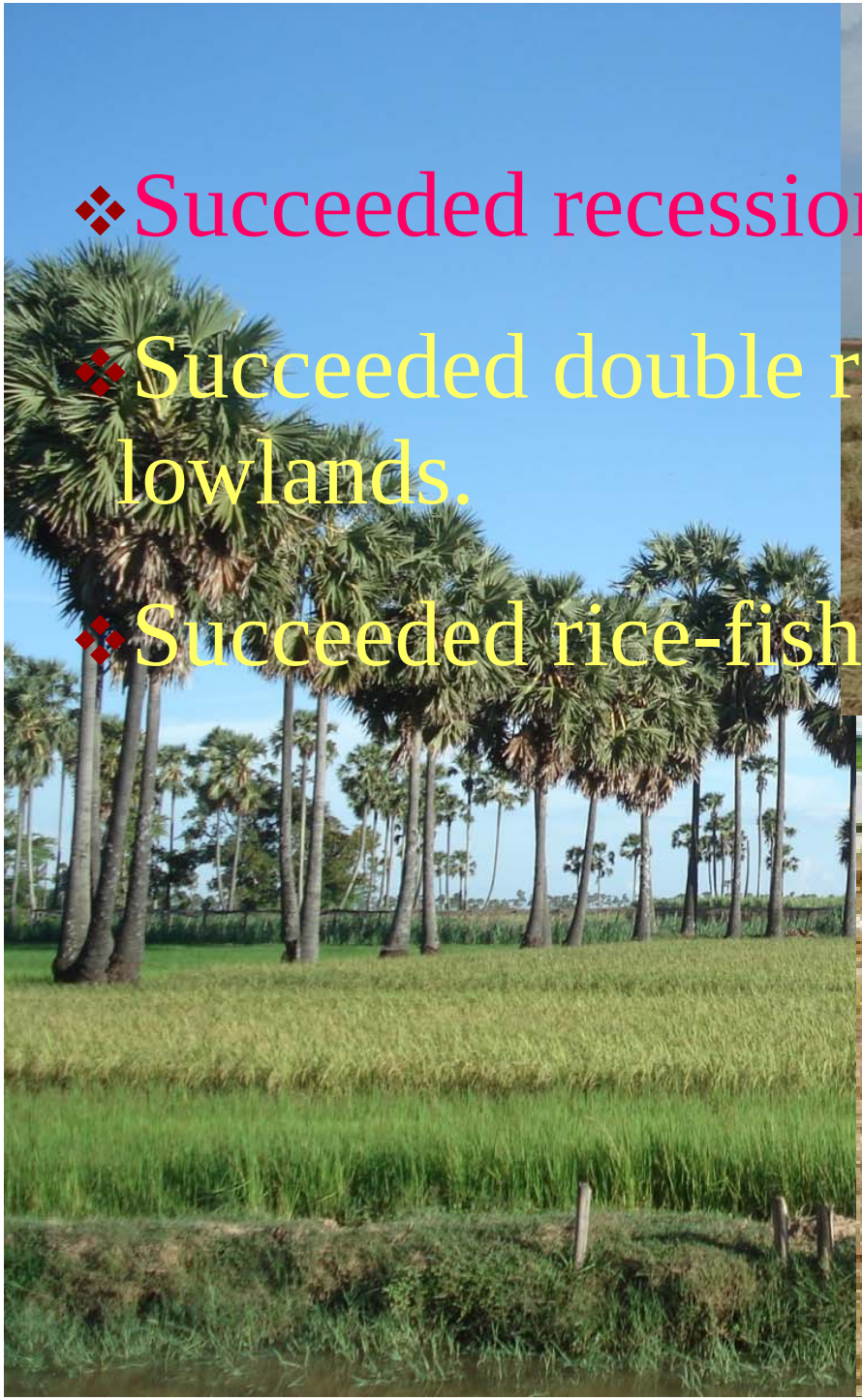
Keo Reach

Ekve

TB

Ekv

- Succeeded recession rice farming.
- Succeeded double rice crops in rainfed lowlands.
- Succeeded rice-fish farming system.



National IPM Programme in Cambodia

2,464 rice FFSs and with 76,759 farmers participated,

125 Integrated Rice-Fish-Vegetable Production FFSs and 3,582 farmers participated,

199 Student Field Schools involving 5,365 students


International Workshop on
“CLIMATE AND AGRICULTURAL RISK MANAGEMENT”
16-21 November 2009
CARDI, Phnom Penh, Cambodia

-Increased knowledge on how access to improved medium-term weather and seasonal climate forecasting can enhance the capacity of both farmers and rural communities to adapt to climate variability, including climate change. For Climate Change, our concentration is on adaptation rather than mitigation.

- Concept notes for collaborative research projects for major agricultural areas in South Asia and South-East Asia on managing climate risk and adapting to climate change.

- Recommendations for policies and strategies will increase the uptake of research findings and decision-making tools by stakeholders in rural communities.

- A viable and active Network with effective working relationships encourage collaboration and information exchange between scientists, policy makers and farmer organisations.

- Knowledge of how access to seasonal climate forecasting can enhance farmers' capacity to adapt to climate change.

Lao P.D.R:

Tropical with wet and dry seasons.

Two monsoons:

1) the Northeast monsoon, which occurs from November to mid of March and

2) the Southwest monsoon, occurs from mid of May to mid of October; latter being characterized by frequent and heavy rainfall and high humidity.

A short drought: 02 weeks between the end of **June** and the beginning of **July**.

The annual rainfall: 1,400mm - 3,500mm.

The temperature:

- highest in April (35^{o}C-38^{o}C) and

- lowest from December-January (13^{o}C –17^{o}C) with an annual average of 26^{o}C.

- Monthly recording of meteorological data and rainfall are collected from a network of main and secondary synoptic stations *(power man resources is limited for daily recording).*

- Department of meteorology and hydrology (DMH) is responsible on data processing, analyzing and archiving system.

Data storage and data processing center

The main activity:

Process all climatic data in accordance to Clicom and spreadsheet Excel (Climate computing),

for the hydrological data use HYMOS modeling for processing and analysis the stream flow data,

Weather situation use Synergies software for analyzing the surface ,Upper air chart and the tropical cyclone Track forecast from TC web site Project under WMO (As JMA, KMA and other…),

Rainfall forecast 1-7 days from NOAA, and every 3hours from USA (Fnoc Navy) and

IRI probabilities Enso for the seasonal weather forecast;

History of Agriculture losses by disasters in Vietnam (1951-1998) (*):

-13 *Elniño* years,

-11 *Laniña* years and

-24 non ENSO years.

-The thirteen *Elniño years* were recorded in 1951, 1953, 1957, 1963, 1965, 1969, 1972, 1976, 1982, 1987, 1991, 1994, 1997 and

-11 *Laniña* years were occurred in 1955, 1956, 1964, 1970, 1971, 1973, 1975, 1988, 1995 &1998.

-The average losses due to those phenomenons are US$ 134 million per year

(*) Source: Nguyen Van Viet, researcher from Agro-meteorological Research Center of Vietnam

To cope with climate change and disasters for food security and sustainable development the Government of Vietnam is taken two principal measures approaches:

1) adaptation strategies for agriculture and

2) application of ENSO forecast for changing crop calendar in winter - spring, summer rice such as in *Laniña years*.

The first approach of adaptation strategies for agriculture is grouping into two:

short term and long term adaptation.

1)- The short term adaptation :

- insurance in agriculture to cope with weather variation, -
- diversification on crop and livestock for changing crop types requires sufficient,
- farmers' knowledge related to the climate change impact, production intensification,
- improving nutrient and pest control management, changes in tillage practices and farm systems and temporary migration.

2)- The long term adaptation strategies for agriculture:

- The development of new technologies and modernization, changing crop mix,
- Improving water management and permanent migration of labor.

However, there are several strategies that can be short and/or long term; such as:

- the investment and accumulation of capital,
- reform of pricing schemes development of open markets and other reforms,
- adaptation of new technologies,
- promotion of trade, this is likely to enhance economic adaptations under climate,
- extension services,
- diversification if income earning and employment opportunities, dissemination of climate data, institutional planning and implementation.

The second approach of adaptation measures:

Application of ENSO forecast for changing crop calendar in winter - spring, summer rice such as in *Laniña* years.

In *Laniña* years, rice crops should be change in winter-spring and such rice production system should consider with some necessary measures.

There are some measures that need to be considered according to the region:

for example, in the North Vietnam should pay attention to having measure for preventing chilling for seeding, using late maturity and chilling tolerant varieties and having priority to early and leading crops in designing rice cropping pattern in delta region.

For Vietnam, we would pay attention in the following aspects:

1)-The effect of climate change, variability, and disasters on agriculture is not similar in different agro-ecological regions in Vietnam.

2)- For serving on food security and sustainable development on agriculture to cope with climate change and disasters, it is obligatory to change the cropping calendar, cropping pattern, cropping rotation for every agro-ecological regions.

3)- At present and near future it is important to use climate index and ENSO index in early agro-meteorological monitoring and forecasting food crop yield especially for rice, for conserving with food security in Vietnam.

4)- For region with unsustainable soil moistures it is necessary to keep water in the soil as first response, and then choose new varieties of crop, which can adapt to drought.

5)- Building a good irrigating system such as in the Red River Delta and Mekong River Delta.

6)- Building more reservoirs of all kinds in the midland and highland regions.

Methods of the predict food crop yields before harvest time :

Nguyen Van Viet, researcher from Agro-meteorological Research Center of Vietnam

$$Y_{t+1} = Y_t + \Delta Y$$

Where are: Y_{t+1} prediction of crop yield in present year

Y_t crop year in the year before

ΔY difference food crop yield can be found in the following equations:

1)- For winter-spring rice:

a1) in midland Bacbo: $\Delta Y = 0.451 - 1.156\Delta T_3 + 0.095\Delta R_2 + 0.095\Delta S_4$

a2) in red river delta: $\Delta Y = 0.714 - 2.2422\Delta T_3 + 0.024\Delta R_2 + 0.02\Delta S_{11}$

a3) the Mekong river delta: $\Delta Y = 0.708 + 1.095\Delta T_2 + 0.0296\Delta R_2 + 0.042\Delta S_{12}$

Where are: ΔT_2 , ΔT_3, ΔR_2, ΔS_4 , ΔS_{11} and ΔS_{12} are the differences of temperature, rainfall and sunshine duration in February, May, April, November and December.

2)- For summer rice:

b1) in midland Bacbo: $\Delta Y = 0.397 - 2.034\Delta T_8 + 0.01\Delta R_{10} + 0.008\Delta S_7$

b2) in red river delta: $\Delta Y = 0.159 - 3.406\Delta T_7 + 0.002\Delta R_7 + 0.02\Delta S_5$

b3) the Mekong river delta: $\Delta Y = 0.851 + 0.613\Delta T_7 + 0.011\Delta R_7 + 0.106\Delta S_6$

Where: ΔT_7, ΔT_8, ΔR_{10}, ΔS_5, ΔS_6 and ΔS_7 are the differences of temperature, rainfall and sunshine duration in May, June, July, August and October.

Global concern to deal with climate change:

There are three key issues for taking action:

1)- a long-term global goal for emissions reductions;

2)- credible commitments and actions by all major economies to reduce their emissions; and

3)- support to help the most vulnerable and least able adapt to the inevitable impacts of climate change.


Thank You Very Much