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# **Drought in Southeast Asia**

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# Southeast Asia



- Is located on the equator, entire region falls within the warm, humid tropics as influenced by Asian monsoon.
- Includes Myanmar, Cambodia, Laos, Thailand, Vietnam, Brunei, East Malaysia, East Timor, Indonesia, Papua New Guinea, Philippines and Singapore
- Has nearly 580 million population in 2009 accounting for 8.7% of world's population. Indonesia is the 5<sup>th</sup> largest population in the world (236 million)
- Is one of the world's largest urbanized regions, growing at unprecedented rate, 1.75 times faster than world's urban population
- Is risk to ecosystems vulnerability and deforestation

# Climate change, drought, agriculture and economics

- Region's annual temperature will increase in the order of 0.4-1.3 deg C by 2030 and 0.9-4.0 deg C by 2070 while winter rainfall is projected to decrease (<10% by 2030 and 20-30% by 2070). Sea level rise may be as much as 3-16 cm by 2030 and 7-50 cm by 2070 (Global climate scenarios)
- Philippines, Vietnam, Cambodia, Lao PDR, Thailand and Indonesia are identified as climate change 'hotspots' (Yusuf and Francisco, 2009) and about 0-105 million experiencing water stress in Greater Mekong will be increased (Arnell, 2004).
- Drought and flood are major climate change problem on the environment and sustainable development in the region
- Severe drought caused rainfalls lower than average since September, assessed by MRC. It declines rainfall to dry season even drier than normal. It is sharply lowered the supply of drinking water and irrigation
- Drought has an impact on agriculture, food security, access to clean water, energy production, river transport, tourism and recreation, forest and wild fires, human health and economic development of people facing poverty
- Rice farmers are urged to plant crops that require less water and to refrain from planting a second rice crop
- Subsistence farmers have to seek new off-farm job and change their way of life because crops (rice, coffee, sugar etc) were damaged and stressed.

# Impacts of drought in SEA

- Thailand, Vietnam, Myanmar, Cambodia, Laos and some of the islands of Indonesia have seriously affected from drought in 2004 and so. Crops are shriving and drinking water become scarce.
- Thailand lost the crops of 809,000 ha (about USD193.2 million)
- USD4.29 million has lost in tour boats and cargo boats in the Mekong River
- Vietnam has lost USD60 million in crops and 1.3 million people did not have access to clean water
- Cambodia has affected with food shortages
- Indonesia and Malaysia may scale down their palm oil by one million tons, while Thailand and Vietnam may scale down for rice production
- Rationing, reducing planted area, shifting to drought-resistant crops, adjusting planting dates, digging wells, releasing stored water from reservoirs, and cloud-seeding are managed by Governments.



Transboundary waters (Thailand, Vietnam, Laos, Myanmar, Cambodia and China): Mekong River Basin is running at its lowest water level in 50 years. It is possibly getting lower.

Kampong Speu Province, Phnom Pehn, **Cambodia**. Drought has affected thousands of hectares of rice paddy throughout the country, eight provinces are hit y drought



Severe drought in Southern **Philippines**. Crops were harvested less than 1/3 of normal yield since last November 2004

Lam Takong Dam, **Thailand**, has dried up due to prolonged drought in March 2005. Severe water shortage and damage to agriculture brought about by the severe drought has affected millions

Hundreds of hectares of paddy fields in Banyumas, Central Java, **Indonesia**, are suffering from the drought, with farmers facing the prospect of crop failures since the past few years (2005-2007). It has forced some ppl to walk 3.2 km to fetch drinking water in Southern Sulawesi Province.



Dried-up bed of the Red River, near long Bien bridge in Hanoi, **Vietnam**, on Dec. 1, 2009. it is the worst drought in more than 100 years after no rainfall since September. It leads fires in north and tinder-dry conditions threaten forests. Credit: [www.time.com](http://www.time.com)

# Drought is disregarded in SEA...

- Drought has unique features unlike other natural disasters (earthquake, flood, volcano, typhoon, landslide, tsunami, hurricane etc), it starts unnoticed and develops slowly. It has a prolonged existence as called “creeping” which can cause complex web of impacts
- Then it is a reason that drought disaster is often underestimated because of its slow rate of onset and less visual impact on human. Though its impacts are cumulative and can be very devastating, it is not immediately observable by eye or ground data in short period. By the time the results are evident, it is too late.
- Lack of clear understanding of effect of drought, appropriate response and its vulnerabilities
- Meteorological (rainfall), agricultural (biological) and hydrological (water resource) drought are hardly to distinct between these because of its relevance inevitably

# Why drought should be concerned...

- Population growth at 1.3 world rank
- Wet season ended about a month ahead of schedule and drought conditions quickly developed across an areas that stretched from central china to southern Thailand to Luzon, Philippines, in 2004
- Rice crops were estimated at 17.0 million tons, down 1.0 from 2003 (estimated by USDA) and sugar crop dropped by about 30% in 2004/5
- Region's economy greatly depends upon agriculture accounting for 40 percent of GDP
- Agriculture highly depends upon rainfall which occurs during the wet season.
- Therefore, agricultural drought has particularly been studied in many SEA countries to great help in planning agricultural production

# Opportunities and constraints of remote sensing technology to monitor drought in SEA

- Traditional methods of drought monitoring are limited in the region. The most difficulty is relevance of conducting near real-time ground data (e.g. soil moisture condition, rainfall)
- Time consuming and too expensive for ground data collection
- With a great help of RS, it allows long-term time series (spatial, duration and intensity) studies and storage of the information which may prove invaluable in future situations
- RS can provide large amounts of data quickly and inexpensively by means of collection. Also allows to integrate vast amounts of information from a wide variety of sources to make applicable in emergency situations
- Drought is considered as region phenomenon, therefore, RS can provide more accessible information though less ground information available



# Some EOS examples in SEA

- Interested in agricultural drought because of agriculture production in the region, therefore, drought indices are challenging for being used to research for aiding the agricultural plan under the drought event or water shortage
- Some indices that have been used in the drought monitoring in the region such as:
  - Thailand: NDVI, SPI, PDSI and biomass
  - Philippines: monitoring in rice production (SPI, PDSI, Product departure, SMI)
  - Cambodia: SMI but very less number of researches
  - Indonesia: SPI, Veg Condition Index, Thermal Condition Index, Veg Health Index
  - Vietnam: SPI (for met drought) and SWSI for hydro drought

# Capacity building on space technology to drought monitoring and assessment

- Education, training and research in the field of RS/GIS to are needed to integrate for drought monitoring study, as well as information sharing
- Technical assistance and consulting services is a needed for advanced drought monitoring and assessment study and even move further to establish early warning system for drought
- SEA have been recognized that there is a limited knowledge and understanding of drought disasters, impact assessment, early warning system with great effort in real time monitoring
- Ground data and tool for validation of drought monitoring using RS/GIS are unavailable and inaccurate like soil moisture content, precipitation
- Drought awareness and knowledge management are need to be arose to communities, local governments through national governments
- Simple toolkit or method can assist the community or local government to monitor drought severity

# THANK YOU

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