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# Mekong Adaptation and Resilience to Climate Change (Mekong ARCC)



Paul Hartman, Chief of Party



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# Mekong ARCC



## Goal: Increase adaptation capacity & resilience of communities

- Use climate change downscaling techniques to identify vulnerable crops, fisheries and ecosystems in Lower Mekong countries
- Work at field level on climate planning that supports community development of adaptation and resilience strategies
- Collect extensive data to:
  - quantify ecosystem services
  - assess climate change impact
  - develop proposals for adaptation financing
- Disseminate project results and best practices across the region via platform partners to broaden/sustain impact







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# Shifting Climate Zones

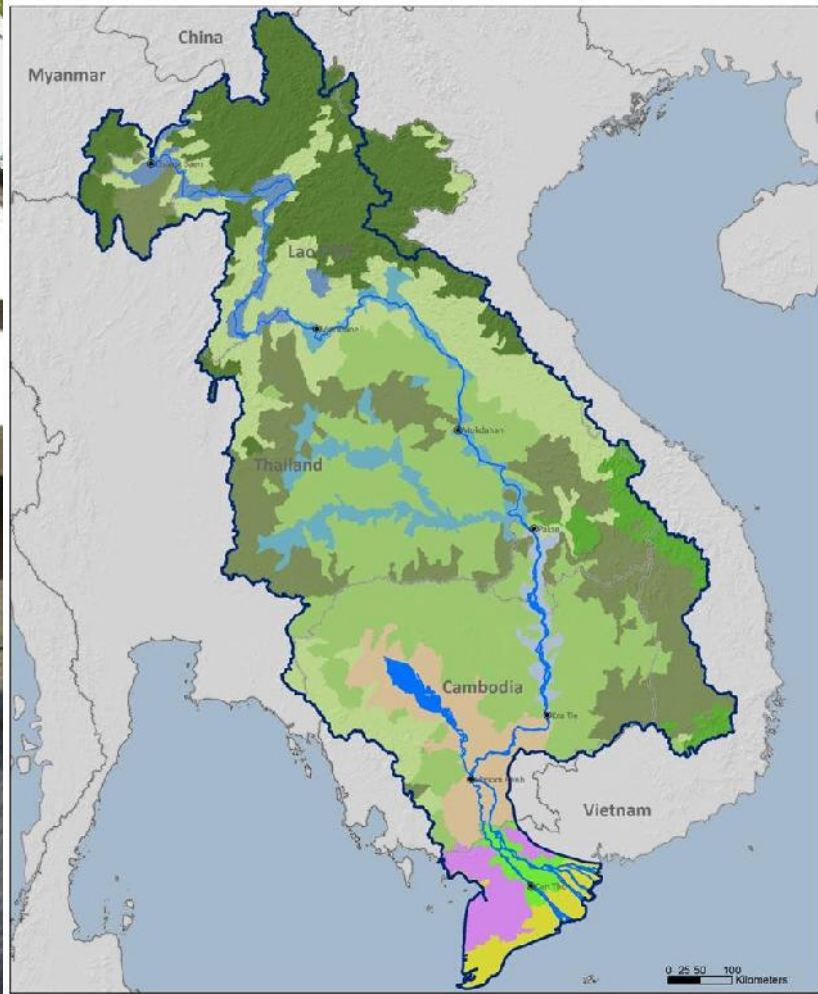


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**ECOZONES IN THE LOWER MEKONG BASIN**

National border	High elevation moist broadleaf forest (Annamites)	Mid floodplain, wetland, lake (Vientiane to Paksé)
LME boundary	High-elevation moist broadleaf forest (North Indochina)	Lower floodplain, wetland, lake (Paksé to Kratie)
Water body	Mid-elevation dry broad leaf forest	Tonle Sap swamp forest & lower floodplain (Kratie to delta)
	Low-elevation dry broadleaf forest	Alluvial fresh water floodplain
	Low-elevation moist broadleaf forest	Low lying acidic area
	Upper floodplain wetland, lake (Chiang Saen to Vientiane)	Delta mangroves and saline water

Data Source: ICGM 2012, UNEP 2002-2005, ICM GIS Database





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# CC assessment parameters



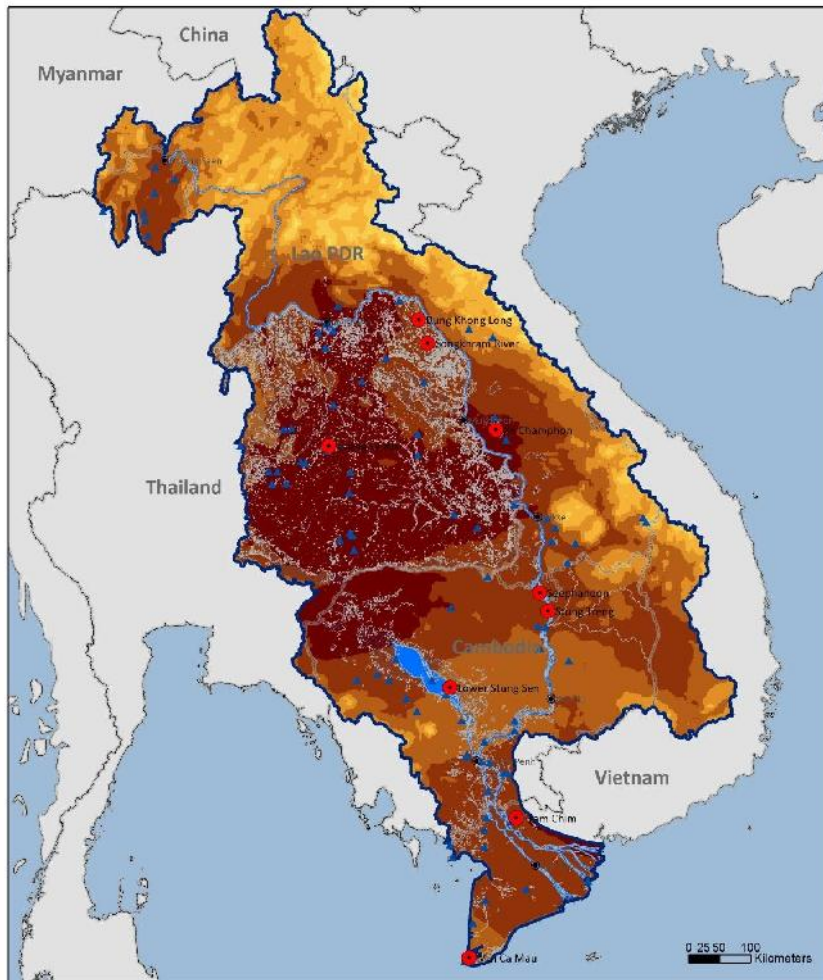
1. Max/min daily Temperature
2. Seasonal rainfall
3. Timing of the monsoon
4. Peak rainfall events
5. Erosion potential
6. Drought
7. Storms & cyclones
8. Soil water availability
9. River flow
10. Hydro-biological seasons
11. Flooding (depth & duration)
12. Non-climate Drivers



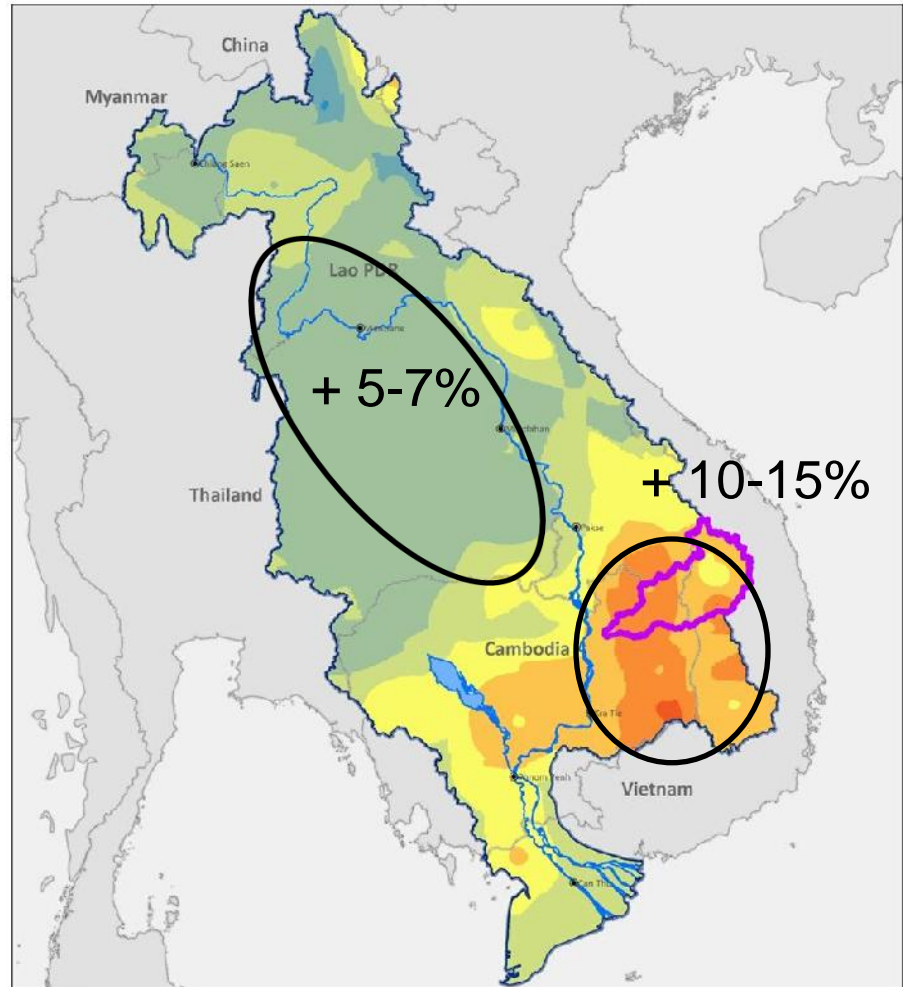
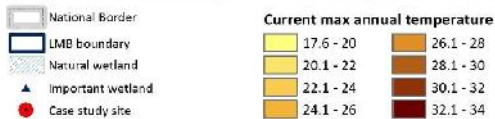


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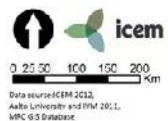
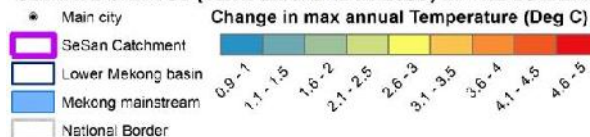
# % change in max annual temperature by 2050



**PRESENT MAX ANNUAL TEMPERATURE IN THE LOWER MEKONG BASIN**



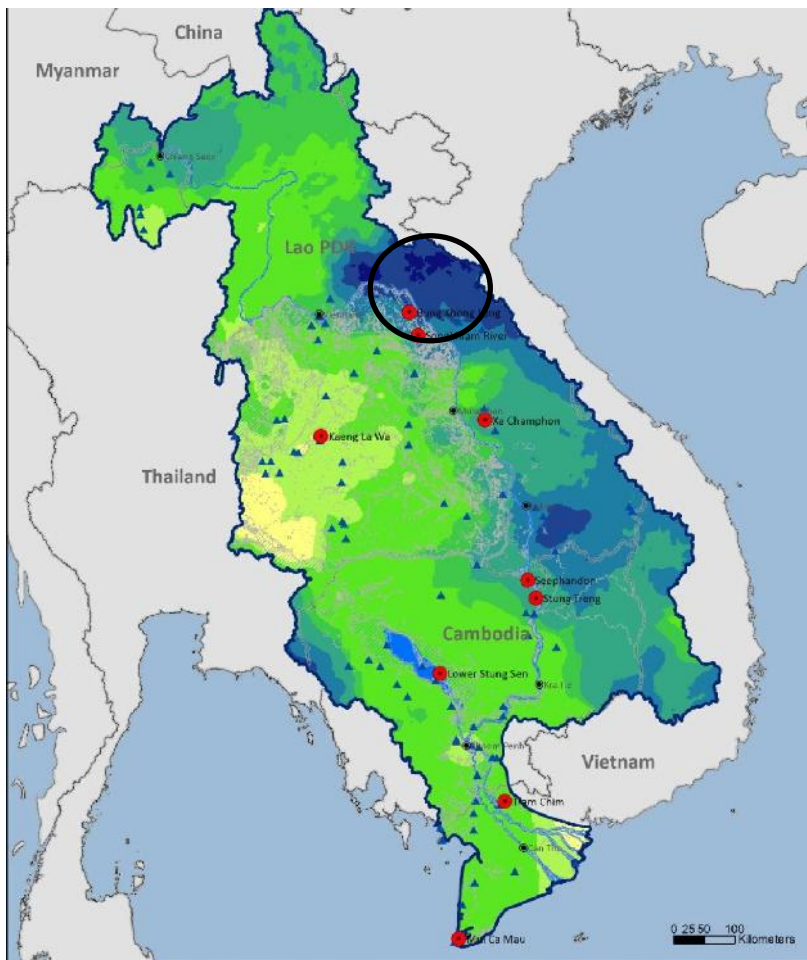
**CLIMATE CHANGE (TEMPERATURE IN 2050) IN THE LOWER MEKONG BASIN**



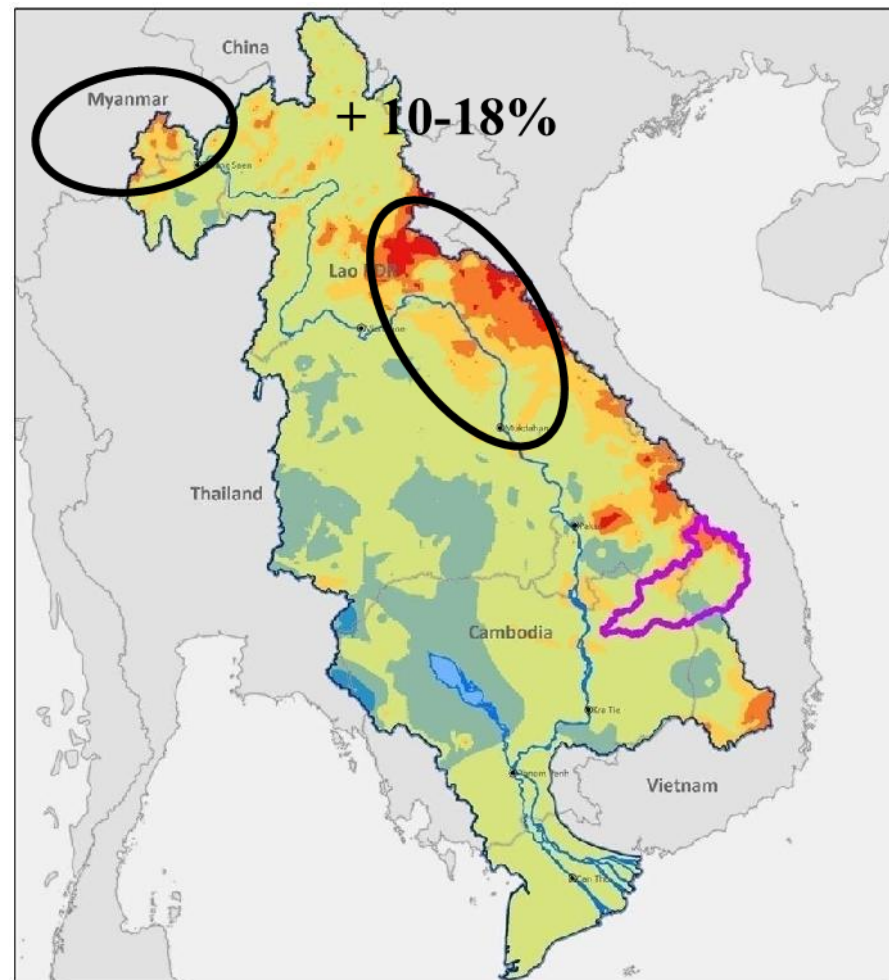
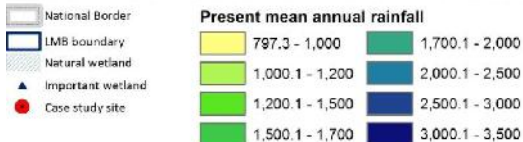


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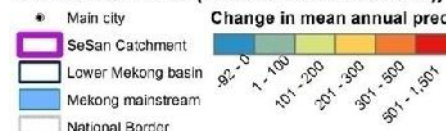
# % change in annual rainfall by 2050



**PRESENT MEAN ANNUAL PRECIPITATION IN THE LOWER MEKONG BASIN**



**CLIMATE CHANGE (PRECIPITATION IN 2050), LOWER MEKONG BASIN**



Data source: ICTIR 2012, Aalto University and ICM 2011, MRC GIS Database

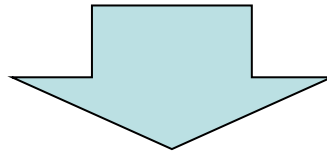


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# Species Comfort Zones



**Comfort Zones:** where temperature, rainfall, & soil conditions create favorable growing/productive environment.



**Land suitability across basin:** areas suitable for different species under differing conditions of climate, topography and soils

**Crop yields in specific 'hot spot' provinces:**

- Losses or gains in crop yields within hot spots caused by:
  - impact of water availability
  - heat stress
  - water stress
  - salinity intrusion in the delta





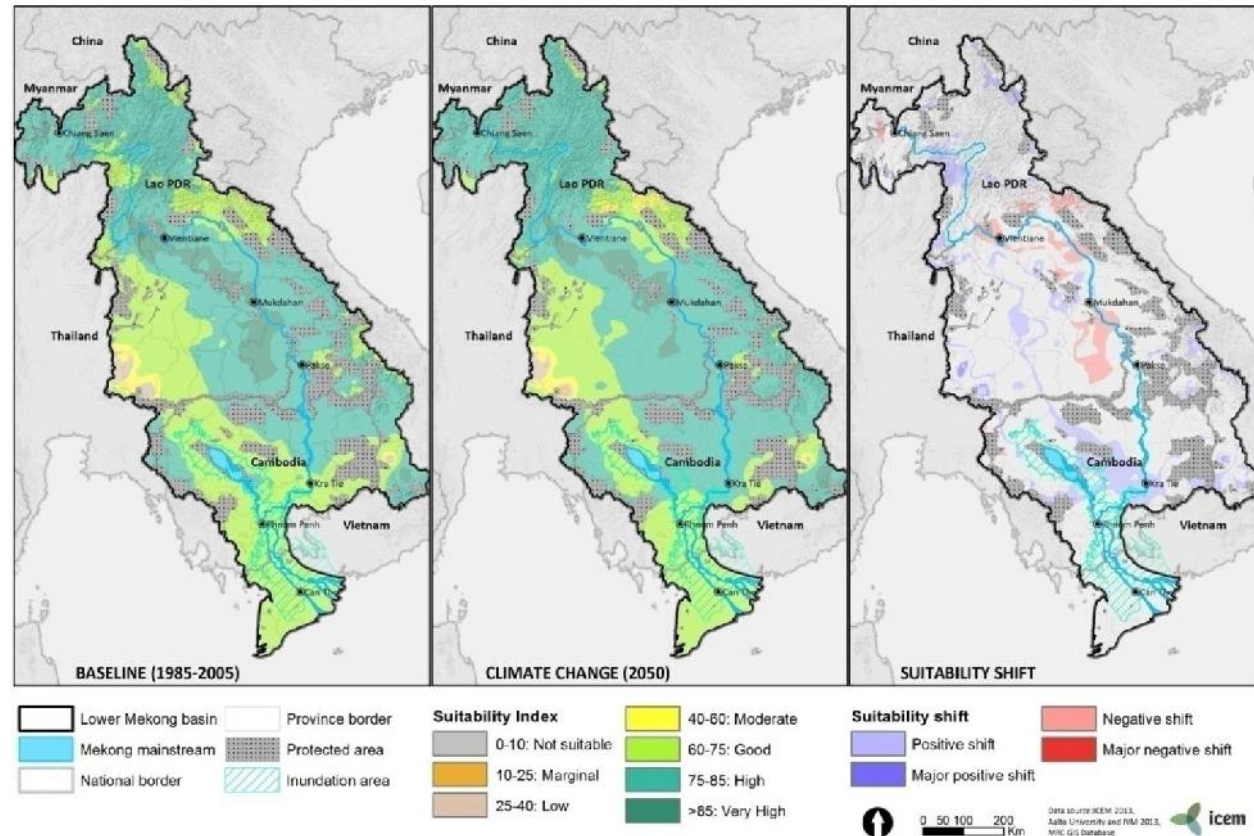
# Land Suitability



Suitability of six crop species with projections of future changes in climate together with topographical characteristics.

- **rainfed rice**
- **soya**
- **maize**
- **cassava**
- **robusta coffee**
- **rubber**

LOWLAND RAINFED RICE SUITABILITY IN THE LOWER MEKONG BASIN

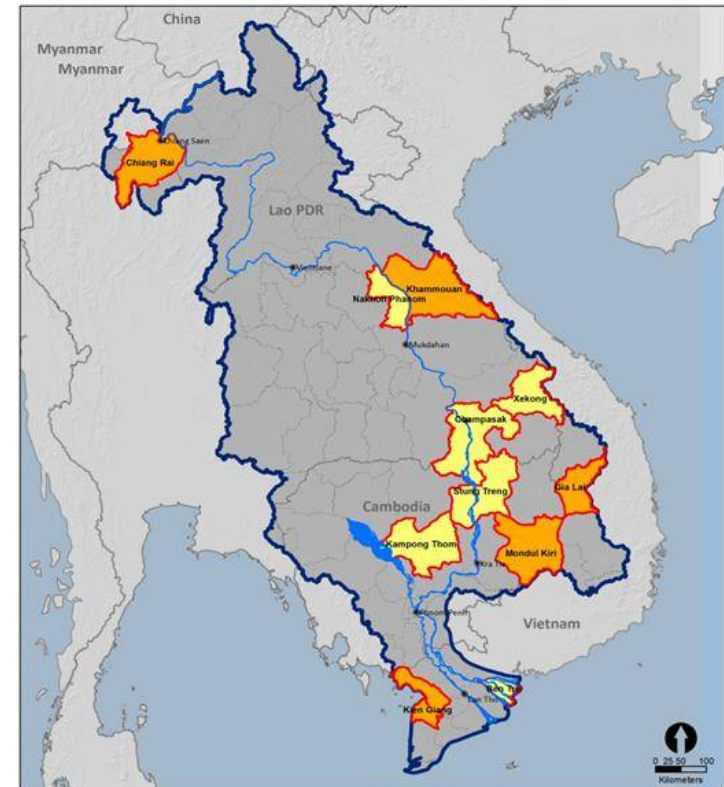






## Basis for Selection

1. Representative of the ecosystems found across the Basin
2. Contain a mix of staple and commercial crops, fisheries and livestock that are common to LMB,
3. Projected to experience the greatest relative increase in average temperature and/or rainfall, and;
4. where such shifts would significantly impact important livelihood/subsistence options for communities.



SELECTED HOTSPOT PROVINCES IN THE LOWER MEKONG BASIN

Legend:  
National border (grey line)  
LMB boundary (blue line)  
Water body (blue area)  
Selected Hotspot Province (orange/yellow area)



Data Source: ICM 2011, WRI 2002-2006, MRC GIS Database

- 1) Chiang Rai – TH, 2) Sakon Nakhon – TH, 3) Khammouan – LAO, 4) Champasak – LAO, 5) Stung Treng - KHM, 6) Kampong Thom – KHM, 7) Mondul Kiri - 8) KHM, Gia Lai – VN, 9) Kien Giang – VN,



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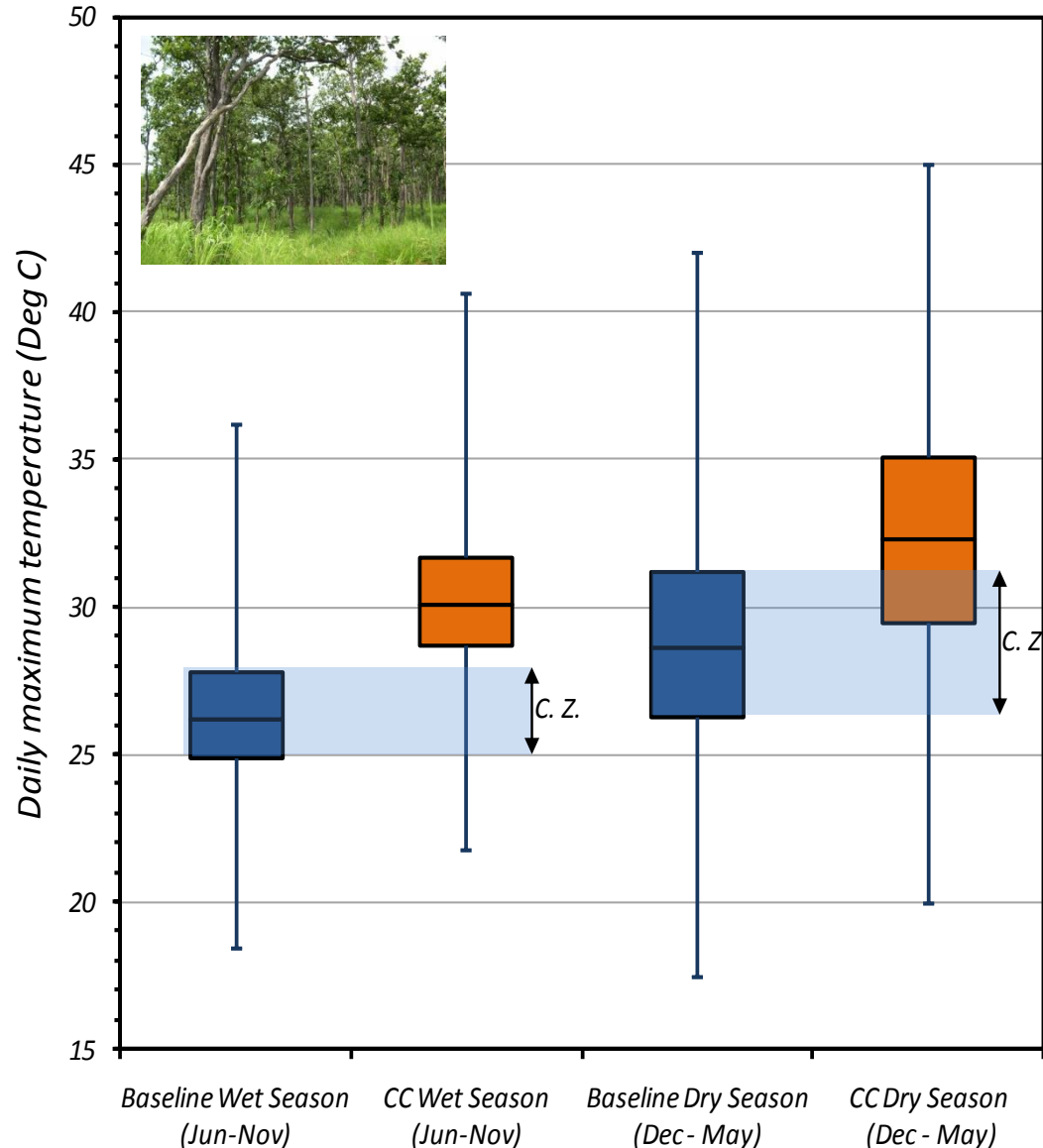
# Mondulkiri comfort zones



Mid elevation dry broadleaf forest - Mondulkiri

*Ecosystem comfort zone:*

The range of precipitation or temperature that was experienced during 50% of the baseline around the mean.







## Provincial Climate Change Impacts at 2050 – Mondul Kiri

Temperature	Precipitation	Storms	Droughts	Soil Moisture	
				Upland	Lowland
A 3.7 Deg C. increase in annual mean temperature; the avg. daily maximum temperature will rise from 38 to 42 Deg C.	Annual rainfall will increase from 1,935 mm/yr to 2,117mm/yr (+182mm/yr); Aug-Oct will see 10% increase in monthly rainfall, while Feb will see a 12% reduction	Projected increase from 9 days of large rainfall events (>100mm/day) to 21 days	April, the historical transition from the dry to wet season, will be drier and prolong water stress at the end of the dry season	Overall decline, peaking at -20% reduction in May	Overall decline, peaking at -10% reduction in Aug

## Sectoral Vulnerabilities – Mondul Kiri

	<i>Exposed Species</i>	<i>Illustrative Climate Vulnerability*</i>
<b>Agriculture</b>	Lowland Rainfed Rice	Increased large rainfall events (waterlogging) & above optimal temperatures
	Soya	Increased large rainfall events (waterlogging) & heat stress above 35°C
	Cassava	Increased large rainfall events (waterlogging) & heat stress above 35°C
	Rubber	Dry season (Mar-May) will see increase in days above 35°C (heat stress)
<b>Livestock</b>	Smallholder Cattle/Buffalo	Heat stress impacts fodder availability and reproduction rates, while flood events increase the spread of disease and herd loss
	Scavenging Chicken	Primary exposure comes from flood event population loss
	Banteng	High adaptive capacity; exposure to heat stress will impact reproduction rates
<b>Fisheries</b>	Upland/Forest Stream Fish	Flash floods may lead to heavy erosion and excess sedimentation levels, particularly in deforested areas
	Migratory White Fish	Prolonged drought will limit stocks in all but the deepest refuge pools at the end of the dry season
	Semi-Intensive Catfish Ponds	Flash floods will lead to stock loss, particularly when ponds located in a stream valley
	Extensive Tilapia-Carp Polyculture	Temp increase and drier dry season means reduced oxygen levels, higher ammonia, reduced survival
<b>Non-Timber Forest Products &amp; Crop Wild Species</b>	Russula Mushroom	Prolonged dry seasons will impact soil moisture and potentially the abundance of this high value species
	False Cardamom	Heat stress (days above 36C) and prolonged dry season during April/May flowering may push to higher elevations
	Wild Orchid	Heat stress and prolonged dry season will impact growth; intense storms will damage high tree canopy growth
	Rattan	Heat stress & prolonged dry season beyond comfort zone; flash floods will impact young seedlings
	Paper Mulberry	Heat stress (days above 38C) and longer season during flowering period (May/June) may push it to higher elevations
	Giant Honeybee	More days above 33C comfort zone threshold will likely cause out migration earlier, impacting pollination
	Wild Rice (O. nivara, O. officinalis)	Heat stress to exceed comfort zone for all life stages; decreased soil moisture in flowering period; as temperature approaches and exceeds 44C O. officinalis will become sterile



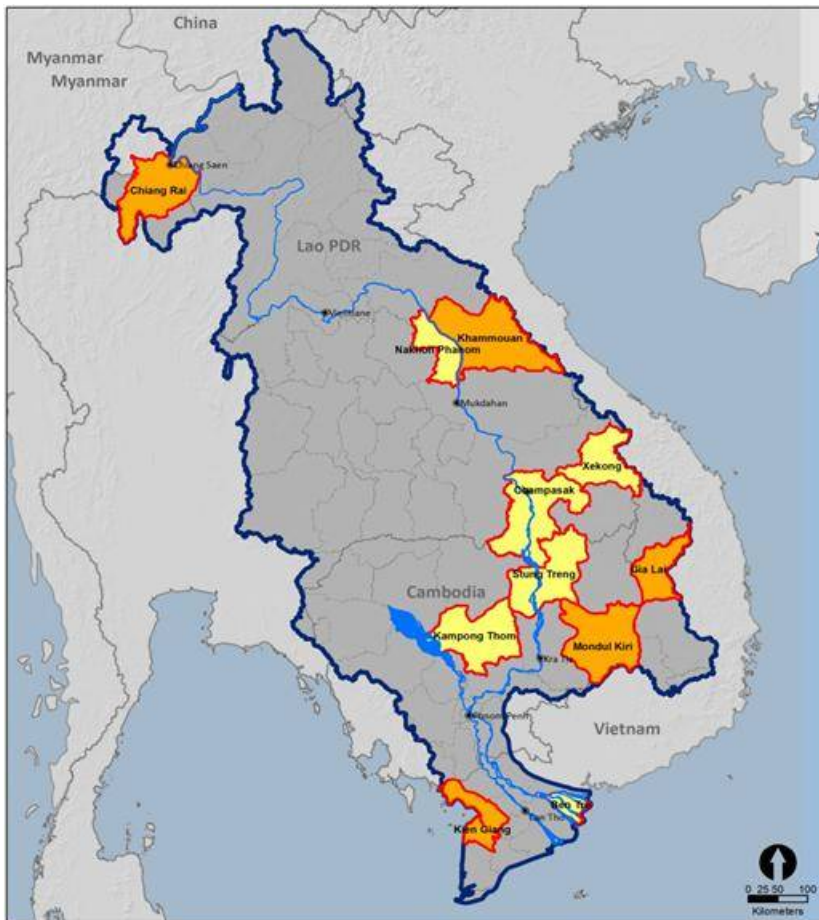
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# Adaptation Initiatives



Strengthen capacity to **'act, learn, act again'** by building communities' ability to:

- a) understand climate risks
- b) identify and prioritize adaptive responses to those risks
- c) Take action to implement adaptive responses
- d) monitor and adjust along an iterative adaptation pathway



SELECTED HOTSPOT PROVINCES IN THE LOWER MEKONG BASIN

Legend:  
National border (grey line)  
LMB boundary (blue line)  
Water body (blue area)  
Selected Hotspot Province (red outline)



Data Source: ICM 2012, WFP 2002-2006, ICM GIS Database





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# Questions?

