



# Turning Science into Action: Applying Climate Change Projections to Decision Making

Awareness of our changing climate has steadily grown over the past decade, but its impacts are viewed as intermittent and fleeting: a big flood or the doubling of the price of rice at the market. Each time we cope and carry on. News reports and expert climate change studies suggest widespread threats to our health and socioeconomic wellbeing, but often fail to explain how to adapt to the nuances of a shifting climate. Armed with only a list of climate change threats and uncertainties, leaders – whether in communities, or in government or executive offices – base on-the-ground decisions on the *past and present*, as they always have, coping with change when it arrives. The Mekong ARCC program works to bridge this gap between climate science and local decision making.

A clear finding of the Mekong ARCC Climate Study is that ***the Basin Will See More Extremes – Wetter Wet Seasons, Drier Dry Seasons, and Higher Temperatures.*** Some parts of the Basin could experience an average annual temperature increase of 4°C to 6°C. In places like the **Eastern Plains of Cambodia**, that means the maximum daily average temperature could rise from 38°C to 42°C, leading to increased heat and water stress on rice and rubber crops at the end of the dry season. The same trend – wetter and hotter – means shifting suitability for crops, making **Northern Lao PDR** better for growing rubber, cassava and robusta coffee, for example.

***But how can decision makers translate this scientific finding into practical adaptation actions?***

Decision makers must understand the subtleties of *how* wetter wet seasons or more days at higher temperatures will directly impact the fortunes of their community, business, or local government. Importantly, they must also be able to monitor and measure changes as they occur. Therefore, the Mekong ARCC project introduces the concepts of ‘*comfort zones*’ and ‘*threshold markers*’ to aid decision makers in analyzing their own distinct vulnerabilities and actively monitor the changes around them. This Study reveals four principle messages on how leaders can incorporate science into decision making.



Den Rathbun / DAI

- 1. Know Your Comfort Zones.** All crops and natural species thrive in a comfort zone where temperature, rainfall, and soil conditions create a favorable growing environment. When these conditions change, the crops struggle or fail. A slightly warmer 2009 winter season in Chiang Rai – when litchi trees flower – drastically impacted litchi fruit productivity, with yields down 50%. Living outside traditional comfort zones will not mean immediate collapse of a crop or natural system, but it does mean a decrease in its vibrancy and productivity. The Study shows how these comfort zones will shift, rendering unsuitable places once thought ideal for certain crops, like the **Central Highlands of Vietnam** for coffee, or **Thailand’s Chiang Rai Province** for rice. Projected shifts outside of these comfort zones mean variable impacts on different key crops and species, such as:

## The Impacts of Breaching Comfort Zones

Rice	More days above 35°C during the October ripening stage in Mondulkiri, Cambodia will reduce grains per plant.
Maize	Wetter wet seasons impact soil moisture, resulting in a projected -12% decline in yield in Gia Lai, Vietnam.
Litchi	Trees require at least 100hrs below 15°C in winter to flower; higher average temperatures impact production.
White Fish	Prolonged dry season will limit stocks in all but the deepest refuge pools in Khammouane, Lao PDR.
Smallholder Pigs	Increased number of days above 35°C across the basin will reduce reproduction rates and immunity.
Siamese Crocodile	Ambient temperature around eggs determine sex, thus higher temperatures could drive species extinction.

**2. Monitor Your Threshold Markers.** Natural systems and crops have tipping points after which they are more likely to fail. With increasing temperatures, rainfall and dry periods, identifying threshold markers that indicate when a comfort zone has been breached, will aid leaders in being proactive to minimize disasters. For example, **Mondulkiri, Cambodia** is projected to experience over 20 days of heavy rainfall (100mm/day) annually, compared to a baseline of 9 days per year. Decision makers should monitor soil moisture thresholds as the change may create flashfloods, erosion, and potentially impact disease vectors. Similarly, drier dry seasons in **Kien Giang, Vietnam** means more saline intrusion in the delta, where rainfed rice yields see significant declines when salinity breaches >4% concentration.

**3. Incorporate Scenario Planning.** The use and development of plausible stories of how the future might unfold is a powerful tool for decision makers. Historical weather trends do matter, but adding future projections on climatic comfort zones and threshold markers in scenario planning exercises can improve the robustness of decisions around farming systems, land use planning, supply chain management, and population migration, among other sectors that will be impacted by climate change. For example, considering a future condition where heat stress might limit production of freshwater prawn or flash floods might cause a sudden drop in salinity of **coastal shrimp ponds in Vietnam** can aid governments, businesses, and communities to develop effective responses and minimize the systemic impacts.

**4. Promote Diversity of Ecological and Agricultural Systems.** Traditional farming approaches and natural systems serve as a buffer to a changing climate. Integrated farming systems – for example, farmers raising ducks and fish in rice paddies – rather than monocultures increase the resilience of both farmers and ecosystems. As the harmonies between human and natural systems fade away, so too does an important element of local resilience.

Interconnected crop and species systems throughout the Lower Mekong Basin will be affected differently as will every business and community. The layered subtleties of how climate change directly impacts people will be amplified by non-climate drivers of change -- dams, deforestation, land conversion for industrial monocultures, and population growth will continually rebalance the landscape and should not be disentangled from adaptation planning. The Mekong ARCC Climate Study demonstrates that **Climate Change is more than an environmental issue**. Developing a coordinated adaptation response to climate change in the Mekong Basin is indeed a formidable challenge, given the uncertainties and many moving pieces. This Study offers decision makers a framework to incorporate science in practical and innovative ways, building resilience into lives and livelihoods across the Basin.

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