

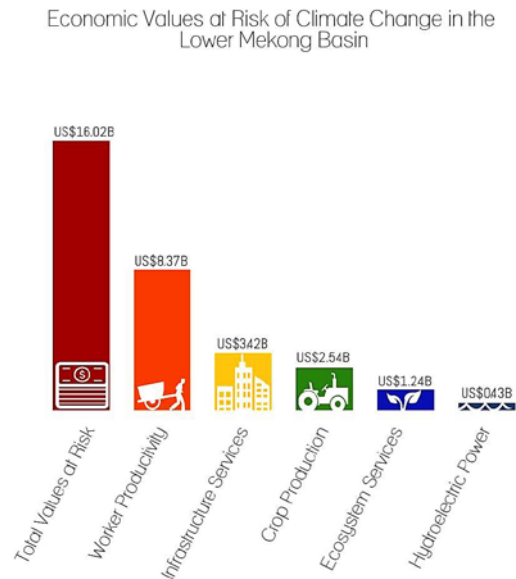
## OVERVIEW

# Climate Change in the Lower Mekong Basin: An Analysis of Economic Values at Risk Report

## Introduction

The *Climate Change in the Lower Mekong Basin: An Analysis of Economic Values at Risk* report explores a scenario in which projected climate changes for the Lower Mekong Basin (LMB), as set out in the [USAID Climate Change Impact and Adaptation Study for the Lower Mekong Basin](#), becomes the present reality rather than occurring incrementally from now until 2050.

- This report **uses an analytic approach** by assessing the values-at-risk (VAR) of key assets in the LMB at their present-day values to get a preliminary picture of the economic toll of anticipated climate changes in the region.
- The total amount in jeopardy in Cambodia, Lao PDR, Thailand and Vietnam **demonstrates the profound risk that climate change poses to the economies of the LMB.**
- The results from this VAR analysis can be applied to **help prioritize national adaptation plans and investments, assess cost effectiveness of adaptation investments and inform land use and other development plans** to avoid unnecessary exposure to climate risks.



## Key findings:

- **This report demonstrates that economic impacts of climate change in the LMB are expected to be wide-ranging, significant and mostly negative.** Of most concern are significant reductions in the yield of crops, fish and non-timber forest products critical for livelihoods of over 60 million people, damages associated with floods and sea level rise, and an increase in the incidence and severity of heat-related illnesses for workers.
- **Based on current values, impacts from climate change could cost the economies of Cambodia, Lao PDR, Thailand and Vietnam approximately \$34 billion per year.** This includes at least **\$16 billion per year in damages to natural resource assets and infrastructure services (which represents between 7 and 30 percent of rural GDP in the LMB)**, and an additional \$18 billion of potential infrastructure damage or loss from flooding and other extreme weather events.
- **Worker productivity across the LMB is significantly threatened by climate change, accounting for more than \$8 billion at risk annually in lost work days resulting from heat-induced illness.** High temperatures, already affecting open-air workers such as farmers and construction workers, will likely increase as a result of climate change, causing spikes in cases of heat stress and other heat-related illnesses in the dry seasons.

- **Built infrastructure services (\$3.42 billion), crop production (\$2.54 billion), ecosystem services (\$1.24 billion) and hydroelectric power (\$430 million) are also at risk from climate change impacts.**

### The Values at Risk Approach

**Rationale** – It is important to understand the potential magnitude of climate change impacts over time to make wise investments in adaptation measures, but the uncertainty in climate models downscaled to any particular region remains too great for reliable estimates. Additionally, decision makers may more easily understand the economic consequences of climate change in a particular region if they are framed in terms of the existing economic value of resources at risk rather than the future value.

**Methodology** – The VAR approach places a value, using current day values, on assets that are at risk. This report applies conservative estimates when valuing specific assets—built infrastructure, worker productivity, crop production, ecosystem services and hydro-electric power generation.

**A VAR analysis looks at the existing value of goods, services and infrastructure that are likely to be adversely impacted by climate change rather than making complex predictions about exactly how, when, and to what extent these resources will be impacted under various states of nature and policy scenarios in the future. It is a technique to help prioritize investments so they're not allocated to adaptation projects with minimal economic return.** — VAR Report author, Dr. John Talberth

The methodology for valuing the risks to these assets:

- (1) **Uses climate model information from the USAID Mekong ARCC Climate Study to identify geographic areas** most likely to be affected by climate change, such as extreme heat waves, drought and sea level rise.
- (2) **Identifies key economic resources** in these geographic areas that would be impacted by these changes in climate.
- (3) **Develops estimates for the economic values of these resources and assets** using standard techniques that takes into account whether those goods and resources are sold in formal or informal markets.

**Application** – While the methodology does not generate precise estimates of how climate change costs will unfold nor where such costs will likely occur at a fine spatial scale, it does provide an analytical approach that can be used by decision makers such as national and local governments and investors to:

- **Prioritize** adaptation plans and investments;
- **Assess the cost effectiveness** of specific adaptation investments and strategies in relation to the value of economic assets at risk, and
- **Inform planning and land use decisions** to avoid actions and investments that lead to unnecessary exposure to climate risks.

### Economic Impacts from Climate Change to Worker Productivity

The VAR report indicates that lost worker productivity is at significant risk from climate change in the LMB, *comprising approximately 50 percent of the total amount at risk annually* from climate change (excluding built infrastructure) at **\$8.37 billion**.

- Open-air workers, such as those in agriculture or construction, are expected to be most affected by rising temperatures.

- Heat-related illnesses such as heat rash, transient heat fatigue and heat stroke are expected to negatively impact work performance and hours worked and increase accident rates.

In order to address expected impacts on worker productivity, the report suggests the following actions:

- **Place worker productivity front and center** in national and regional climate change adaptation plans.
- **Prioritize preventative actions** such as workplace heat assessments, guidelines for recognizing heat stress, strengthening national health systems to address heat-related illnesses and changes to working hours.
- **Urge new thinking about urban design**, for example, by redirecting subsidies and growth spending from conventional urban growth toward greener cities that can help make life more hospitable as temperatures rise.

*There are tens of millions of open-air workers likely to experience greater levels of heat stress and heat-related illnesses when temperatures start rising above 40°C. This means that **communities and governments should pay far more attention to worker productivity.** — Dr. Talberth*

### Economic Impacts from Climate Change to Infrastructure Services and Built Infrastructure

Throughout the LMB, the existing network of roads, bridges, communication lines, structures, irrigation systems, permanent crop and livestock areas, energy systems and other components of the built environment are at risk from climate change impacts such as storms, rising sea levels and flooding.

- The total amount at risk annually to the goods and services infrastructure provides is estimated to be **\$3.42 billion**, plus potentially an additional \$18 billion in built infrastructure.
- In addition to the more obvious impacts associated with flooding and storm damage, **increased temperatures are likely to stress built infrastructure and require more frequent repair or replacement.**
- Increases in rainfall and humidity are likely to foster mold, termites and other damaging agents.

### Economic Impacts from Climate Change to Crop Production

Projected changes in temperature and rainfall are likely to have significant impacts—both beneficial and adverse—on agricultural production.

- The total amount at risk annually to crop production is estimated to be **\$2.54 billion.**
- The VAR analysis looked at negative shifts in crop suitability with changes in temperature and rainfall and more extensive inundation from flooding and sea level rise for eight commercial crops—rainfed rice, irrigated rice, maize, cassava, soya, sugar, rubber and Robusta coffee.
- Together, **rubber and rainfed rice account for roughly 60 percent** of these values at risk, while soya and sugar represent well under one percent of the total values at risk.

### Economic Impacts from Climate Change to Ecosystem Services

In their natural state, forest, wetland and grassland ecosystems throughout the LMB provide a wide array of goods and services of significant economic value.

- Drawing on the USAID Mekong ARCC Climate Study to identify the ecozones of highest vulnerability and other studies estimating the total economic value of ecosystems, a conservative estimate of ecosystem services values at risk is **\$1.24 billion.**

- Inundation, drought, fires, infestations by exotic species and isolation and fragmentation of habitat, all brought on by climate change, threaten many of these ecosystem services and the livelihoods that depend on them.
- Climate change will also cause shifts in species distributions with potentially major effects on ecosystem structure, composition and processes.

### Economic Impacts from Climate Change to Hydro-electric Power Generation

Over the past 10 years, interest in hydropower has escalated in the LMB accompanied by increasing private sector investment in dams and other power infrastructure. According to a 2010 International Centre for Environmental Management report, most Mekong River tributaries now have “cascades of dams in place or planned with some 71 projects expected to be operational by 2030.”

- The report identifies 11 hydro-electric power facilities at risk by overlaying the location of facilities with the USAID Mekong ARCC’s modeled spatial data showing locations of projected increases in temperature and changes in agricultural drought months due to climate change.
- The report calculated the range of energy production at risk for each facility and multiplied it by two different pricing estimates, yielding an estimated value of **\$430 million**.

### Recommendations

This preliminary VAR analysis highlights the magnitude of values at risk in the LMB and helps emphasize the need for significant investments in adaptation measures for workplace heat assessments and protection measures, eco-resilient cropping techniques and green infrastructure. The USAID Mekong ARCC project has made the VAR report available to the public on its website and will be circulated to enrich regional climate change adaptation discussions.

*Adaptation measures will become more difficult the longer we wait, when there are more frequent natural disasters taking bigger tolls on economic infrastructure. It’s hard to be optimistic these days [about climate change], but if we address the problem early enough—and it is still early enough—we can make investments that are likely to pay off many times over. — Dr. Talberth*

This preliminary analysis lays the groundwork for follow-up analyses, including:

- **A robust VAR analysis for each LMB country** so national policymakers can use these findings to confirm whether their adaptation strategies and spending are responsive to all significant values at risk, including ecosystem services, worker productivity and infrastructure.
- **A rigorous assessment, including original valuation studies, of ecosystem services at risk** based on how local communities actually use or benefit from them.
- **More in-depth analysis of how heat is already impacting worker productivity** in multiple outdoor professions, not just agriculture and construction.

### Acknowledgements

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#### FOR MORE INFORMATION

Access the full Values at Risk Report:

[http://www.mekongarcc.net/sites/default/files/usaaid\\_marcc\\_values\\_at\\_risk\\_report\\_with\\_exesum-revised.pdf](http://www.mekongarcc.net/sites/default/files/usaaid_marcc_values_at_risk_report_with_exesum-revised.pdf)

Read an interview with VAR Report author, Dr. John Talberth: <http://www.mekongarcc.net/blog/interview-john-talberth-wri-senior-economist-values-risk-report-climate-impacts-lower-mekong-ba>

Learn more about the USAID Mekong ARCC project: <http://www.mekongarcc.net/ourwork/our-work>