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Mekong ARCC Adaptation & Resilience to Climate Change

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Strengthening Resilience of Water Management Systems to Climate Change in the Lower Mekong Basin

Best Management Practices for Adaptation

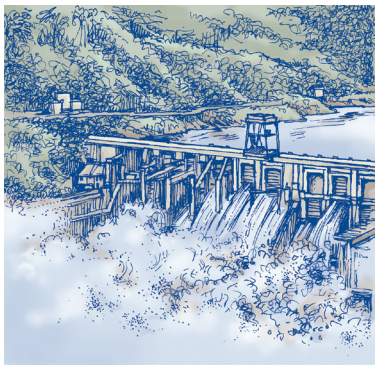
Climate change in the Lower Mekong Basin (LMB) will lead to wetter wet seasons, drier dry seasons, and more frequent and intense storm events. Coastal areas will experience the additional effects of rising sea level and salinization of soil and water resources. These climate hazards have the potential for impacting already-strained water supplies during the dry season; increasing contamination of drinking water especially during flood periods; and heightening the spread of water-borne diseases.

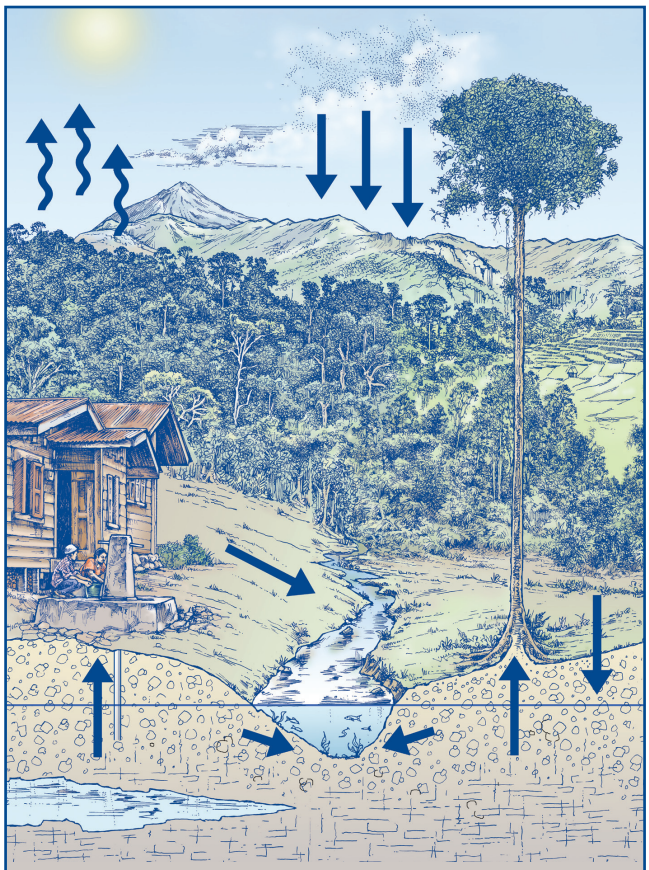
Clean, available water is a key to sustaining rural livelihood practices and is an essential input in supporting healthy and prospering communities. Building resilience into water management systems of LMB communities should be prioritized in all local level development plans.

WATER USES IN THE LOWER MEKONG BASIN

In rural areas of the LMB, the main uses of water are for domestic purposes (e.g., drinking, cleaning, cooking, bathing) and farming activities (e.g., irrigation, livestock, aquaculture). While traditional farming practices in the basin are predominantly rainfed, portions of the LMB, particularly in northeastern Thailand and the Vietnam Delta, rely heavily on irrigation to enhance crop yield. Irrigation for agriculture accounts for the largest consumer of water in the LMB.

Other notable water uses in the basin include hydroelectricity and industrial purposes (e.g., agro-food processing and textile manufacturing). The Mekong mainstream and tributaries are also important for navigation, transportation, and tourism and recreation activities.





The Water Cycle

Rainwater, surface water, and groundwater are the three primary water sources in the LMB. When precipitation enters the hydrologic cycle it can run off into surface waters, such as streams, rivers, lakes; infiltrate to become a component of the groundwater reservoir; or evaporate. Evapotranspiration — which includes both evaporation from soil and water surfaces and plant transpiration — is a significant component of the hydrologic cycle in tropical climates. All of these factors are important in determining water availability and quality in LMB communities.

CLIMATE CHANGE THREATS

Floods

As populations in LMB countries are expected to increase in coming years, with more people and infrastructure likely to occupy flood-prone areas, the present and future risks posed by floods are significant. Floods typically result from heavy storms and precipitation, but also occur by large wave events. Many inhabitants of the LMB rely on cyclical flood occurrence to bring nutrients and water supply into their farming systems. **With climate change**, however, **the LMB will experience increasing frequency and size of storm events**, resulting in **more serious flooding**.

Flood-related consequences are far-reaching and take many shapes including:

- Obstruction of transportation and access routes
- Agricultural crop damage
- Groundwater contamination
- Emergence and spread of waterborne illnesses
- General destruction of property and infrastructure
- Loss of lives

Droughts

Drought results from abnormally low rainfall, and involves water shortages for both human activities and natural systems. In the LMB, an annual drought period (i.e., the dry season) naturally occurs from November until April or May. Traditional systems within the LMB have developed to work around this annual drought, aligning crop calendars and scheduling farming activities to coincide with beneficial rainfall patterns. **With climate change**, however, many areas within the LMB can expect to see **prolonged dry seasons**, and variable rainfall or **atypical drought occurring during an otherwise rainy period**. Water supplies that are often already strained at the end of the typical dry season will be stressed further, and potentially result in harmful impacts to people and their livelihoods.

Increasing temperature and changing rainfall patterns will result in both heightened flood events — particularly during the wet season — and increasing occurrence of drought periods in the LMB. These climate-related threats can be mitigated through proactive planning and improved water management. Identifying the risks and most critical consequences, and then prioritizing solutions is essential to building effective and timely adaptation.

ADAPTIVE SOLUTIONS TO MANAGE INCREASING FLOODS

The **development of adaptation strategies to manage increased flooding** should involve a number of steps.

1. **Identification of risks:** Communities should be made to understand the extent of flood-prone areas based on historical events and projected changes in rainfall/storm patterns due to climate change. Participatory information-sharing approaches should combine the best available data on future climate and hydrologic modeling and site-level surveys that incorporate both community knowledge and an assessment of topographic and landscape characteristics.

2. **Development of a community-level flood response plan:** Key elements of a flood response plan should include an early warning system; measures to be taken prior to arrival of the flood (e.g., moving people and livestock to higher ground, adequate storage of food, drinking water, and medicines); and an emergency action plan for during and immediately following the flood.

3. **Proactive prevention measures to limit consequences of floods:** Measures should include increasing upstream water storage capacity from communities when possible; improving drainage systems; and infrastructure maintenance and improvement measures that increase resilience in water supply systems and sanitation facilities. Land-use planning policies that limit new construction in flood-prone areas are extremely important to develop if not already established.

4. **Heightened public awareness and capacity development:** Increasing understanding and capacity building of local and provincial government officials is critical to building effective resilience in LMB communities.

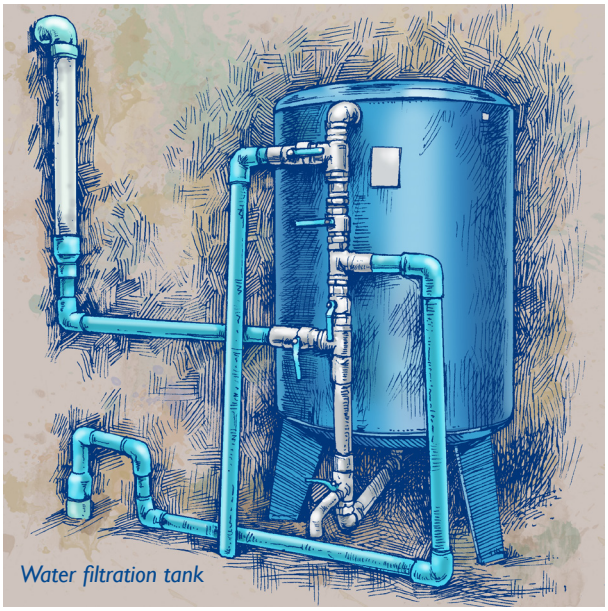
ADAPTIVE SOLUTIONS TO MANAGE INCREASING DROUGHTS

As with flooding, the **development of adaptation strategies to manage increasing drought** will be of critical importance with the onset of climate change. **Identification of risks** is essential for communities to understand and identify their drought-related vulnerabilities and the most serious consequences in order to prioritize solutions. These risks must be evaluated both in the context of historical events and by considering future projections in rainfall and temperature patterns.

Adaptation measures to manage increasing drought can be broadly divided into supply and demand type solutions.

Adapting to drought through measures to increase water supply:

1. **Limit water losses in water supply infrastructure:** Use effective maintenance protocols for new and existing infrastructure to minimize leaks and other inefficiencies.


Water filtration tank

2. **Increase storage capacity:** Use methods such as rainwater harvesting, and improved surface water storage that, ideally, limits evapotranspiration through a closed system.

3. **Careful analysis of private water vendor costs:** It is important to increase transparency of costs to community members to maximize resources available for purchasing water and to avoid potential conflicts.

Adapting to drought through measures to reduce water demand:

1. **Incorporate water-efficient crops into farming systems:** Conditions may warrant shifting to alternative crop varieties with shorter planting duration and/or better suited to growth in drier climates. In addition, the system of rice intensification (SRI) and alternate wetting and drying (AWD) are low-tech, cost-effective methods for improving rice yield with less water.

2. **Use water-saving technologies:** Measures such as drip irrigation may be a viable option for some communities.

3. **Coordination between water users:** Optimize priority uses and limit waste or limit less vital uses whenever water resources are restricted. For example, water used for aquaculture or irrigation should be minimized during stressed periods when the whole community is not sufficiently supplied with water for drinking purposes.

4. **Oversight of water use:** Incorporate water management oversight into communities to ensure efficient and fair use of the water supply. A water committee should be established if the community does not already have one. Price mechanisms can be incorporated to limit wasteful and unnecessary water use.

5. **Establish public awareness campaigns:** Increasing awareness to prioritize water conservation is essential.

6. **Diversification of income sources:** Incorporate livelihoods that depend less on water use in particularly stressed areas.

Design & illustration by Donald Bason

USAID Mekong ARCC is assisting communities at five sites across the Lower Mekong Basin to better understand and prioritize climate risks, and take actions to adapt to climate change impacts on livelihoods, food security, and health. This includes strengthening the resilience of water management systems at sites in Lao PDR, Thailand and Cambodia.

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