



## Forecast Mekong: Navigating Changing Waters

The U.S. Geological Survey (USGS) is using research and data from the Mekong River Delta in Southeast Asia to compare restoration, conservation, and management efforts there with those done in other major river deltas, such as the Mississippi River Delta in the United States. The project provides a forum to engage regional partners in the Mekong Basin countries to share data and support local research efforts. Ultimately, Forecast Mekong will lead to more informed decisions about how to make the Mekong and Mississippi Deltas resilient in the face of climate change, economic stresses, and other impacts.

General Information Product 126

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## Early Successes

In its early phase, USGS work within the Mekong Delta focused primarily on five activities to help begin cooperative efforts:

- Sharing information and technology and collaborating with scientists working in similar deltas
- Generating sea-level rise scenarios for the Mekong Delta
- Showing how data can be integrated and visualized at broad scales
- Developing satellite-based indices to monitor flooding and plant growth
- Providing downscaled climate change data to help predict environmental changes



Suggested citation:

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## Information Sharing and Collaboration

A highlight of this activity was the USGS-State Department sponsored Forecast Mekong Workshop, December 9–11, 2009, in Vietnam. More than 75 scientists and government officials from Cambodia, Laos, Vietnam, Thailand, China, and the United States met to prioritize work and identify information gaps related to the Mekong Delta and climate change.

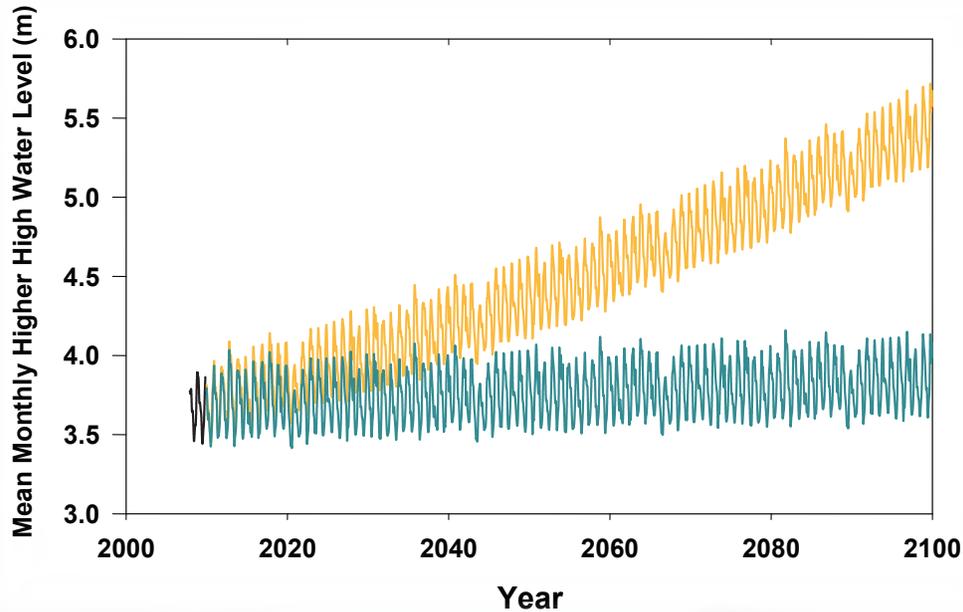
As a result of the workshop, the USGS will continue building stronger ties with Mekong region scientists by participating in cooperative research projects, providing training for Mekong scientists, providing technical expertise in data analysis and integration, conducting ecological monitoring, and developing data visualization tools.

Additional meetings occurred in spring of 2010 in Vietnam and Thailand. The USGS helped sponsor scientists from Southeast Asia to attend the “Deltas in Times of Climate Change” conference in Rotterdam, Netherlands, in September 2010.



## Sea-level Rise

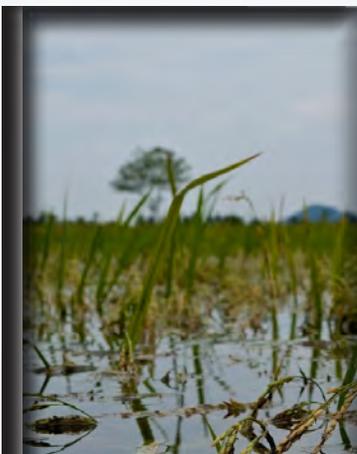
A model of sea-level rise scenarios in the Mekong Delta has been completed. This model uses historical sea-level records for a tide station at Vung Tau, Vietnam, as well as projections of land subsidence and change in sea level under climate change to show the possible scenarios for sea-level rise in the region. A USGS report on the findings is in press.



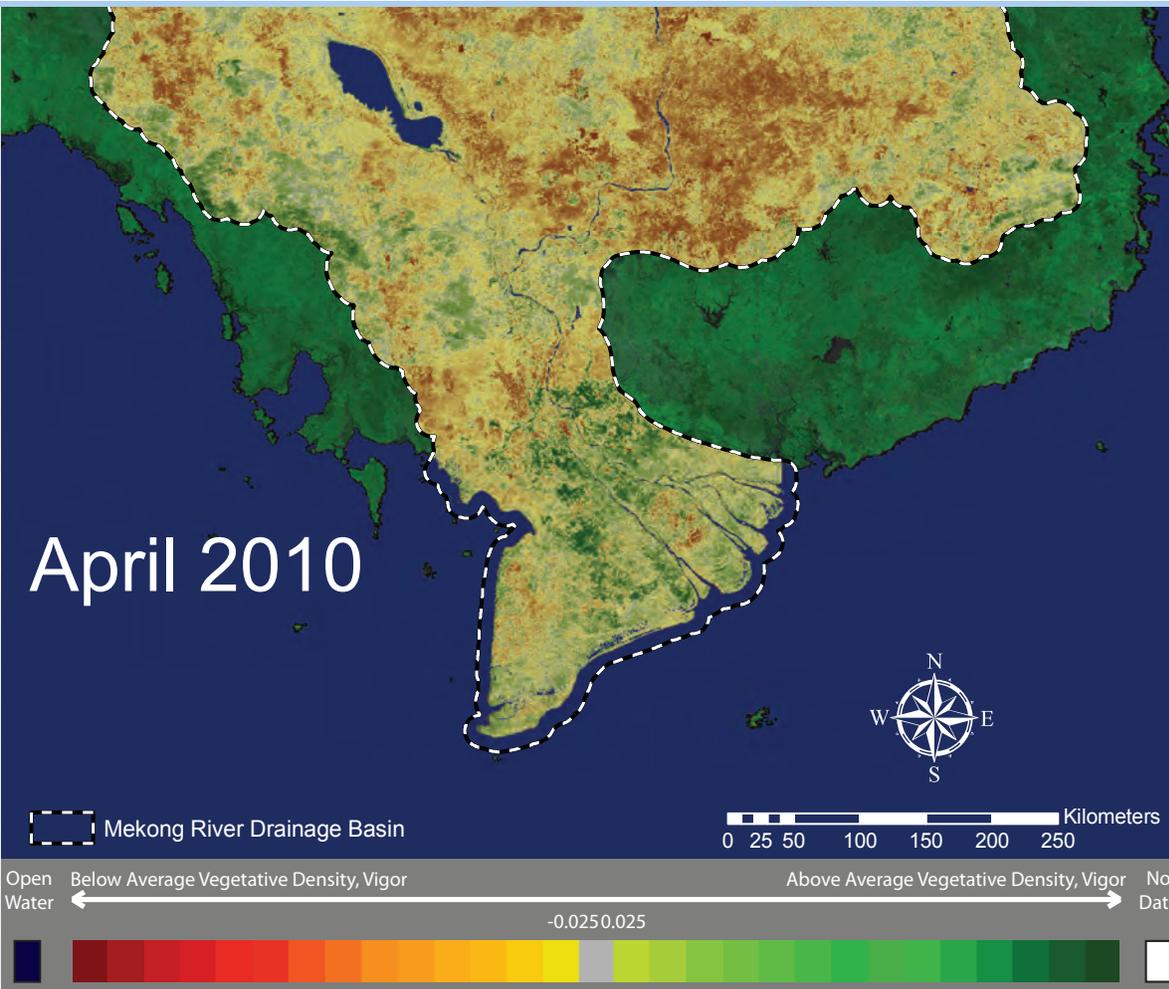
Constructed sea-level rise scenarios under climate change for an emission case for an Intergovernmental Panel on Climate Change model plus a net subsidence of 9 millimeters per year (yellow) in contrast with the historical eustacy condition without climate change (blue) and rectified to the contemporary tide record (black) at Vung Tau, Vietnam.

## Data Integration and Visualization

USGS produced a short video that addresses water quality, climate change, and the unique seasonal flow of the Mekong River. More importantly, the video shows the unintended consequences of water management scenarios in other river systems. What might be affected? Fisheries productivity, sediment loss, and increasing vulnerability to sea-level rise.



## Satellite-Based Data

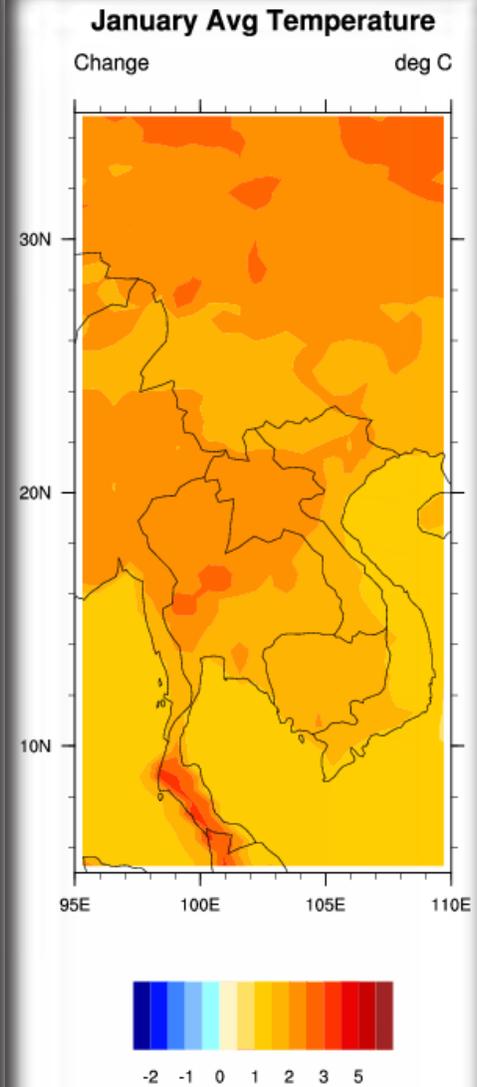
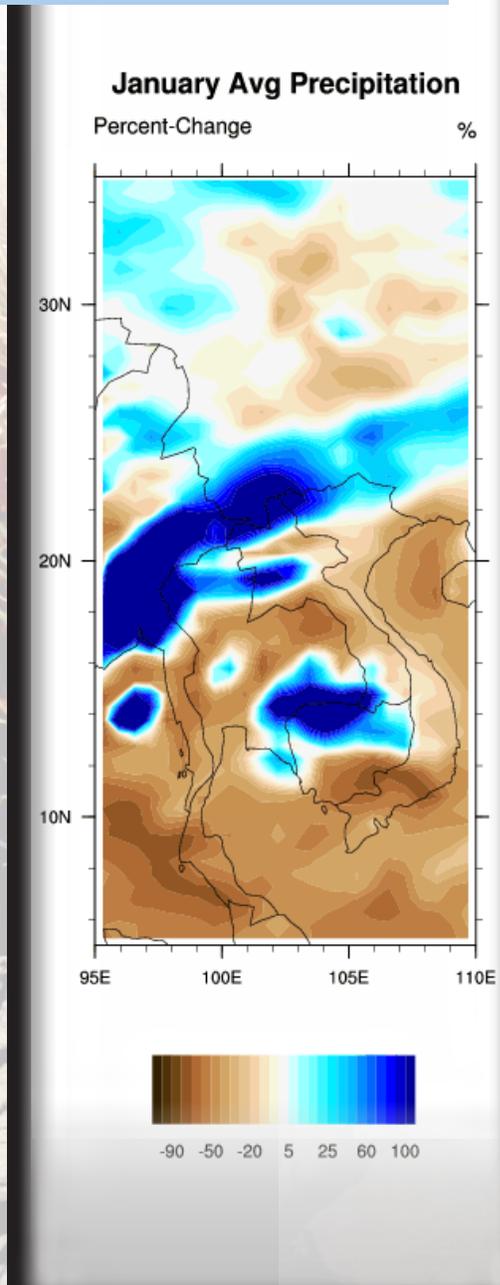


To monitor vegetation health and flooding extent, the USGS is developing baselines of conditions in the Mekong area with the help of available MODIS satellite data at 250-m resolution. Changes in growth patterns of plants and flooding or drought extent will be illustrated by measuring the departure from these baselines and creating visual outputs. For instance, the drought conditions in the spring of 2010 are clearly visible in the satellite data.

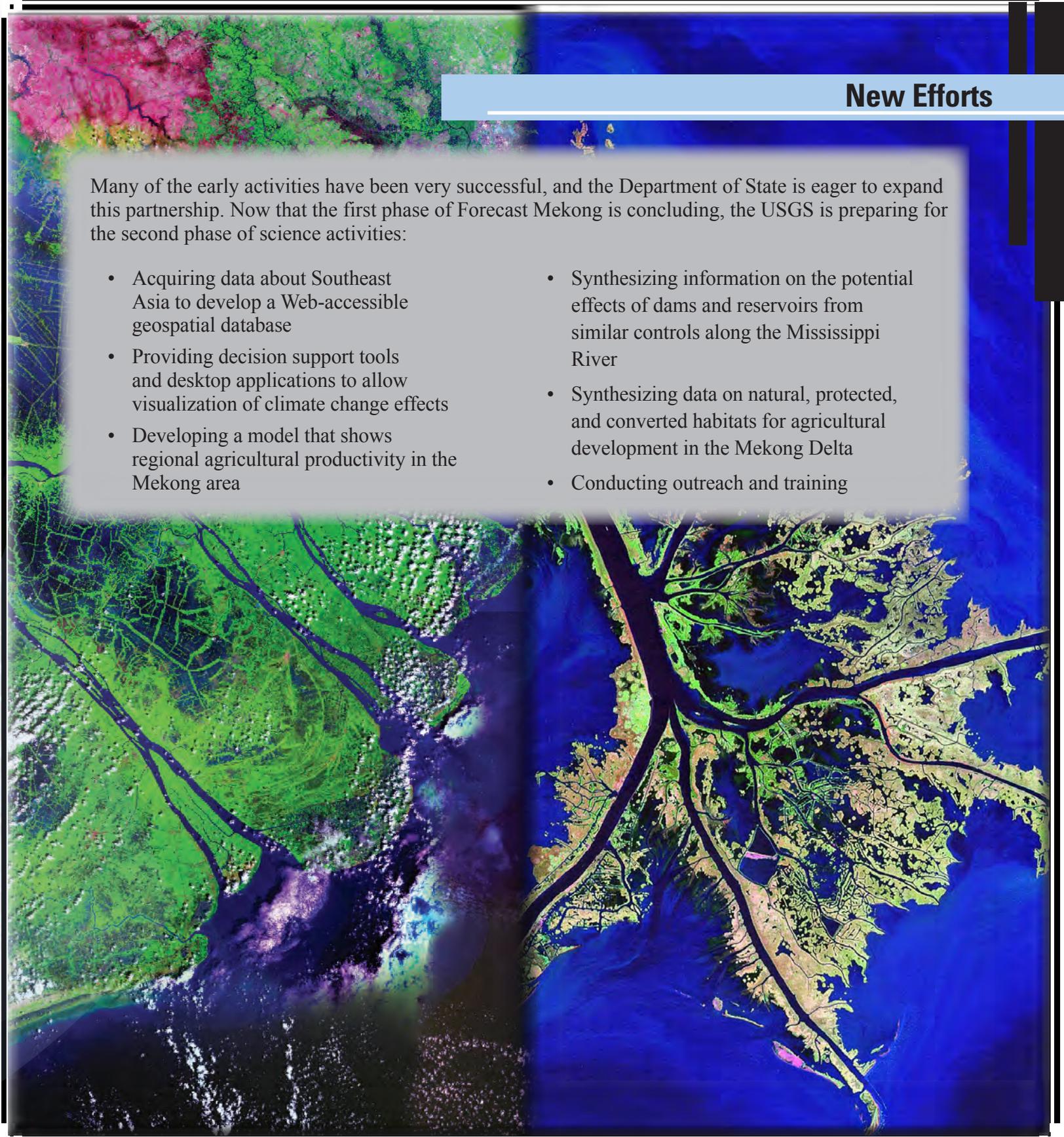
This map shows departure from baseline conditions by using the Normalized Difference Vegetation Index for the lower portion of the Mekong River Basin in April 2010. Orange and red colors represent vegetation density and vigor, which are below average for April. Scientists believe a drought in the region may be partially responsible for the patterns shown in this image.

## Climate Change Data

The USGS, working with the North American Regional Climate Change Assessment Program, will make the regional climate data available to Mekong area scientists and others to aid in climate change research. These data will help predict precipitation, temperature, humidity, and other climate variables.



These panels show analyses based on time slice experiments conducted with the Geophysical Fluid Dynamics Laboratory atmospheric model. The climate data plots depict the average percent change in precipitation and temperature by month for future climate conditions (2041–2070) compared to the current climate (1971–2000).

An aerial photograph of a river delta, likely the Mekong Delta, showing a complex network of waterways and land. The image is colorized, with the water appearing in shades of blue and purple, and the land in various shades of green and yellow. A semi-transparent white text box is overlaid on the upper portion of the image, containing text and a list of activities. The title 'New Efforts' is positioned in the top right corner of the text box.

## New Efforts

Many of the early activities have been very successful, and the Department of State is eager to expand this partnership. Now that the first phase of Forecast Mekong is concluding, the USGS is preparing for the second phase of science activities:

- Acquiring data about Southeast Asia to develop a Web-accessible geospatial database
- Providing decision support tools and desktop applications to allow visualization of climate change effects
- Developing a model that shows regional agricultural productivity in the Mekong area
- Synthesizing information on the potential effects of dams and reservoirs from similar controls along the Mississippi River
- Synthesizing data on natural, protected, and converted habitats for agricultural development in the Mekong Delta
- Conducting outreach and training

