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Please note that this presentation was given during the United Nations Climate Change Conference (COP-15) in Copenhagen, December 7-18, 2009 for more information please visit <http://www.cop15.state.gov/> .





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Tools and Methods for Adaptation

COP 15

December 14th 2009

John Furlow, USAID

Climate Change Impacts

Select Impacts:

- Changes in water availability
- Changes in pollutant loading
- Infrastructure damage
- Change in forest cover
- Amplified hazards
- Sea level rise
- Increased hunger
- Spread of disease
- Loss of biodiversity

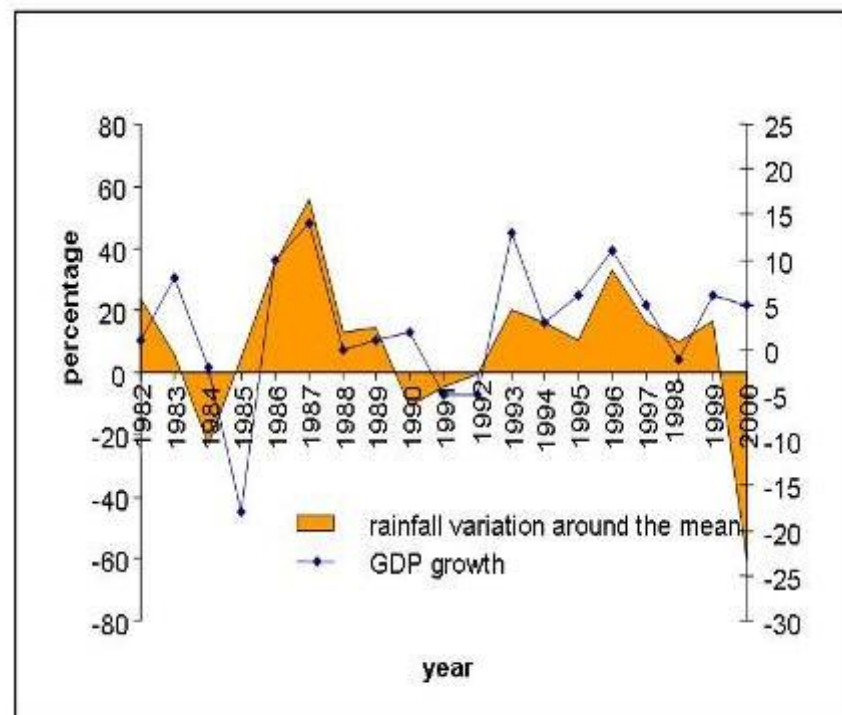


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Why Adapt to Climate Change?

- Developing country economies concentrated in climate sensitive sectors
- ~70% of developing country populations derive income from agriculture

Ethiopia: Rainfall, GDP, and Ag GDP



Source: The World Bank. "Managing Water Resources to Maximize Sustainable Growth: A Country Water Resources Assistance Strategy for Ethiopia." 2005.



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What Is Adaptation?

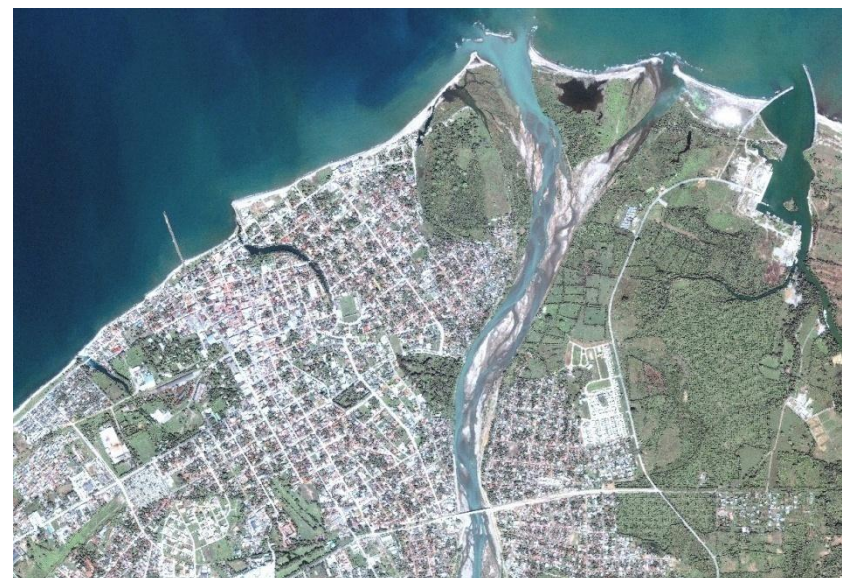
- IPCC: adaptation is “Adjustment in systems in response to actual or expected climatic stimuli or their effects. . .”
 - Process of examining and understanding vulnerabilities
 - Responding in some way to reduce vulnerability, build resilience



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What Is Vulnerability?

- **Vulnerability:** $f(\text{exposure, sensitivity, adaptive capacity})$
- **Exposure:** Is an asset out in the elements?
 - Flooding, drought, erosion, sedimentation
 - Agriculture is exposed, highly dependent on weather/climate
- **Sensitivity:** Does exposure matter?
 - Are crops suitable to a range of temperatures and precipitation profiles?
- **Adaptive Capacity:** Can you respond to the impact to reduce the vulnerability
 - Ag sensitivity can be reduced with irrigation, drainage, crop selection
 - Crop and economic diversification can reduce damages
 - Insurance spreads risk



$(\text{Exposure} + \text{Sensitivity}) - \text{Adaptive Capacity} = \text{Vulnerability}$



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Some Challenges to Adaptation

Technical

- Poor historical records
- Poor current weather data
- Low local capacity
- GCM uncertainty
- Poorly adapted to current conditions

Social

- Competing Interests
- Too many challenges
- “More pressing needs”
- Poor understanding of climate change
- Intimidating topic
- Limited experience



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USAID's Challenges

- Remain true to Development Mission
- Cope with data limitations
- Build support, capacity, confidence to address climate change
- Simplify, streamline the adaptation process for non-climate experts
- Build resilience while pursuing development gains

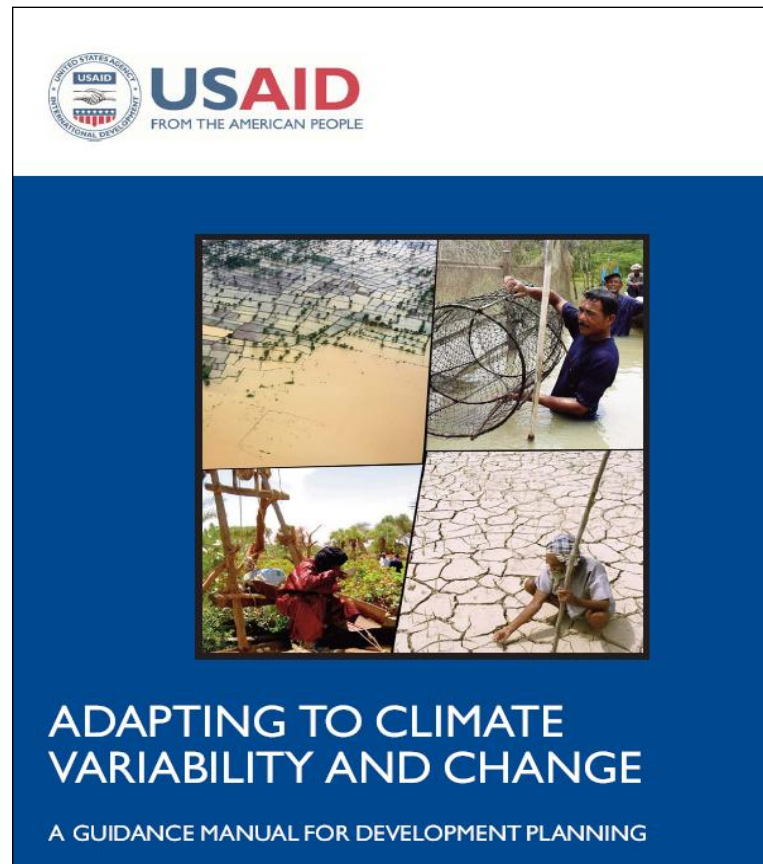


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Adapting to Climate Change and Variability

USAID Adaptation Goals:

- Educate project planners:
 - Provide climate change information for non-experts
- Increase resilience of projects
 - Identify opportunities for adaptation
- Improve planning processes
 - Incorporate adaptation into project planning
- Approach
 - Tools
 - Guidance
 - Stakeholder engagement



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Adaptation Guidance Manual

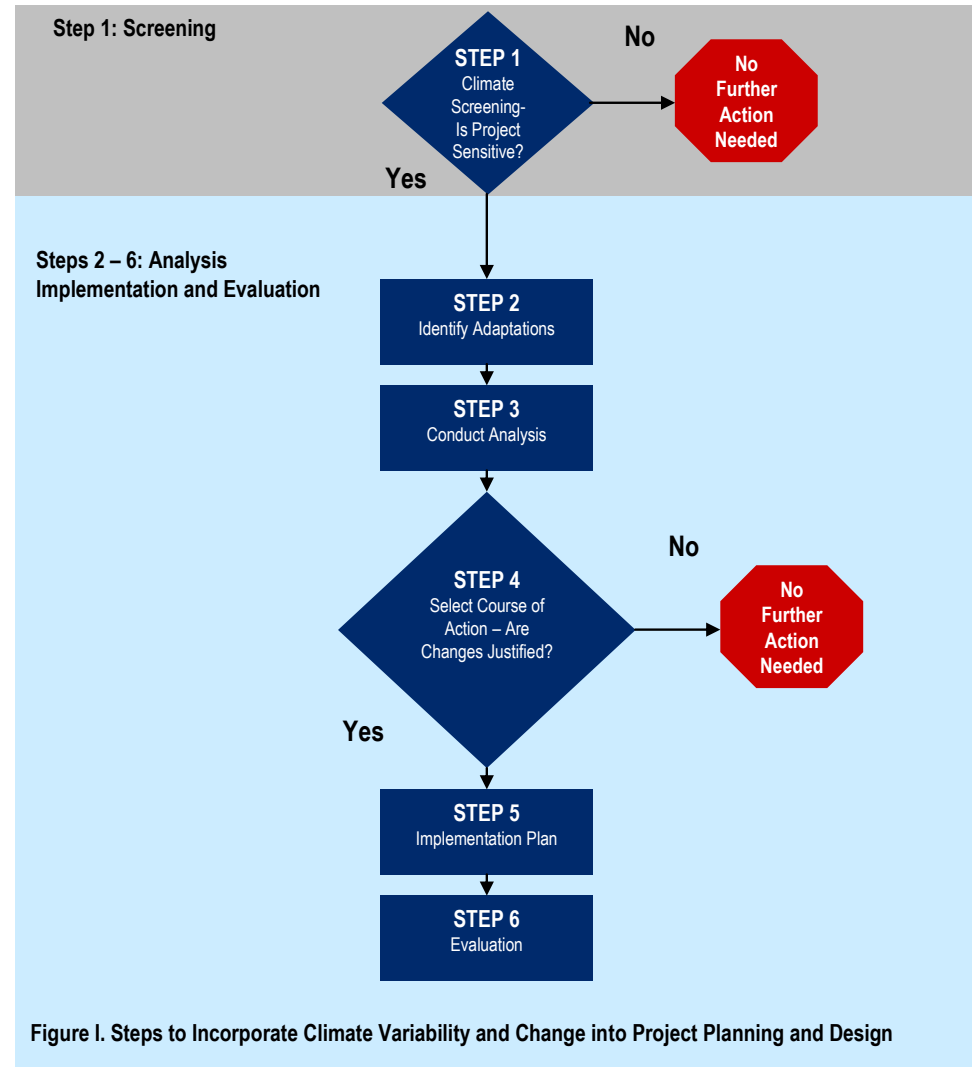
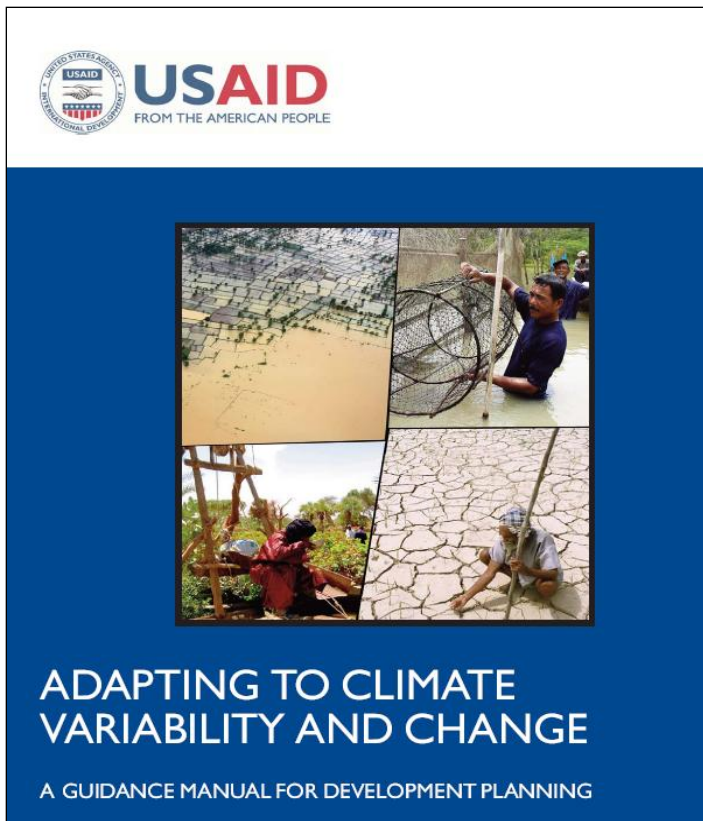


Figure I. Steps to Incorporate Climate Variability and Change into Project Planning and Design

USAID's Adaptation case studies

- **Honduras:** coastal zone development
- **Mali:** rice and potato production
- **South Africa:** municipal water sources
- **Thailand:** fisheries, rice production
- **Madagascar:** protected areas management and livelihoods
- **Coastal Hazards:** building resilience to multiple hazards
- **Andes/Himalaya:** adapting to a world without glaciers
- **Ghana:** urban water quality



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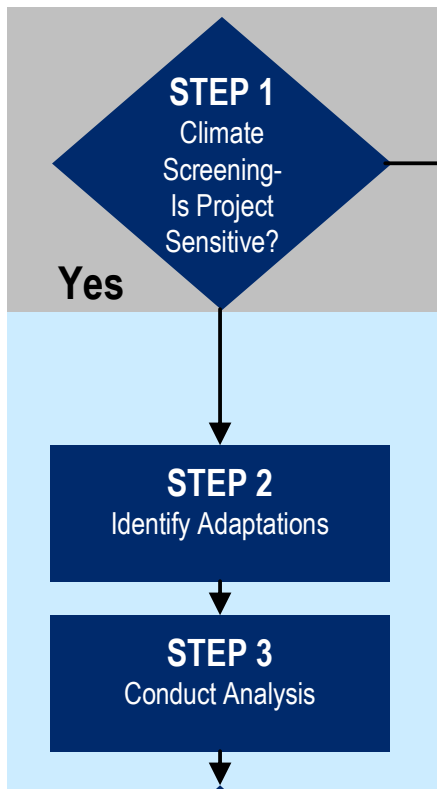
La Ceiba, Honduras: Coastal Issues

- Coastal city at mouth of two rivers
- Tourism destination and staging site for tourism in islands, on Cangrejal River
- Climate-related concerns include flooding and storm surge
- Coordinated with the USAID-funded MIRA (Integrated Management of Environmental Resources) Project implemented by IRG



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La Ceiba: Development Project Objectives



- Develop Coastal Tourism
- Develop river-based tourism (rafting, hiking)
- Watershed Protection, restoration
- Construction of beachfront boardwalk
- Reduce flooding



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Asset: Coastal tourist infrastructure

- Vulnerabilities:
 - Exposure (Clim): flooding from storm surge, urban rains, river flooding
 - Sensitivity (NC): Buildings right on beach, no set back, poor building design
 - Adapt. Cap (NC): Low – codes not enforced, drainage not understood



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La Ceiba: Uncertainties

Uncertainties:

- Change in Temp
 - +~1.5 °C
- Change in Rainfall
 - +~11% heavy events,
less total rain annually
- Change in Sea Level
 - +~20cm
- Change in Storm
frequency/intensity



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La Ceiba Adaptation Options

- **Risk management** – (1) Determine acceptable risks; (2) *Environmental education*
- **Coastal zone (developed areas)** – (1) Build groins to protect against erosion; (2) Sand pumping; (3) Build breakwaters
- **Coastal Zone (less developed areas)** – (1) Set-backs; (2) Zoning and building codes; (3) Construction of houses on stilts
- **Rio Cangrejal flooding** – (1) Improved design and higher levees in most vulnerable locations; (2) *Limit deforestation and promote reforestation*; (3) Construct a flood control dam; (4) Dredging of river; (5) *Flood warning system*
- **Urban drainage** – (1) Accommodate/adapt to flooding; (2) Install drainage systems



SERVIR: Tools to Assist Development

The screenshot displays the SERVIR website's main interface. At the top left is the SERVIR logo, which consists of a stylized globe icon followed by the word "SERVIR" in a bold, sans-serif font. To the right of the logo is a search bar with the placeholder text "buscar...". Further right is a language dropdown menu currently set to "Español". Below the header is a horizontal navigation menu with the following items: "INICIO", "NOTICIAS", "SERVIR BLOG", "PORTAL DE DATOS", "CALIDAD DEL AIRE", "VISUALIZACIONES 3D", "DOCUMENTOS", "GALERÍA DE IMÁGENES", and "ACERCA DE SERVIR". The main content area features a large weather radar map of South America, showing precipitation intensity with a color scale from blue (light) to red (heavy). Several yellow circular icons with lightning bolts are overlaid on the map, indicating specific weather events. Above the map is a toolbar with various icons for map navigation and data visualization. In the bottom left corner of the map area, the text "SERVIR.NET" and "22 OCT 08 - 16:45:00 UTC" is displayed. At the bottom left of the entire page is the USAID logo, and at the bottom center is the "POWERED BY Google" logo. At the bottom right, there is a small copyright notice: "Imagery ©2008 TerraMetrics - Terms of Use".



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SERVIR: Climate Mapper

Climate Mapper [-] [x]

File Help *Users of this tool have read and understand the [Disclaimer](#)

Select a Theme:
 Temperature [v]

Observed Modeled Projection [What do these mean?](#)

Observed
 Monthly Temperature Values from 1961 to 1990 [v]

Modeled Forecast

GCM Model		Time Period
For Map <input checked="" type="radio"/> Dry (GFDL_CM21) <input type="radio"/> Mid (ECHAM5) <input type="radio"/> Wet (NCAR_CCSM)	For Graph <input checked="" type="checkbox"/> Dry (GFDL_CM21) <input checked="" type="checkbox"/> Mid (ECHAM5) <input checked="" type="checkbox"/> Wet (NCAR_CCSM)	<input checked="" type="radio"/> 2031 - 2040 <input type="radio"/> 2051 - 2060

Choose an Action:

Close Map

Opacity: [slider]

--- OR ---

Graph by X,Y Location [->]

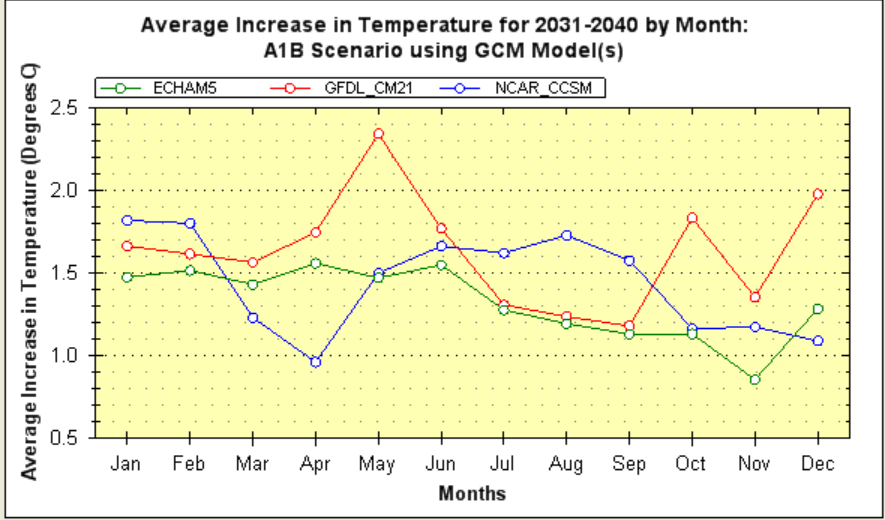
Cancel

Show Spatial Average Grid
 Show Country Boundaries

Export Graph Data

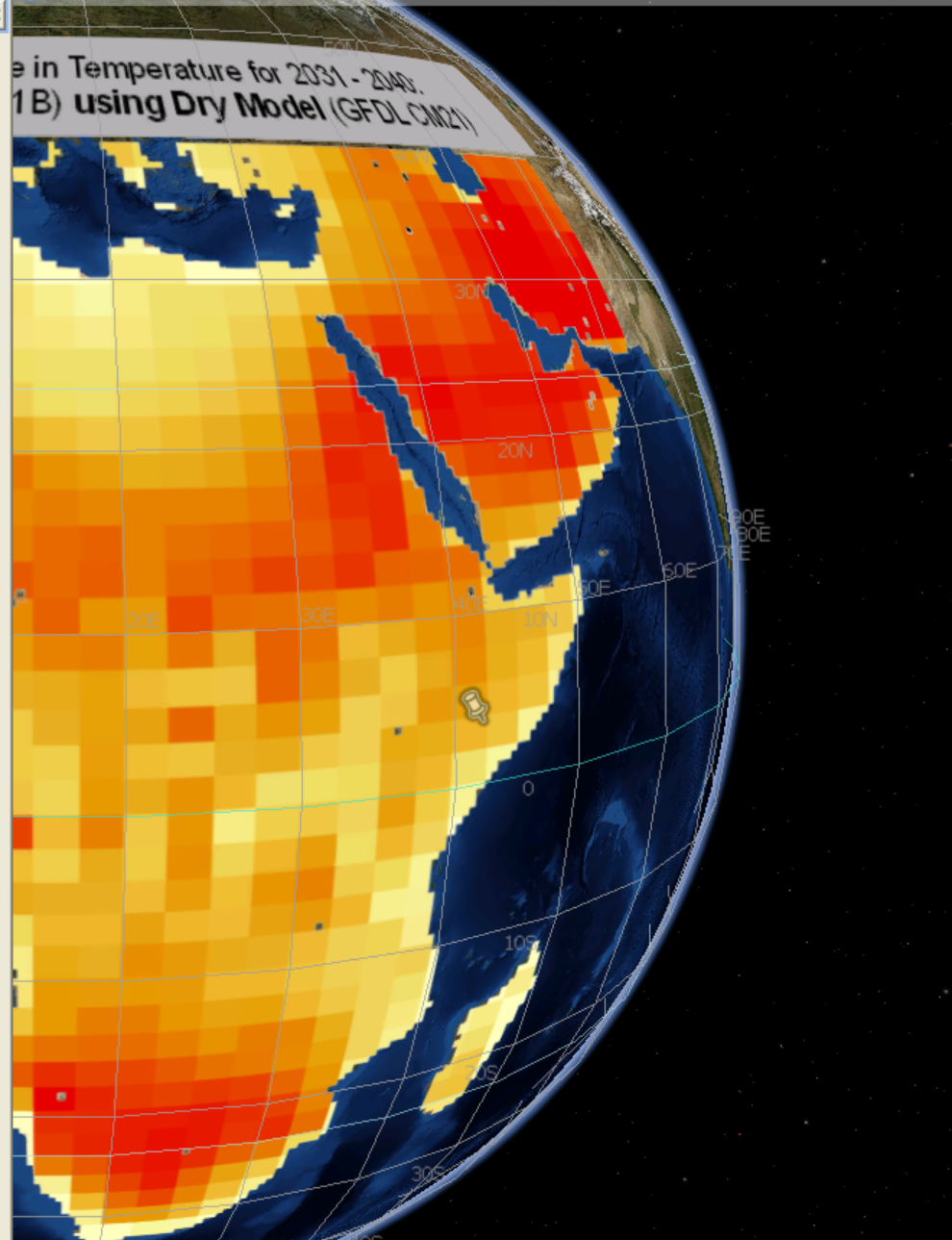
Average Annual Increase in Temperature (deg C)(Dry) = **+1.6**
 Average Annual Increase in Temperature (deg C)(Mid) = **+1.3**
 Average Annual Increase in Temperature (deg C)(Wet) = **+1.4**

Graph by Location: Lat: 3.519 Lon: 42.4093



Data Description:

Observed Data: The observed data are for temperature for the base period (1961-1990). The data are taken from the University of East Anglia's Climate Research Unit(CRU) database of monthly climate observations from meteorological stations and interpolated onto a 0.5 degree grid covering the global land surface.



Tools and Information: SERVIR

The screenshot displays the Climate Mapper web application. At the top, a navigation bar includes logos for GEOS, IRI, and Virtual Earth. The main interface features a map of the Caribbean Sea and surrounding islands, with a location marker for Panama. A data graph is overlaid on the map, showing the average increase in temperature for 2031-2040 by month for three different GCM models: ECHAM5 (Mid), GFDL CM21 (Dry), and NCAR CCSM (Wet). The graph shows a seasonal cycle with the highest increases occurring in the spring and summer months. The interface also includes a menu with options like 'Choose Theme', 'Set Parameters', and 'Graph', and an 'Actions' panel with buttons for 'Map!', 'Graph by X,Y Location', and 'Export Graph'.

Climate Mapper

File Help

Choose Theme Set Parameters Graph

Average Change in Temperature

Climate Mapper

File Help *Users of this tool have read and understand the [Disclaimer](#)

Choose Theme Set Parameters Graph Map

Location:

Average Annual Increase in Temperature (deg C)(Dry) = **+1.4**

Lat: 9.2987 Average Annual Increase in Temperature (deg C)(Mid) = **+1.2**

Lon: -79.6606 Average Annual Increase in Temperature (deg C)(Wet) = **+1.2**

Average Increase in Temperature for 2031-2040 by Month:
A1B Scenario using GCM Model(s)

Legend: ECHAM5 (Mid) GFDL CM21 (Dry) NCAR CCSM (Wet)

Month	ECHAM5 (Mid)	GFDL CM21 (Dry)	NCAR CCSM (Wet)
Jan	1.28	1.42	1.00
Feb	1.38	1.45	0.92
Mar	1.58	1.32	0.88
Apr	1.62	1.42	0.92
May	1.28	1.35	1.42
Jun	0.95	1.05	1.42
Jul	0.98	1.38	1.28
Aug	1.18	1.25	1.42
Sep	1.42	1.22	1.42
Oct	1.18	1.52	1.48
Nov	1.02	1.48	1.48
Dec	1.12	1.42	1.12

Actions:

Map!

Opacity: [Slider]

--- OR ---

Graph by X,Y Location [Input]

Cancel

Show Spatial Average Grid

Show Country Boundaries

Export Graph

Caribbean Sea

Panama

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Thank you



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