Capacity-Building in GI4DM: Lessons learned in the implementation of the Regional Visualization & Monitoring System, SERVIR

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SERVIR is a completely open-access system w/ products in range of formats

Possible Future SERVIR Network

Global Earth Observation System of Systems (GEOSS)
International Charter on Space and Major Disasters
Mesoamerican Environmental Information System (SIAM)

Current Links
Future Links

In the Regional Visualization & Monitoring System (SERVIR), Mesoamerica’s Earth Observation & Decision Support System:

Thematic Areas:
- Agriculture
- Biodiversity
- Climate
- Ecosystems
- Energy
- Disasters
- Health
- Water
- Weather

Users:
- Central American Government agencies
- NGOs, researchers
- Educators, etc.

Impacts:
- Emergency Response
- Policy Changes
- Corridor Preservation
- Species Preservation
- Sustained Development
- Improved livelihoods

Fires
Red Tides
Land Cover / Use Change

Data ingest from EOS and EDOS

Operational Node at CATHALAC Panama

Environmental Monitoring & Decision Support Products

Web Interface

Terra
Aqua

Agriculture
Biodiversity
Climate
Ecosystems
Energy
Disasters
Health
Water
Weather

Operational Mode at CATHALAC Panama
SERVIR Team

Building regional to national to local relationships through SERVIR geosciences platforms and people

SERVIR Team Members

SERVIR-Mesoamerica at CATHALAC in Panama
SERVIR Test-Bed and Coordination Office NASA/Marshall Space Flight Center in USA
SERVIR-Africa at RCMRD in Kenya

SERVIR Platform: User Perspective

Discover
- Managed knowledge base
- Catalog services
- Directory services
- Notification services
- Browse & search function

Acquire
- Ground receiving station
- Data acquisition services
- Data processing services
- Data archive
- Geodata services

Share
- Managed knowledge base
- Catalog services
- Directory services
- Notification services
- Browse & search function

Web portal
- Visualization tools
- Decision support tools
- Forecasts and models
- Support for interoperability
- Support for product use

Use / Create/Decide
- Visualization tools
- Decision support tools
- Forecasts and models
- Support for interoperability
- Support for product use

Current Priorities

SERVIR: Principal Areas of Work

1. Infrastructure for information sharing
2. Data development / Modeling / Research & Devt.
3. Decision support for GEO SBAs, including emergency response
4. Capacity-building

www.servir.net

- Downloadable data
- Online mapping & animation applications
- Decision support tools
- 3D visualization tools
Using SERVIR’s image archive to track development

**Then: Belize City in 1980**
- ~39,771 inhabitants
- 1,706 acres (6.9 km²)
- Density of 5,756 people / km²
- Nat'l density of 6 people / km²

**Now: Belize City in 2007**
- ~66,422 inhabitants
- 3,449 acres (14 km²)
- Density of 4,758 people / km²
- Nat'l density of 13 people / km²

- Belize City’s area has about doubled between 1980 and 2007
- The annual growth rate has been ~106 acres (43 ha.) per year
- The 1,700+ acres (705 ha) cleared has largely been mangrove & other wetlands

False color ASTER image courtesy of NASA / JAXA

Raw MODIS imagery of the Eastern Caribbean (July 2008)
Satellite-Based Precipitation Estimates: NOAA’s CMORPH product

Source: NASA TRMM

SERVIR incorporates both cutting-edge visualizations and numerical forecasting capabilities (e.g. MM5, WRF)

The SERVIR Viz software seen here can be downloaded for free.
18 CCSI trials:

- 3 models
- 2 scenarios
- 3 time periods

Potential Impacts of Climate Change on Biodiversity in Central America, Mexico, and the Dominican Republic, CATHALAC 2008.

Critical areas: high species richness and climate change severity in Central America, Mexico, and the Dominican Republic.

SERVIR Support for Disaster Response

- Generation of products for 30 events between June 2004 and September 2009

2009: Potential landslide near San Salvador, El Salvador

- Cicatriz de deslizamiento, Volcán San Salvador

2008: Flooding in Gonaïves, Haiti after Hurricane Ike
2007: Flooding in Dominican Republic after TS Noel

Areas of Inundaciones Substanciales de Tormenta Tropical Noel

2007: Fire in Mountain Pine Ridge Forest Reserve, Belize

24,000 acres of the Mountain Pine Ridge Forest Reserve burned (areas in black)

2005: Effects of Hurricane Stan in Guatemala

Current Conditions  Forecast  Near Realtime Flood Maps

Processed Flood Maps  3D Composites

SERVIR-Africa: overview

- Launched in November 2008
- Functioning South-South exchange between SERVIR nodes on two continents
- Inventory and cataloguing of African geospatial datasets – geospatial “one stop” discovery
- Providing initial flood forecasting, flood mapping, and Rift Valley Fever probability using NASA science results
- Training and capacity building
- Strengthening collaboration between NASA centers (NASA/MSFC and NASA/GSFC) and other USG agencies

Flooding in Kenya near Lake Victoria as detected by NASA’s EO-1 satellite

Central Americans and Africans working together to build SERVIR-Africa system
Flood Potential & Forecast Mapping

- Using a regional/global hydrologic model with near-real time precipitation from the multi-sensor NASA TRMM 3B42 precipitation product to derive flood potential
- Provides an estimate of expected depth of flood inundation at a 0.25 degree resolution (approx. 25 km)
- Precipitation forecast data can be used with the model to provide longer lead time forecasts

Rapid flood mapping using MODIS

- NASA’s MODIS Rapid Response System provides SERVIR with imagery and data within 5-6 hours from acquisition.
- These products are used to create rapid flood maps using a semi-automated approach developed by the Dartmouth Flood Observatory.
- SERVIR is working to reduce the lag time to less than 3 hours, and trying to fully automate the MODIS flood mapping process.

Training & Capacity Building

2nd GEOSS in the Americas Symposium
October 2008 - Panama City, Panama
Training & Capacity Building

- Targeted trainings in Central America (June – Sept. 2009), funded by USAID
- Remote sensing, spatial analysis & modeling
- Disaster mgt. agencies, met. services, envir. ministries, universities
- Collaboration between CATHALAC, NASA, NOAA

SERVIR national training workshop in Nicaragua, August 2009

Concluding thoughts

- Who are the **people** directly involved in preparing for and responding to disasters?
- Do **people** have access to the **data / tools** (e.g. **models**) they need **before** an event occurs?
- Do **people** have access to the data (e.g. **imagery**, **local data**) they need **during / after** an event?
- Do **people** have access to the tools they need to **analyze** the data?
- Are the relevant people **trained** in using the available tools and data? Do we have **critical mass**?
- Can we learn from each other (e.g. **South-South knowledge transfers**)?