Water Resources Highlights from the Capacity Building Program

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**Indigenous People Pilot:** Cindy Schmidt and Amber McCullum*

(*presenting today for CBP as a whole)

Water Resources Science Team Meeting
July 19, 2017
Applied Sciences Program: Lines of Business

**Societal & Economic Applications**
Generate, test, develop, enable adoption, and extol applications ideas for sustained uses of Earth observations in decisions and actions.

**Capacity Building**
Build skills, workforce, and capabilities in US and developing countries to apply Earth obs. to benefit society and build economies.

**Applications in Mission Planning**
Identify applications early and throughout mission lifecycle, integrate end-user needs in design and development, enable user feedback, and broaden advocacy.

Innovative and practical uses of Earth observations
### Capacity Building Program

**NASA Earth Science**

**Improve the capabilities of individuals and institutions related to accessing and applying Earth observations. This context includes human, scientific, technological, organizational, institutional, and resource-based capacities.**

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
<th>2016:</th>
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<tr>
<td><strong>ARSET</strong>, Applied Remote Sensing Training</td>
<td>builds skills in accessing and using Earth observations data across applications topics through computer-based training for government and private sector individuals.</td>
<td>3130 trainees, 9 webinars, 6 in-persons</td>
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<td><strong>DEVELOP</strong> is a national training and development program for individuals to gain experience applying Earth observations through 10-week interdisciplinary projects, including with state and local governments.</td>
<td>358 Participants, 77 Projects</td>
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<td><strong>SERVIR</strong> is a NASA NASA/USAID-sponsored initiative that enables uses satellite observations to help developing nations monitor, forecast, and respond to environmental changes.</td>
<td></td>
<td>2016: Opened new hub in West Africa</td>
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Goals of NASA Capacity Building Program

• Expand the network of individuals and organizations aware of and able to access NASA Earth observations.

• Increase the capabilities of individuals and organizations to use and apply NASA Earth observations in their management decisions and actions.

• Enable sustained use of existing NASA Earth observations for decisions and actions, and the ability to incorporate new observations as they become available.

• Build skills of Earth sciences community to define end user needs, collect and share robust feedback, build capacity and to assess impact of capacity building activities.

• Improve feedback of lessons learned through capacity building to Earth science research & analysis, applications, and data systems program management.
CBP 2017 Portfolio Overview (Through Sept)

**WATER RESOURCES**
- SERVIR Multi-Year Projects: 7
- DEVELOP Feasibility Studies: 14
- ARSET Online / In-Person Trainings: 4

**ECO FORECASTING**
- SERVIR Multi-Year Projects: 5
- DEVELOP Feasibility Studies: 8
- ARSET Online / In-Person Trainings: 4

**DISASTERS**
- SERVIR Multi-Year Projects: 3
- DEVELOP Feasibility Studies: 7
- ARSET Online / In-Person Trainings: 3

**HEALTH & AQ**
- SERVIR Multi-Year Projects: 2
- DEVELOP Feasibility Studies: 5
- ARSET Online / In-Person Trainings: 4

**CROSS-CUTTING**
- DEVELOP Feasibility Studies: 5

**CLIMATE**
- Multi-Year Projects: 4
- Feasibility Studies: 4

**AGRICULTURE**
- Multi-Year Projects: 5
- Feasibility Studies: 3

**OCEANS**
- DEVELOP Feasibility Studies: 4

**ENERGY**
- DEVELOP Feasibility Studies: 2

**WEATHER**
- SERVIR Multi-Year Project: 1
ARSET

NASA’s Applied Remote Sensing Training Program (ARSET)
Empowering the global community through remote sensing training

Since 2009, ARSET has had over 9,200 participants across 4 focus areas

**Example: Water Resources**
(2011-current)

**Individuals & Institutions Reached:**
- 2,414 Participants
- 1,062 Organizations

**Geographic Reach:**
- 122 Countries
- 51 U.S. States and Washington D.C.

**Data:**
- 10 satellites & sensors
- 45 tools & portals for accessing data

**Depth:**
In-person and online training ranging from 4-24 hours of coursework

**Desired Outcomes:**
Building attendee’s awareness of available EO resources for water and flood applications
Enable attendees to apply remote sensing data to their needs
**Training**
Since 2011, ARSET has held 17 water-related trainings
- 6 in-person
- 11 online

**Topics Include**
- Drought
- Soil Moisture
- Water Quality
- Coastal & Ocean Applications
- Water Management
- Precipitation

**Example: Water Resources**
(2011-current)

**Monitoring, Evaluation, and Learning**
- ARSET remains in contact with attendees and organizations to learn what their training needs are
- ARSET attendees complete a survey immediately after training, and 6 months after training

“Though I had a fair idea about the requirements of remote sensing data [that] would help me greatly with my work, the training helped me understand the basic principles of such remote sensing data and how to access them.”
– Indian Federal Government Employee, attendee of *Applications of Remote Sensing to Soil Moisture and Evapotranspiration*
What is DEVELOP?

“Shaping the future by integrating Earth observations into global decision making.”

**Individuals + Earth Observations + Institutions**

DEVELOP addresses environmental and public policy issues by conducting interdisciplinary feasibility projects that apply the lens of NASA Earth observations to community concerns around the globe. This bridges the gap between NASA Earth Science and society, building capacity in both individuals and institutions to apply Earth observations to address the environmental challenges that society faces.
DEVELOP

Highlighting one water resources related project in Arizona

Using NASA Earth Observations to Assist the National Park Service in Assessing Snow Cover Distribution and Persistence Changes in the Sky Islands

Individuals & Institutions:
2 End Users (Federal Agencies)
   NPS, Intermountain Region
   NPS, Saguaro National Park

5 DEVELOPers

Geography:
1 state (Arizona)

Thematic/ SBA’s:
Water Resources

Time: 10-week project

Data: 6 satellites & sensors

Depth: Feasibility project

Partnerships:
National Park Service

Desired Outcomes:
Building partners’ awareness and capacity to apply EO understand changes in snow cover in the Sky Island mountain ranges due to changes in climate and impacts on vegetation and wildlife
DEVELOP

Highlighting one water resources related project in Arizona

Products Co-developed:
• Historical Snow Cover Map
• Comparison of snow cover and water presence
• Snow Cover Assessment Script/Tool (Google Earth Engine)

Training:
Partner hand-off & WebEx training on Google Earth Engine tool

Relationship Brokering:
TBD

Monitoring, Evaluation, & Learning:
“The DEVELOP project provided data and knowledge to address a current issue - water conservation - where no tools were previously available.”
– NPS, Saguaro National Park

Partner Reported Outcomes:
• Expanded knowledge of how NASA Earth observations can be used in decision making
• Demonstrated applications of NASA remote sensing data

Products being used for:
• Monitoring
• Dissemination of results
• Evaluation of previous data
• Augment established projects
SERVIR is a joint development initiative of NASA and USAID, working in partnership with leading regional organizations around the globe, to help developing countries use information provided by Earth observing satellites and geospatial technologies to address Food Security, Water and Disasters, Weather and Climate, and Land Use/Land Cover Change.

- Preventing seafood poisoning by mapping harmful microalgae
- Helping herders and farmers by detecting ephemeral water bodies
- Conserving forests by mapping land cover and land use change
- Supporting food security by monitoring agricultural drought
- Protecting lives by monitoring and forecasting intense thunderstorms
Partnerships:
SERVIR has brokered several partnerships in East Africa. For example:
• Water Resources Management Agency (WRMA) now works closely with Kenya Meteorological Department.
• The World Bank (WB) has used SERVIR products in designing dike repair efforts worth over $10M in Western Kenya.

Desired Outcomes:
Building the capacity of partner countries water resources (WR) departments to use Earth observations for improved decisions during floods as well as droughts and low flow conditions.
**SERVIR**

*Highlighting water resources projects in East Africa*

**Products Co-developed:**
- Hydrologic modeling capability developed in WR departments
- Linking numerical weather models for flood forecasting
- Co-developing flood inundation & mapping tools (WB)
- Enabling regional institutions with reliable low flow estimation for irrigation water allocation decisions (WRMA)

**Training:**
- Hydrologic Modeling trainings on VIC, CREST
- Training on Google Earth Engine tools

**Monitoring, Evaluation, & Learning:**
- SERVIR follows through with the ministries on a regular basis for model calibrations and with newer datasets and tools
- External evaluation of CREST modeling efforts by MSI Inc. showed ministries effectively using the products and trainings in their intended and more exciting but unintended uses
- SERVIR is designing a hydrologic model inter-comparison effort, after feedback from the end users on demonstrating efficacy of models under different conditions such as flooding and droughts/low flow.
Summary

• CBP has a robust water resources portfolio that builds on the efforts from the Applied Sciences Program at large.

• The elements of CBP have significant synergies and present a strong partner for the ASP water resources program for potentially
  • Reaching broader audiences of ongoing activities
  • Expanding the uses of existing or developed tools, trainings, and methodologies
  • Collecting feedback from ongoing projects and missions in a cohesive manner.

• CBP reaches a different set of audiences than the Applications Areas. It offers additional avenues for expanded reaches of mutual initiatives.
Thanks!

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NASA Applied Sciences Program
Appliedsciences.nasa.gov

Earth Science Data Access
Earthdata.nasa.gov