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Science Applications

Our science applications use high-tech satellite data and predictive models to develop visualization tools for addressing environmental issues within hub regions. We consult and partner with prospective users to ensure that applications are tailored to their needs and priorities. This user-engaged, hands-on approach to developing science applications enables us to apply global technology at the grass roots level in the manner most beneficial to each region. This section of the website provides information about each SERVIR application, organized according to eight areas of societal benefit identified by the Group on Earth Observations (agriculture, biodiversity, climate, disasters, ecosystems, health, water, weather).

Region: Please Choose | Country: Please Choose | Themes: Please Choose

Keyword | Start Date | End Date | FILTER RESULTS

DISASTER SUPPORT ACTIVITIES

Agriculture

Water Resources Assessment and Forecasting Tool
4/01/2012
Information on soil moisture, evapotranspiration, and streamflow is key to assessing water resources. To provide this information in East
Read More

30-meter Resolution Land Cover Data Set for East Africa
3/30/2012
SERVIR is producing land cover maps (for 2000, 2005, and 2010) for six African countries (Malawi, Zambia, Rwanda, Tanzania, Botswana, and
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Historical Changes in Snow Cover in Hindu Kush Himalaya
3/30/2012
This SERVIR application provides interactive snow cover mapping in Himalaya along with major basin and sub-basins statistics important for
Read More

Himalaya MODIS Land Cover Maps
3/30/2012
MODIS-based land cover data sets (land cover maps, land cover change maps, and vegetation status maps) help the land and forest ministries
Read More

East Africa MODIS Land Cover Maps
3/30/2012
SERVIR is producing land cover maps, land cover change maps, and vegetation status maps to help land and forest ministries in East Africa
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Latin America and the Caribbean: Atlas of Our Changing Environment
3/28/2012
This atlas represents the first regional effort to analyze the changes taking place in the Mesoamerican environment, combining precise and
Read More

Biodiversity

Resource Inventory and Assessment of Phobikha Wetland Ecosystem
4/01/2012
The application provides important information and a basis for management zoning of the valley for conservation efforts. It has been
Read More

Land Cover Dynamics in Bhutan
3/30/2012
This tool facilitates land cover assessment and monitoring of land cover dynamics, which are essential for environmental protection,
Read More

Climate

Scenario-based Climate Change Impact on Water Availability and Hydrologic Flows in the Wangchu Basin of Bhutan
4/01/2012
Water security is a major concern related to climate change. This SERVIR application uses a distributed hydrological model called CREST
Read More

30-meter Resolution Land Cover Data Set for East Africa
3/30/2012
SERVIR is producing land cover maps (for 2000, 2005, and 2010) for six African countries (Malawi, Zambia, Rwanda, Tanzania, Botswana, and
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Disasters

SERVIR publishes CEMEC's Weekly Fire Monitoring Reports
4/19/2012
The department of Petén is the most forested area in Guatemala, in fact northern Petén adjoins patches of forest in neighboring Mexico and
Read More

SERVIR training in East Africa to help in assessing water resources
4/16/2012
Twenty-one people from 13 countries, including many East African countries as well as Bhutan and Nepal, participated in a hydrological
Read More

Ecosystems

Resource Inventory and Assessment of Phobikha Wetland Ecosystem
4/01/2012
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Health

Mapping Haze as indicator of Air Quality in Bhutan

SERVIR to conduct remote sensing training at Mexico's University of

Interactive Mapper

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- Agriculture
- Biodiversity
- Disasters
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Base Layers

- Admin Boundaries, Countries (Natural Earth)
- Admin Boundaries, Subnational (GAUL)
- Elevation, 250-meter (SRTM)
- *Elevation, 90-meter (SRTM)*

Controls | Description | Legend

SERVIR Reference Node implementation of NASA SRTM 90m Digital Elevation Database

- Hydrology, Rivers (CIA WDB)
- Hydrology, Hydrobasins (CIA WDB)
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- Population, Settlement Points (CIESIN)
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- Population Density: 1995 (CIESIN)
- Population Density: 2000 (CIESIN)
- Population Future Estimates: 2005 (CIESIN)
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- Population Future Estimates: 2015 (CIESIN)
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- Roads, Minor: Africa (OSM)
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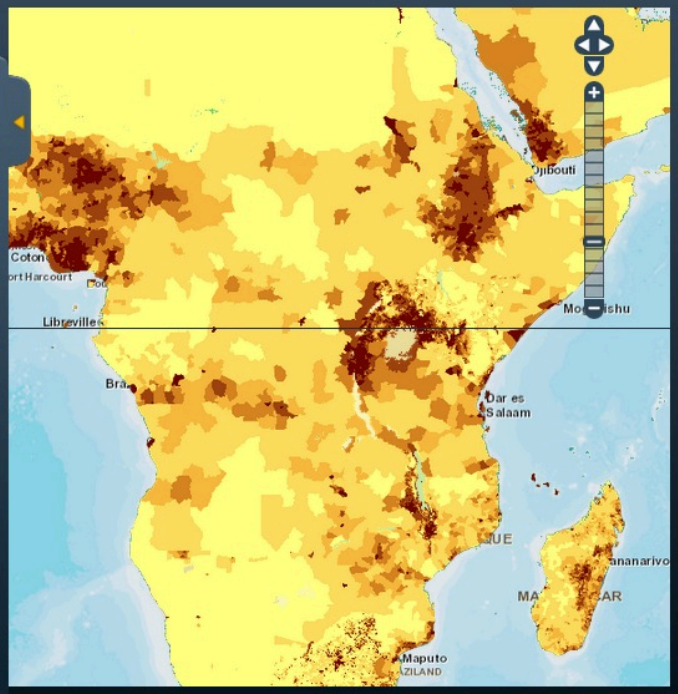

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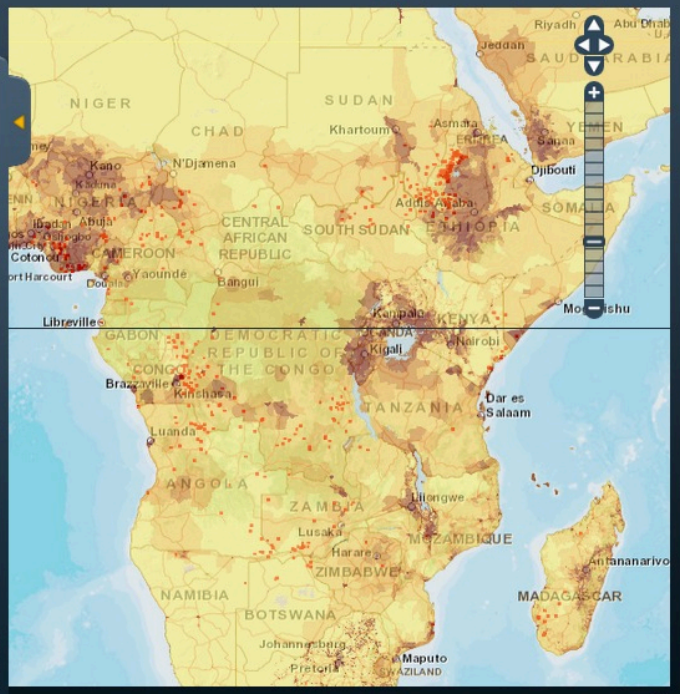
Map | Terrain | Satellite | Hybrid



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- **Biodiversity**
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- **Disasters**
  - GDACS
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  - *Land Cover: 2001 (MODIS)*

Controls | Description | Legend

- Water
- Evergreen Needleleaf forest
- Evergreen Broadleaf forest
- Deciduous Needleleaf forest
- Deciduous Broadleaf forest
- Mixed forest
- Closed shrublands
- Open shrublands
- Woody savannas
- Savannas
- Grasslands
- Permanent wetlands
- Croplands
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- Snow and ice
- Barren or sparsely vegetated

- Land Cover: 2002 (MODIS)
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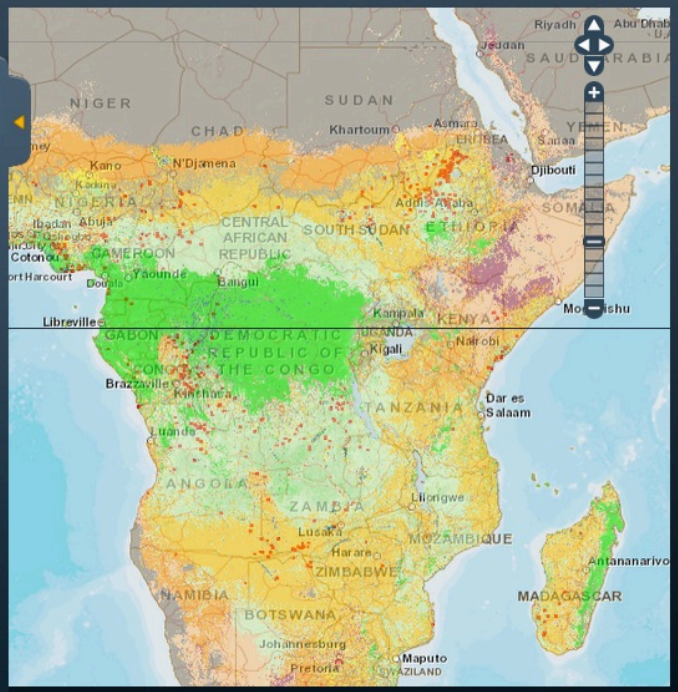

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  - Malaria Early Warning System
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  - CREST Model, NRT Streamflow
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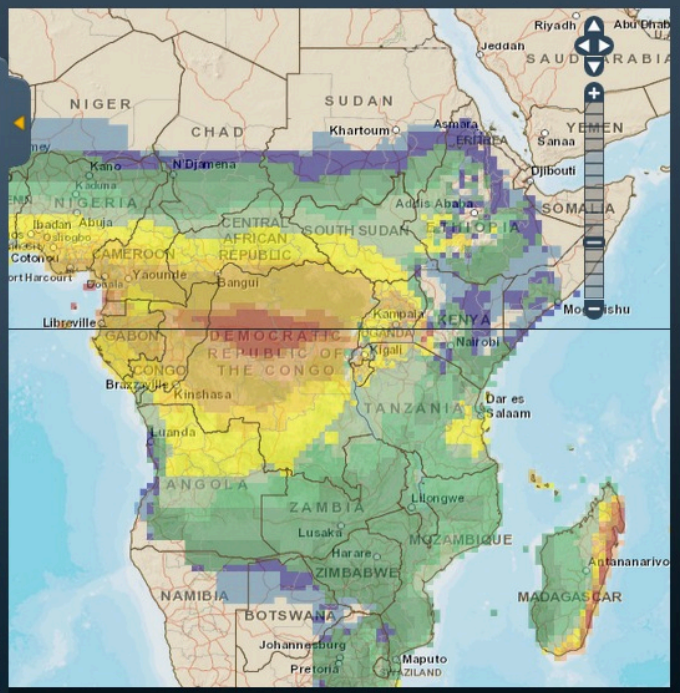

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Controls | Description | Legend

Transparency

Water

- Chlorophyll Concentration: 1 Month (MODIS)

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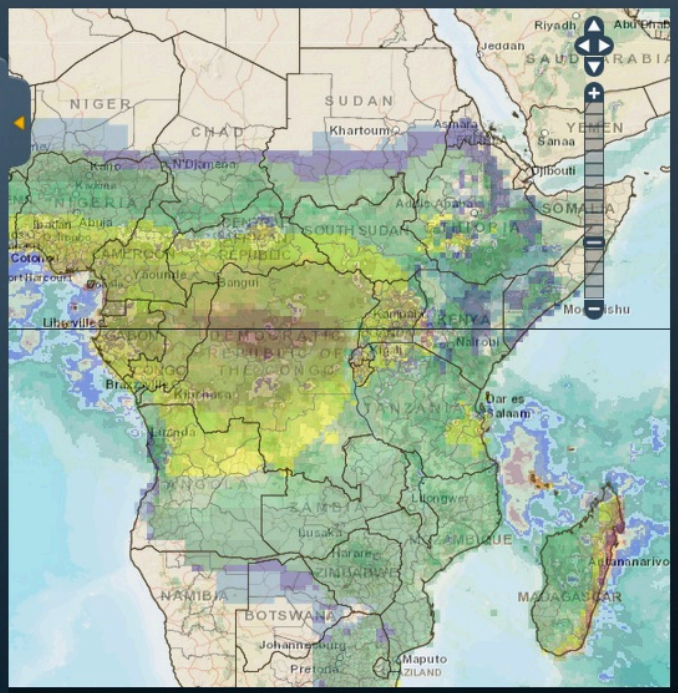
  - Chlorophyll Concentration: 1 Month (MODIS)

Map | Terrain | Satellite | Hybrid



DISASTER SUPPORT ACTIVITIES

SERVIR GLOBAL

Cerese Albers

- SERVIR Science Applications Deputy Lead

TRMM RAINFALL AND CREST IN THE INTERACTIVE MAPPER

USAID FROM THE AMERICAN PEOPLE

NASA

Interactive Mapper

www.servirglobal.net/EastAfrica/MapsData/InteractiveMapper.aspx

The SERVIR Interactive Mapper allows you not only to access and display SERVIR data and functionality, but also to retrieve the same kinds of information from multiple external sources so you can create new services. Using the online Mapper interface, you can choose specific data sets and information products, display them on a base map, and further manipulate them for analysis.

Browse Layers by Region

Map | Terrain | Satellite | Hybrid

Layer

- Isobioclimates (USGS)
- Land Surface Forms (USGS)
- Surficial Lithology (USGS)
- Terrestrial Ecosystems (USGS)
- Topo Moisture Potential (USGS)

Health

- Malaria Climatological Suitability
- Malaria Early Warning System

Water

- Chlorophyll Concentration: 1 Month (MODIS)
- Sea Surface Temp Anomaly: 1 Month (MODIS)
- CREST Model, NRT Soil Moisture
- CREST Model, NRT Streamflow
- CREST Model, QPF Rain
- CREST Model, QPF Soil Moisture
- CREST Model, QPF Streamflow
- CREST Model, Quantile Soil Moisture
- CREST Model, Quantile Streamflow

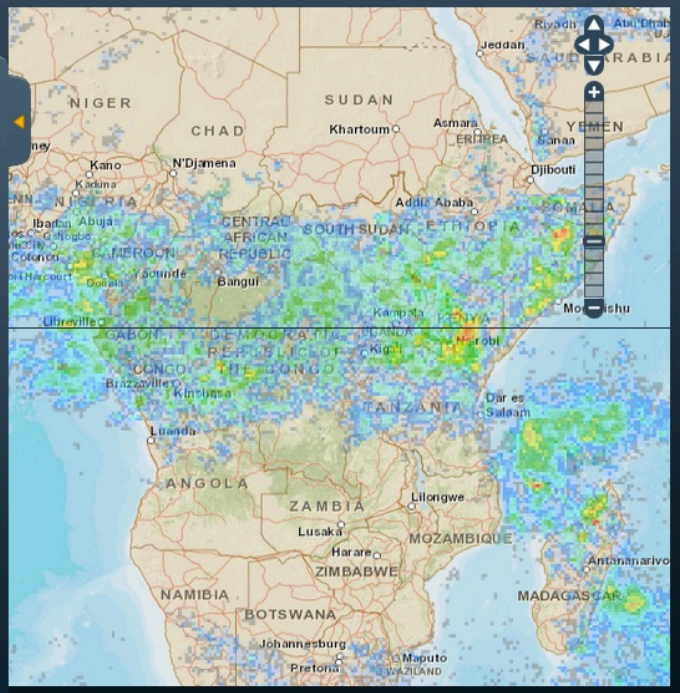
Weather

- *Rainfall: NRT 3-Hour (TRMM)*
- Rainfall: Latest 1-Day (TRMM)
- *Rainfall: Latest 7-Day (TRMM)*

Controls | Description | Legend

Transparency

- Rainfall: Latest 30-Day (TRMM)



DISASTER SUPPORT ACTIVITIES

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Mesoamerica
East Africa
Himalaya

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Browse Layers by Region

Layer

- Net Primary Productivity: 1 Month (MODIS)
- Vegetation Index: 1 Month (MODIS)
- Isobioclimates (USGS)
- Land Surface Forms (USGS)
- Surficial Lithology (USGS)
- Terrestrial Ecosystems (USGS)
- Topo Moisture Potential (USGS)

Health

- Malaria Climatological Suitability
- Malaria Early Warning System

Water

- Chlorophyll Concentration: 1 Month (MODIS)
- Sea Surface Temp Anomaly: 1 Month (MODIS)
- *CREST Model, NRT Soil Moisture*

Controls | Description | Legend

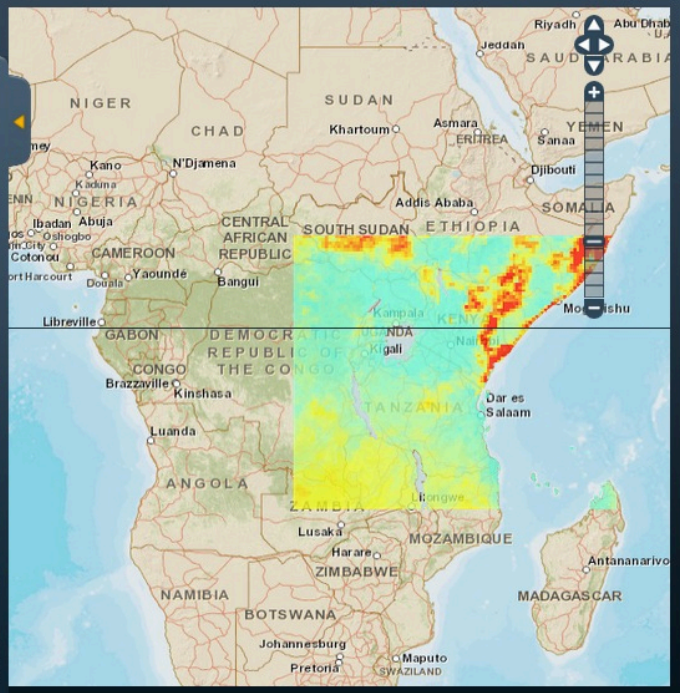
Transparency

Animation Layer Controls

Build Animation

- CREST Model, NRT Streamflow
- CREST Model, QPF Rain
- CREST Model, QPF Soil Moisture

Map | Terrain | Satellite | Hybrid



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Browse Layers by Region

Layer

- Isobioclimates (USGS)
- Land Surface Forms (USGS)
- Surficial Lithology (USGS)
- Terrestrial Ecosystems (USGS)
- Topo Moisture Potential (USGS)

Health

- Malaria Climatological Suitability
- Malaria Early Warning System

Water

- Chlorophyll Concentration: 1 Month (MODIS)
- Sea Surface Temp Anomaly: 1 Month (MODIS)
- *CREST Model, NRT Soil Moisture*

Controls | Description | Legend

Dry — Wet

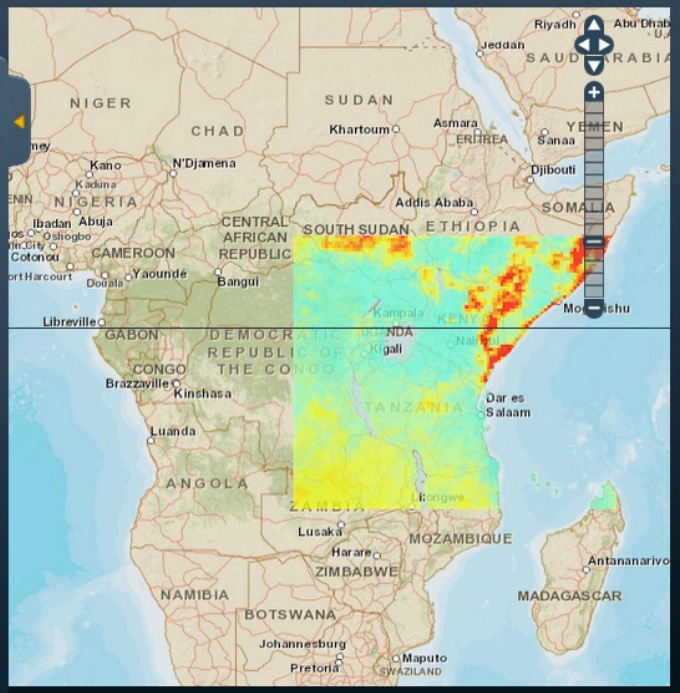
Units fractions (%)

- CREST Model, NRT Streamflow
- CREST Model, QPF Rain
- CREST Model, QPF Soil Moisture
- CREST Model, QPF Streamflow
- CREST Model, Quantile Soil Moisture
- CREST Model, Quantile Streamflow

Weather

- Rainfall: NRT 3-Hour (TRMM)
- Rainfall: Latest 1-Day (TRMM)
- Rainfall: Latest 7-Day (TRMM)
- Rainfall: Latest 30-Day (TRMM)

Map | Terrain | Satellite | Hybrid



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Browse Layers by Region

Map | Terrain | Satellite | Hybrid

Layer

- Surficial Lithology (USGS)
- Terrestrial Ecosystems (USGS)
- Topo Moisture Potential (USGS)

Health

- Malaria Climatological Suitability
- Malaria Early Warning System

Water

- Chlorophyll Concentration: 1 Month (MODIS)
- Sea Surface Temp Anomaly: 1 Month (MODIS)
- *CREST Model, NRT Soil Moisture*

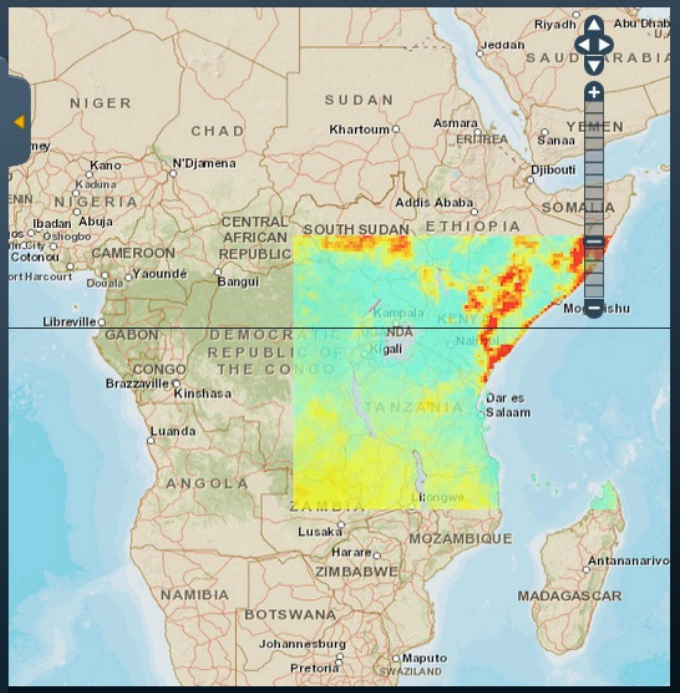
Controls | Description | Legend

Provider: SERVIR-East Africa

Provider url:
http://41.206.34.124/crestviewer/

More about CREST

The near real-time (NRT) soil moisture maps are generated using the near real-time rainfall data from the Tropical Rainfall Measuring Mission (TRMM) and Coupled Routing and Excess Storage (CREST) model.



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Browse Layers by Region

Layer

- Malaria Early Warning System
- **Water**
  - Chlorophyll Concentration: 1 Month (MODIS)
  - Sea Surface Temp Anomaly: 1 Month (MODIS)
  - CREST Model, NRT Soil Moisture
  - CREST Model, NRT Streamflow
  - *CREST Model, QPF Rain*

Controls | Description | Legend

Provider: SERVIR-East Africa

Provider url: http://41.206.34.124/crestviewer/

More about CREST

This product was generated using satellite rainfall from Tropical Rainfall Measuring Mission (TRMM) and quantitative precipitation forecasts from Kenya Meteorological Department.

Read more »

- CREST Model, QPF Soil Moisture

Map | Terrain | Satellite | Hybrid

DISASTER SUPPORT ACTIVITIES

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Browse Layers by Region

Layer

- Land Cover: 2008 (MODIS)
- Land Cover: 2009 (MODIS)
- Leaf Area Index: 1 Month (MODIS)
- Net Primary Productivity: 1 Month (MODIS)
- Vegetation Index: 1 Month (MODIS)
- Isobioclimates (USGS)
- Land Surface Forms (USGS)
- Surficial Lithology (USGS)
- Terrestrial Ecosystems (USGS)
- Topo Moisture Potential (USGS)

Health

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- Malaria Early Warning System

Water

- Chlorophyll Concentration: 1 Month (MODIS)
- Sea Surface Temp Anomaly: 1 Month (MODIS)
- CREST Model, NRT Soil Moisture
- CREST Model, NRT Streamflow
- CREST Model, QPF Rain
- *CREST Model, QPF Soil Moisture*

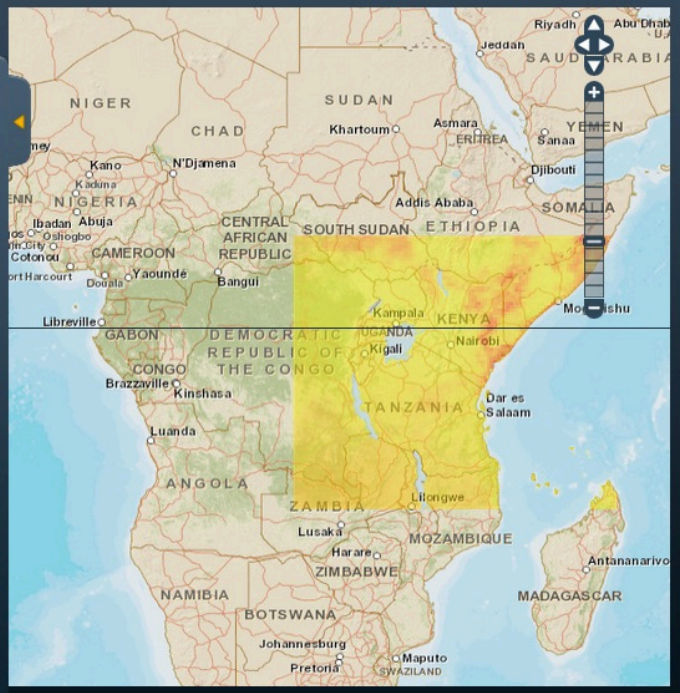
Controls | Description | Legend

Dry — Wet

Units fractions (%)

- CREST Model, QPF Streamflow
- CREST Model, Quantile Soil Moisture

Map | Terrain | Satellite | Hybrid



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Browse Layers by Region

Layer

- Malaria Early Warning System
- **Water**
  - Chlorophyll Concentration: 1 Month (MODIS)
  - Sea Surface Temp Anomaly: 1 Month (MODIS)
  - CREST Model, NRT Soil Moisture
  - CREST Model, NRT Streamflow
  - *CREST Model, QPF Rain*

Controls | Description | Legend

Provider: SERVIR-East Africa

Provider url: http://41.206.34.124/crestviewer/

More about CREST

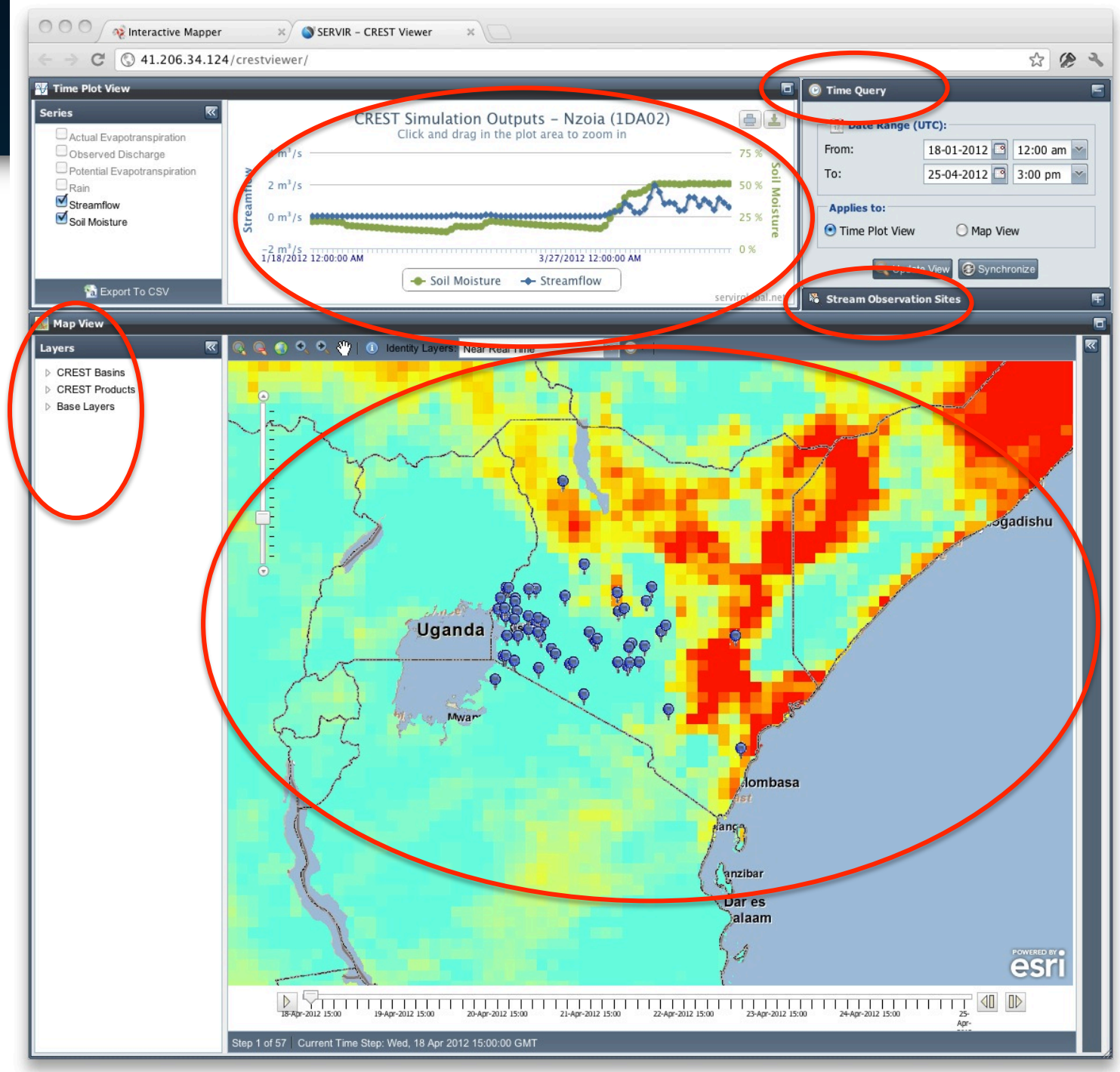
This product was generated using satellite rainfall from Tropical Rainfall Measuring Mission (TRMM) and quantitative precipitation forecasts from Kenya Meteorological Department.

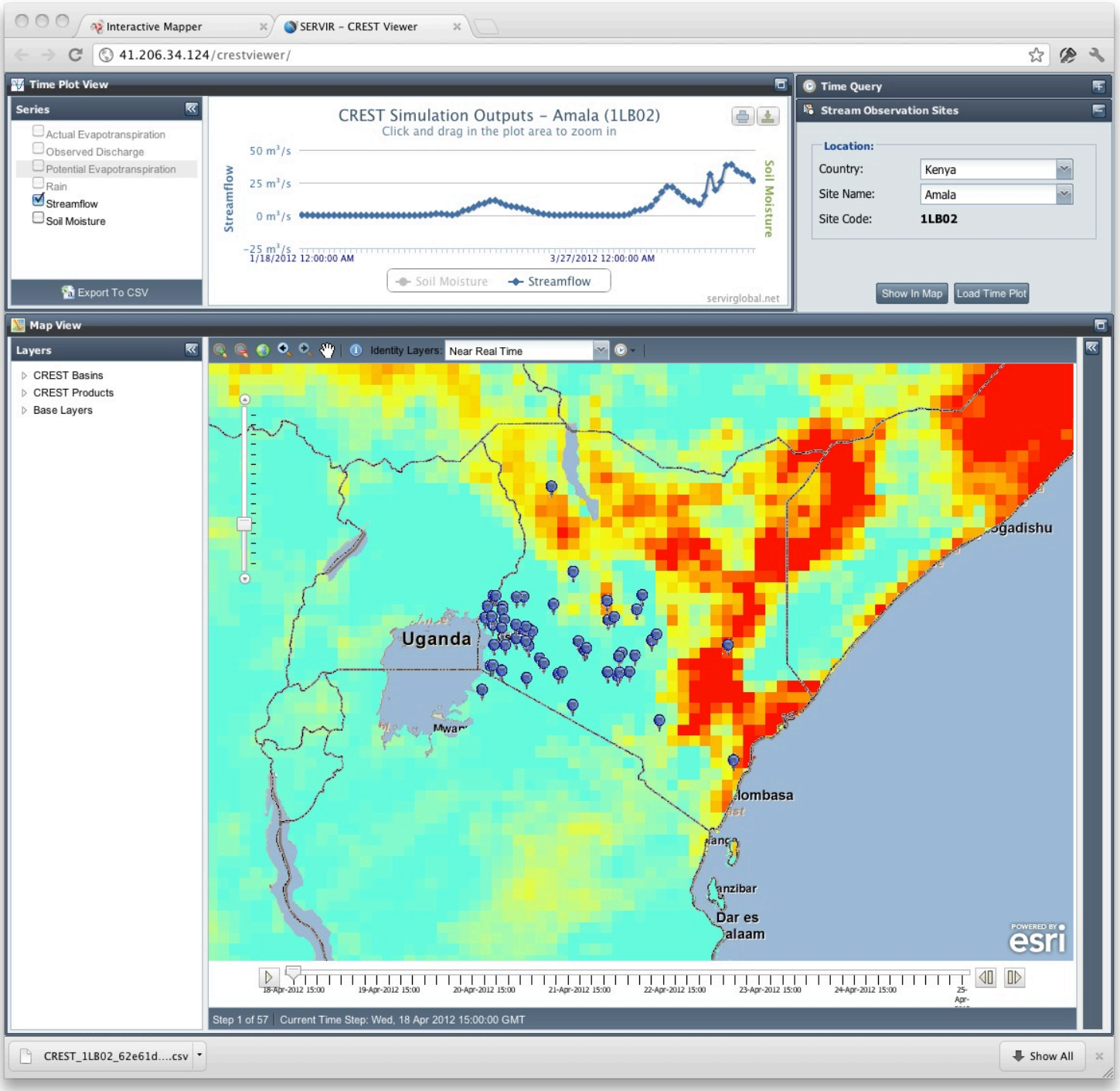
Read more »

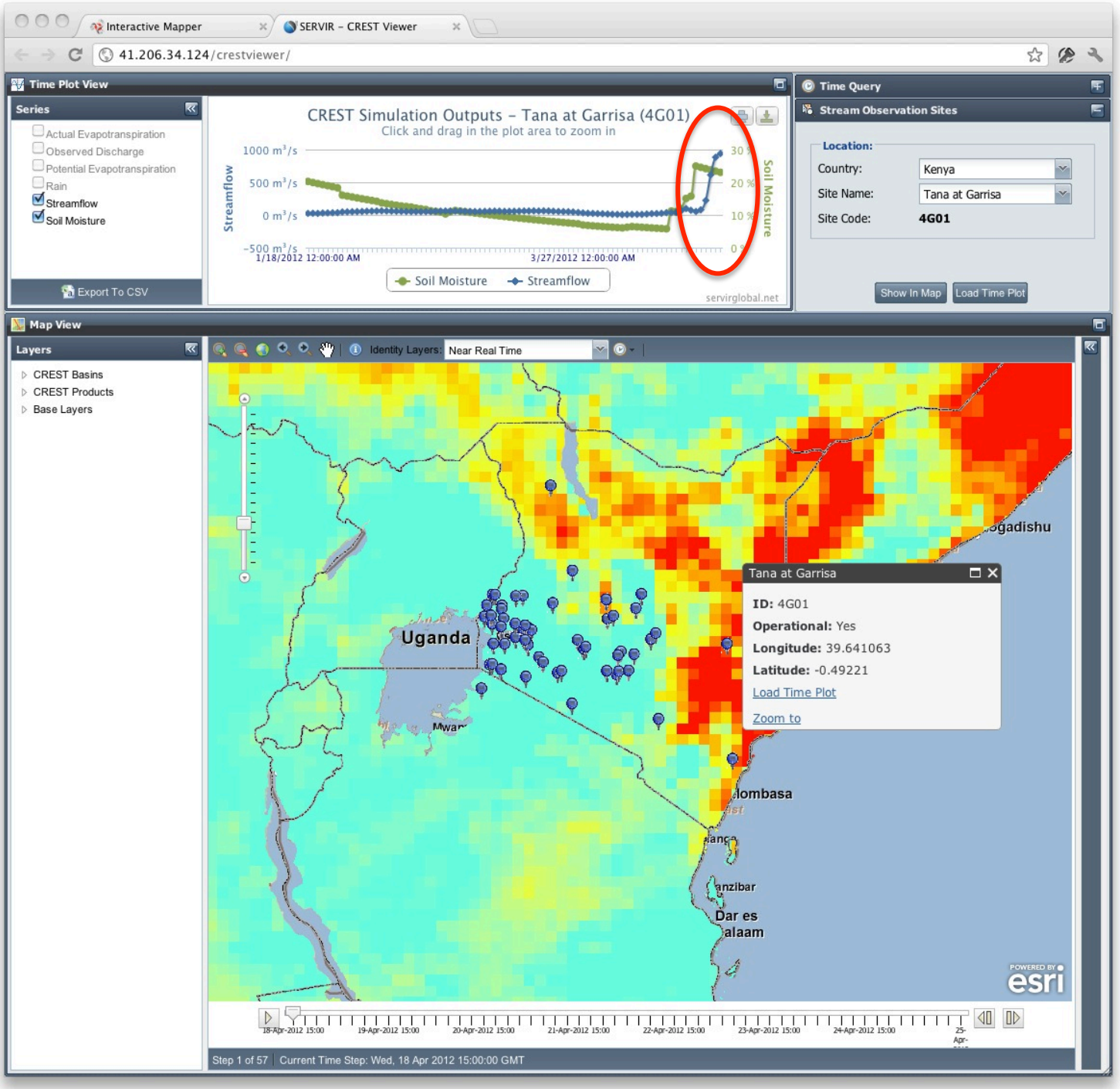
- CREST Model, QPF Soil Moisture

Map | Terrain | Satellite | Hybrid

DISASTER SUPPORT ACTIVITIES


Interactive Mapper
SERVIR – CREST Viewer
41.206.34.124/crestviewer/
Time Plot View
Series
Actual Evapotranspiration
Observed Discharge
Potential Evapotranspiration
Rain
Streamflow
Soil Moisture
Export To CSV
CREST Simulation Outputs – Nzoia (1DA02)
Click and drag in the plot area to zoom in
Streamflow
Soil Moisture
2 m³/s
0 m³/s
-2 m³/s
75 %
50 %
25 %
0 %
1/18/2012 12:00:00 AM
3/27/2012 12:00:00 AM
Soil Moisture
Streamflow
Time Query
Date Range (UTC):
From:
18-01-2012
12:00 am
To:
25-04-2012
3:00 pm
Applies to:
Time Plot View
Map View
Synchronize
Stream Observation Sites
Map View
Layers
CREST Basins
CREST Products
Base Layers
Identity Layers:
Uganda
Mwanza
Mombasa
Zanzibar
Dar es Salaam
Mogadishu
POWERED BY esri
18-Apr-2012 15:00
19-Apr-2012 15:00
20-Apr-2012 15:00
21-Apr-2012 15:00
22-Apr-2012 15:00
23-Apr-2012 15:00
24-Apr-2012 15:00
Step 1 of 57
Current Time Step: Wed, 18 Apr 2012 15:00:00 GMT


Interactive Mapper
SERVIR - CREST Viewer
41.206.34.124/crestviewer/
Time Plot View
Series
Actual Evapotranspiration
Observed Discharge
Potential Evapotranspiration
Rain
Streamflow
Soil Moisture
Export To CSV
CREST Simulation Outputs - Amala (1LB02)
Click and drag in the plot area to zoom in
50 m³/s
25 m³/s
0 m³/s
-25 m³/s
Streamflow
Soil Moisture
1/18/2012 12:00:00 AM
3/27/2012 12:00:00 AM
Soil Moisture
Streamflow
servirglobal.net
Time Query
Stream Observation Sites
Location:
Country: Kenya
Site Name: Amala
Site Code: 1LB02
Show In Map
Load Time Plot
Map View
Layers
CREST Basins
CREST Products
Base Layers
Identity Layers: Near Real Time
Uganda
Mwanza
Mogadishu
Mombasa
Zanzibar
Dar es Salaam
POWERED BY esri
18-Apr-2012 15:00
19-Apr-2012 15:00
20-Apr-2012 15:00
21-Apr-2012 15:00
22-Apr-2012 15:00
23-Apr-2012 15:00
24-Apr-2012 15:00
Step 1 of 57
Current Time Step: Wed, 18 Apr 2012 15:00:00 GMT
CREST_1LB02_62e61d....csv
Show All


Interactive Mapper
SERVIR - CREST Viewer
41.206.34.124/crestviewer/
Time Plot View
Series
Actual Evapotranspiration
Observed Discharge
Potential Evapotranspiration
Rain
Streamflow
Soil Moisture
Export To CSV
CREST Simulation Outputs - Tana at Garrisa (4G01)
Click and drag in the plot area to zoom in
1000 m³/s
500 m³/s
0 m³/s
-500 m³/s
Streamflow
30 %
20 %
10 %
0 %
Soil Moisture
1/18/2012 12:00:00 AM
3/27/2012 12:00:00 AM
Soil Moisture
Streamflow
servirglobal.net
Time Query
Stream Observation Sites
Location:
Country:
Kenya
Site Name:
Tana at Garrisa
Site Code:
4G01
Show In Map
Load Time Plot
Map View
Layers
CREST Basins
CREST Products
Base Layers
Identity Layers:
Near Real Time
Uganda
Tana at Garrisa
ID: 4G01
Operational: Yes
Longitude: 39.641063
Latitude: -0.49221
Load Time Plot
Zoom to
Mombasa
Dar es Salaam
Zanzibar
POWERED BY esri
18-Apr-2012 15:00
19-Apr-2012 15:00
20-Apr-2012 15:00
21-Apr-2012 15:00
22-Apr-2012 15:00
23-Apr-2012 15:00
24-Apr-2012 15:00
Step 1 of 57
Current Time Step: Wed, 18 Apr 2012 15:00:00 GMT

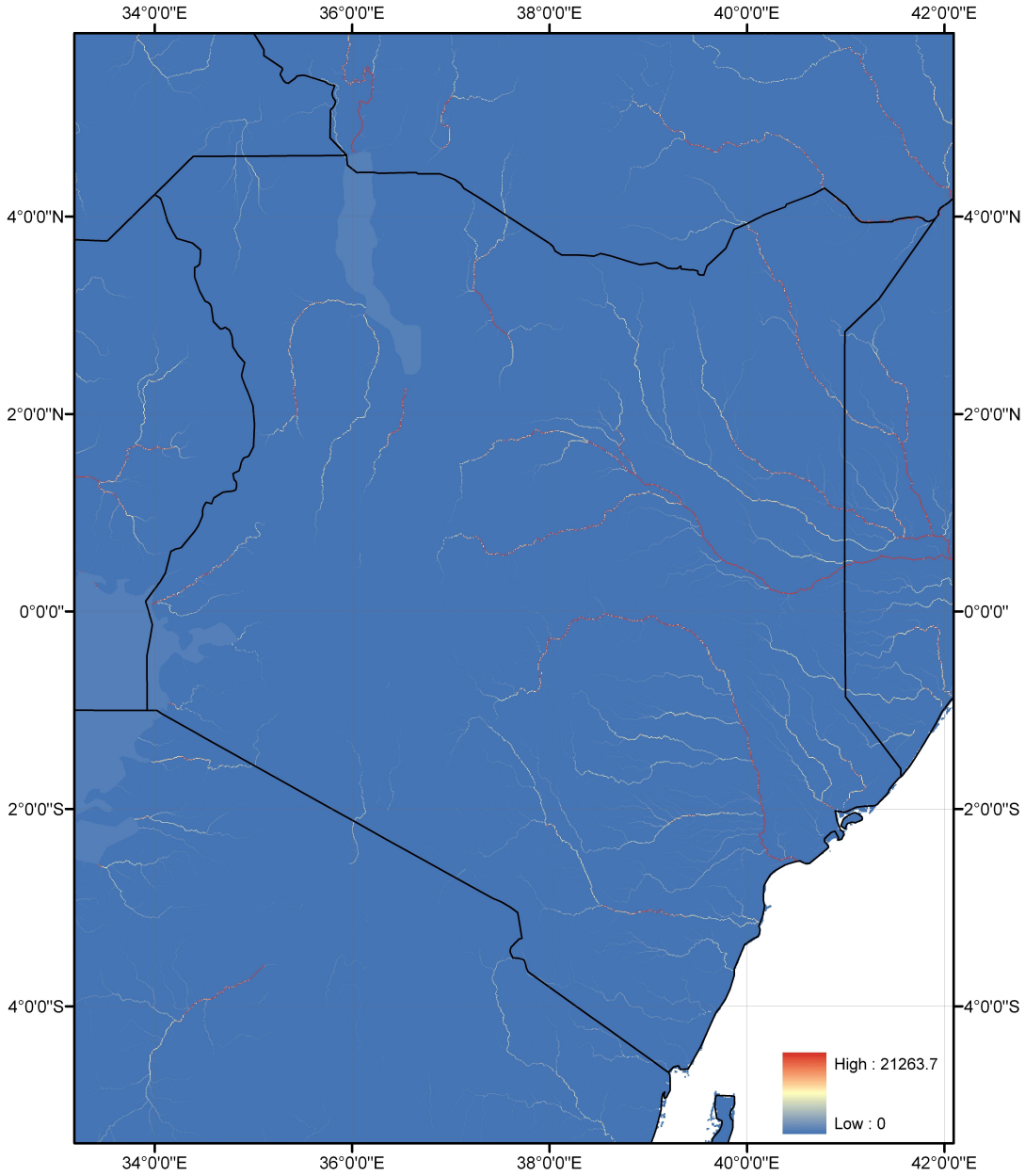
Demonstration:
Kenya Floods – Nov and Dec 2011

SERVIR Coordination Office
Cerese Albers & Sarah Hemmings

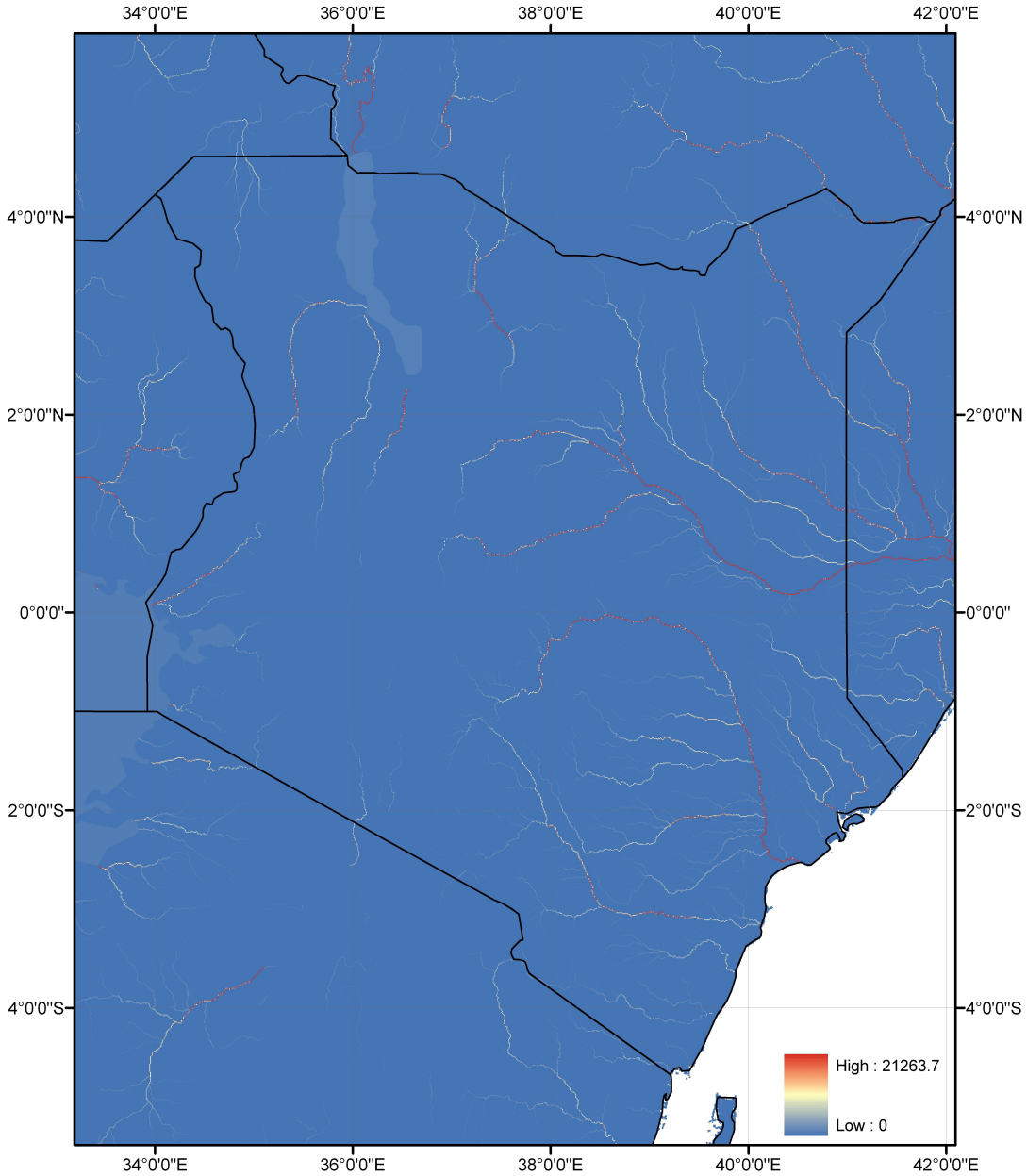
Floods in Kenya

- Following significant rains on Nov 26 through Dec 2, 2011 in several parts of Kenya, widespread flooding occurred along many streams.
- SERVIR Africa hydrologic modeling, supported by NASA satellite rainfall datasets, clearly showed the rapid rise in streamflow.
- Following slides present a spatial extent of the streamflow for entire Kenya.

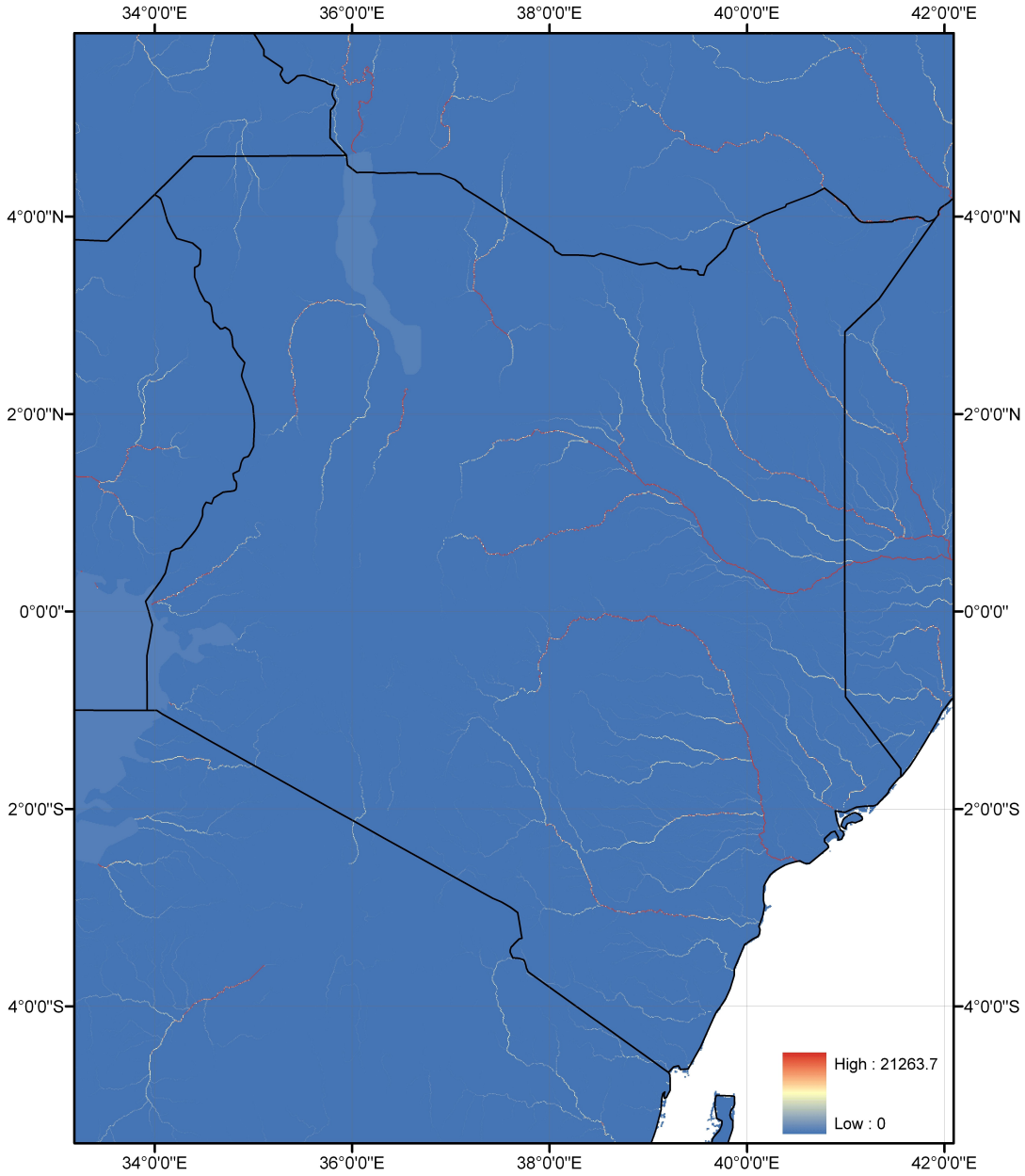
Streamflow (m3/s) Nov 21, 2011



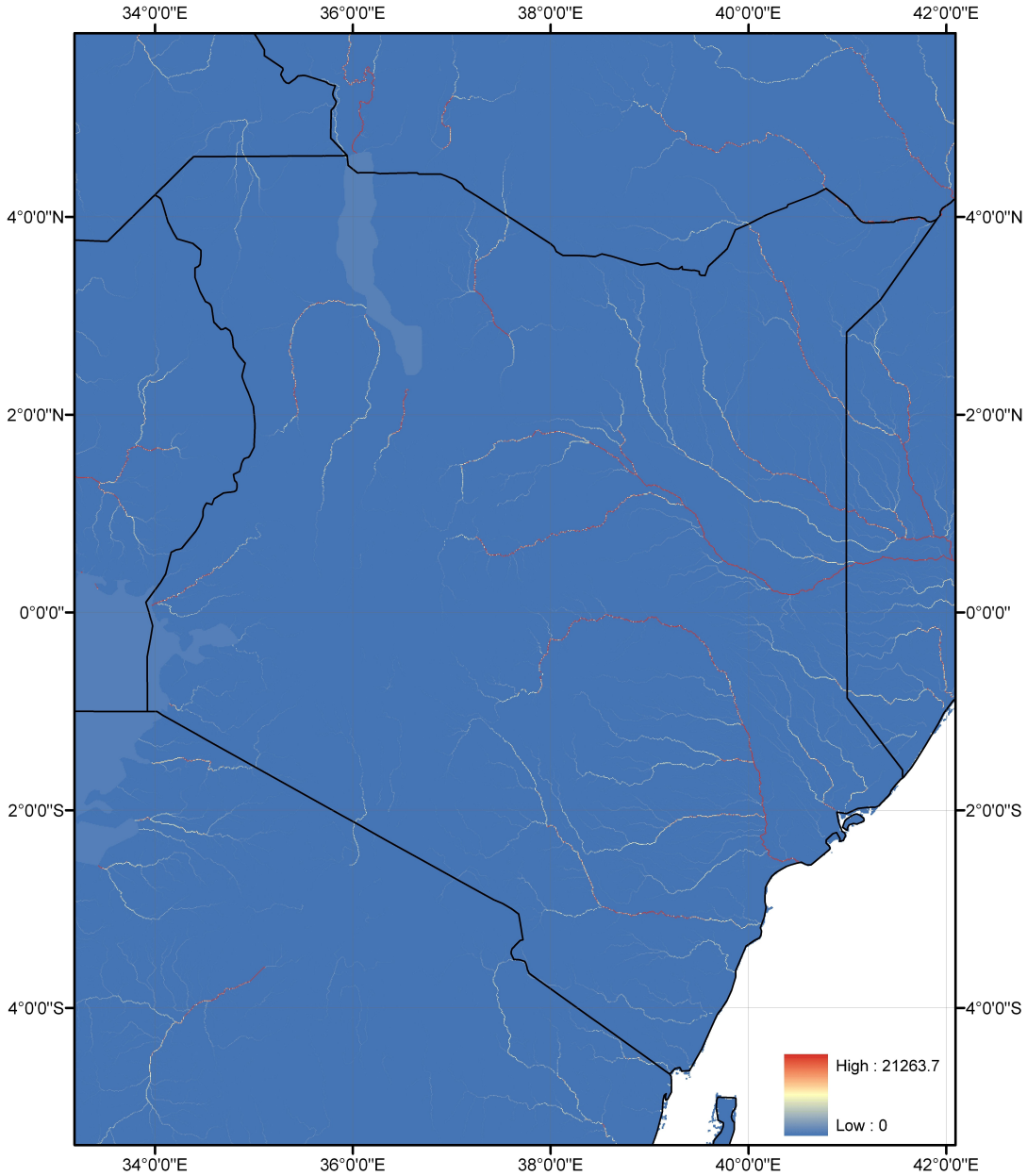
Streamflow (m3/s) Nov 22, 2011



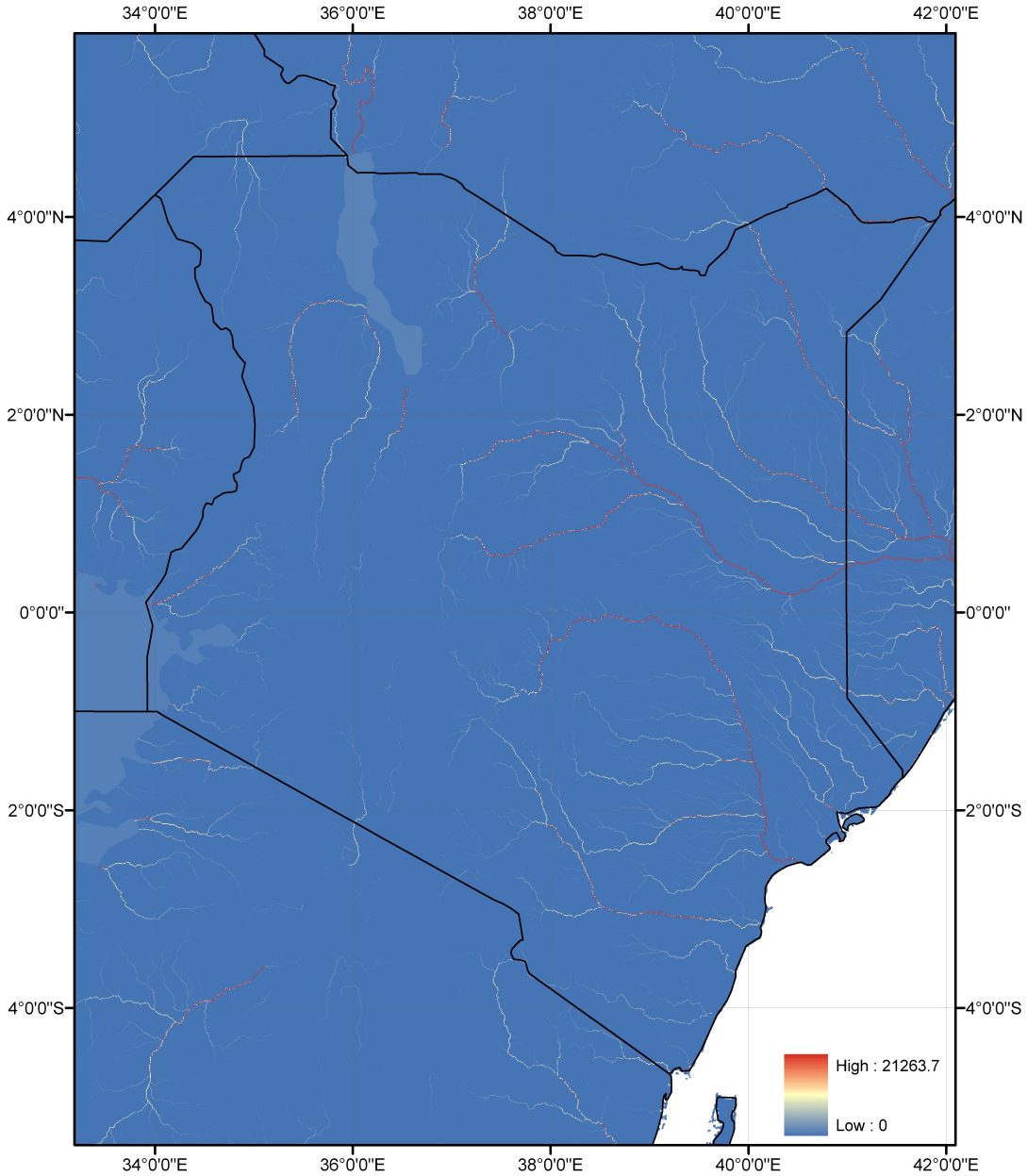
Streamflow (m3/s) Nov 23, 2011



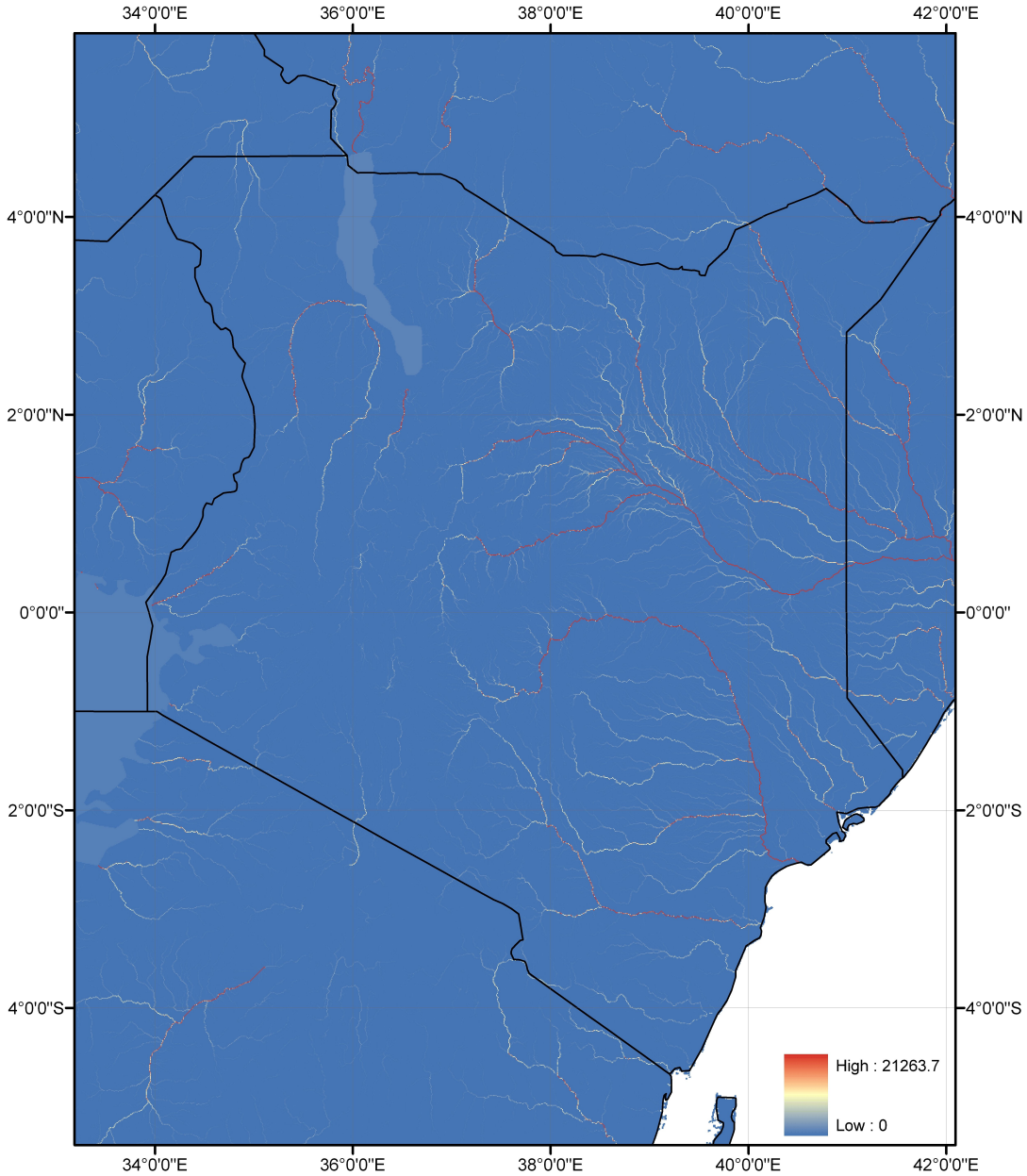
Streamflow (m3/s) Nov 24, 2011



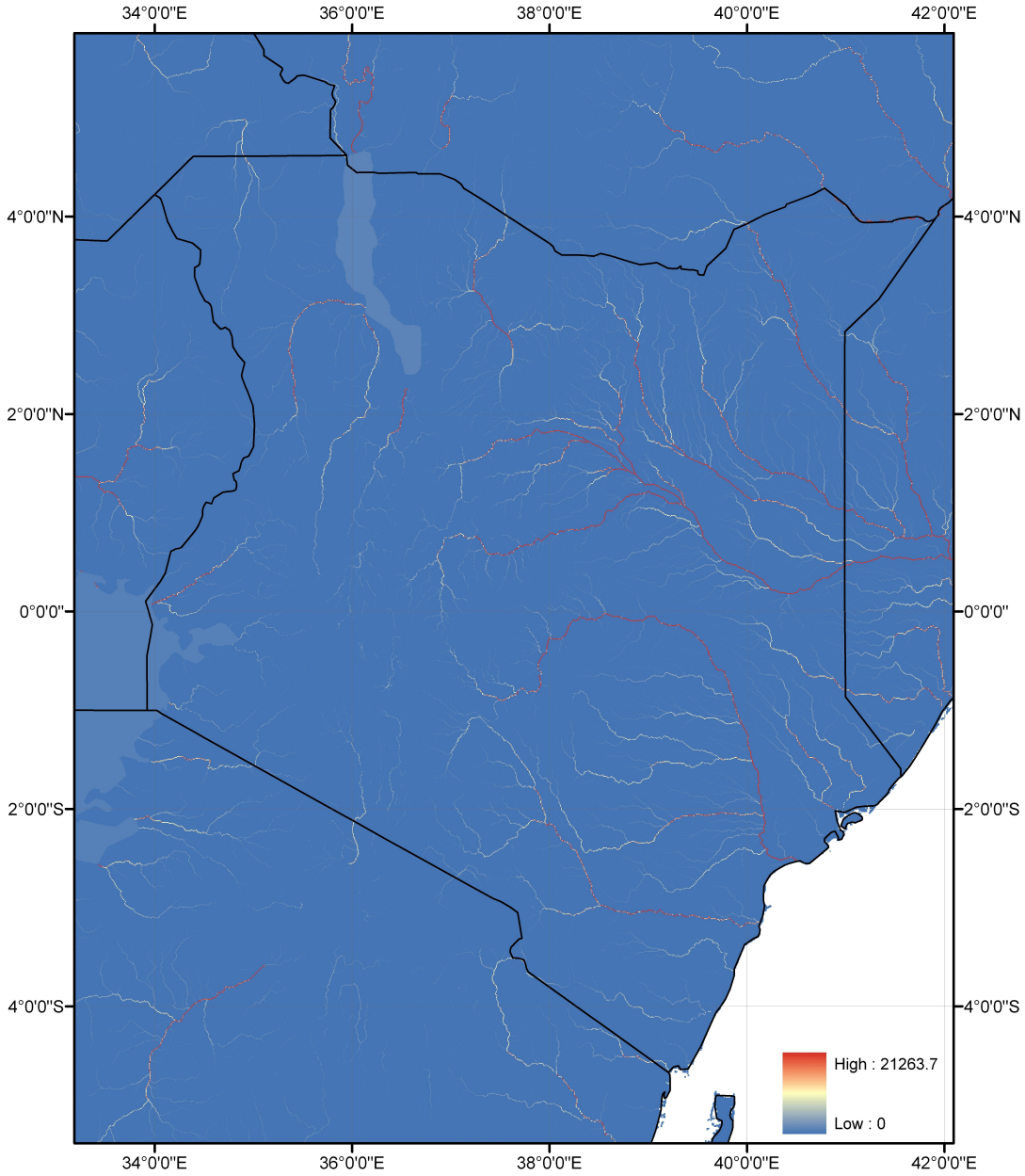
Streamflow (m3/s) Nov 25, 2011



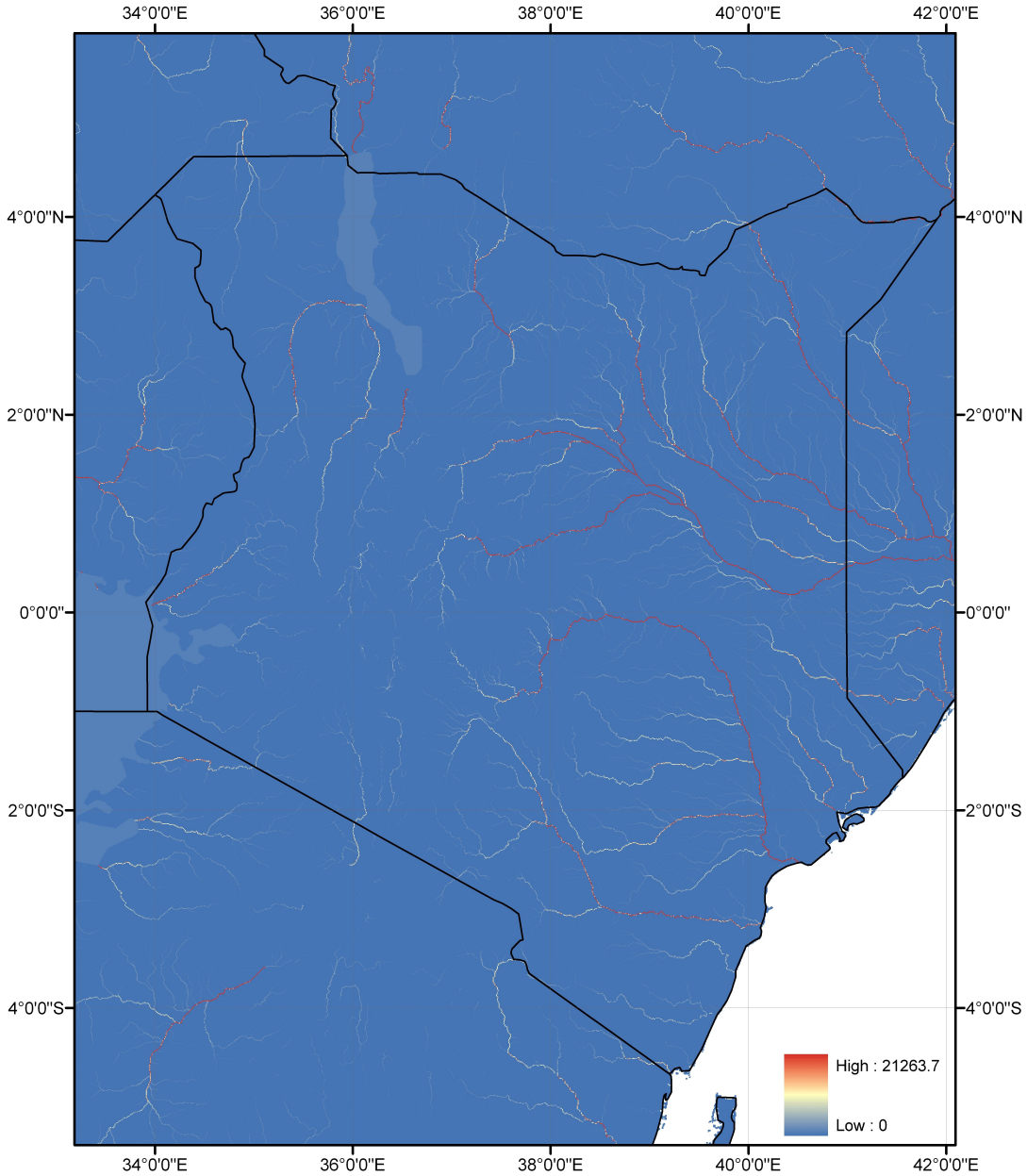
Streamflow (m3/s) Nov 26, 2011



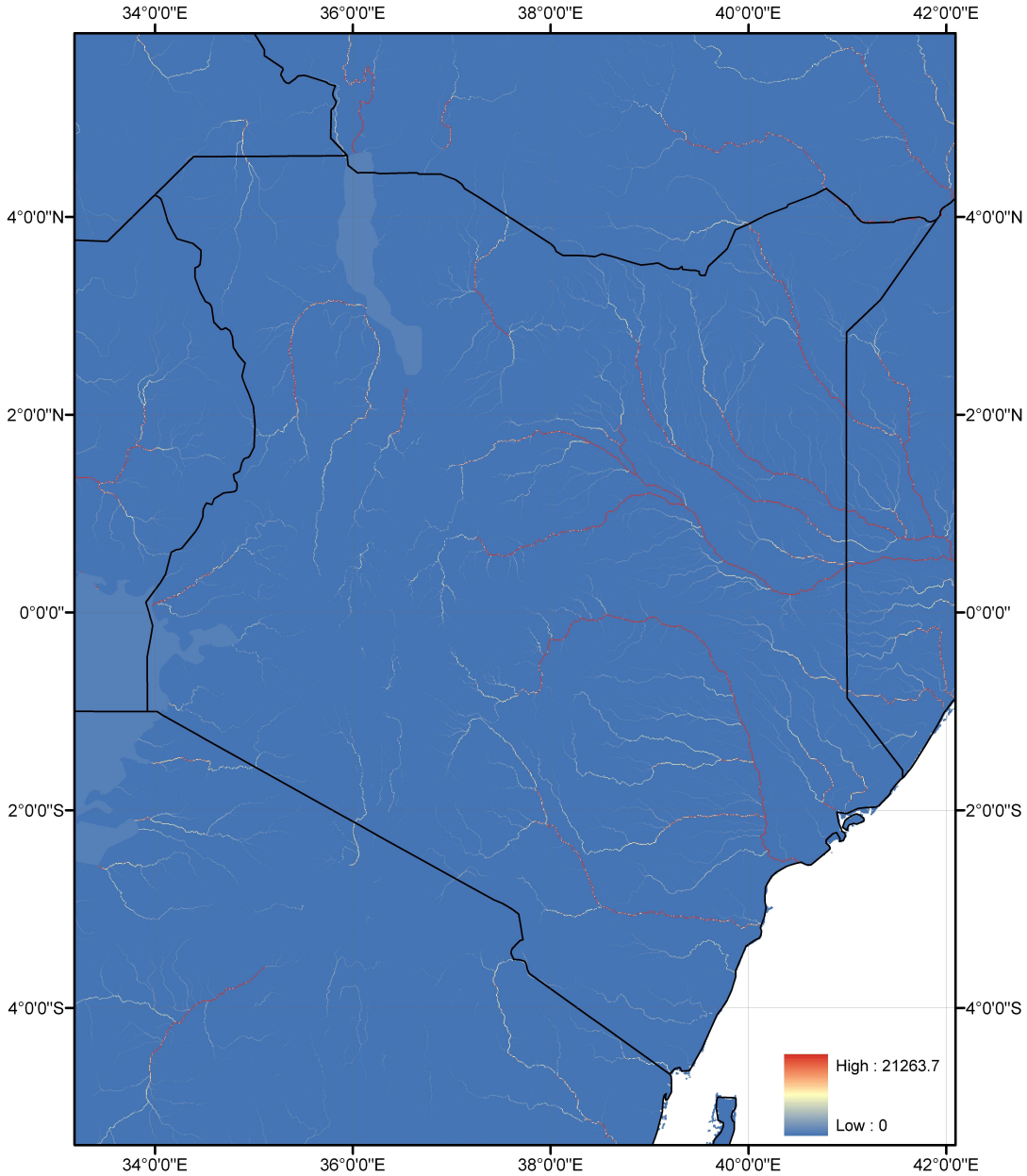
Streamflow (m3/s) Nov 27, 2011



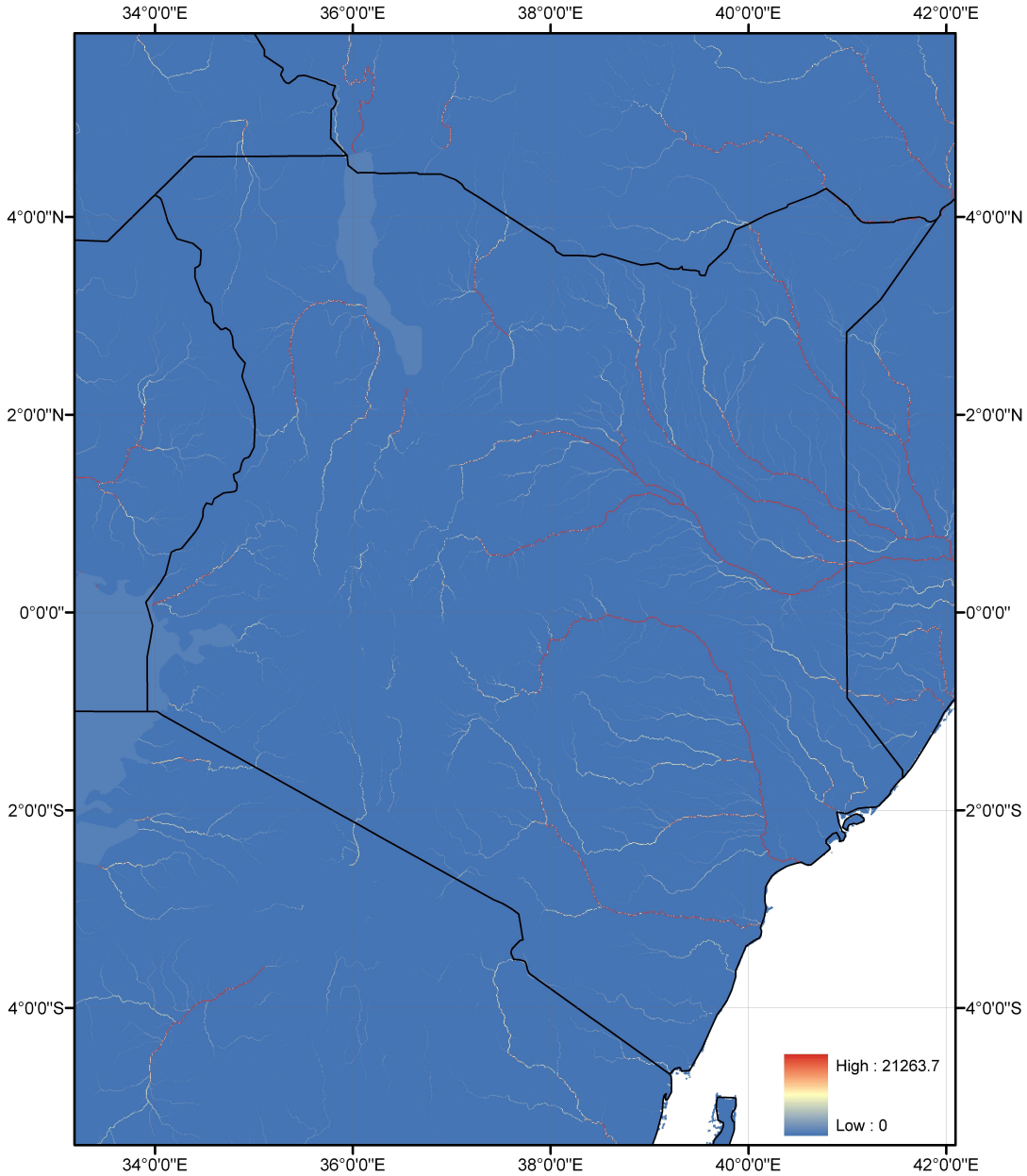
Streamflow (m3/s) Nov 28, 2011



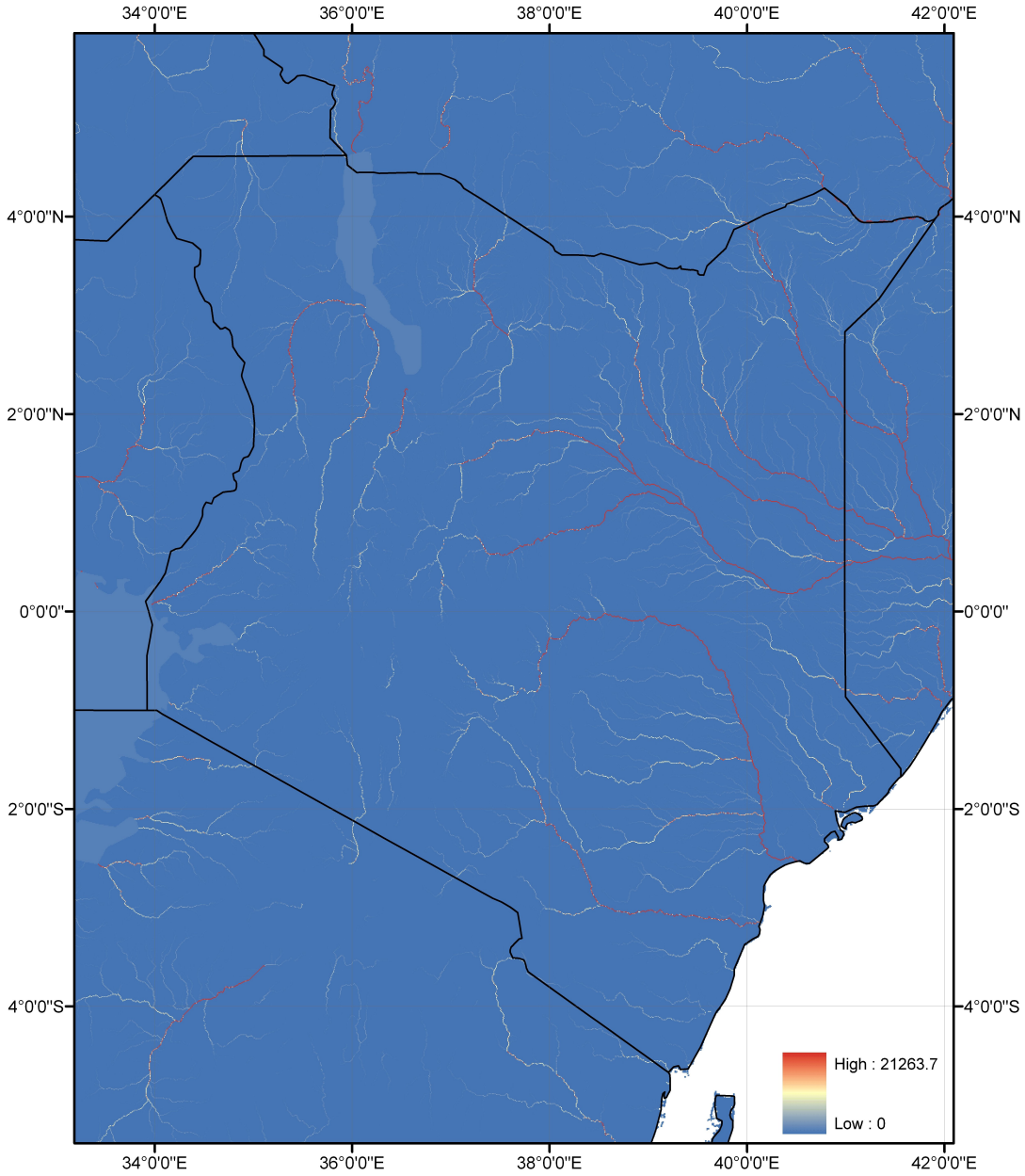
Streamflow (m3/s) Nov 29, 2011



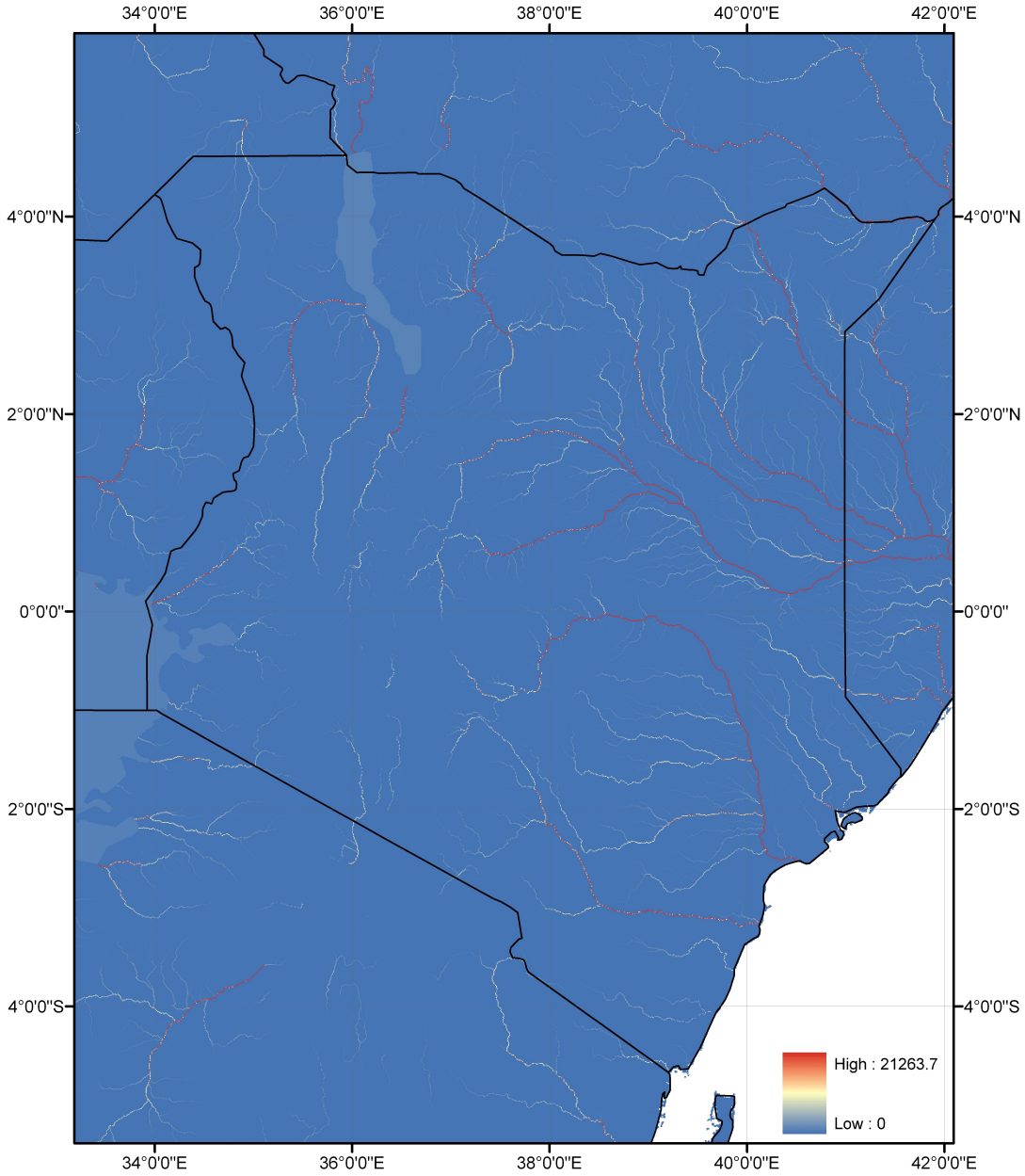
Streamflow (m3/s) Nov 30, 2011



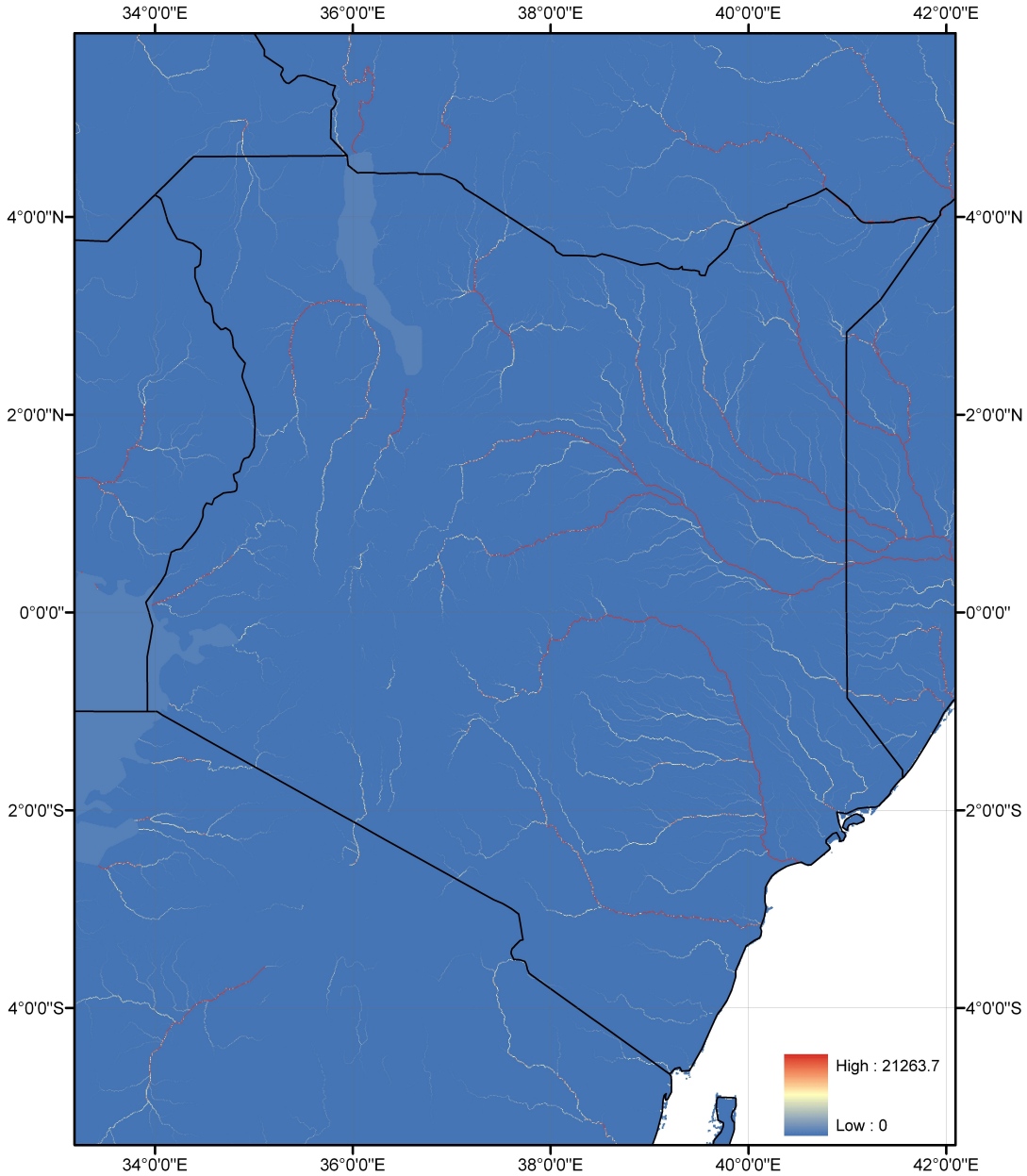
Streamflow (m3/s) Dec 01, 2011



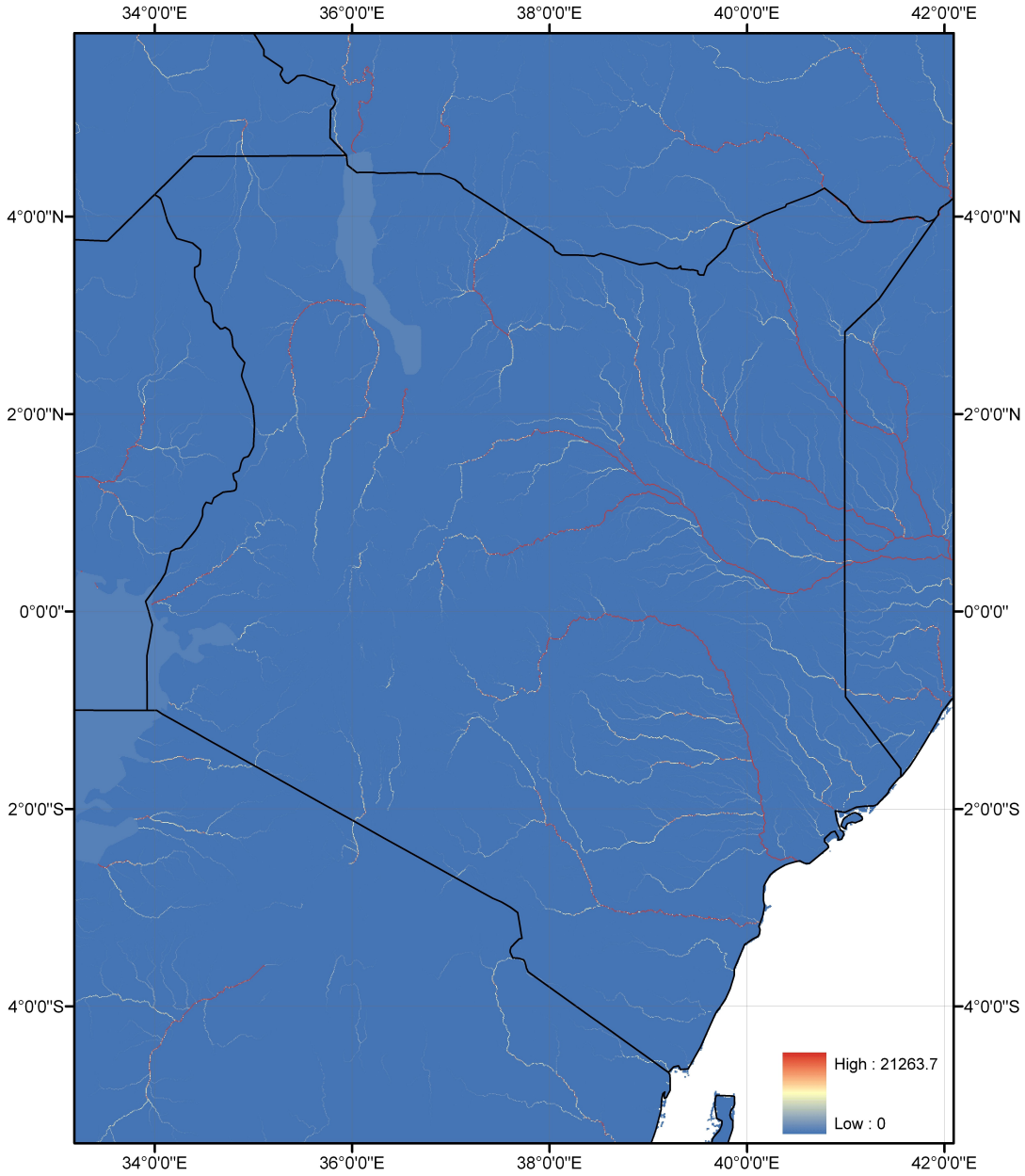
Streamflow (m3/s) Dec 02, 2011



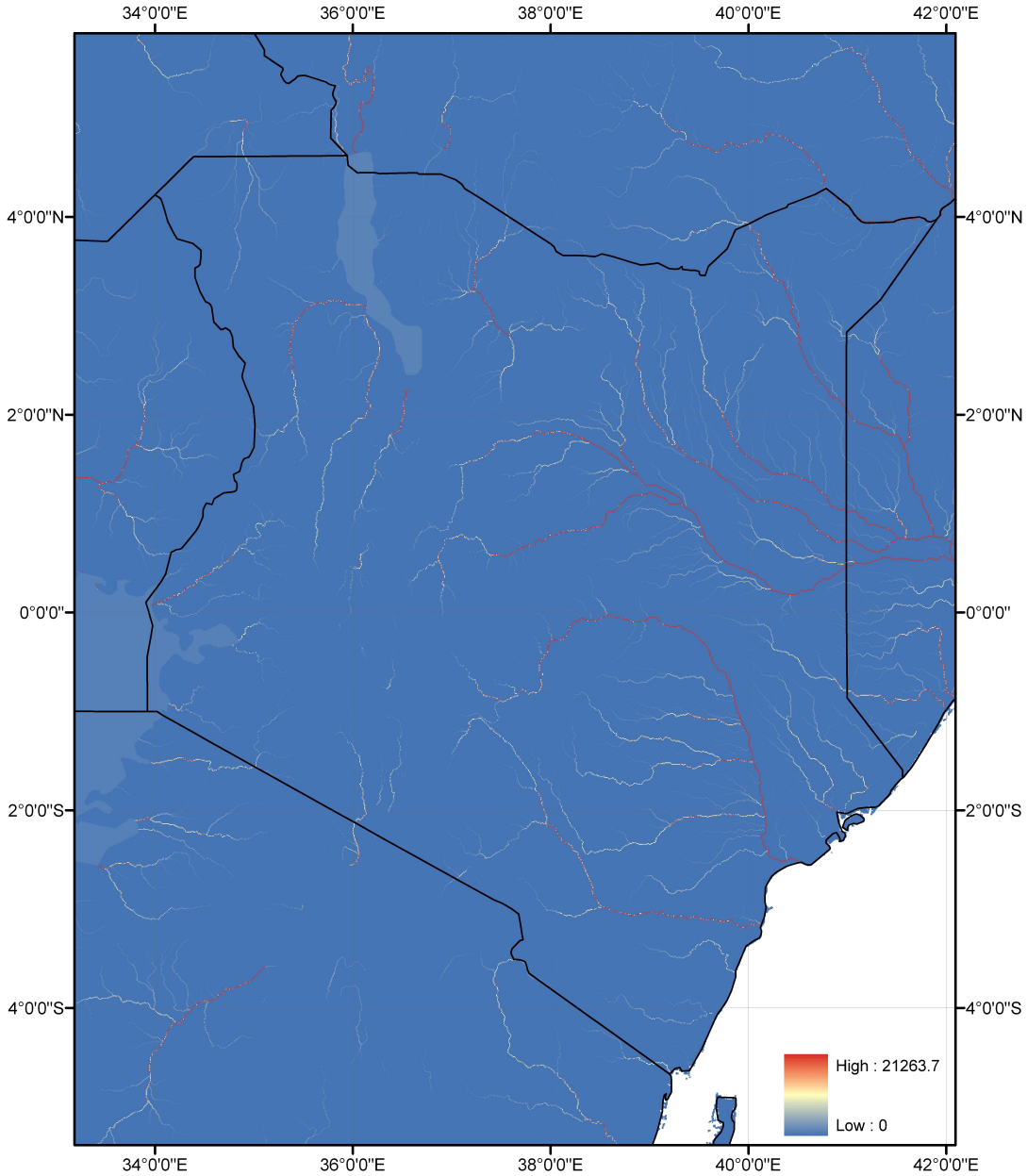
Streamflow (m3/s) Dec 03, 2011



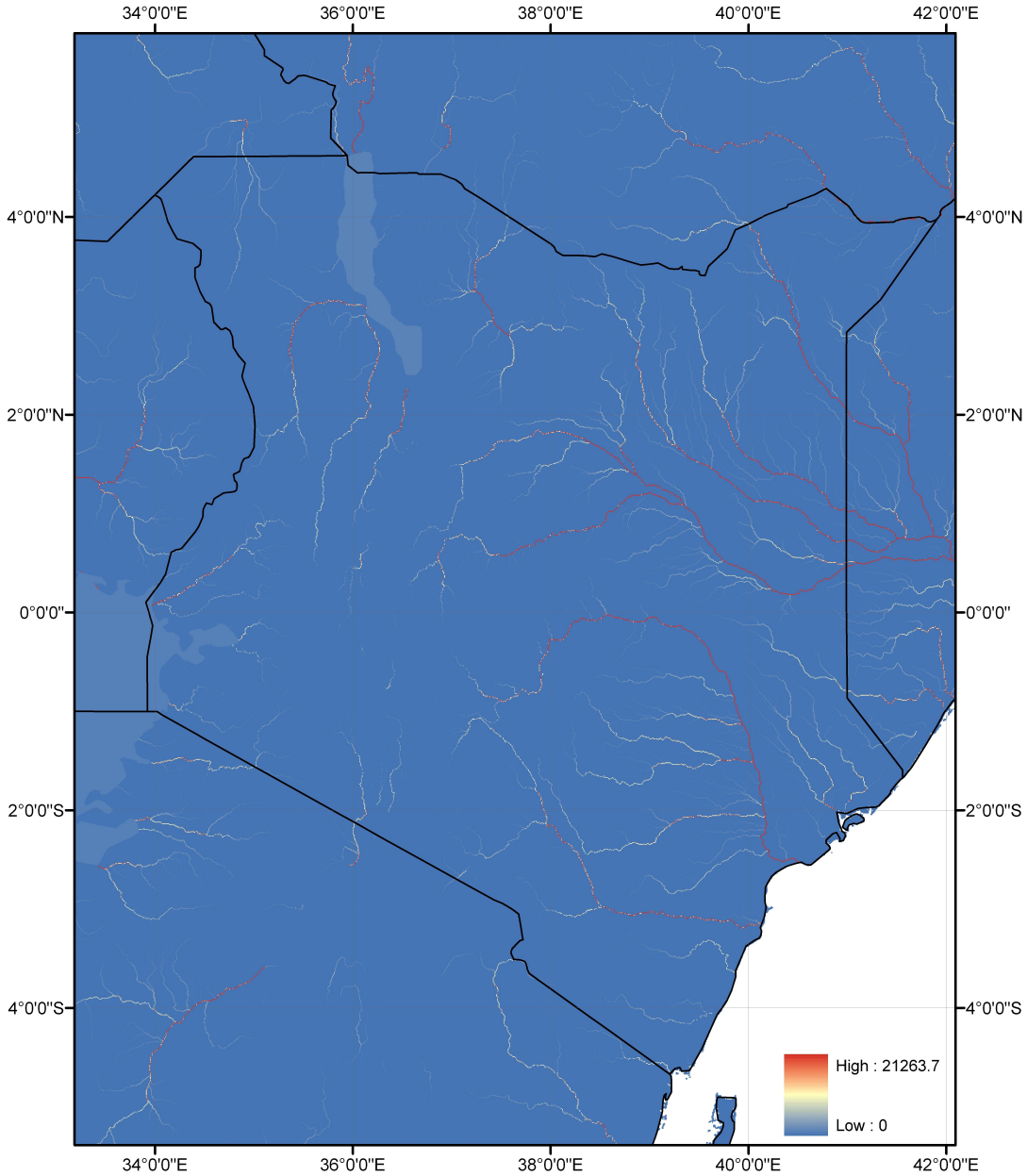
Streamflow (m3/s) Dec 04, 2011



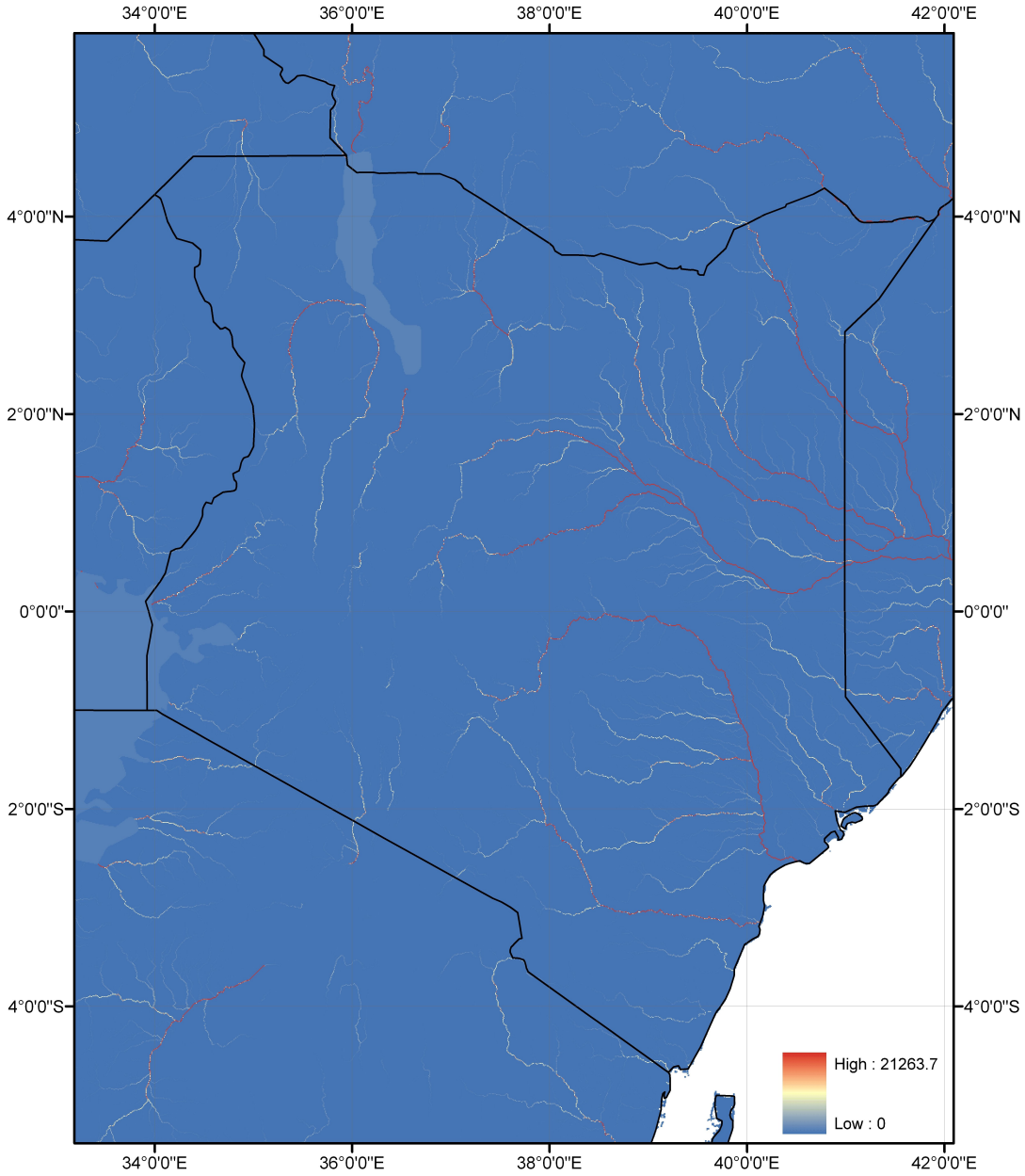
Streamflow (m3/s) Dec 05, 2011



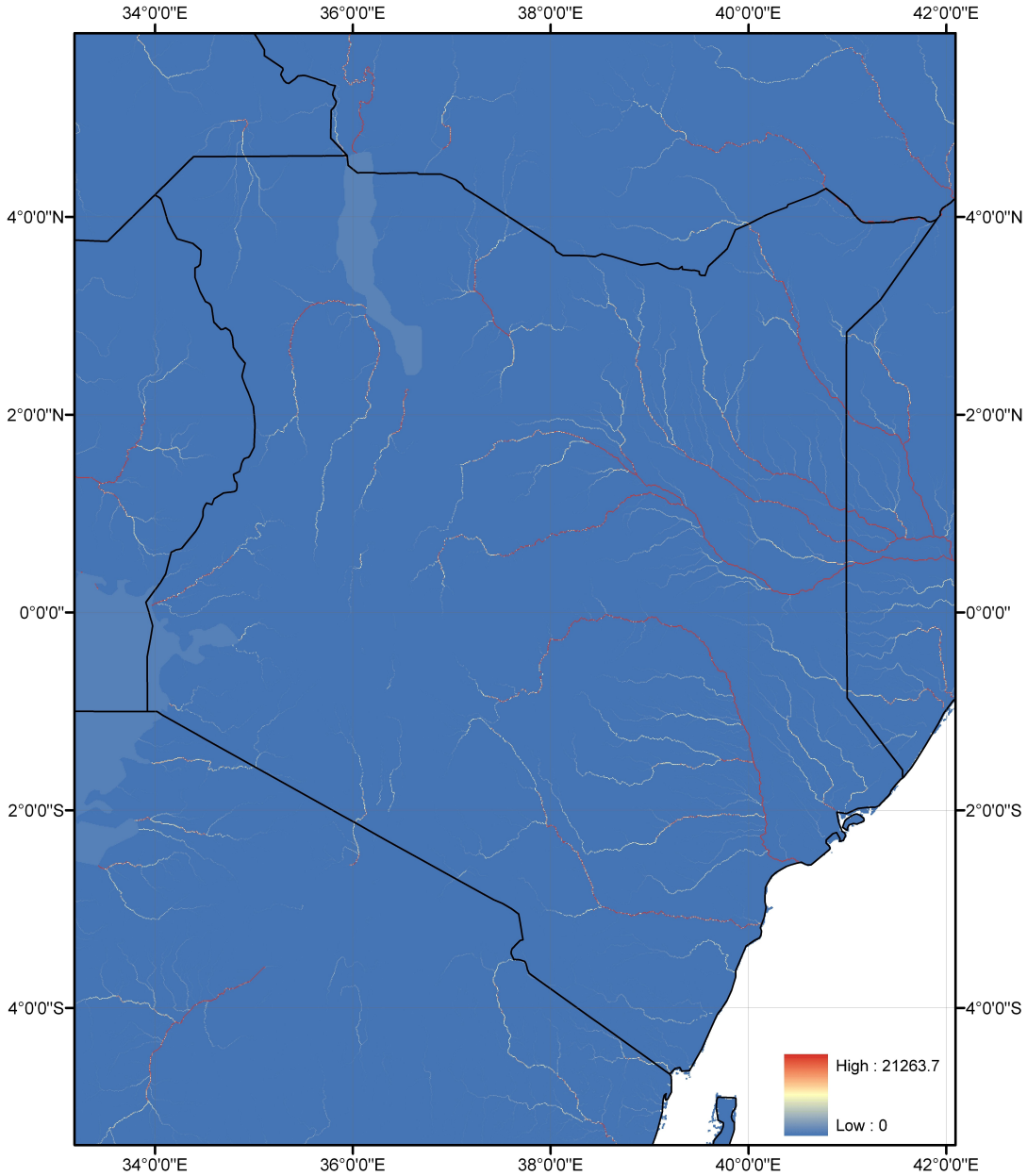
Streamflow (m3/s) Dec 06, 2011



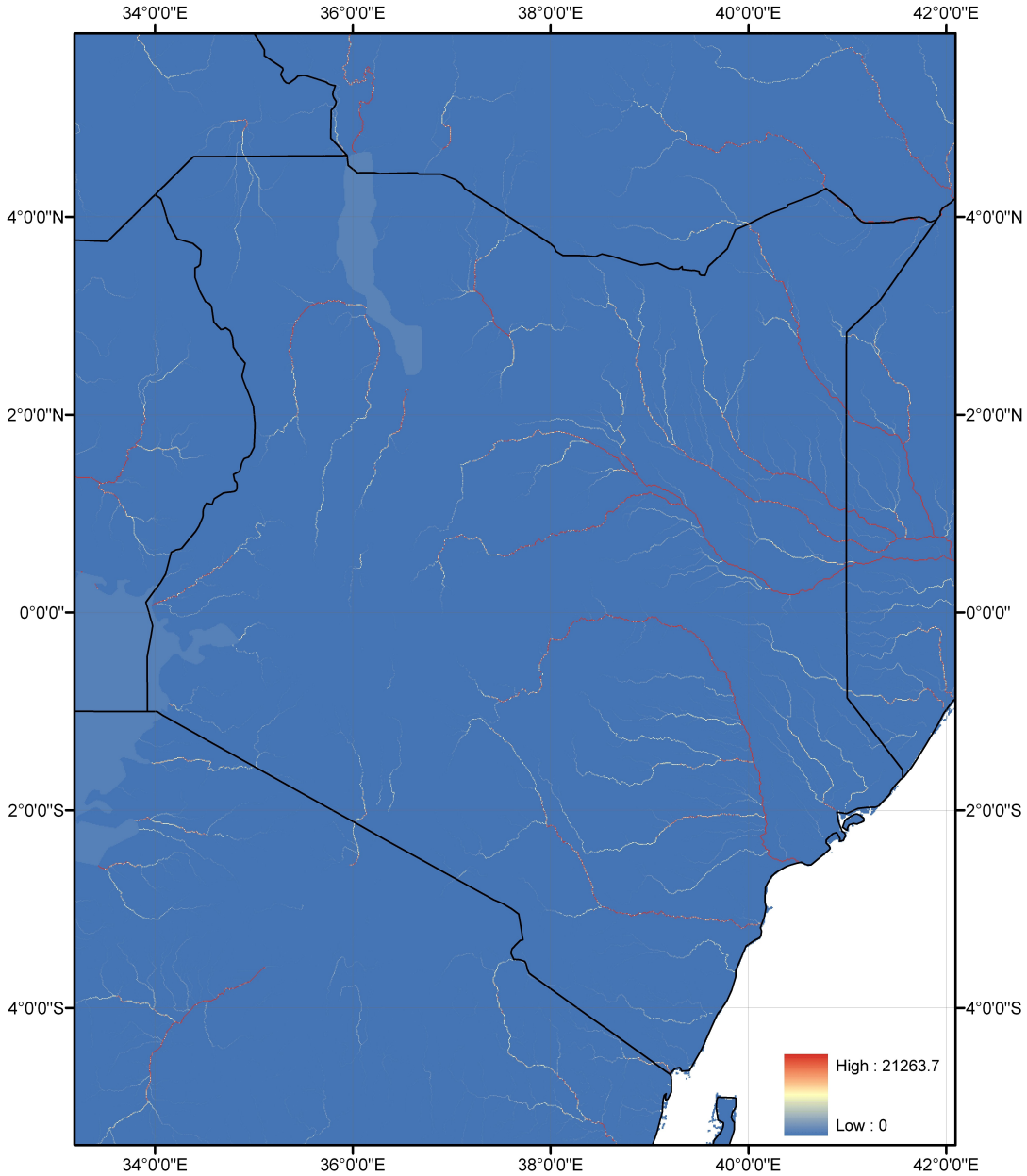
Streamflow (m3/s) Dec 07, 2011



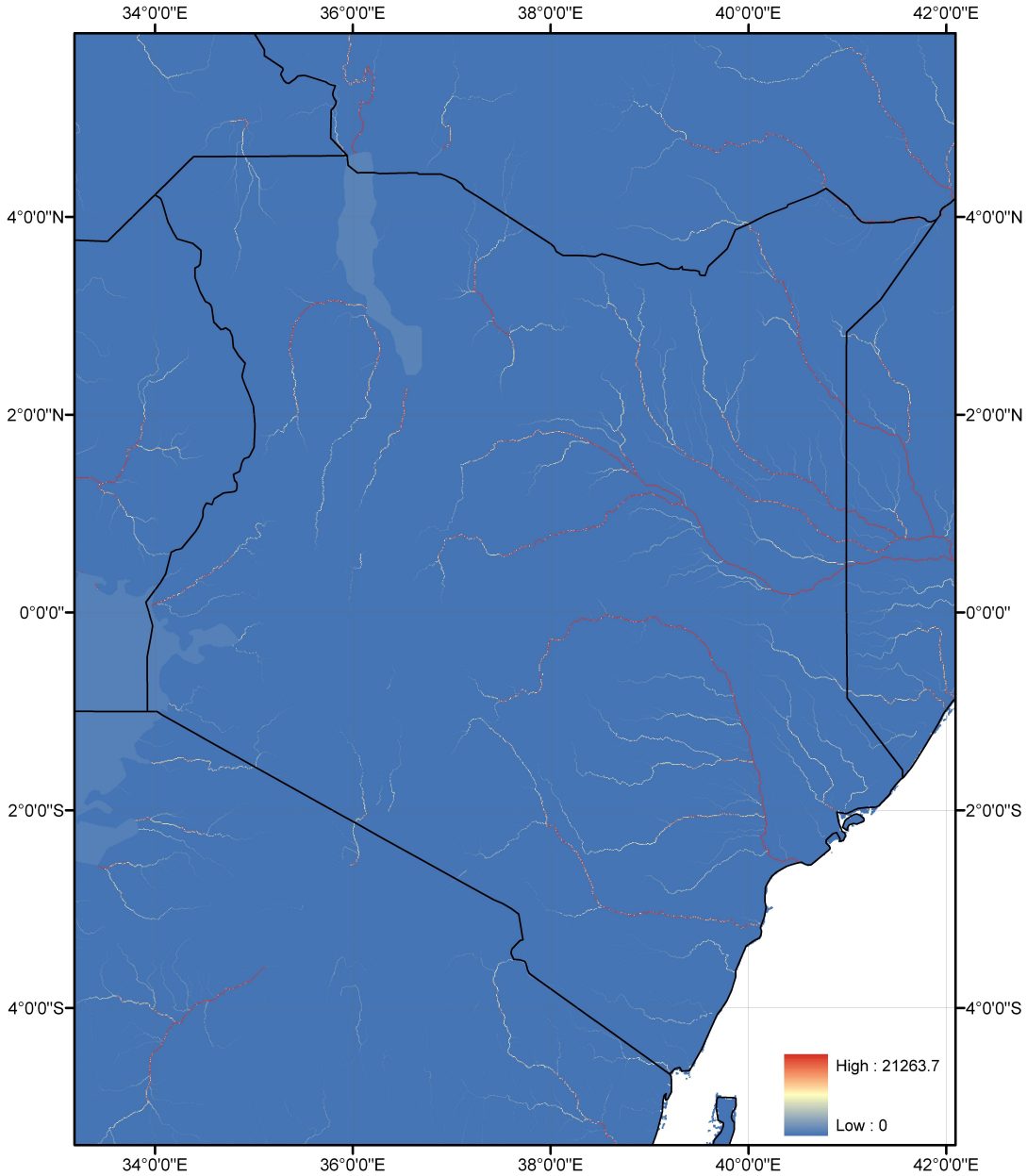
Streamflow (m3/s) Dec 08, 2011



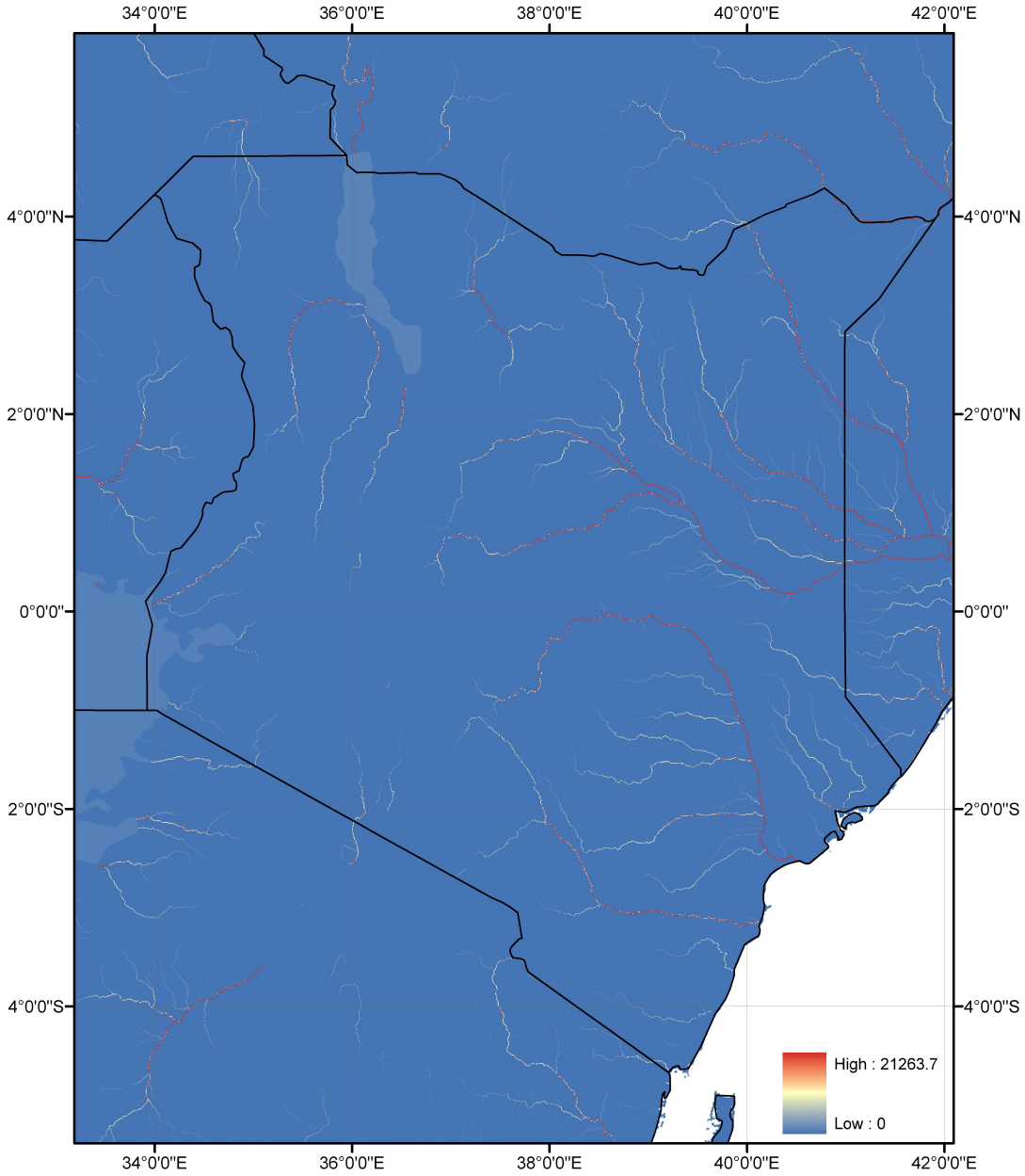
Streamflow (m3/s) Dec 09, 2011



Streamflow (m3/s) Dec 10, 2011



Streamflow (m3/s) Dec 11, 2011

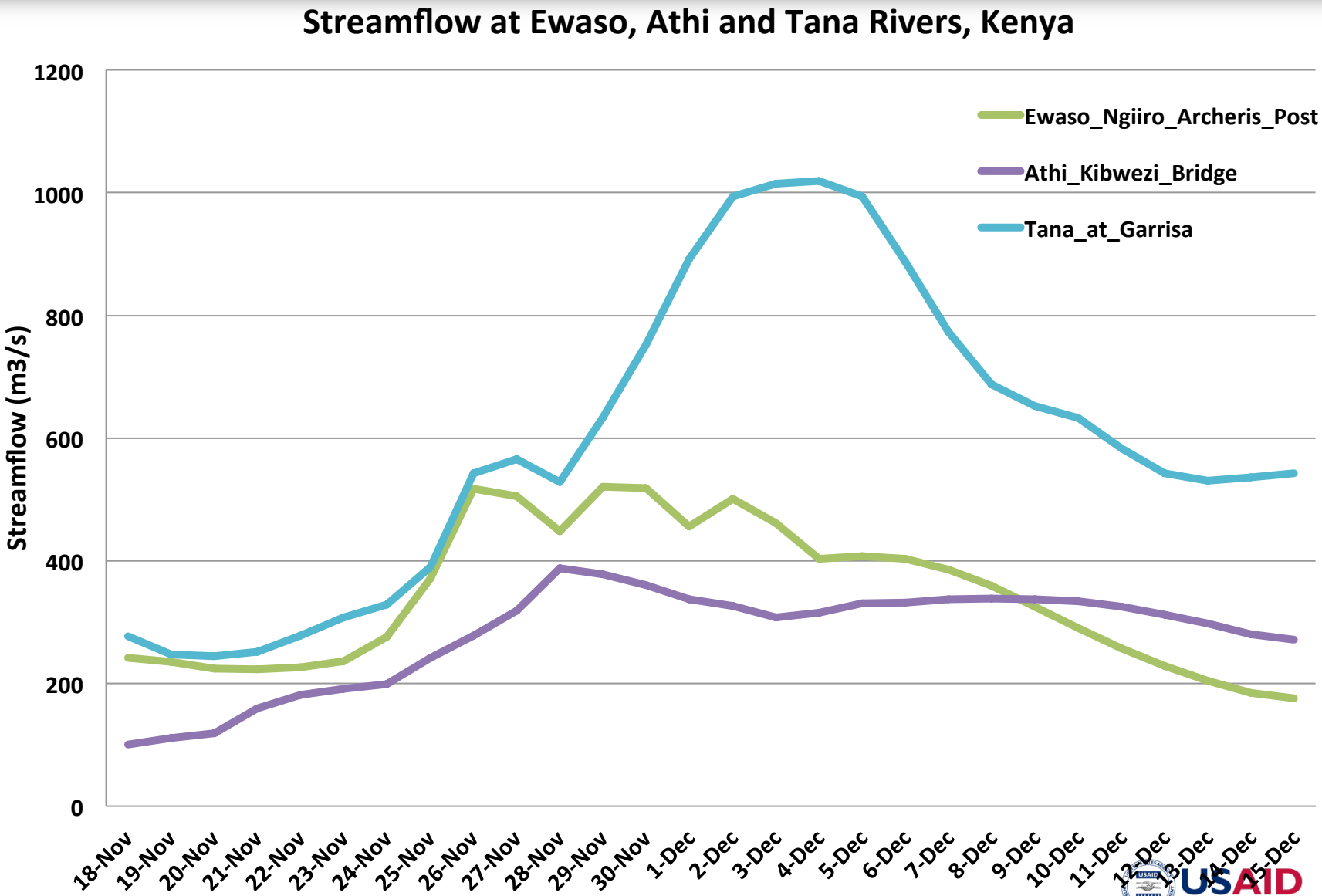


Hydrographs

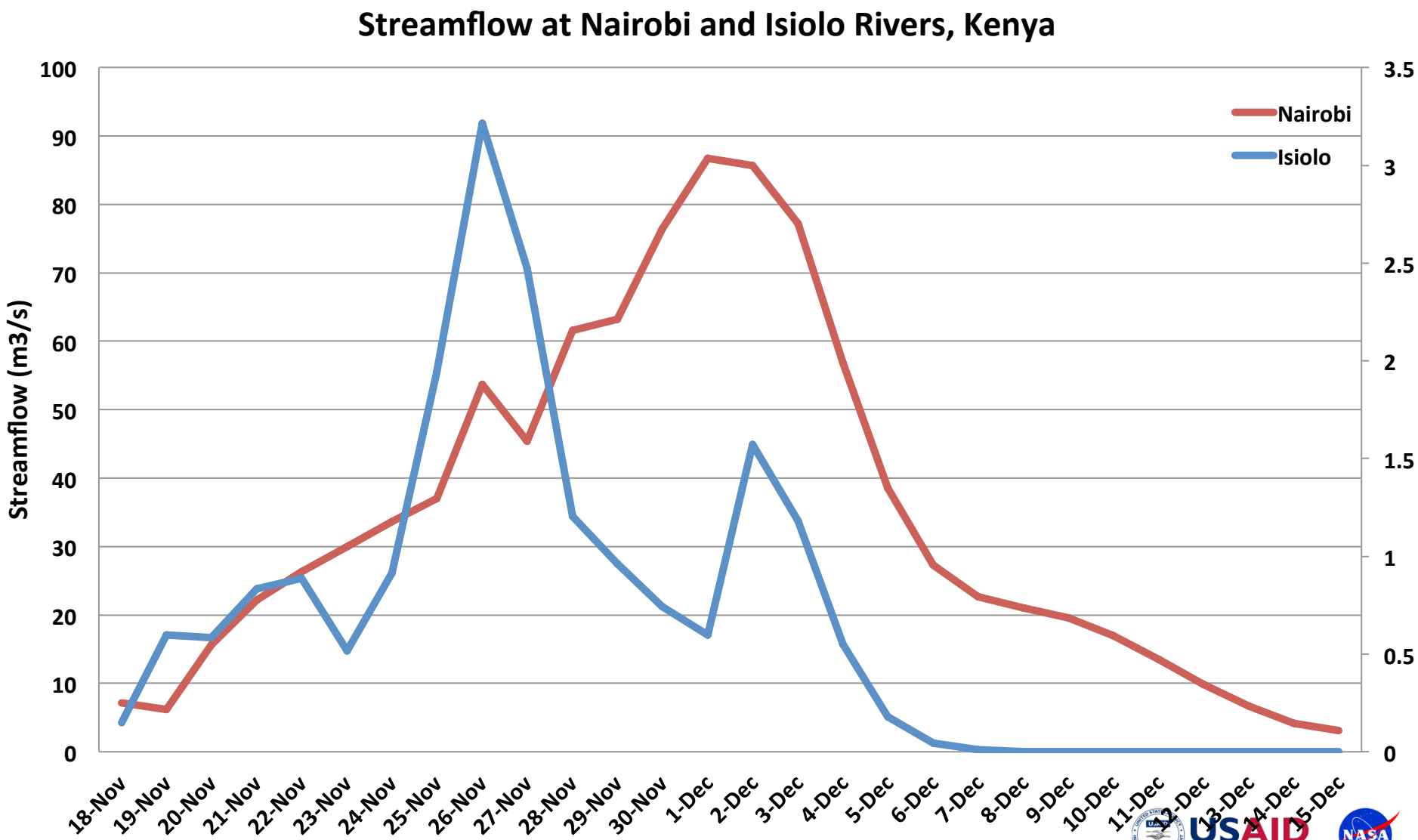
We have documented the modeled streamflow for each of the 1 km pixel for the flood.

We have selected some of the gauges for plotting the hydrographs. Following slides show hydrographs along five streams where flooding affected homes along the rivers.

November-December Floods in Kenya



November-December Floods in Kenya



Conclusions

- The Hydrologic Modeling System put together by RCMRD – SERVIR- Africa captured the floods very well.
- SERVIR Africa is committed to making the products useful to governmental and non-governmental agencies for their decision making.
- Collaborations to bring additional satellite observations, modeled products and in-situ data will strengthen those decision making capabilities.
- We will be excited to see how our datasets and applications can help the decision makers. Please drop me an email if you would like access to any of the datasets I presented today.
- Let's walk through a case study together via the online tool and visualize this event by viewing time series of streamflow and soil moisture for the event at any of over 850 stations.

Case Study Worksheet

- Please take out the worksheet for this case study of Kenyan Floods.
- Access the SERVIR Interactive Mapper and the SERVIR CREST Viewer applications via the instructions provided.
- Cerese, Sarah, and Nancy are available to assist you as we begin the hands-on demonstration.

Thank You