Sooners Without Borders: Capacity Building for Flood Prediction in Africa

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Flash floods kill 60, displace thousands in Namibia

In Namibia, more than 60 people have died and some 10,000 more have been forced to leave their homes by flash floods caused by torrential rains and which many say is the most terrible natural disaster in the entire history of this southern African nation.

KIGALI, 20 February 2013 (IRIN) - Flash floods have affected hundreds of farming households in northern and western Rwanda, increasing the risk of food insecurity in those areas, officials say.

"Overall, the floods have affected around 11,346 people, especially in three districts of Rubavu, Musanze and Nyabihu, with several other marshland areas in the suburb areas of Kigali City [also affected]," Antoine Ruvebana, the permanent secretary in the Ministry of Disaster Management and Refugee Affairs, told IRIN.
SERVIR: Connecting Space to Village

SERVIR program manager, Dan Irwin, shows students the capabilities available in the SERVIR lab.
SERVIR

- Launched 2005 in Central America
- Expanded in 2008 into East Africa region with hub in Nairobi, Kenya

http://www.servirglobal.net/
Coupled Routing and Excess Storage (CREST) Hydrologic Model

Provide Training to RCMRD in 2010
Quasi-Operational System at RCMRD

- CREST running in real-time mode for East Africa Region
- Uses NASA TRMM based precipitation
- Combined with Quantitative Precipitation Forecast from WRF numerical weather prediction model run at Kenya Meteorological Department

Workshop
April 2012
Local Developments at RCMRD

https://servirglobal.net/EastAfrica/MapsData/InteractiveMapper.asp
Namibia Work

January 2012, January 2013, November 2013
Namibia Flood Dashboard

http://matsu.opencloudconsortium.org/namibiaflood
CREST Training Workshops

• 4 Days
  – Intro to CREST
  – Data for CREST
  – Examples of CREST Applications
  – Running Example Basin
  – Preparing Data for CREST
  – Preparing Basins for CREST
  – Calibrating CREST
  – Visualizing CREST Outputs

• ArcGIS

• Excel

http://hydro.ou.edu/research/crest/
Impact of Changing Climate?

Fig. 7. a) Percentage anomaly in precipitation compared to the 1990-1999 for the A2, A1B and B1 scenarios, a) time series for 2000-2099 and seasonal anomalies for b) 2020-2029, c) 2060-2069 and d) 2090-2099

More extreme events???

Pradeep Adhikari
http://www.academia.edu/3275058/Will_Nzoia_Basin_in_Kenya_See_Water_Deficiency_in_Coming_Decades_as_a_Result_of_Climate_Change

Fig. 11. Surface water anomaly (i.e., runoff) for the 2020s and 2090s in higher and lower emissions scenarios over the study basin
National Mosaic and Multi-Sensor QPE (NMQ) Flooded Locations And Simulated Hydrographs (FLASH)

NMQ-FLASH: A CONUS-wide flash-flood forecasting demonstration system,

NMQ/Q2 Rainfall Observations
-1km²/5 min
Stormscale Rainfall Forecasts

Stormscale Distributed Hydrologic Models

Probabilistic Forecast Return Periods and Estimated Impacts

Simulated surface water flow

10-11 June 2010, Albert Pike Rec Area, Arkansas

20 fatalities

250 mm

150

200

2000 t

3000 t

40% 60% 80%

Property Damage (USD)

Probability of life-threatening flash flood
Summary

• NASA/OU CREST Hydrologic Model
• Capacity Building for Flood Prediction with African Partners
• Great assistance from RCMRD staff & KMD
• Rapidly expanding -> work in Namibia
• More still to come.