

CLIMATE RESILIENT ALTITUDINAL GRADIENTS (CRAGS): A PLANNING TOOL FOR CATCHMENT RESILIENCE

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WHAT ARE CRAGS?

Climate-Resilient Altitudinal Gradients (CRAGs) can be defined as *multi-scale landscape units, ideally with a minimum altitudinal range of 1,000 meters, that are characterized by climate-resilient biodiversity and ecosystem service values.*

WHY AGs?

OPPORTUNITIES

AGs provide some of the most important ecosystem services in landscapes

- Water provision and regulation
- Diverse habitats supporting traditional livelihoods
- Forests, pastures and wetlands
- Carbon sequestering and storage
- Refugia for biodiversity
- Recreational, aesthetic, cultural, and spiritual values
- Ecotourism

WHY CRAGs?

CHALLENGES

AGs are the most vulnerable elements in the landscape under extreme climatic events

- Magnets for disasters, landslides and floods
- Most vulnerable to erosion
- Major source of sediments
- Determine local rainfall/flooding regimes
- Exhibit sharp temperature changes
- Shifting biodiversity and summit traps

RUSIZI-KIVU CRAG INTERVENTION PLAN

BACKGROUND

Chapter 1: Introduction

STATE

Chapter 2: The Kivu-Rusizi Landscape

Chapter 3: Socio-economic, Policy, and Institutional Context

BENEFITS

Chapter 4: Biodiversity in the Basin

Chapter 5: Ecosystem Services

PRESSURES

Chapter 6: Climate Change

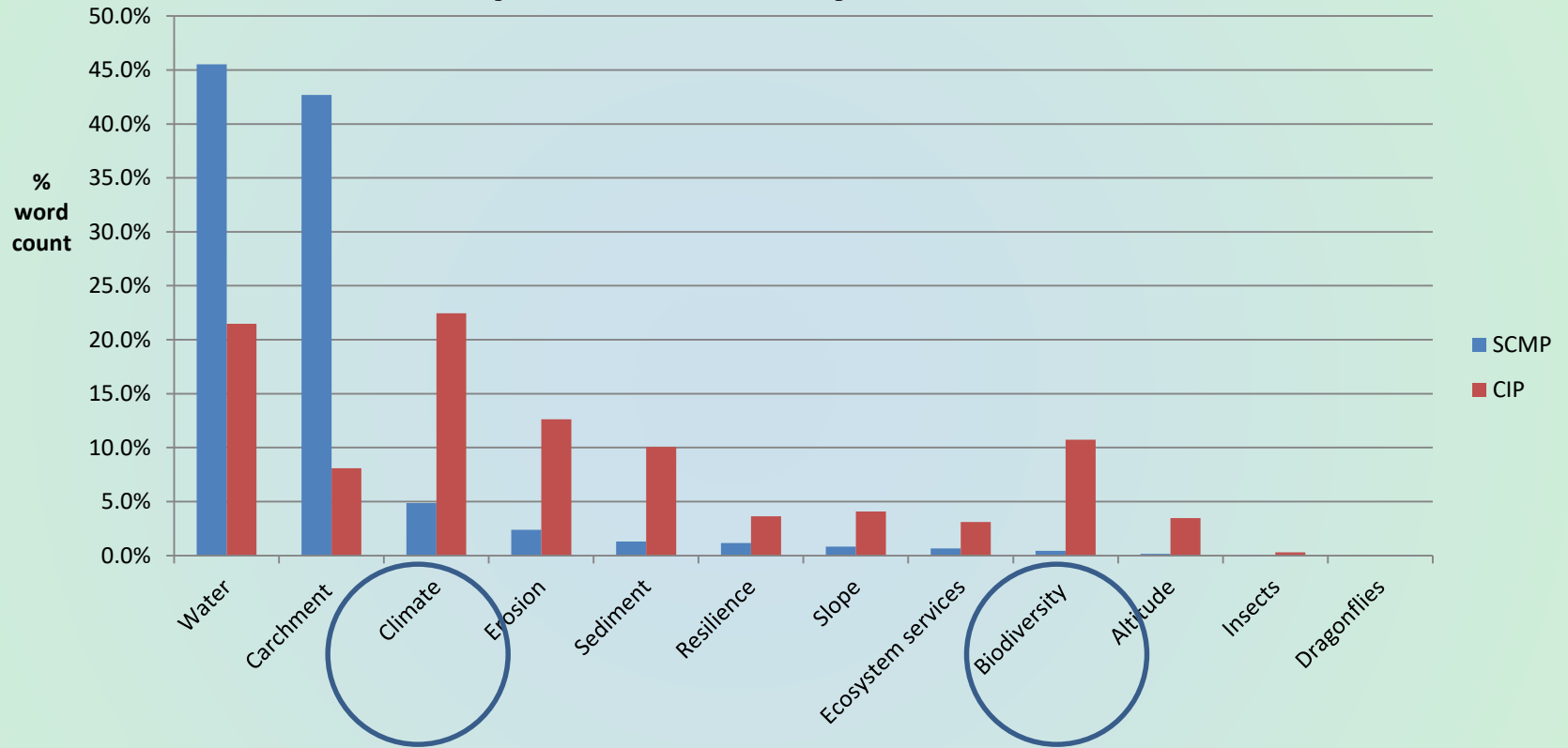
Chapter 7: Threats

RESPONSES

Chapter 8: Interventions

CRAGS AND CATCHMENT MANAGEMENT PLANS

Word count comparison: Sebeya CMP and Rusizi-Kivu CIP



Similar content, different emphasis

CLIMATE CHANGE: RECENT ADVANCES IN TRACKING

CHIRPS: Climate Hazards Group InfraRed Precipitation with Station data

- incorporates 0.05° resolution satellite imagery with in-situ station data to create gridded rainfall time series for trend analysis and seasonal drought monitoring.

IMERG: Integrated Multi-satellite Retrievals for Global Precipitation Measures

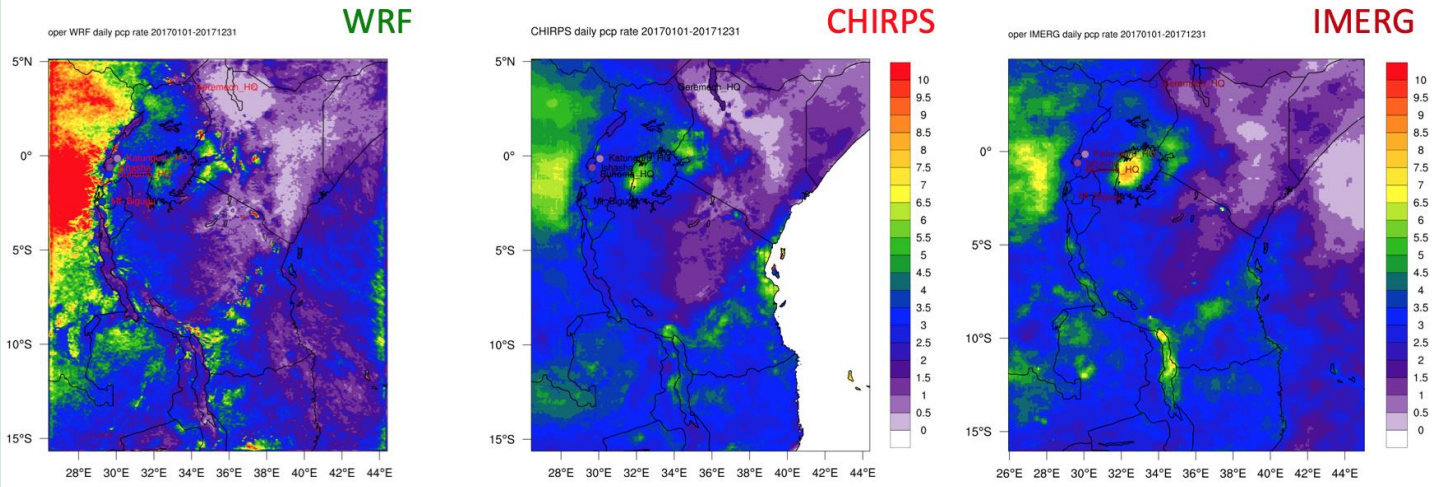
- provides near-realtime "early run" product generated by NASA's Precipitation Processing System every half hour with a 6 hour latency from the time of data acquisition.

WRF: Weather Research and Forecasting Model

- next-generation mesoscale numerical weather prediction system designed for both atmospheric research and operational forecasting applications.

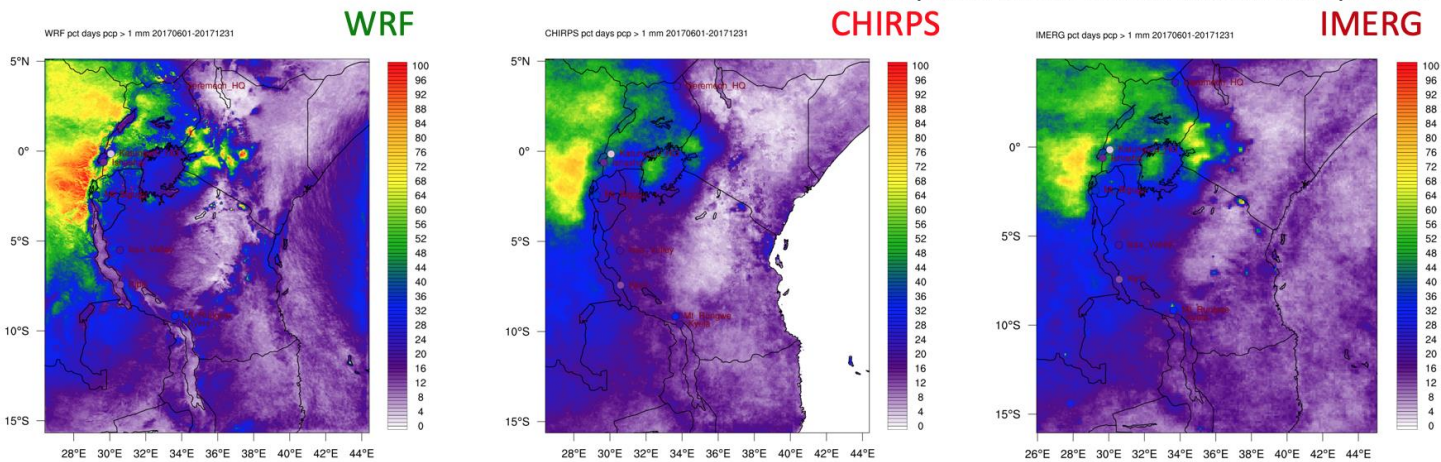
RECENT ADVANCES IN CLIMATE TRACKING

Precipitation Totals for 2017



Percentage of days exceeding 1 mm June – Dec 2017*

*time period when 9 surface stations were present

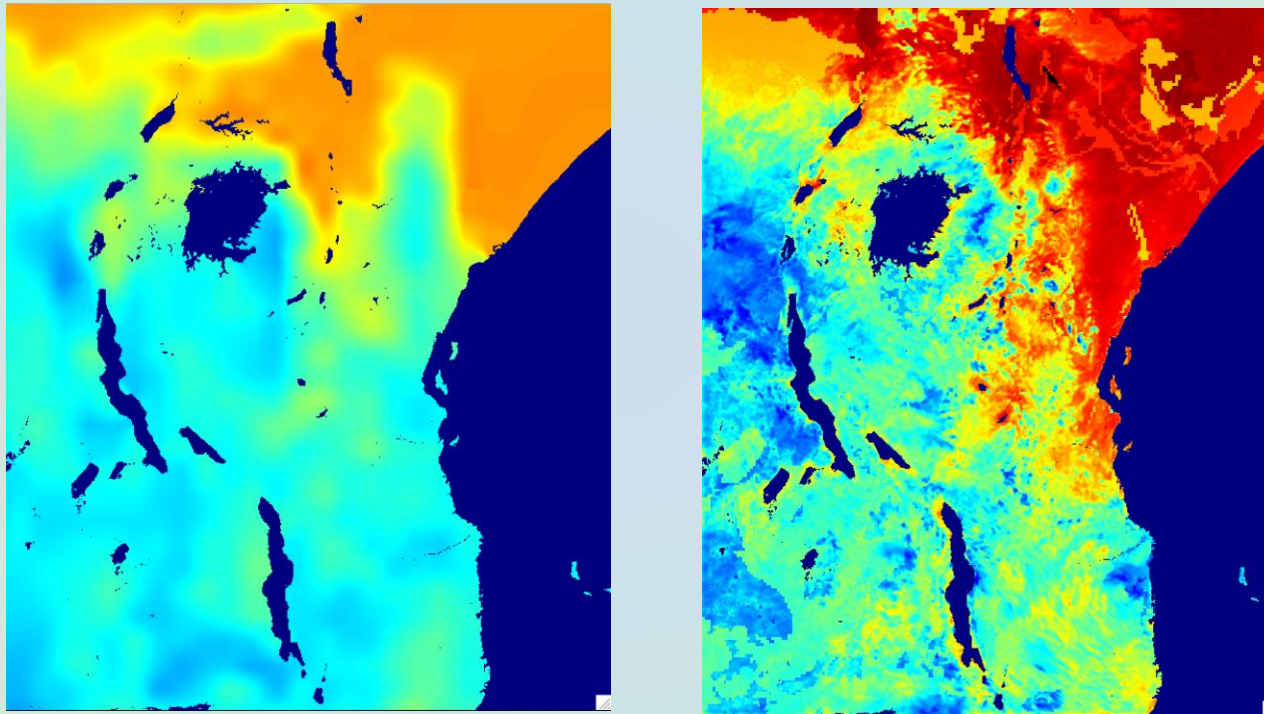


Source: National Center for Atmospheric Research & Appalachian State University, USA

Contact: Anton.Seimon@gmail.com

CLIMATE CHANGE: RECENT ADVANCES IN SPATIAL RESOLUTION

Benefits of high-resolution dynamical downscaling:
Soil moisture representation in ERA-Interim (80-km grid) and WRF (3.3-km grid)



Soil moisture ($\text{m}^3 \text{m}^{-3}$)



Source: National Center for Atmospheric Research & Appalachian State University, USA
Contact: Anton.Seimon@gmail.com

NOT FORGETTING ...

“Prediction is very difficult, especially about the future”

Variously attributed to Nobel Prize winning physicist and Mark Twain, American humourist

"All models are wrong, but some are useful"

Attributed to George Box, Statistician

BIODIVERSITY

No Biodiversity No Ecosystem Services

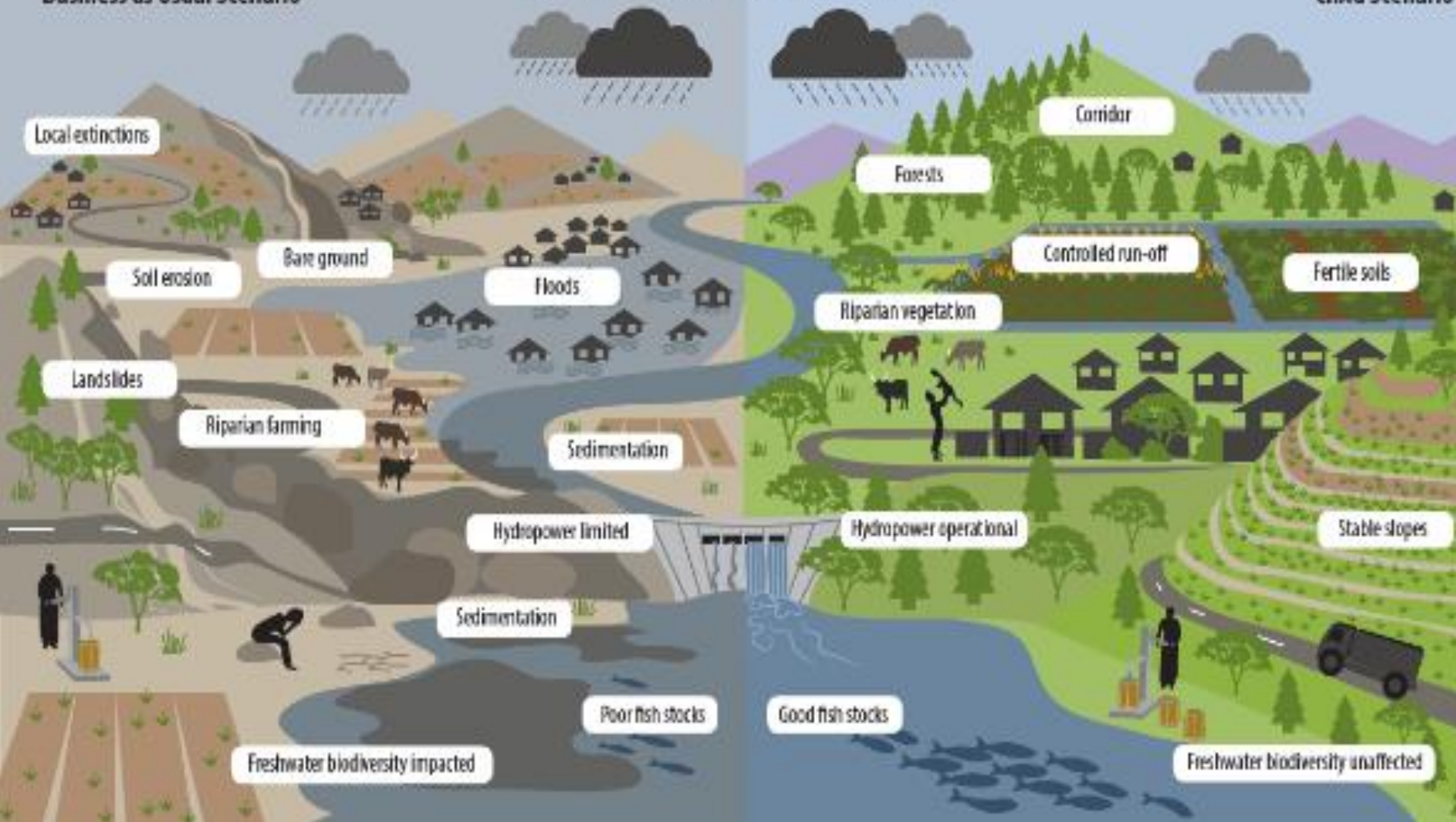
In the context of CRAGs:

- AGs are thermometers – upward range shifts measure biotic responses to climate change
- Summit trap extinctions
- Indicators of habitat quality – dragonflies for water, butterflies and birds for forests
- Tourism revenues

Business as Usual Scenario

Climate Change Resilience

CRAG Scenario



TAKE HOME MESSAGE

A country that has turned its AGs into CRAGs has gone a long way to achieving national climate change resilience.