Climate Variability and Climate Change in Pastoral Systems

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Pastoralists and climate risk

Oromiya Region, Ethiopia by Andrew Heavens
Annual rainfall, Yabello, Ethiopia, 1966 to 2005

Year

Rainfall (mm)
Figure 1: Variation of monthly (blue) and 12 month running average (red) of NDVI for Kajiado district from 1982 to end of 2009. Source: unpublished ILRI analysis.
Vegetation biomass and livestock mortality

Biomass and NDVI, Kajiado, Kenya

Biomass and NDVI, Laikipia, Kenya
Forage available (kg/ha) for Kenya northern arid lands (2006-2010). Source of information: GL CRSP LEWS

Biomass (kg/ha)
- <800
- 800 - 1000
- 1000 - 1200
- 1200 - 1400
- 1400 - 1600
- 1600 - 1800
- 1800 - 2000
- >2000

N

2006 2007 2008
2009 2010

300 0 300 600 Kilometers

Forage deviation
Very Good Deviation > 30
Good 30 >= Deviation >10
Normal 10 >= Deviation > -10
Poor -10 >= Deviation > -30
Scarcity -30 >= Deviation > -50
Drought -50 >= Deviation > -70
Disaster -70 >= Deviation

300 0 300 600 Kilometers

2006 2007 2008
2009 2010
Climate Change

Image of the Future

Graph showing global surface warming (°C) from 1900 to 2100.
Climate change exposure: changes in rain per rainfall event

Ericksen et al, 2011
Unpublished IRLI analysis
East Africa:
Simulated plant functional types:

(top) 20th century

(bottom) 20th and 21st centuries (one climate model)

Doherty et al 2009
Climate change: rainfall and temperature

Sources:
- Catchment boundary was generated from ASTER
  DEMs
- 30m, granular resolution and digital elevation
  models from SRTM30, 30m, ground resolution
- Trees (GeoTopographic maps scale 1:50,000)
- Waterbodies (FIA 2001)
- Agricultural zones (RGI, Sandvik et al. 1992)
- Rainfall and temperature changes (Jones et al.
  published works)
- HPPs using ASTER DEM, 30m, ground
  resolution
- MODIS (Moderate Resolution Imaging Spectroradiometer)
  Satellite data NASA, 2009 Ground resolution, 1 kilometer

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Scale 1:5,500,000
Adaptation research priorities

• Context of rapidly changing production systems and livelihood strategies

• Will CC mean more or less livestock production in marginal areas (CC to Livestock keepers)?
  • What do the exposure thresholds mean for dryland areas?

• Constraints on social/ econ/ institutional issues of adaptive capacity
  • Safety nets
  • Markets
  • Land tenure

• SCENARIOS as a planning tool
Thank you...