AWF Climate Adaptation – Beyond Virunga

David Williams, African Wildlife Foundation

Albertine Rift Climate Change Adaptation Workshop
Gashora, Rwanda; Feb 2011
Adaptation: AWF Context

- Recognize Africa as most vulnerable continent to CC.
- While our research and conservation efforts span decades, have much to learn of species and system-specific CC impacts.
- Incipient AWF CC adaptation strategy.
- Staging pilot projects to inform strategy development and generate adaptation capacity in AWF and partners.
- Virunga 1st adaptation effort...what next?
AWF Heartlands

- 7 savannah-dom. landscapes
- Share similar conservation targets (e.g., elephants, predator guilds, declining ungulate species) and proximate threats (habitat loss, fragmentation, HW conflict, limited h2o)
- What is our approach to adaptation?
Considerations:

- Build on Virunga VA experience as a fine-scale modeling pilot.
- Samburu HL offers relatively rich database and field research programs to inform and explore approaches. Good biophysical and soc-economic representation of 3 E. African HLs.
- Elephants and grevy’s zebra
  - ele – in all 7 LS; representativeness/umbrella/flagship values
  - grevy’s – rarity
Samburu Heartland

- In rain-shadow of Mt Kenya/Abedares range.
- Wildlife include northern specialists species (reticulated giraffe and Somali ostrich and the endangered Grevy’s zebra) as well Kenya’s 2nd largest elephant population.
- Wildlife numbers outside parks have steadily increased in recent years.
Goals:

• Formulate CC adaptation strategy for SH focusing on two keystone species that will build adaptation capacity in landscape stakeholders.

• Develop a template and AWF capacity to replicate climate change vulnerability assessments for other arid regions of Africa.
Samburu Heartland Adaptation

Guiding principals:
- Give the wildlife options…connectivity/space.
- Be pro-active in seeking opportunities, yet cautious.
- Explore intervention scenarios including restoration to improve resilience.
- Don’t lose focus of imminent threats (Noss 2001, Hansen et al).
- Stakeholder focused. Build capacity for AWF exit.
Conceptual Framework

Vulnerability:

Exposure + sensitivity - capacity to adapt

Consider direct and indirect effects
Samburu: African Elephant

Status

- Increasing population (2300 in 1990, 6365 in 2008)
- Generalist browser/grazer
- Wide latitudinal range
- Home ranges for females 100 – 5000 Km² (Thouless 1995).

Threats

- Human wildlife conflict/PAC
- Poaching (heavy in 70s)
- Drought, spurring HW conflict (harbinger?)

Figure 7.1. Number of poached carcasses, remainder of carcasses found and proportion of all found carcasses that were poached, Samburu/Laikipia, 1990–June 2002. (Source: EMD)
Samburu: Grevy’s Zebra

Status

• Endangered by the IUCN/SSC Equid Specialist Group.

• Habitat: semi-arid scrublands/plains

• Declined from 15,000 in the late 1970s to <3000. >2200 in Samburu where pop. is stable to increasing.

Threats

• Competition w/livestock for forage and water.

• Poaching for skins.

• Disease (anthrax)

Kingdon, 1979, 1997; Yalden et al., 1986
Data Assembly: Focal Species
Data Assembly: Focal species
Data Assembly: Focal species
Data Assembly: Human Footprint
Data Assembly: Human Footprint
Data Assembly: Land Cover

Samburu Heartland: Land Use/Land Cover

- Boma/Settlement
- AWF Heartland
- Conservation Land
- Cultivated/Settled
- Urban/Dense Development
- Montane/Closed Woodland
- Open Woodland
- Savanna-Mosaic
- Water
- Wetland

Sources:
AWF-Tradit-Age
NASA, SRTM
Land Use/Land SRTM, GeoEye

AWF Spatial Analysis
Laboratory, Feb-11

AFRICAN WILDLIFE FOUNDATION
Climatology

**FIGURE 11(b)**

Trends in mean annual rainfall and temperature variations in the Laikipia district between 1959 and 2007 shows a slight decline in rainfall amounts and appreciably rising temperatures.

(Ojwang’ 2010)
Climatology-Precipitation

1950 - 2000 Average Monthly Precipitation - April

Hi  697mm
Low  68mm

Sources:
WorldClim
Climatology-Precipitation

FIGURE 2
Seasonal variability of climatic condition in Kenya, showing a drastic environmental change over the same period (May) of interval of two years (1998 - El Niño) [Left] ) and 2000 drought) [Right]. [Source: DRSRS NDVI dekadal plant biomass productivity analysis]

(Ojwang’ 2010)

Led to food extensive insecurity, conflict, famine.
Climatology-Runoff

- Declining flow since ‘70s
  - Dried up above Archers Post several times in ‘00s.
  - Abstraction. Predicted to rise over 200% to 2025.

Source: ENNDA
Climate Prediction: Temperature

A2 Mean Temperature 2040-2069

A2 Mean Temperature 2070-99

Sources: ClimateWizard, TNC
Climate Prediction: Precipitation
Samburu: Modeling Approach

• Dr. Jim Thorne, UC Davis providing guidance.
• Will use a similar SDM approach exploring a range of climate scenarios.
• Possibly simulate impact of management actions (e.g., water resources).
Species Distribution Modeling

Gorilla Location

Model Input Data

| ID | X | Y | P1 | P2 | P3 |...
|----|---|---|----|----|----|---
| 1  |   |   |    |    |    |    
| 2  |   |   |    |    |    |    
| 3  |   |   |    |    |    |    
| 4  |   |   |    |    |    |    
| ...|   |   |    |    |    |    |

Predictor Variables

Current Climate

Current Distribution

Future Climate

Future Distribution

Jim Thorne, UC Davis
Analysis: Corridors

1. Isolate core use areas
2. Model links using independent variables (topo, proximity to h2o)
3. Evaluate vs. mapped corridors
4. If effective model and climate-related variables are Significant>>model corridors future CC scenarios.
Samburu: Modeling Outcome

Next workshop!
Research Questions

Biogeography of the focal species and threats
• Can identify fundamental controls on current focal species movement patterns, distribution, and density through GIS layers? If yes, and climate-related variables are significant, scenario SDMs could be valuable.

Climate change impact
• How might species respond to range of future climates scenarios?
• What climate related factors contribute (e.g., spatiotemporal water availability)?
Research Questions

Management implications

• How expand/reconfigure conservation land base for corridors/habitat protection to bolster resilience of focal species?
• Where can we improve ecosystem function/alter resource availability to boost resilience? Water storage?
• How will pastoralists/rangelands be affected?
• What should we monitor to guide CC-informed adaptive management?
Future Directions

- Landscape stakeholder meeting to interpret utility of analyses. Range from conservation community to water authorities.
- Consider climate impact on grazing resources/viability of pastoralist.
- Harness traditional knowledge on climate adaptations.
- Project future land use, population change. How might intersect with climate impacts?
Beyond Samburu?

Create vulnerability analysis/adaptation strategy development template using Samburu/Virunga experience for application in other landscapes.

Given lack of resources/data to conduct SDM based VA for every species/landscape…need a light assessment framework.

• Expert-driven “trait” approach seems most viable option (e.g., Chin 2010). Conducted by landscape research/conservation community.
• Would rank species as high/moderate/low vulnerability…triage.
• High vulnerability species could be considered for more SDM VA.
• Trait assessment would inform monitoring programs.
Closing remarks

1. Use REDD+ to compliment adaptation strategy…find win-wins.
2. Tap traditional knowledge.
THANK YOU!