Climate change and biodiversity
(cartoon)
Species at risk - montage
Nature Jan 1 2004 cover
Aloe dichotoma
(quiver tree)

Figure 4: Maps showing bioclimatic envelope projections for Aloe dichotoma in South Africa based on the HadCM2 (no-sulphates) model for a) the present, b) 2010, c) 2020, d) 2030, e) 2040 and f) 2050. Red points show the current distribution.
Andes Hotspot maps from BIOME for original class biome types

Current Biome Type
- Boreal deciduous forest/woodland
- Temperate conifer forest
- Temperate/boreal mixed forest
- Temperate deciduous forest
- Temperate broad-leaved evergreen forest
- Tropical seasonal forest
- Tropical rain forest
- Tropical deciduous forest
- Moist savannas
- Dry savannas
- Tall grassland
- Short grassland
- Xeric woodlands/scrub
- Arid shrubland/steppe
- Desert
- Arctic/alpine tundra

No. of models predict pixel change
- 0
- 1
- 2
- 3
- 4
- 5
- 6
Methods

• Range shift modeling
  – BioMOD
  – Bayesian soils
  – Consensus Model

• Dynamic modeling
  – Sierra foothills case study
1) GLM                         2) GAM                         3) CART                         4) ANN

The probability map under **the current climate**

BioMOD (Thuiller et al 2003)

The probability map under **the future climate**
Bayesian suitability

The probability map under **the current climate**

The probability map under **the future climate**

1) Climate
2) Soil
3) Climate+Soil
4) Bayesian
Consensus model

The predicted distribution under **the current climate**

The predicted distribution under **the future climate**
Results

• **Range shift projections**
  – Individual species
  – Patterns of richness
  – Vulnerable species assessment

• **Dynamic modeling**
  – Sierra foothills case study
Range Shift: *Q. garryana*
Range Shift: *P. contorta*
Endemic Richness

31 Endemic Tree Species
Case Study Area: Southern Sierra Foothills
Effects of fire on distribution of blue oaks in presence of competing pine species

- Oaks present only with fire
- Oaks present only without fire
- Oaks present with or without fire
Toles Washington Post - cartoon