

Are Cape Lowlands doomed for climatic extinction?

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science
& technology

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Climate change and geography

The geography of climate change: implications for conservation biogeography

D. D. Ackerly^{1*}, S. R. Loarie², W. K. Cornwell¹, S. B. Weiss³, H. Hamilton⁴,
R. Branciforte⁵ and N. J. B. Kraft^{1†}

The velocity of climate change

Scott R. Loarie¹, Philip B. Duffy^{1,2}, Healy Hamilton³, Gregory P. Asner¹, Christopher B. Field¹ & David D. Ackerly⁴

A Climatic Stability Approach to Prioritizing Global Conservation Investments

Takuya Iwamura*, Kerrie A. Wilson, Oscar Venter, Hugh P. Possingham

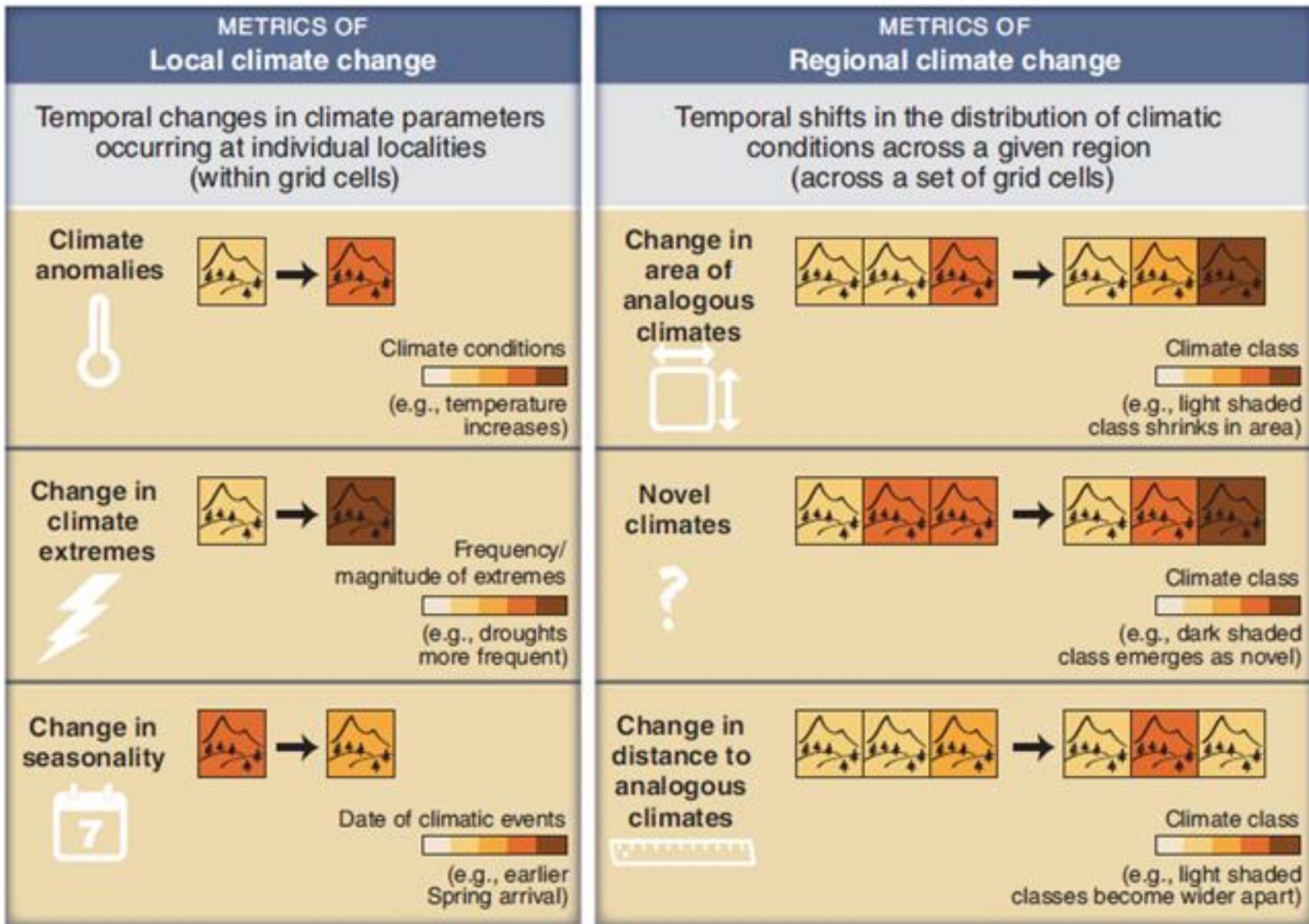
Ecology Centre, The University of Queensland, Brisbane, Queensland, Australia

Targeting climate diversity in conservation planning
to build resilience to climate change

NICOLE E. HELLER,^{1,2,†} JASON KREITLER,³ DAVID D. ACKERLY,⁴ STUART B. WEISS,⁵ AMANDA RECINOS,⁶
RYAN BRANCIFORTE,⁷ LORRAINE E. FLINT,⁸ ALAN L. FLINT,⁸ AND ELISABETH MICHELI¹

Multiple Dimensions of Climate Change and Their Implications for Biodiversity

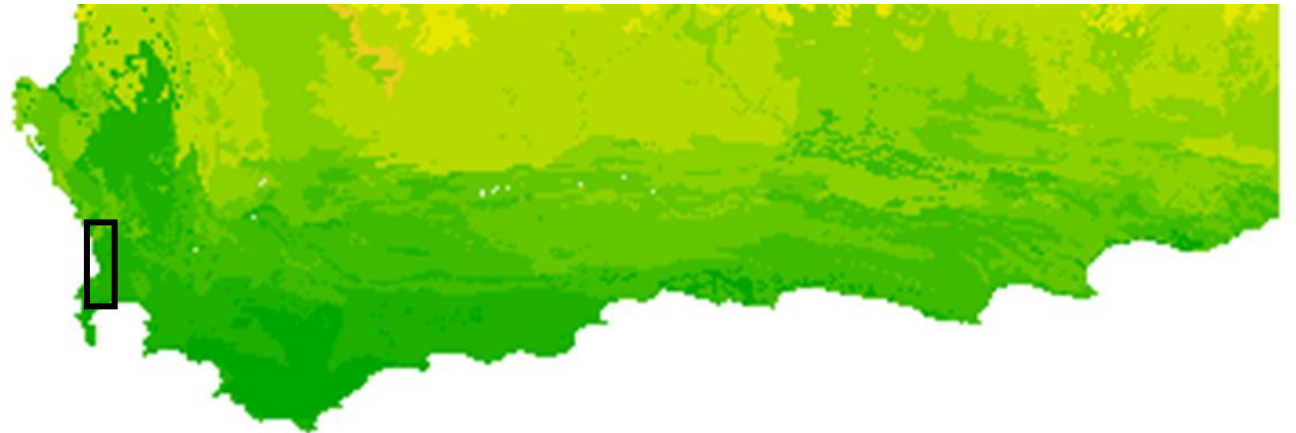
Raquel A. Garcia,* Mar Cabeza, Carsten Rahbek, Miguel B. Araújo*



Multiple Dimensions of climate change. Garcia *et al.* 2015

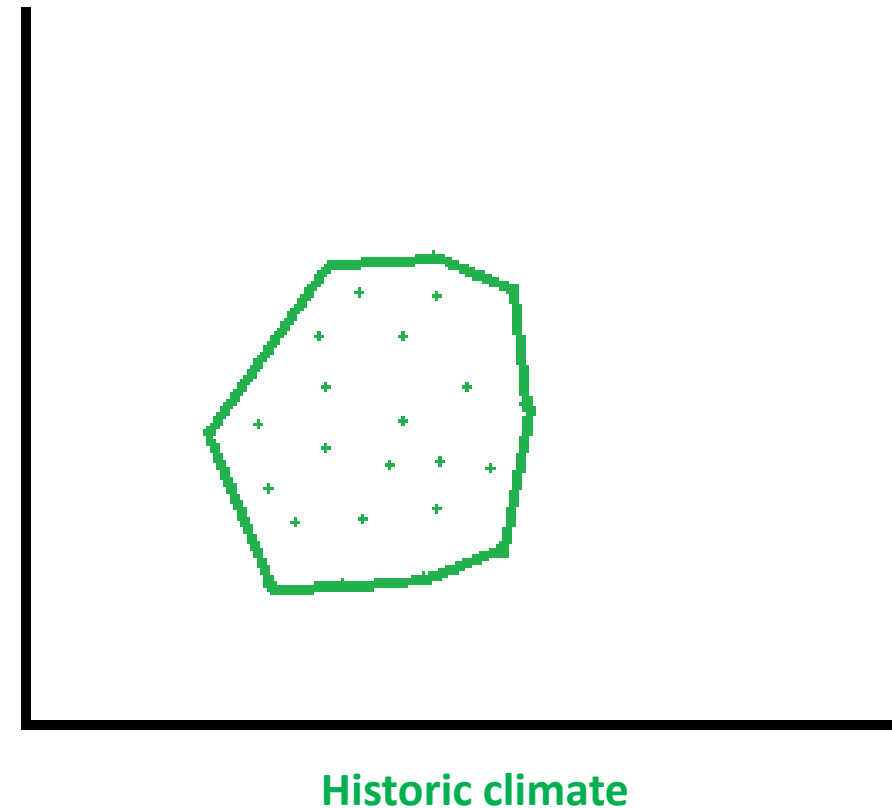
Are Cape lowlands doomed for climatic extinction?

- Cape Lowlands are severely transformed + additional threats
 - Alien invasions
 - Climate change
- Climate change is expected to be a major driver, but interaction with transformation will be very devastating
- Aim: quantify threat of climate change for Cape Lowlands and species they harbour



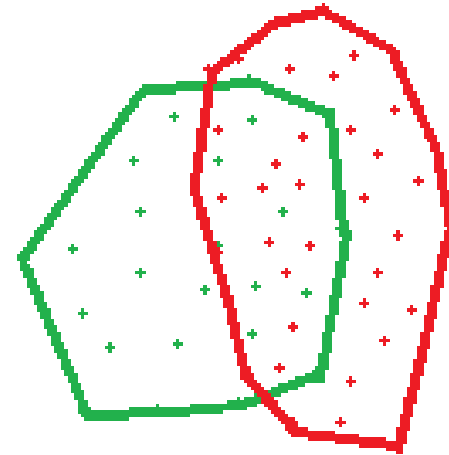
Are Cape lowlands doomed for climatic extinction?

- Climatic stability
 - Compute convex hull volume using 5 climatic variables



Are Cape lowlands doomed for climatic extinction?

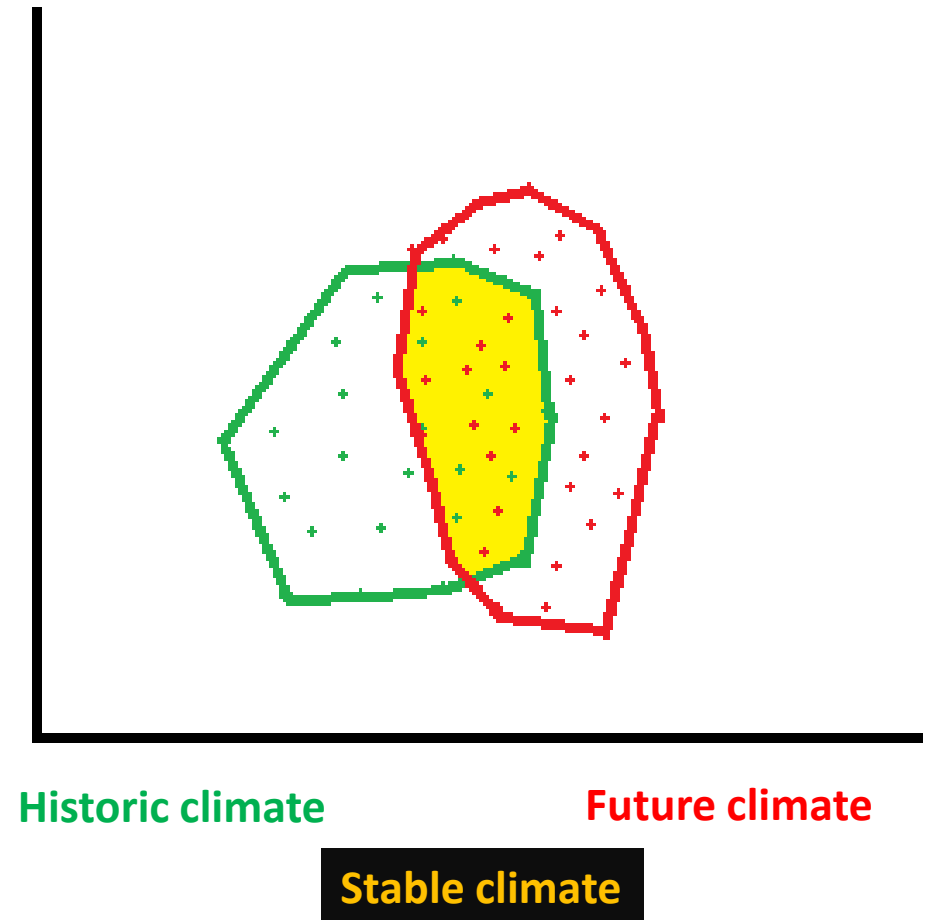
- Climatic stability
 - Compute convex hull volume using 5 climatic variables
- Future climate models
 - Downscaled by Wilson et al. 2015
 - 11 CMIP5 general circulation models
 - 2 scenarios, RCP4.5 and RCP8.5
 - 1950-2000 and 2046-2065



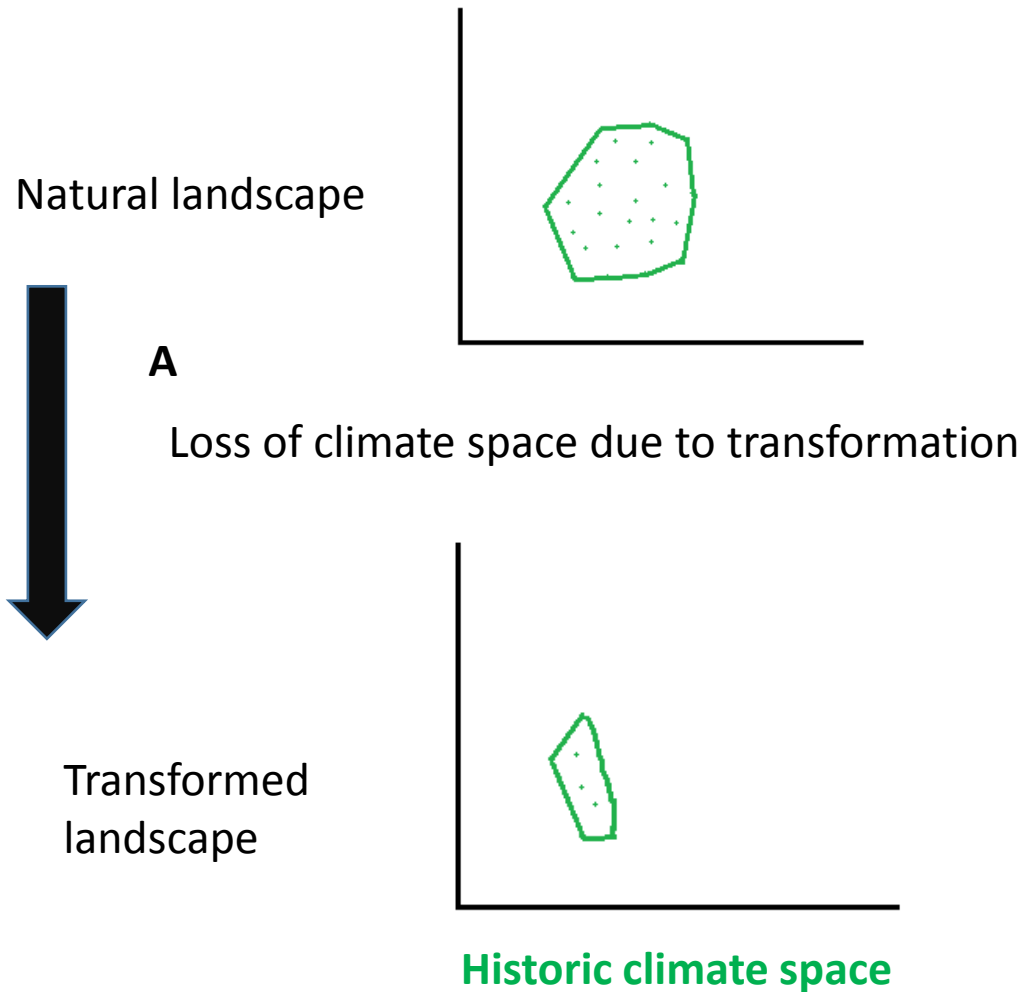
Are Cape lowlands doomed for climatic extinction?

- Climatic stability
 - Compute convex hull volume using 5 climatic variables
- Future climate models
 - Downscaled by Wilson et al. 2015
 - 1950-2000 and 2046-2065
- Calculate climatic stability as

$$\frac{(HullV_h + HullV_f - HullV_u)}{HullV_h}$$



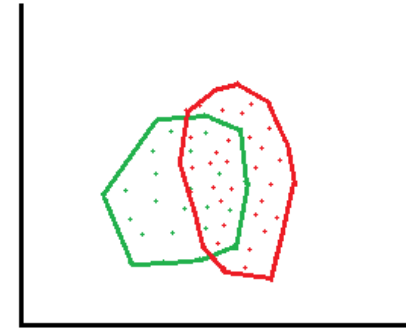
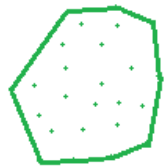
Climate change interaction with transformation



Climate change interaction with transformation

B Loss of climate space due to climate change

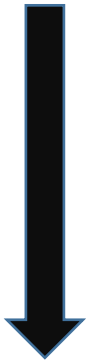
Natural landscape



Future climate space

A

Loss of climate space due to transformation



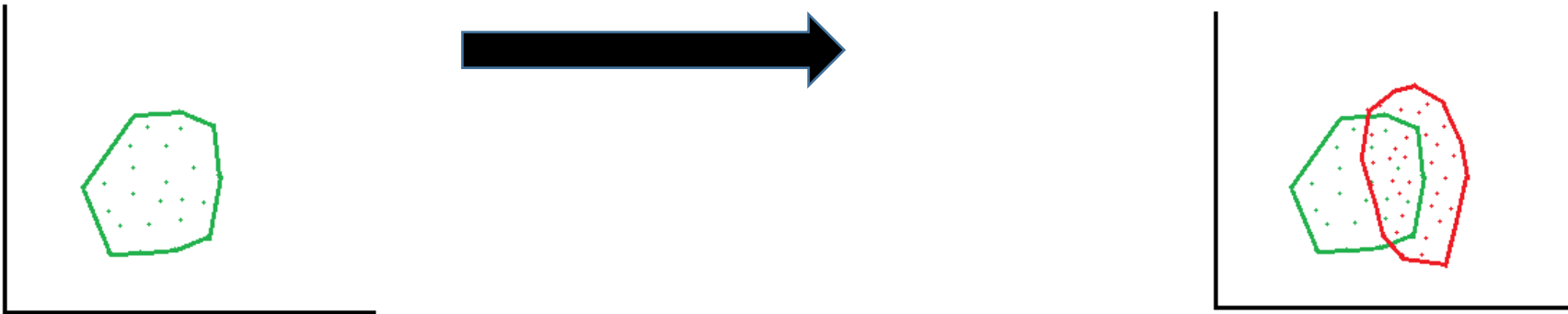
Transformed landscape



Historic climate space

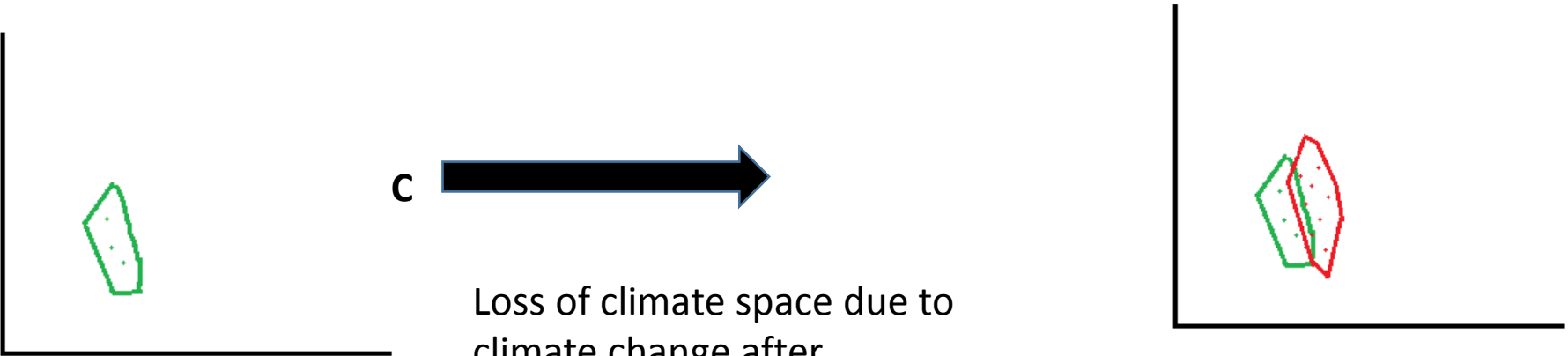
Climate change interaction with transformation

B Loss of climate space due to climate change



Natural landscape

A
Loss of climate space due to transformation



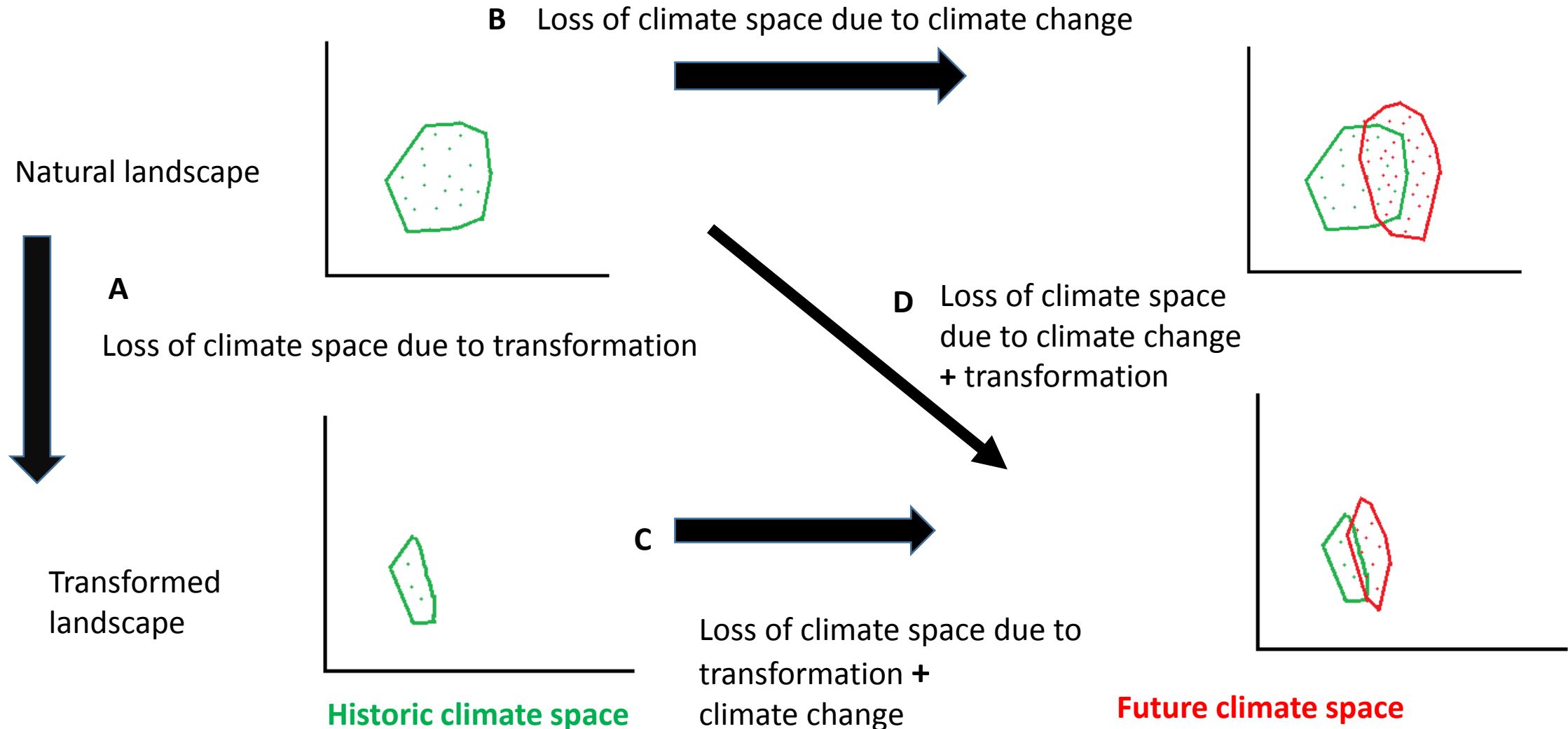
Transformed landscape

C
Loss of climate space due to climate change after transformation

Historic climate space

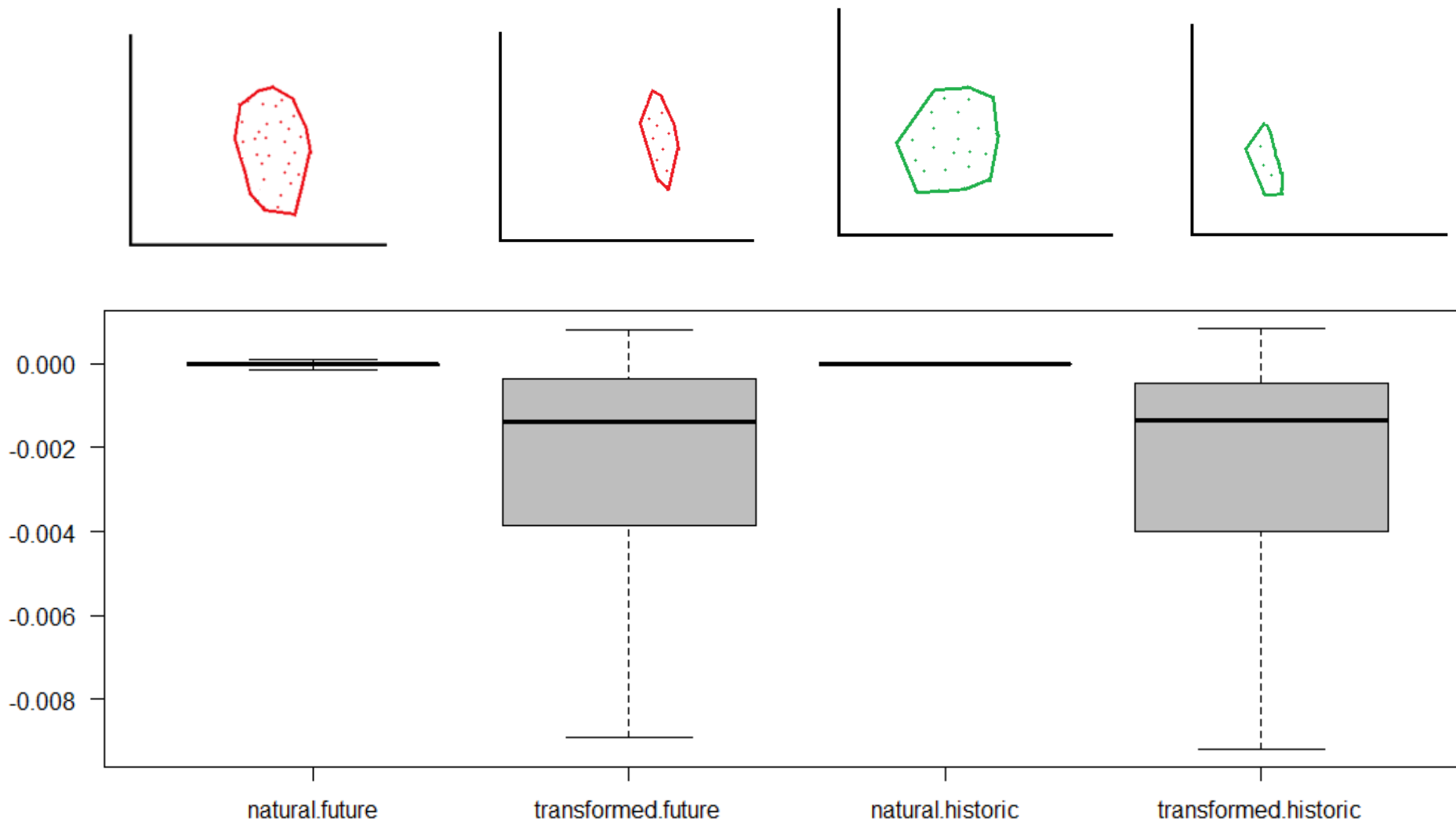
Future climate space

Climate change interaction with transformation



Climate convex hull volume relative to natural, historic climate

Climate volume difference from natural historic



Summary of preliminary findings

- Climate space lost due to transformation
 - This raises further concerns for climate change impacts
- Climate data is coarse, presenting a challenging when thinking about climate change at microscale
- Topography can be used as proxy for climatic heterogeneity at microscale
- Climatic extinction will poses a threat on taxa with limited dispersal capabilities and low climatic intolerances.

THANK YOU

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 - Serban
 - Jasper
- Fynbos Forum