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 @rvanmazijk



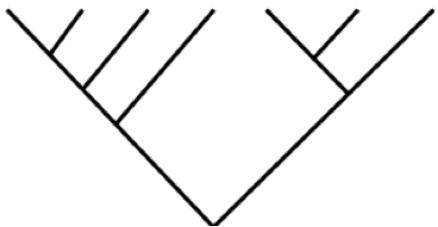
Environmental heterogeneity & plant species richness

In two mediterranean-type hyper-diverse floras

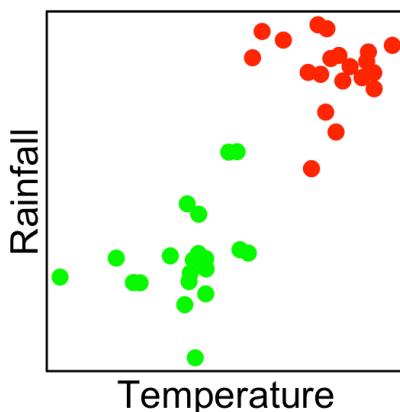
Van Mazijk, Cramer & Verboom (2021). Environmental heterogeneity explains contrasting plant species richness between the South African Cape and southwestern Australia. *Journal of Biogeography* 48(8):1875–1888. DOI: [10.1111/jbi.14118](https://doi.org/10.1111/jbi.14118).

Species richness

Speciation

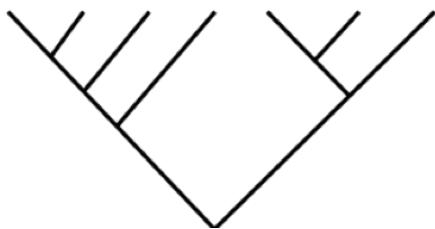


Co-existence

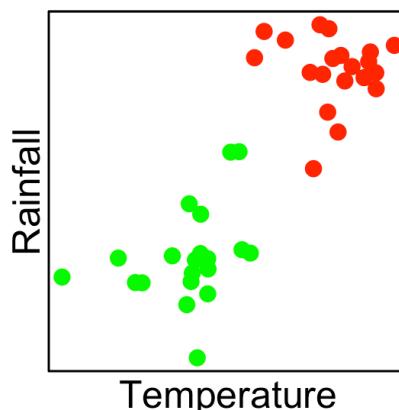


Species richness

Speciation along ecological gradients



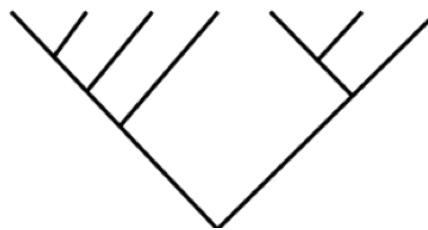
Co-existence within ecological space



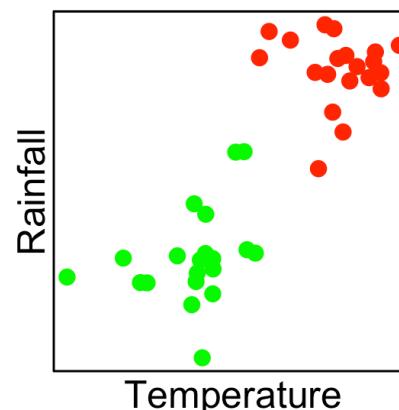
Species richness

(the role of environmental heterogeneity)

Speciation along ecological gradients

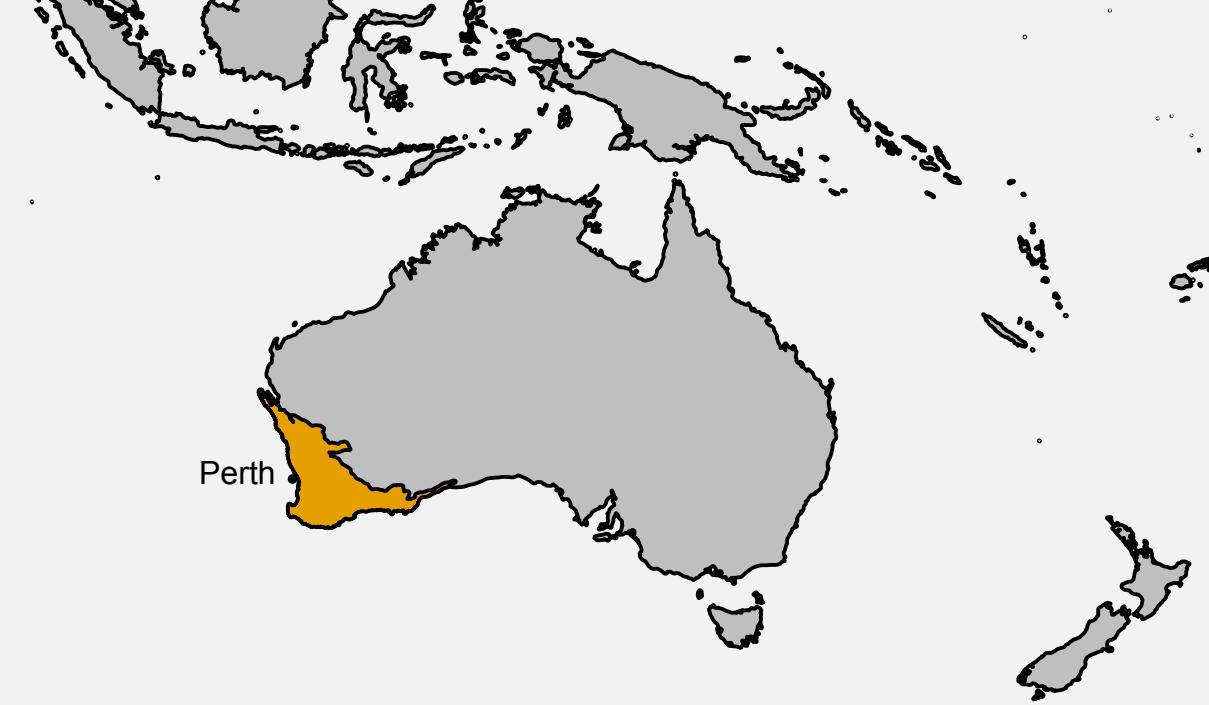


Co-existence within ecological space



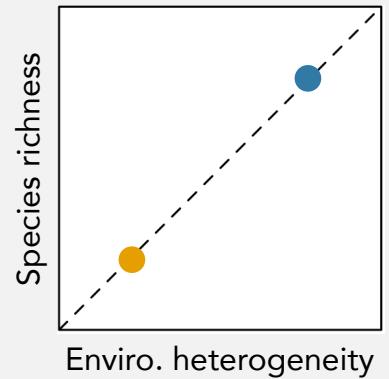


Cape Town

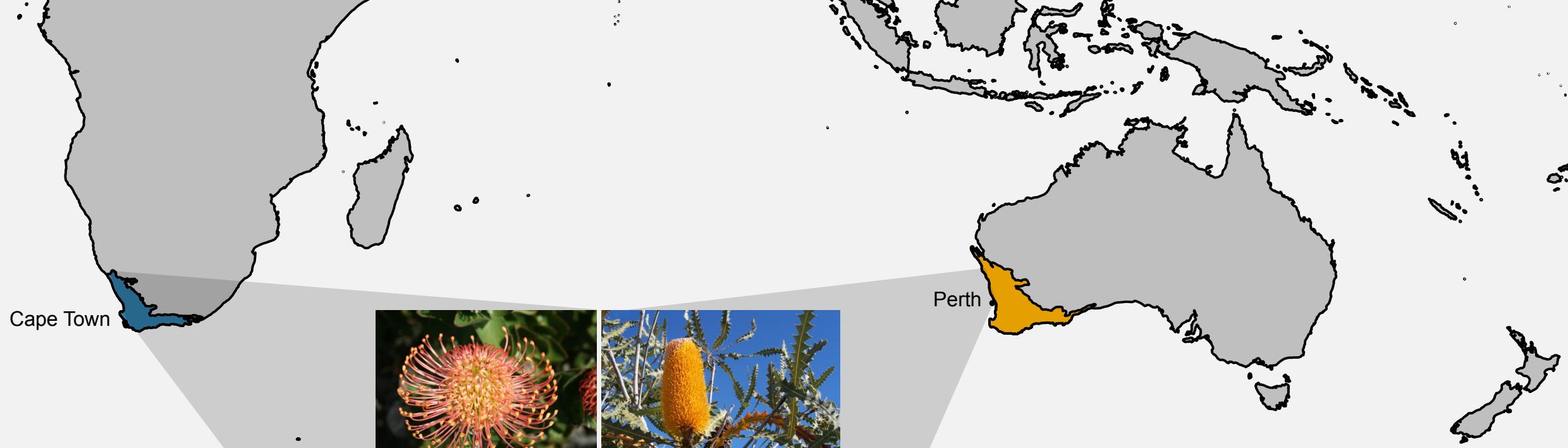


Perth

Expectation:



The Greater Cape Floristic Region &
the Southwest Australian Floristic Region

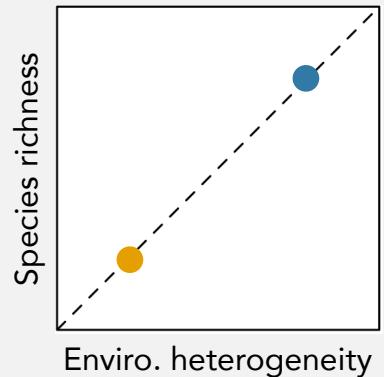


Cape Town

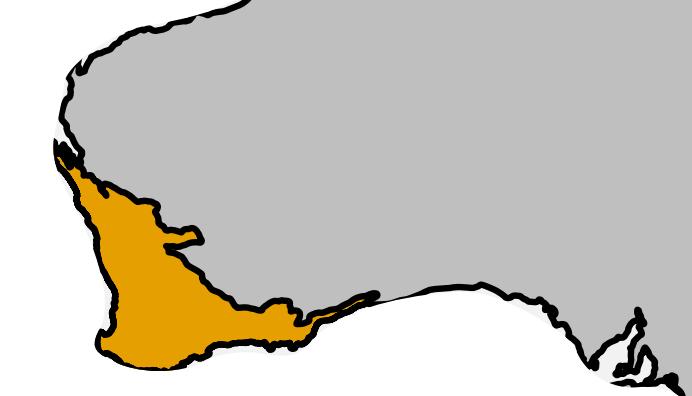
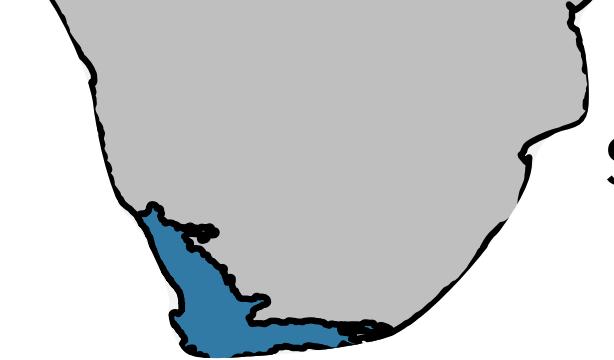
Perth



Expectation:

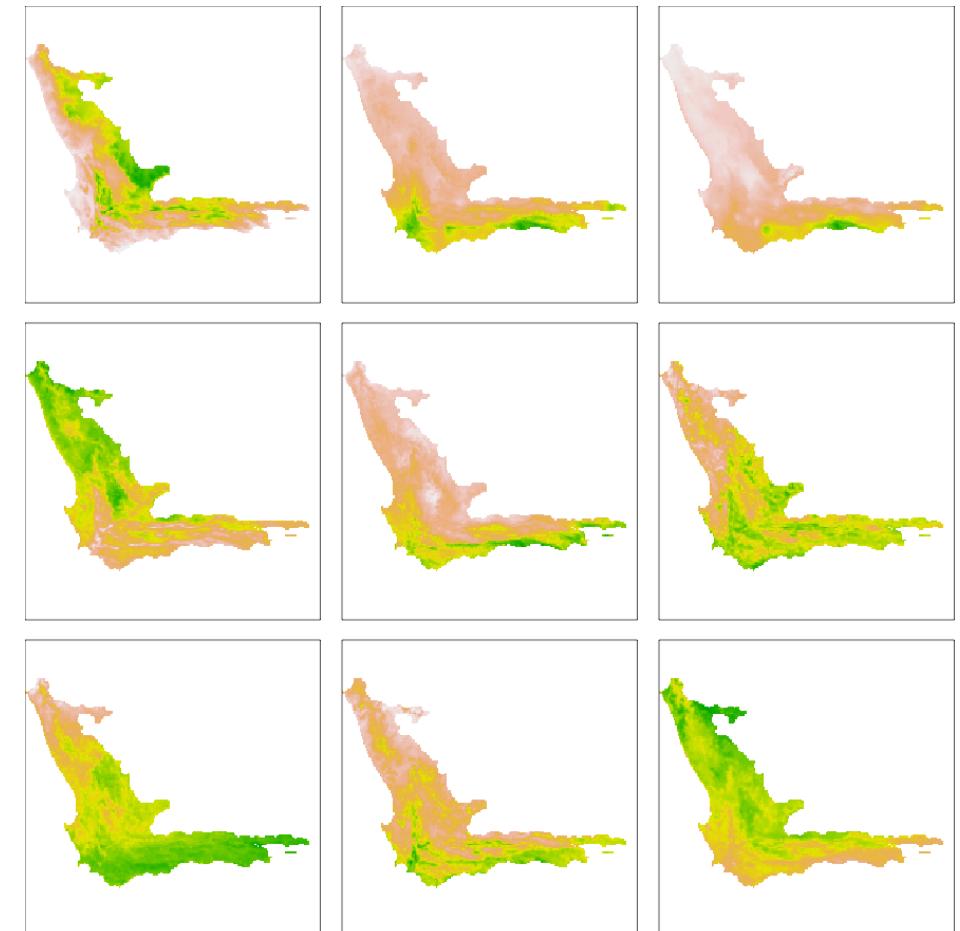


The Greater Cape Floristic Region &
the Southwest Australian Floristic Region

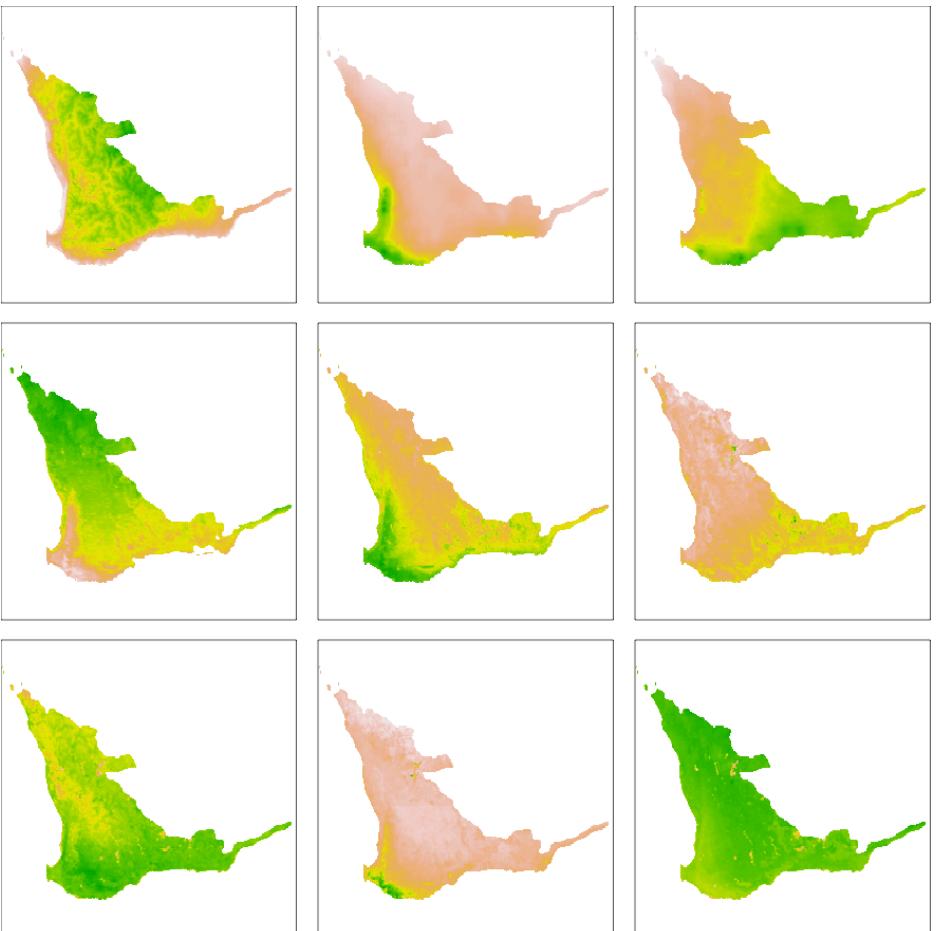


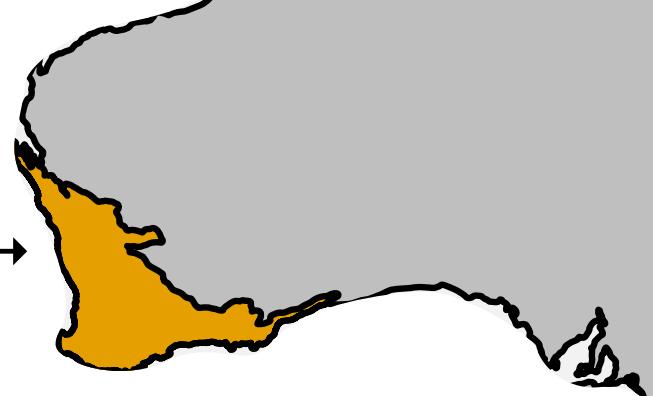
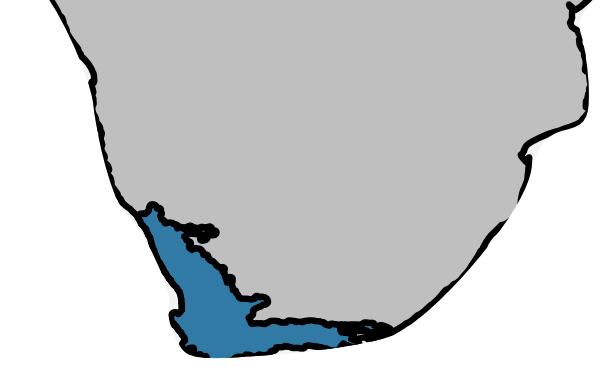
SRTM, MODIS, CHIRPS, SoilGrids250m →

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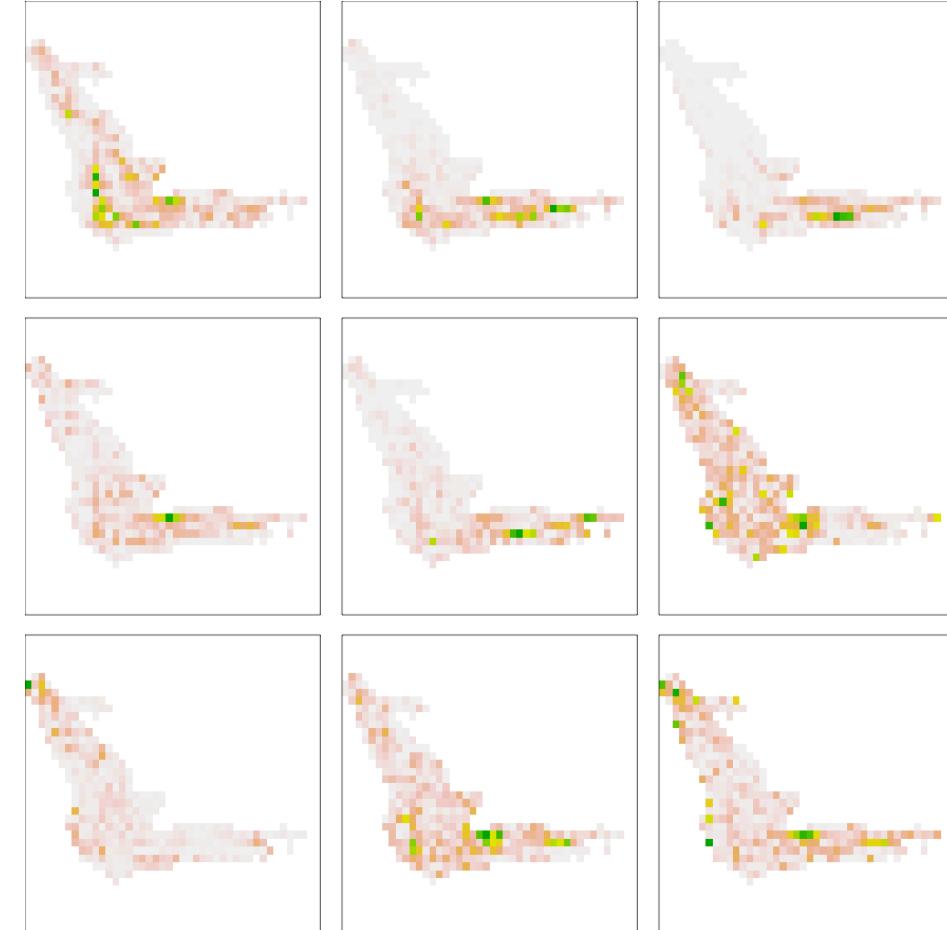


- Elevation
- NDVI
- Surface T
- MAP
- PDQ
- CEC
- Clay
- Soil C
- Soil pH



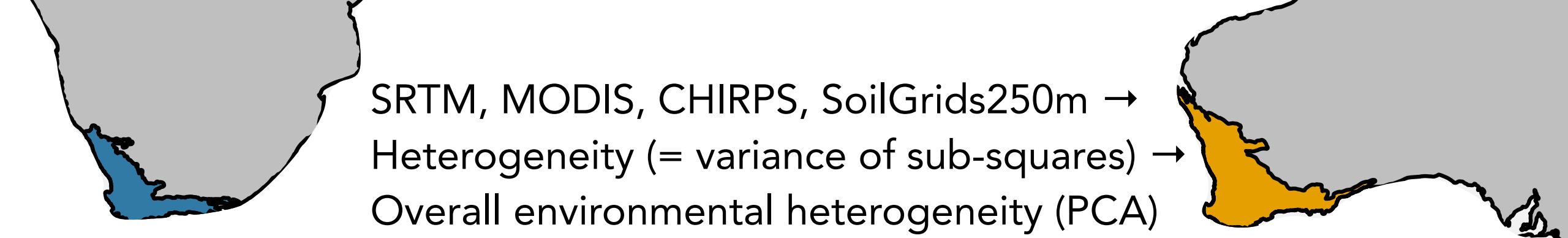


SRTM, MODIS, CHIRPS, SoilGrids250m →
Heterogeneity (= variance of sub-squares) →

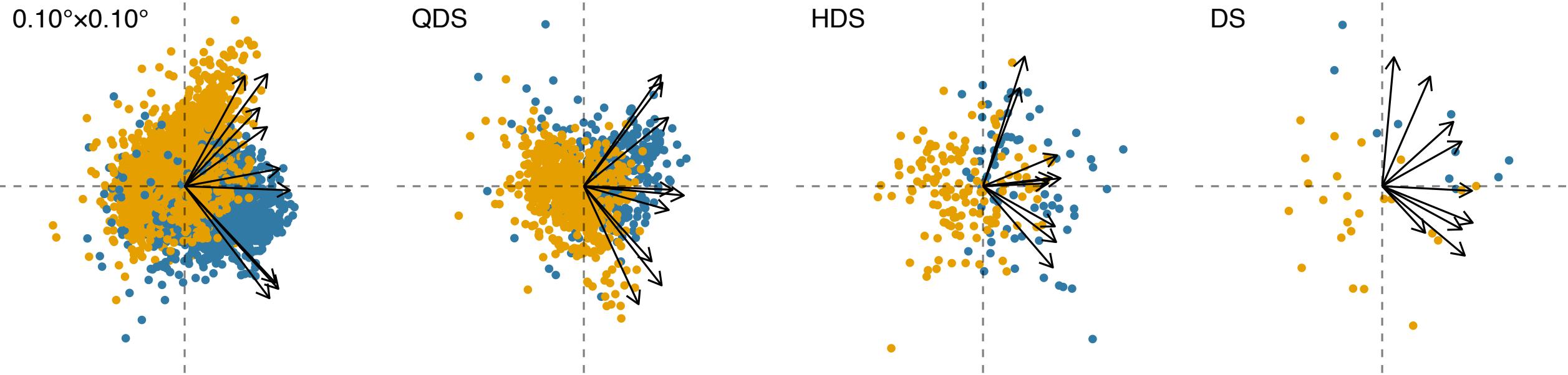


- Elevation
- NDVI
- Surface T
- MAP
- PDQ
- CEC
- Clay
- Soil C
- Soil pH





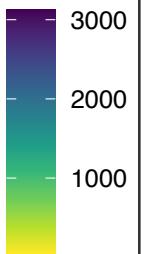
SRTM, MODIS, CHIRPS, SoilGrids250m →
Heterogeneity (= variance of sub-squares) →
Overall environmental heterogeneity (PCA)



GCFR

SWAFR

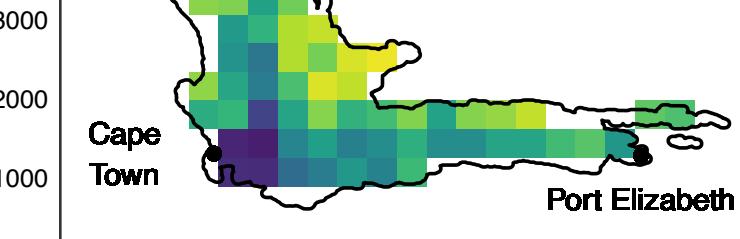
Species
richness:
(GBIF)



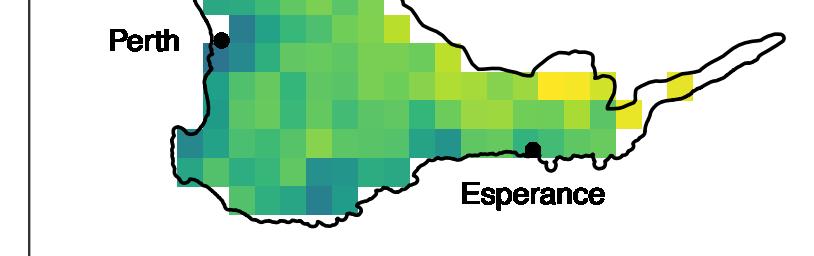
Environmental
heterogeneity:
(SRTM, MODIS,
CHIRPS, SoilGrids250m)



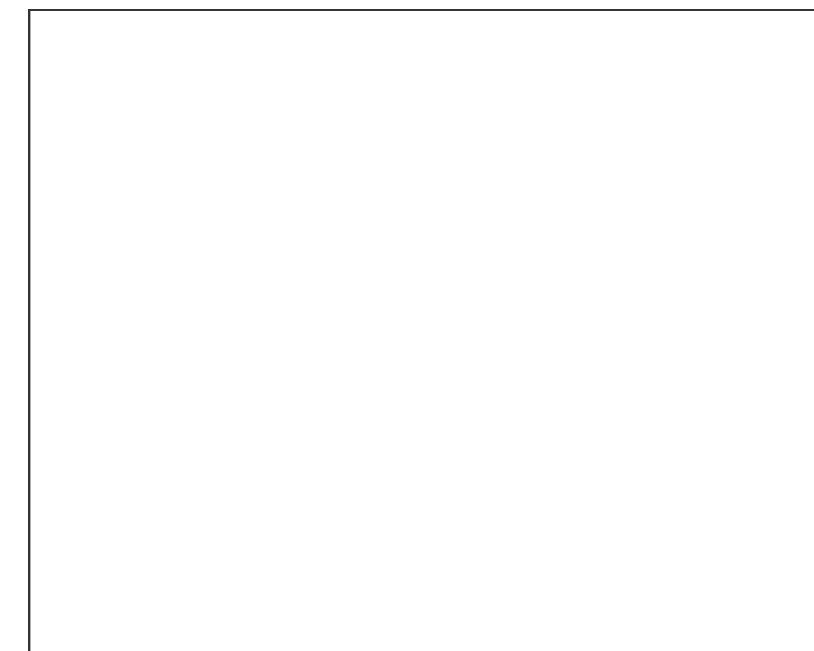
Species richness:
(GBIF)



SWAFR



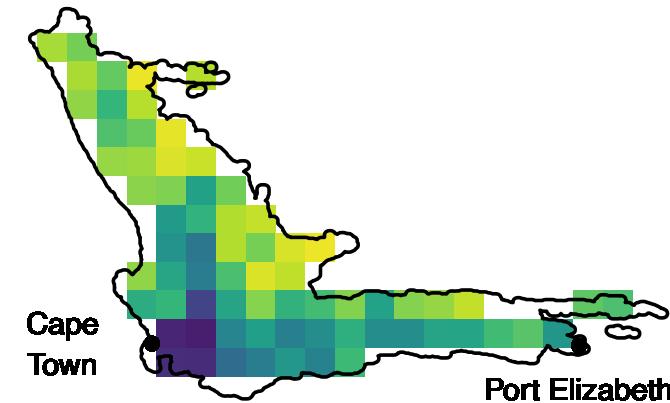
Environmental heterogeneity:
(SRTM, MODIS,
CHIRPS, SoilGrids250m)



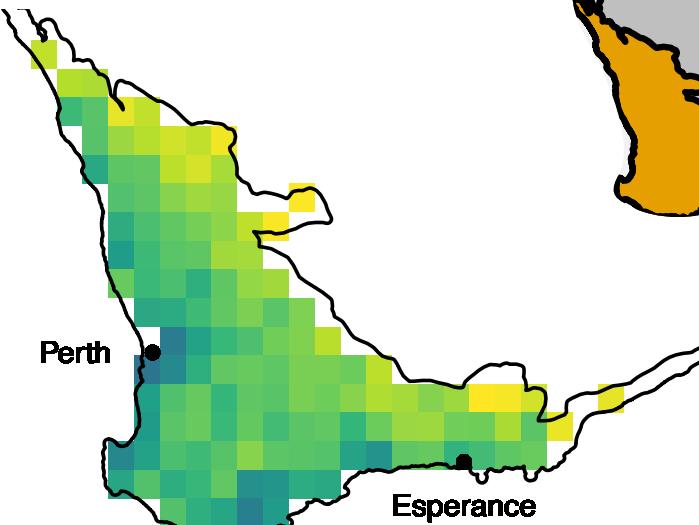
Species richness:
(GBIF)



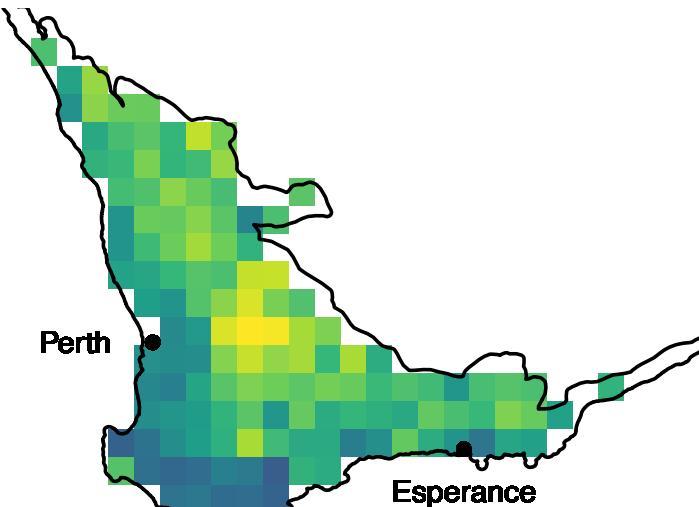
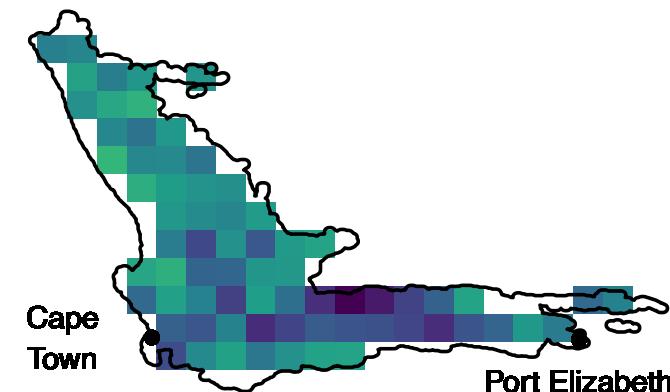
GCFR

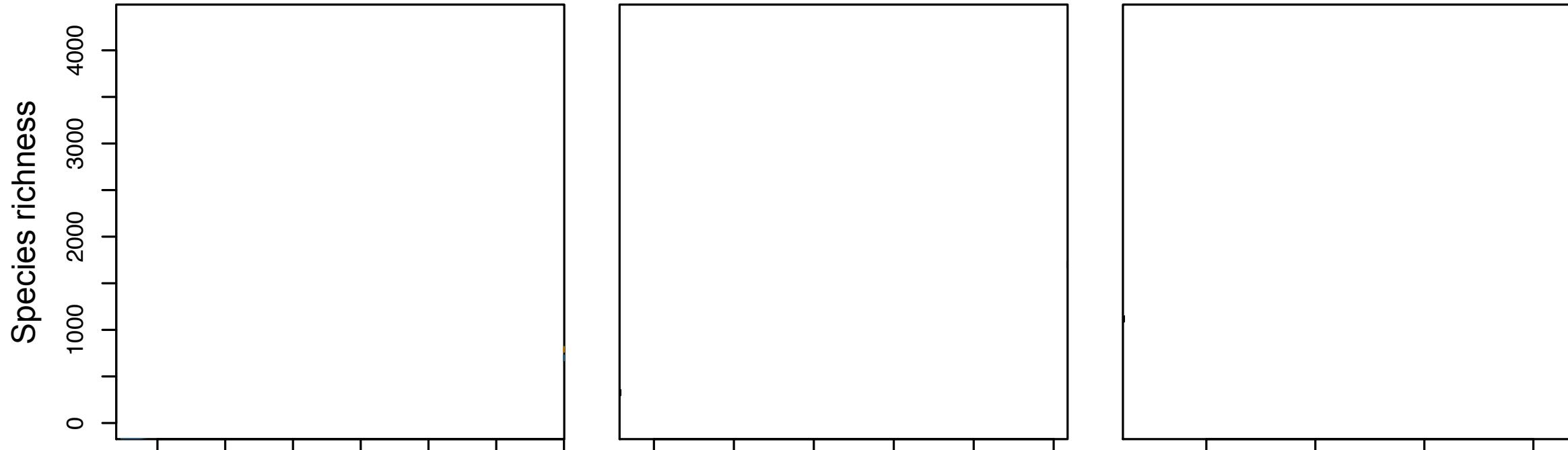


SWAFR

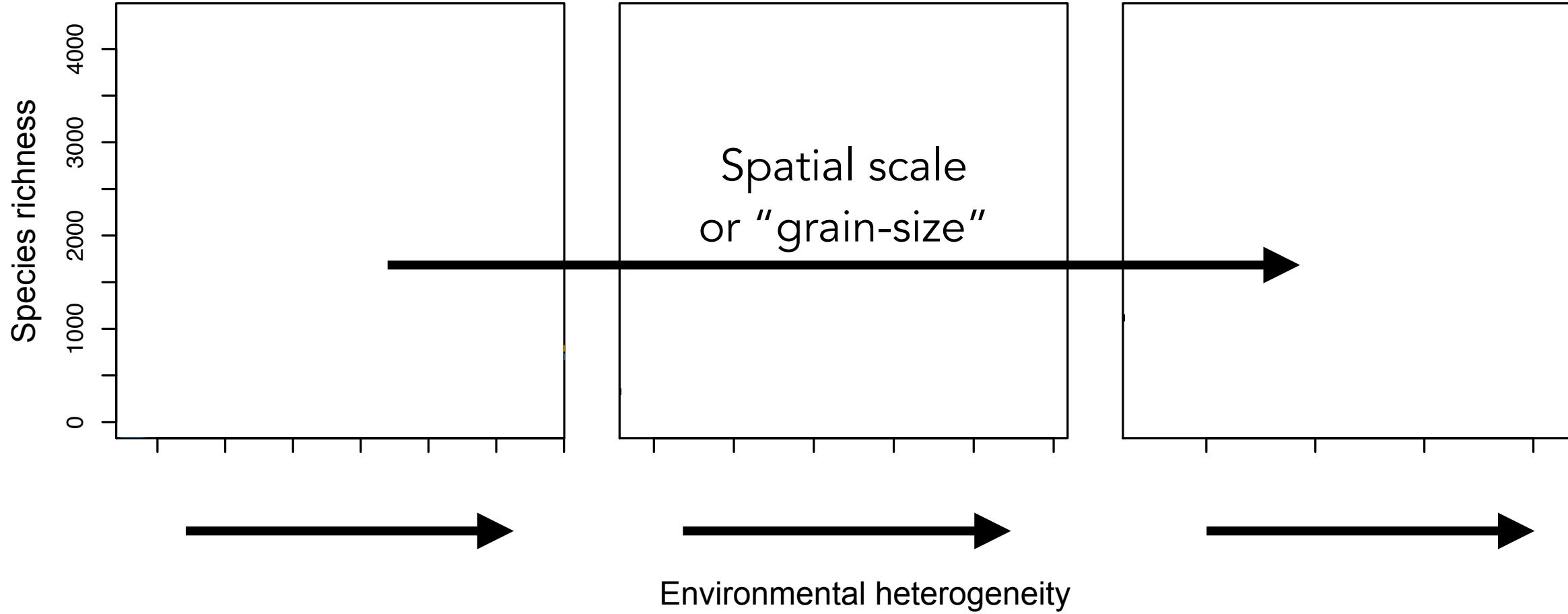


Environmental heterogeneity:
(SRTM, MODIS,
CHIRPS, SoilGrids250m)





Environmental heterogeneity

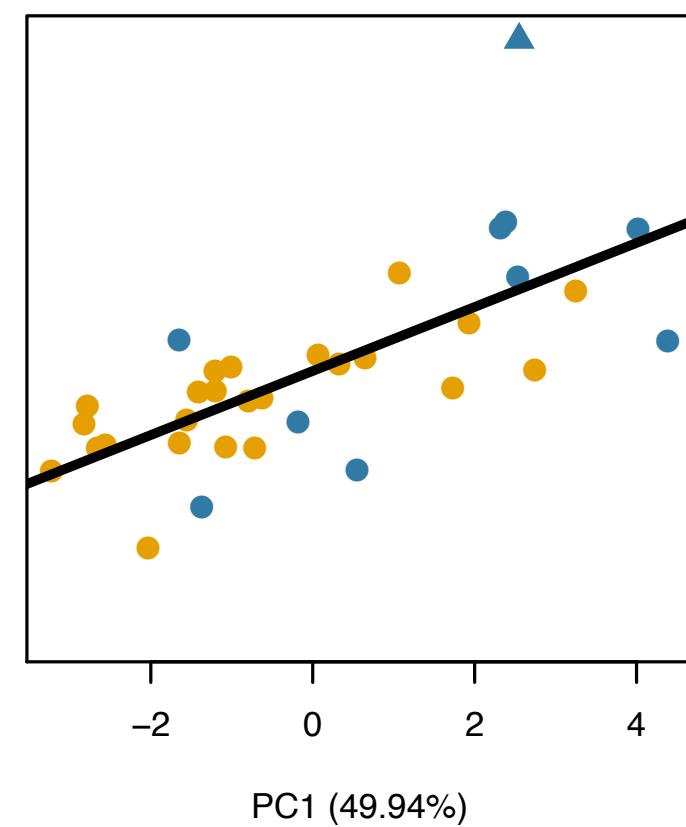
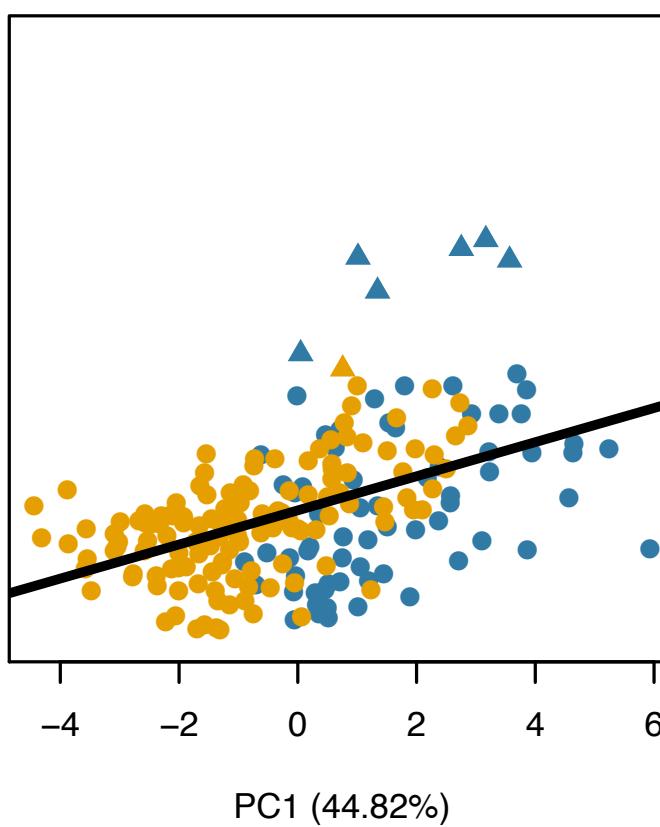
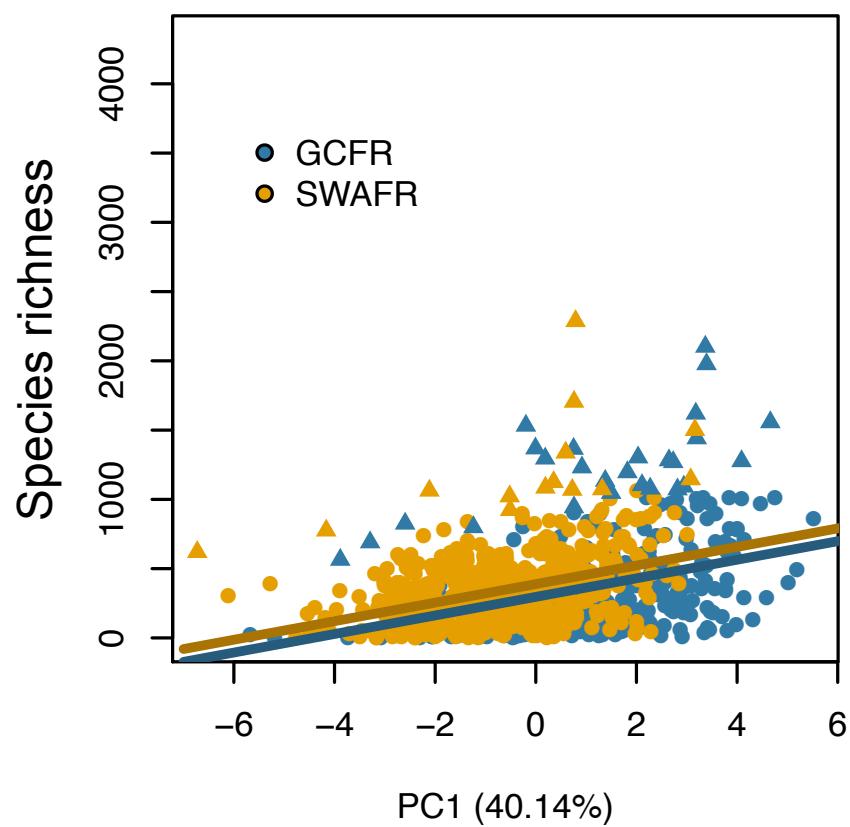




(a) QDS ($R^2 = 0.13$)

(b) HDS ($R^2 = 0.22$)

(c) DS ($R^2 = 0.49$)



Environmental heterogeneity

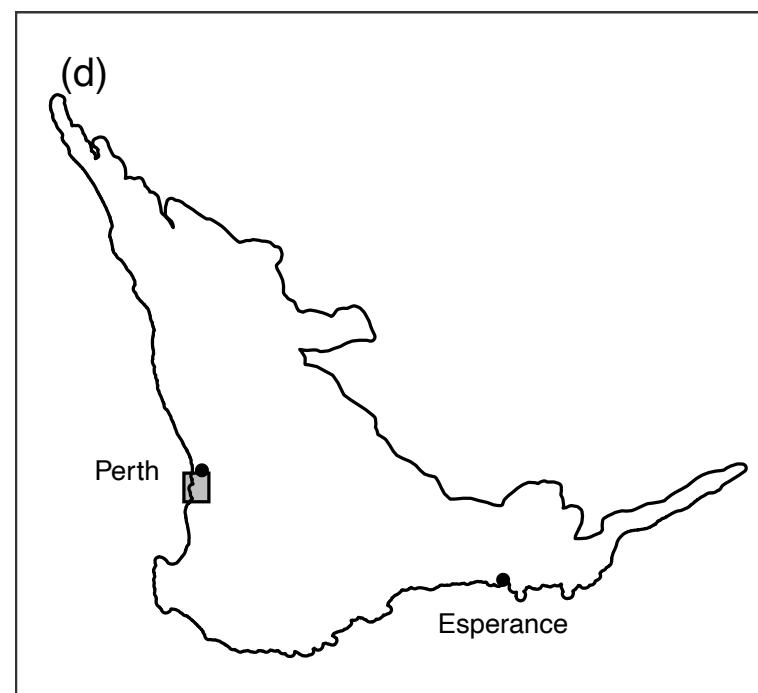
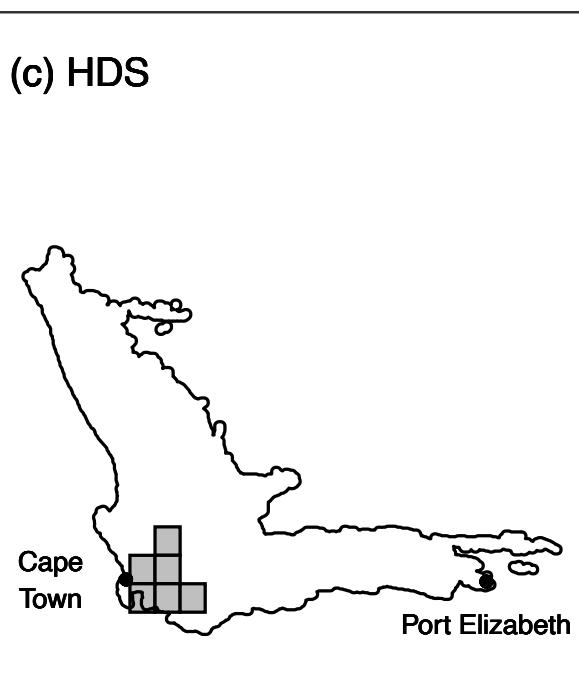
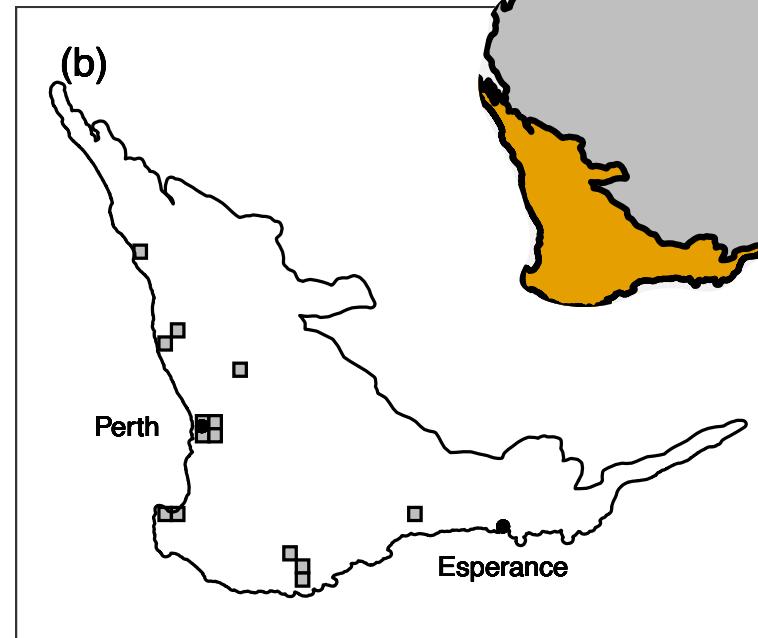
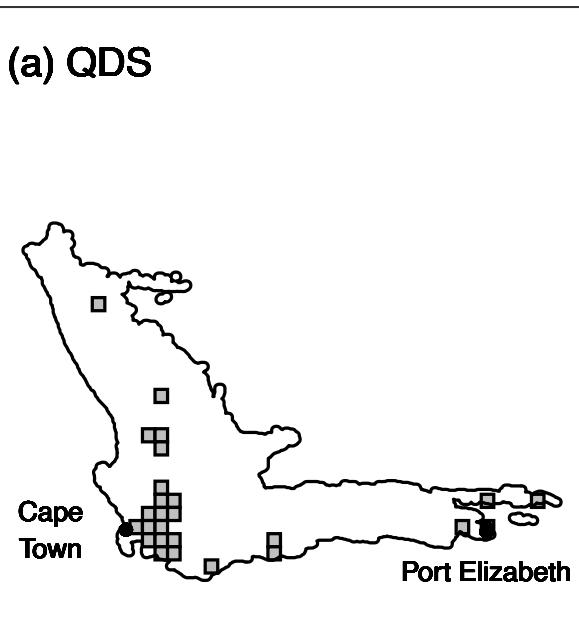


GCFR



SWAFR

Aside: "Hotspots",
where richness $\geq 2 \times SD$
above/below predicted

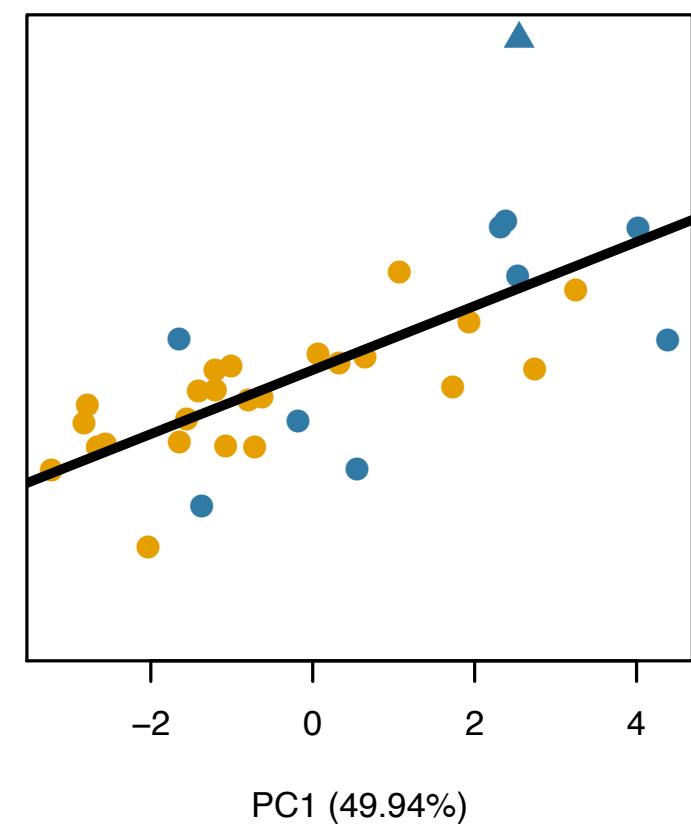
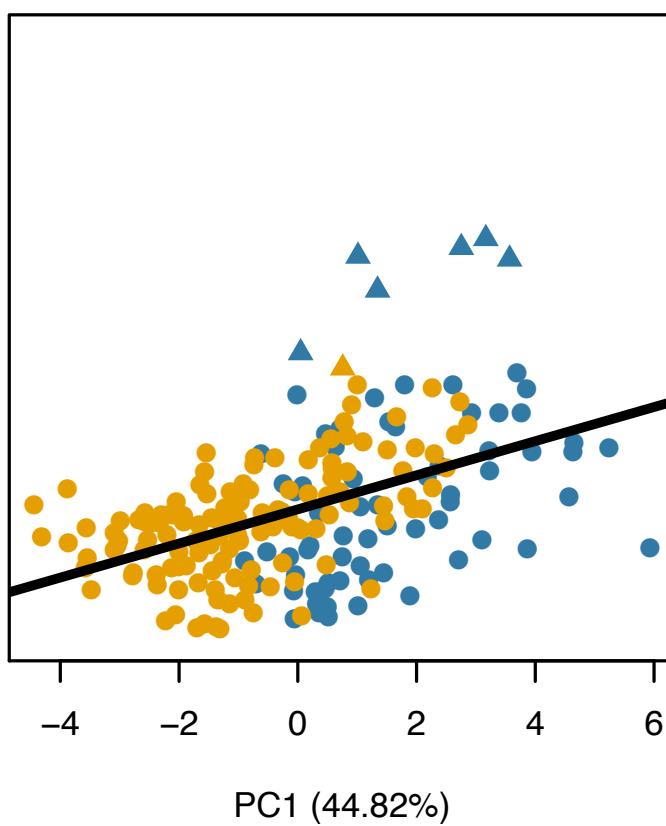
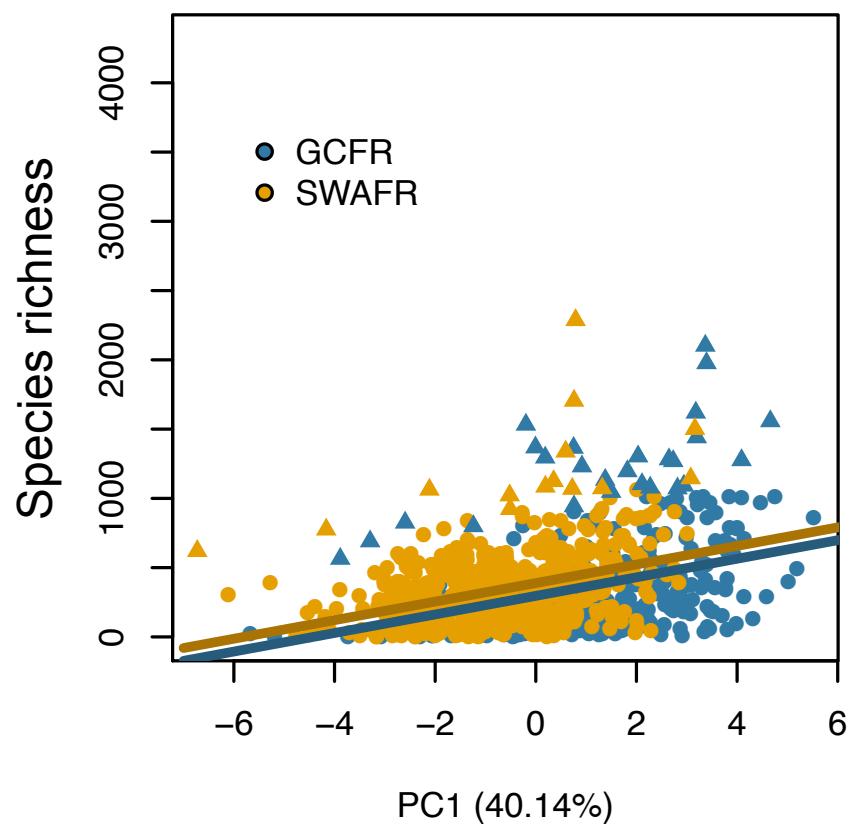




(a) QDS ($R^2 = 0.13$)

(b) HDS ($R^2 = 0.22$)

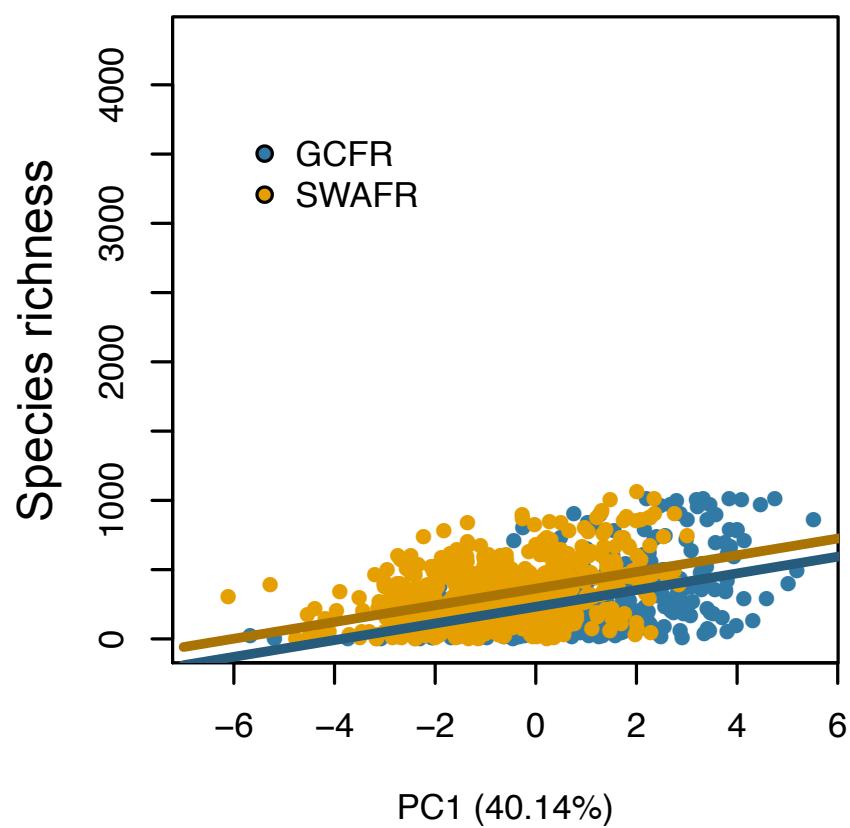
(c) DS ($R^2 = 0.49$)



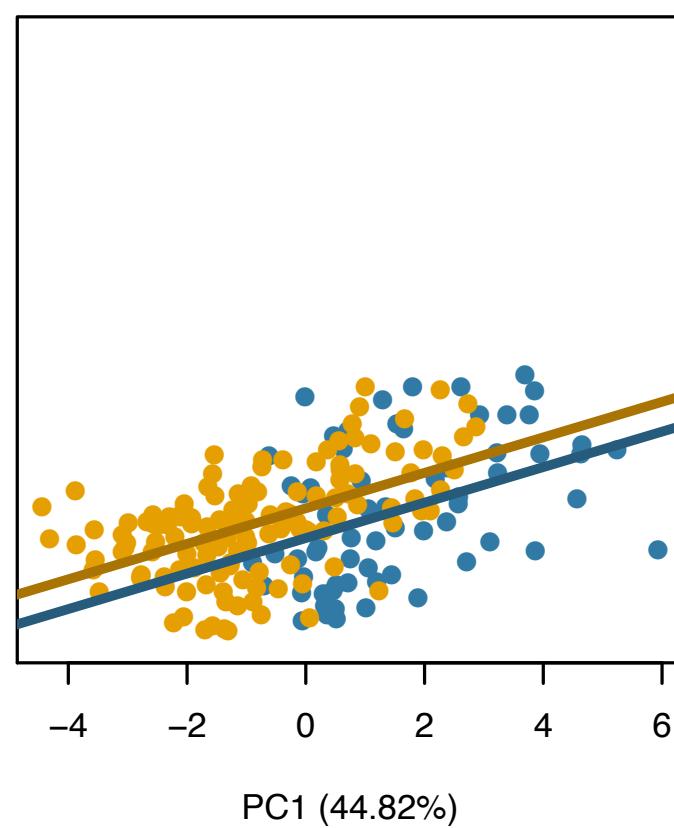
Environmental heterogeneity



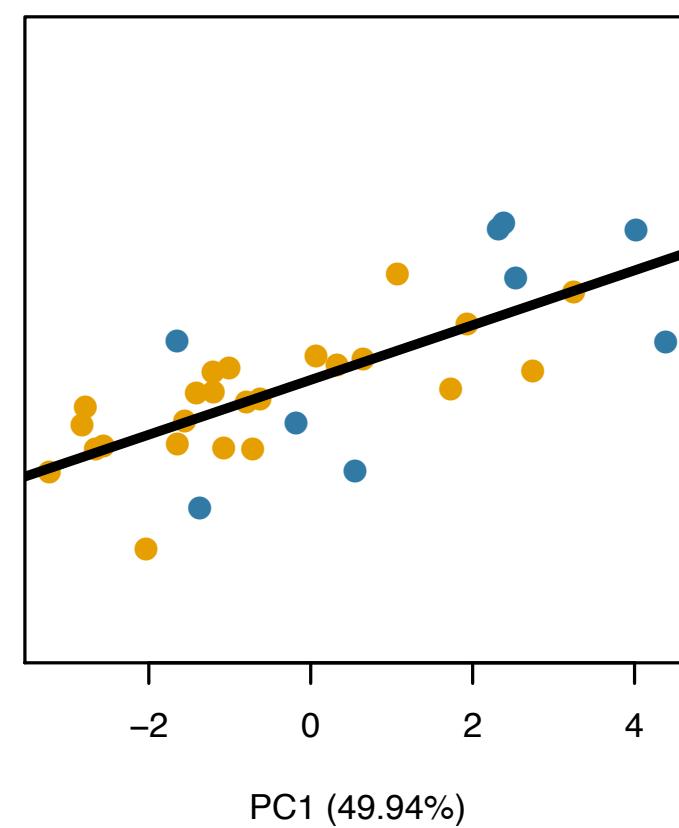
(a) QDS ($R^2 = 0.16$)



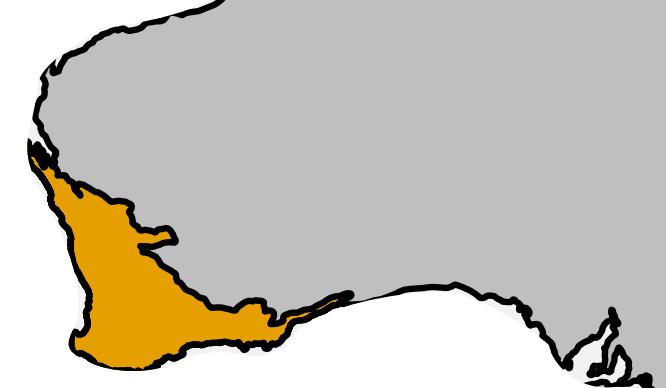
(b) HDS ($R^2 = 0.25$)



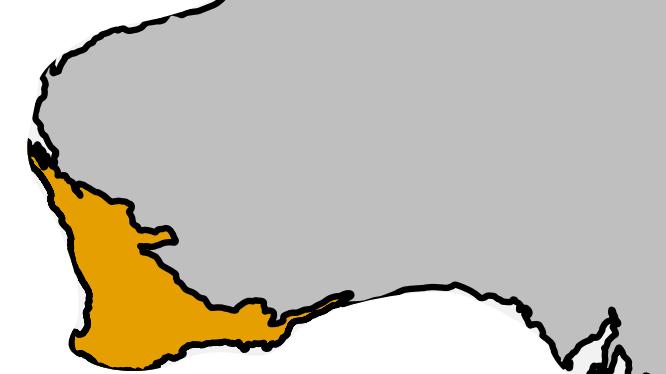
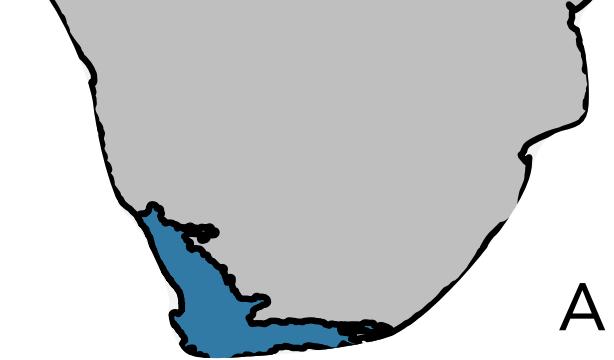
(c) DS ($R^2 = 0.54$)



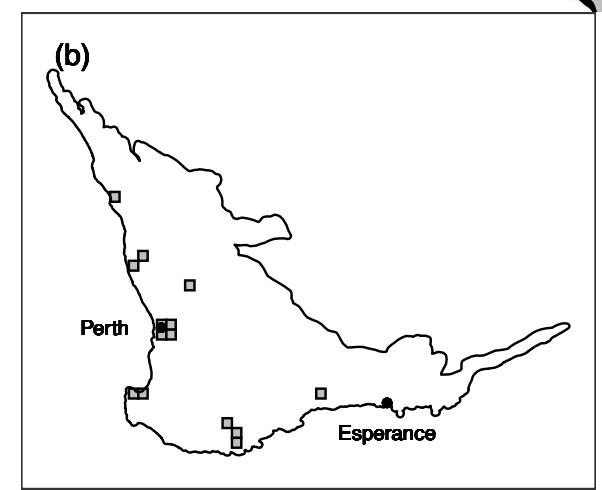
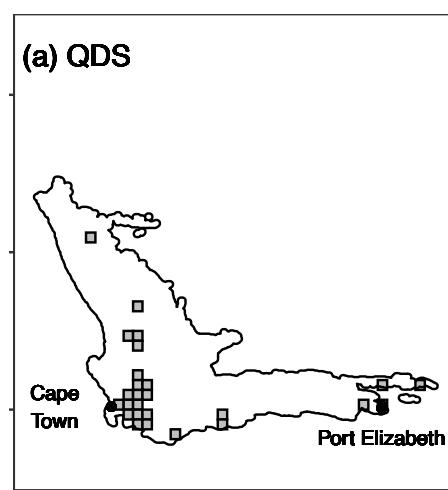
Environmental heterogeneity



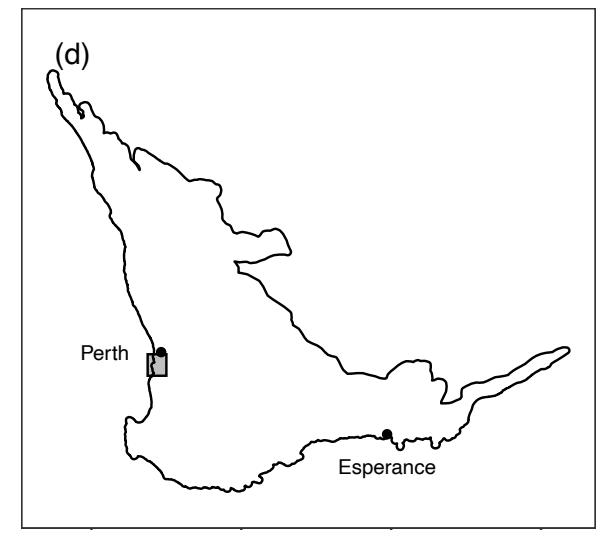
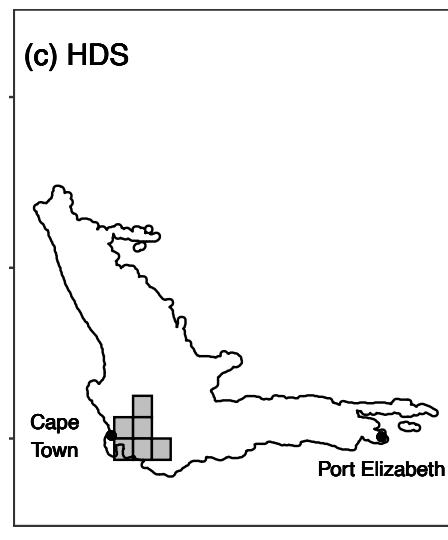
A **common relationship** between floral & environmental diversity, broadly consistent across spatial scales.



A **common relationship** between floral & environmental diversity, broadly consistent across spatial scales.



And **hotspots** of richness in places we expect as habitat refugia.



E.g.

GCFR: Kogelberg Cedarberg ranges

SWAFR: Stirling, Porungurup ranges

Special thanks to:

- My supervisors/co-authors:
Mike Cramer & Tony Verboom
- My department
- National Research Foundation
- South African Department of Science & Technology
- South African Association of Botanists

