

WATER USE IMPACTS ON GROUNDWATER DEPENDENT ECOSYSTEMS: A FRAMEWORK FOR IDENTIFYING HOTSPOTS OF POTENTIAL DAMAGE

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Content

- Problem setting
- Relevant ecosystems
- Prioritization
- Example: South Africa
- Case study: Example Peru

Problem setting

- 70% of fresh water use for agriculture

- Semi-arid and arid

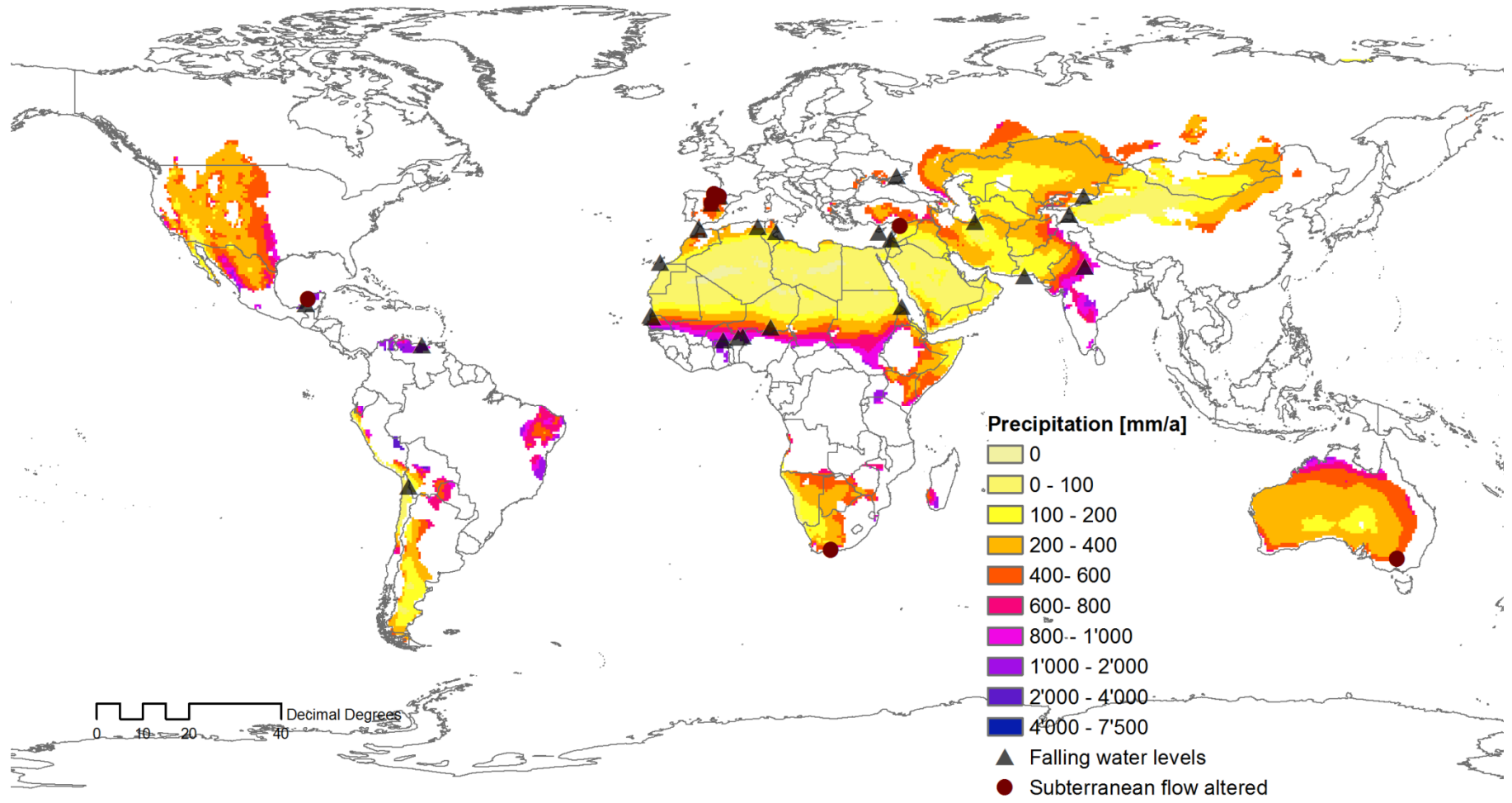
Relevant ecosystems

- Groundwater dependent ecosystems (GDE):
 - Ecosystems that must have access to groundwater to maintain their ecological structure and function (Murray et al. 2006)

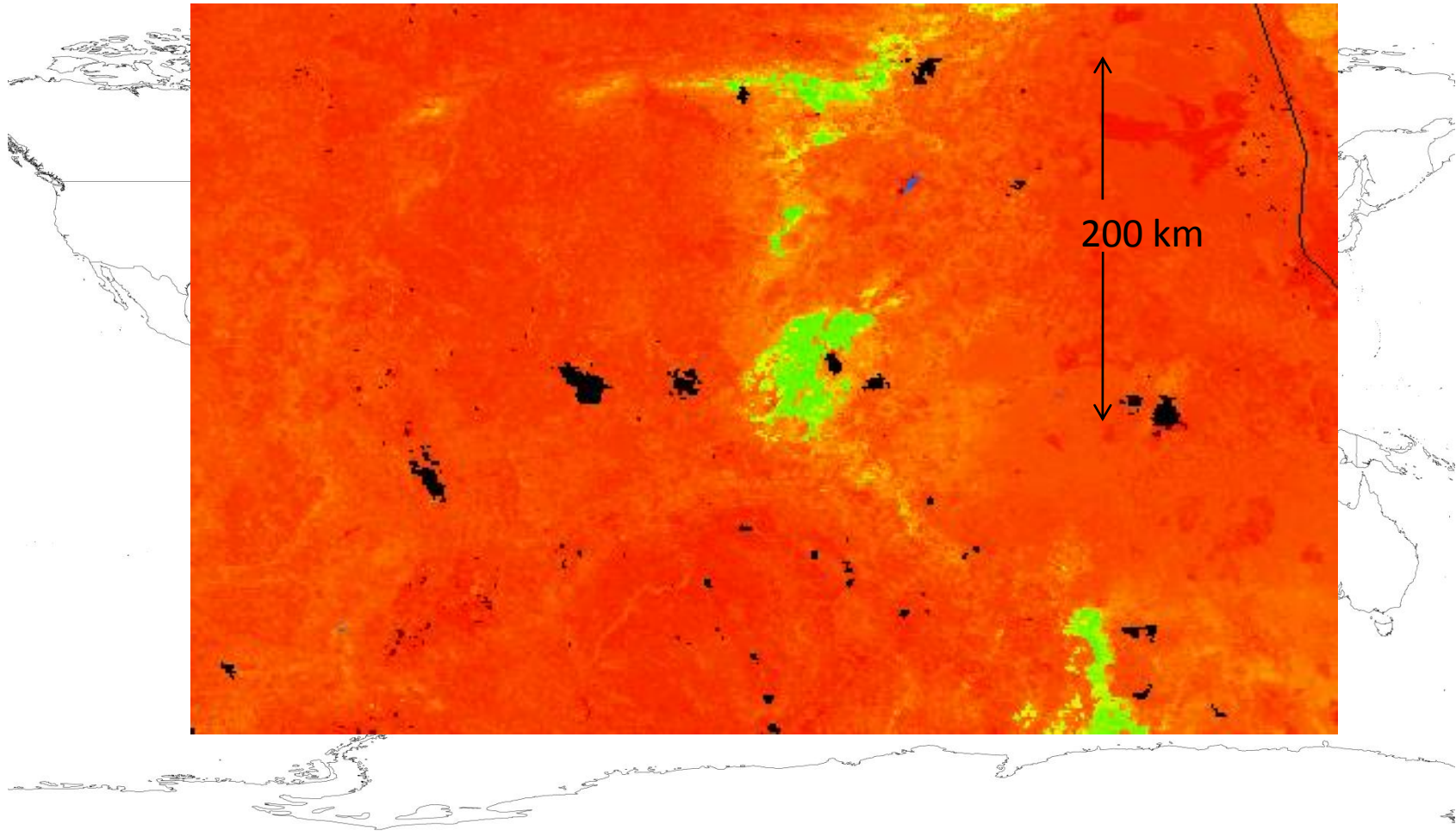
Relevant ecosystems

- Wetlands and springs
- Terrestrial keystone species
- Riparian vegetation

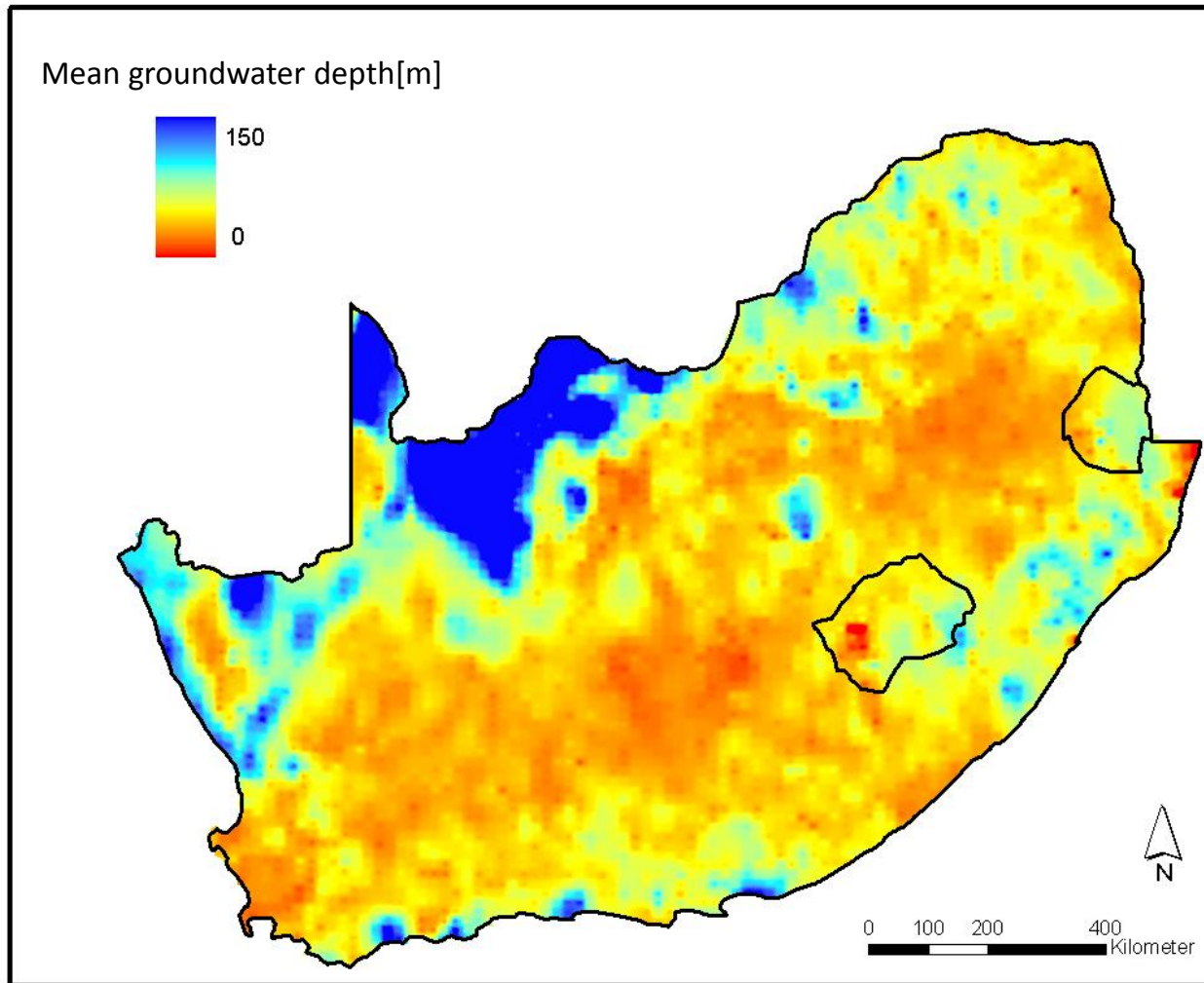
Prioritization



Prioritization -LAI

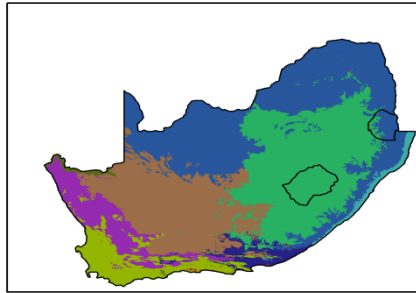


Example South Africa



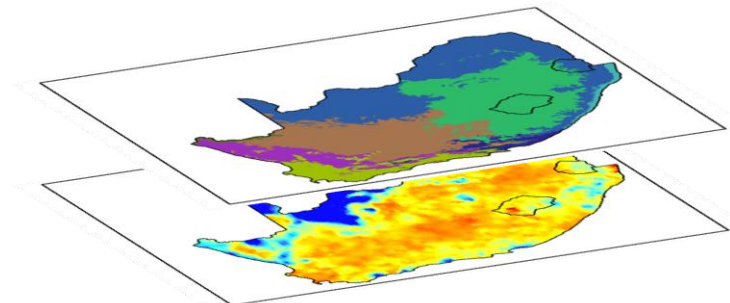
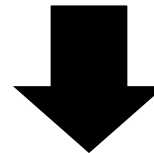
Source: Malin, de Ruiter, et al. (2006) May 2010

Example South Africa



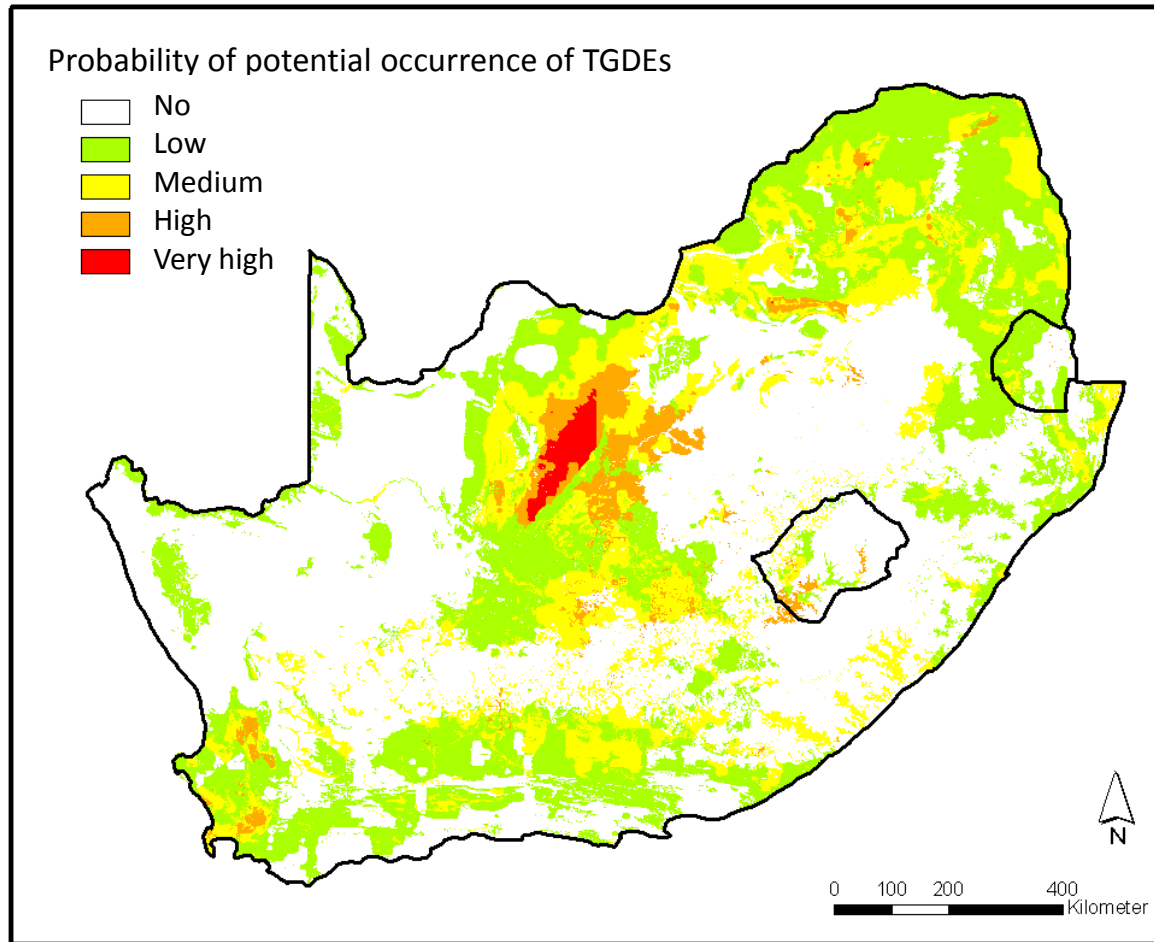
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SVk1	2
SVk1	7
SVk2	7
SVk2	1
SVk5	1
SVk10	3

OBJECTID	Pflanze	Wurzeltiefe
1	Acacia erioloba	70
2	Acacia karoo	30
3	Acacia mellifera	1
4	Boscia albitrunca	68
5	Faidherbia albida	30
6	Rhus Spezies	14
7	Grewia flava	6



Source: BSc thesis C.Nägeli

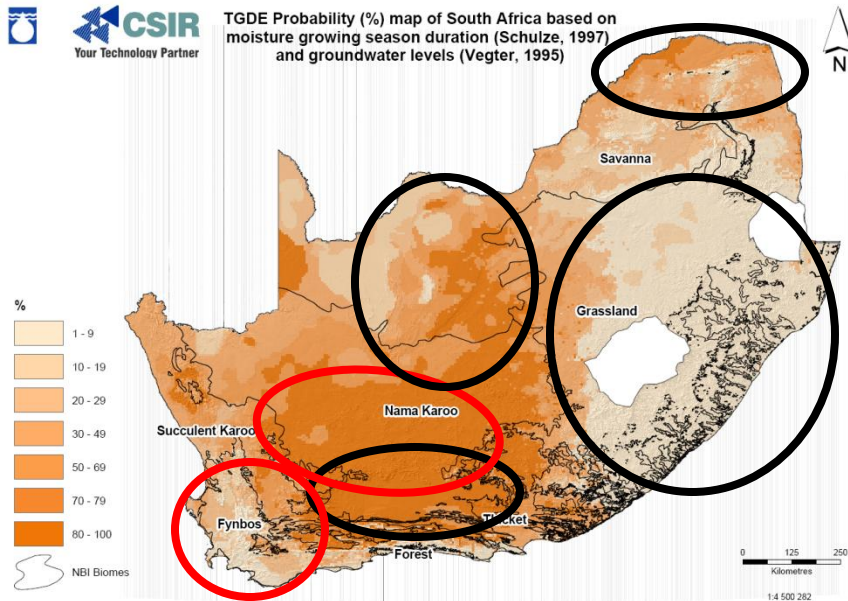
Example South Africa – First results



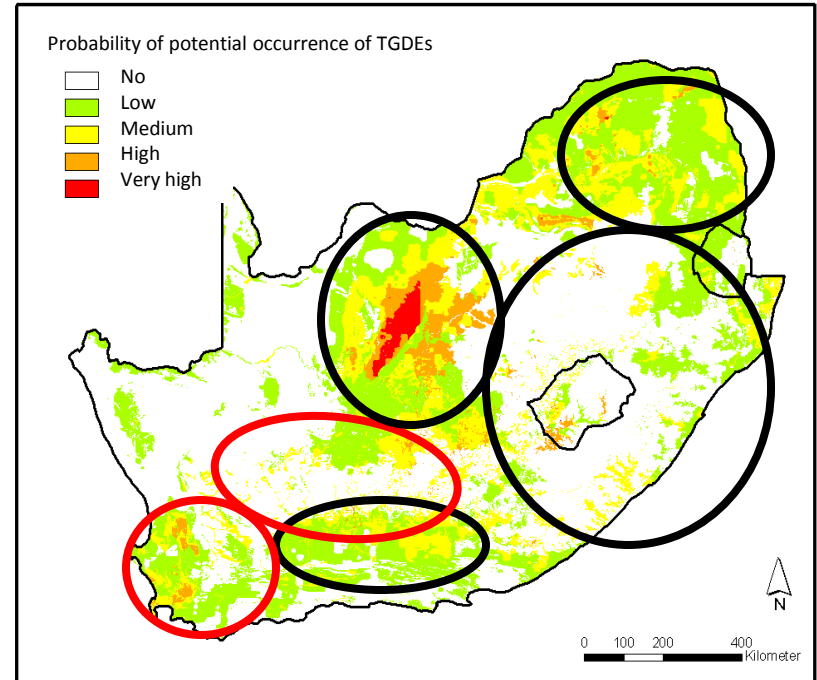
Source: BSc thesis C.Nägeli

Example South Africa – First results

Colvin et al (2003):



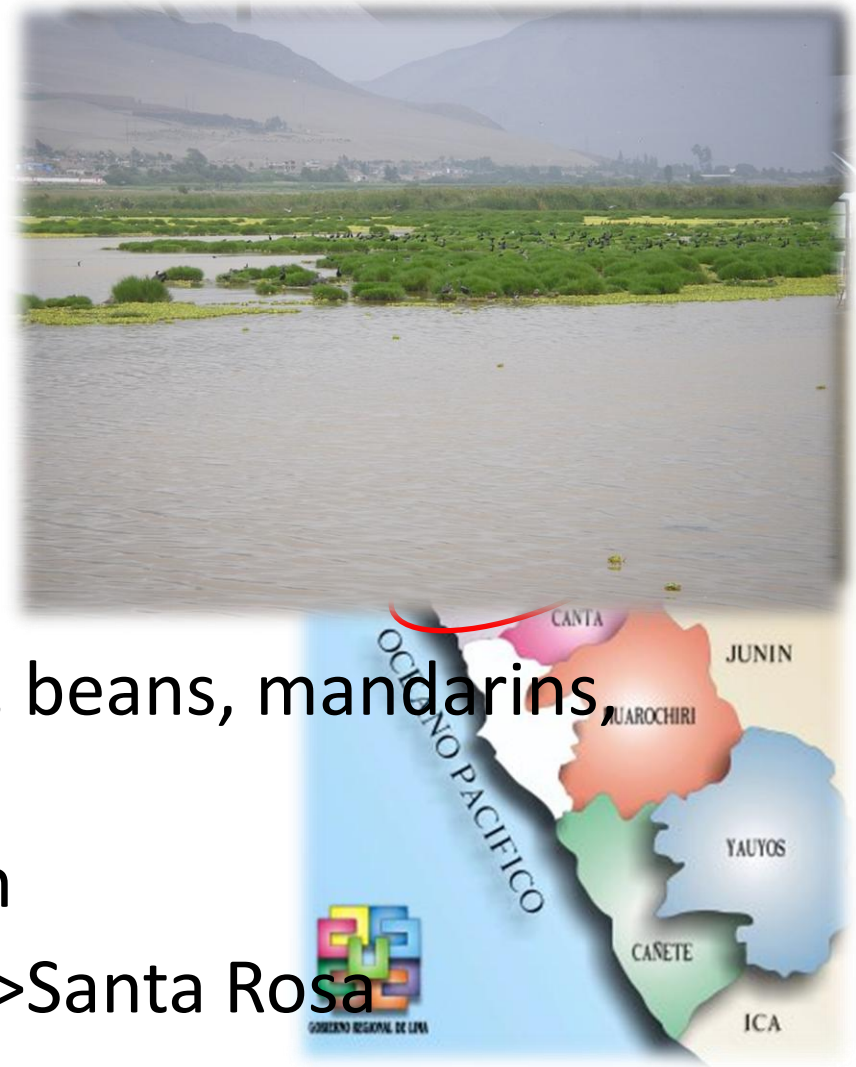
Our results:



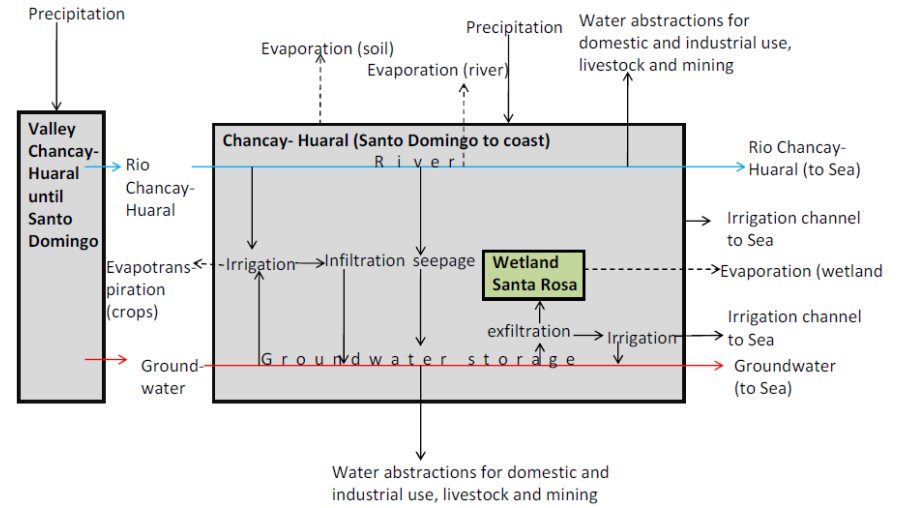
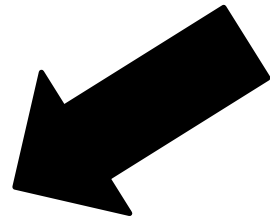
Source: BSc thesis C.Nägeli

Case study

- Chancay-Huaral
- 3095 km² in total
- 1245 km² in lower valley
- Rio Chancay-Huaral
- 26 mm precipitation
- 24'000 ha irrigated (maize, beans, mandarins, cotton)
- 25'000 cows, 2Mio chicken
- Natural vegetation: 40 ha->Santa Rosa



Case study



Original size of wetland (100%)

Climate change (1°C): -4%

Increasing numbers of cows+irrigation (river+groundwater): -10%

Irrigation area doubled: -30%

Increasing numbers of cows+irrigation (groundwater only): -40%

Thank you for your attention.



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