

# NATURE-RELATED RISKS IN SOUTH-AFRICA

## A GEOLOCALISED APPROACH

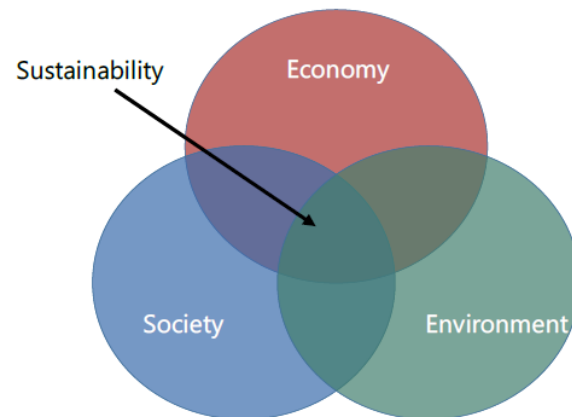
PAUL HADJI-LAZARO, ANTOINE GODIN, JULIEN CALAS

BASED ON A STUDY WITH SANBI, DFFE, SARB, WWF AND CONSERVATION SA,

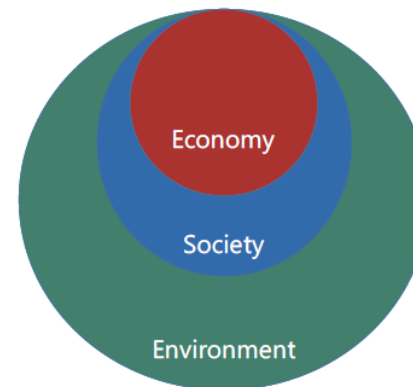
# How can research support public policy dialogue for the ecological transition?

- We need guiding principles to ensure that tensions and synergies between economic, social and ecological aspects are highlighted: research at AFD adopts a strong sustainability approach which assumes a priori no substitution between natural, social and economic capital
- We have to establish a common language between economists, ecologists and social scientists
- We can already do assessments of interaction between social, economic and ecological dynamics with existing datasets and models. The goal is **not to be precise**, given the uncertainty but to prioritize where to act

"Weak sustainability" approach



"Strong sustainability" approach – economic system is embedded in social and ecological systems



# Methodological framework

Our approach is in line with the NGFS framework on nature-related risks or the LEAP approach of TNFD

**Phase 1: Identify sources of physical and transition risks**



**Phase 2: Assess economic risks**



**Phase 3: Assess risks to, from and within the financial system**



We focus on Phase 1 and 2 with additions:

- Phase 1: we measure both exposition and vulnerability
- Phase 2: we measure direct and indirect effects and socio-economic impacts

**LOCATE the interface with nature**



**EVALUATE Dependencies and impacts**



**ASSESS Risks and Opportunities**



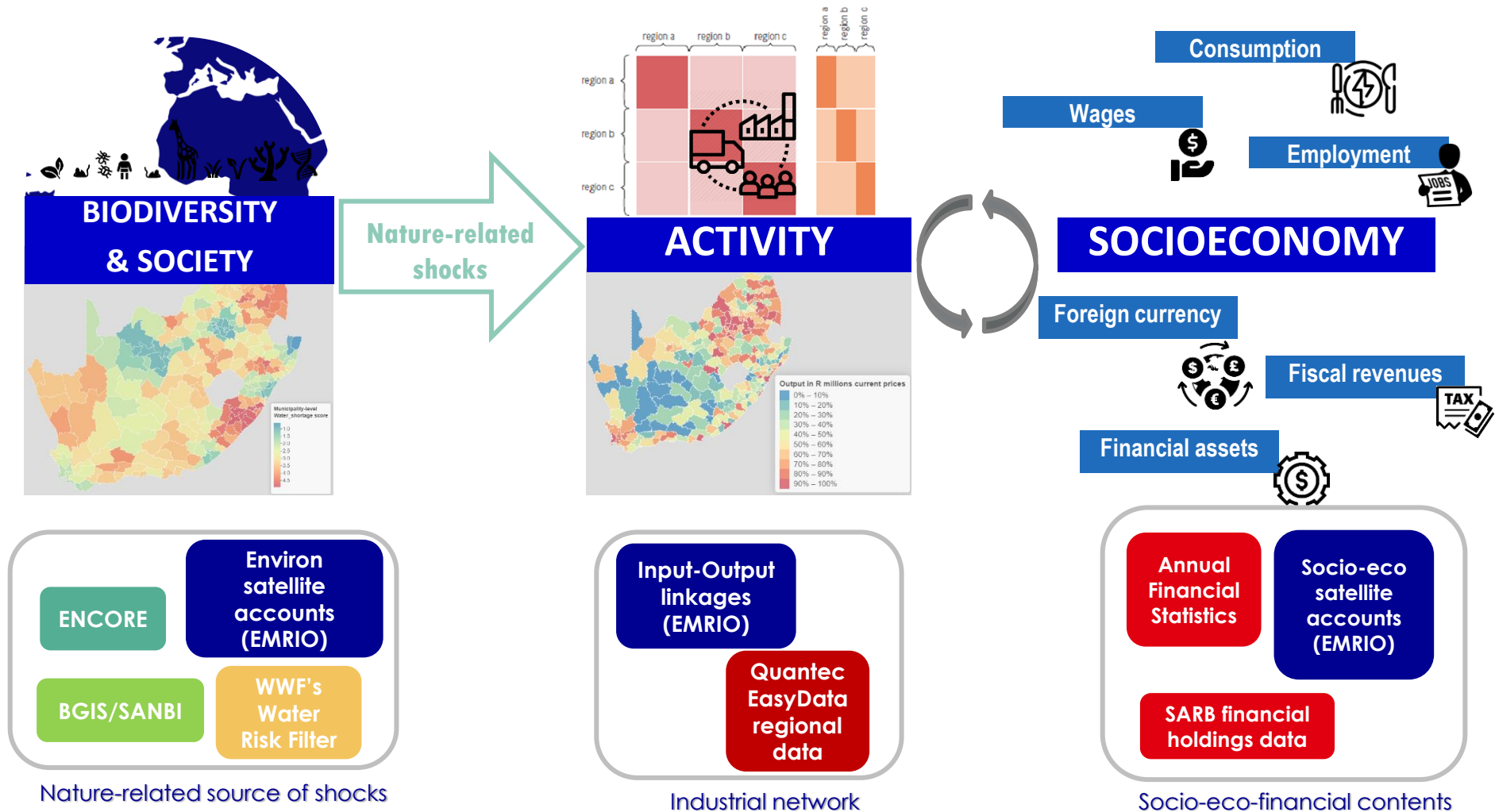
**PREPARE to respond and report**



We focus on the Locate, Evaluate and Assess aspects

# Datasets

We connect several databases according to our analytical understanding of nature-related risks



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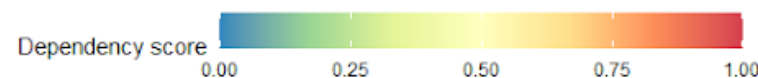
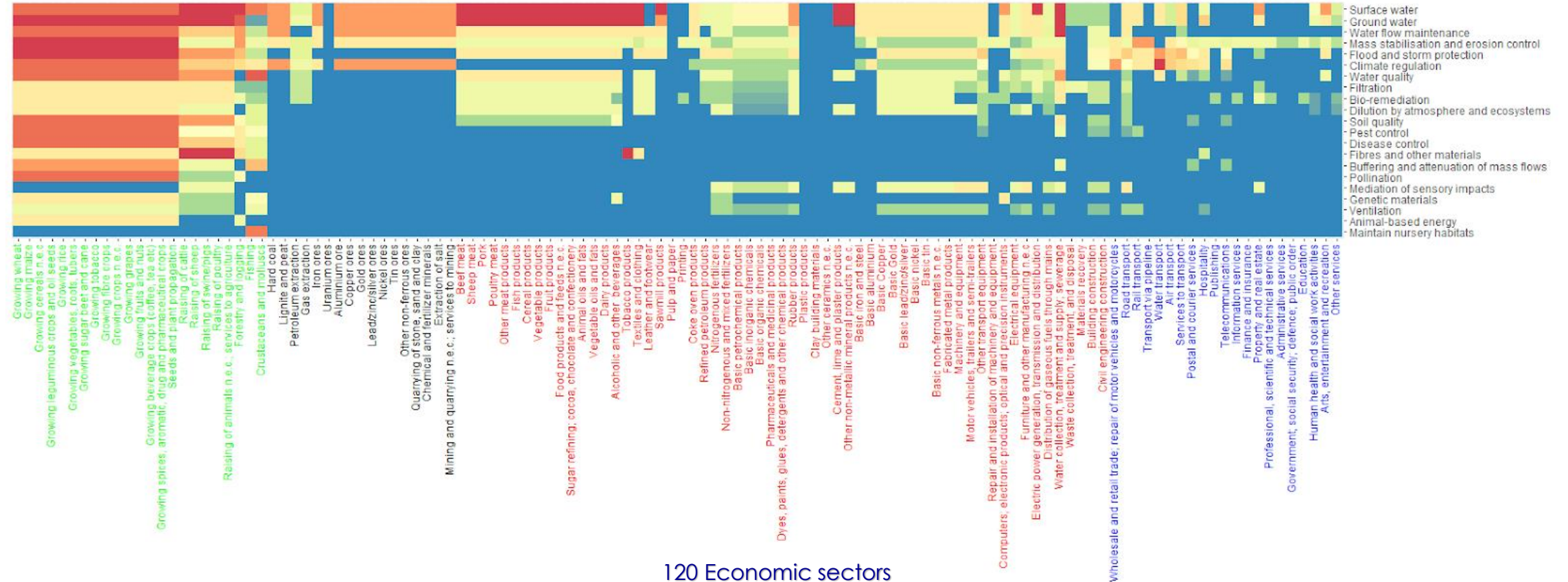
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## Phase 1: Assessing exposition

# Which sectors are dependent to which ecosystem services?

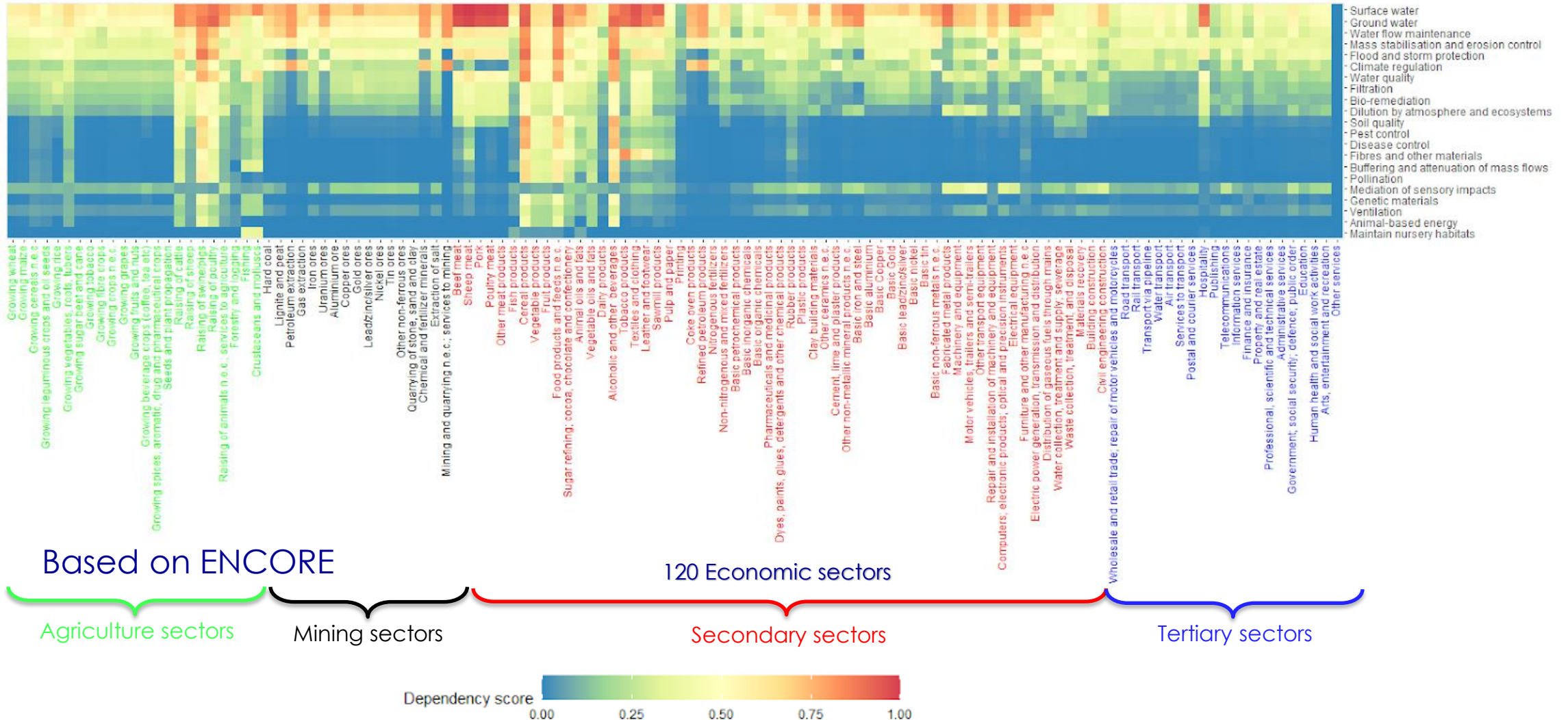
## 21 Ecosystem services



## Phase 1: Assessing exposition

# Which sectors are indirectly dependent to which ecosystem services?

## 21 Ecosystem services

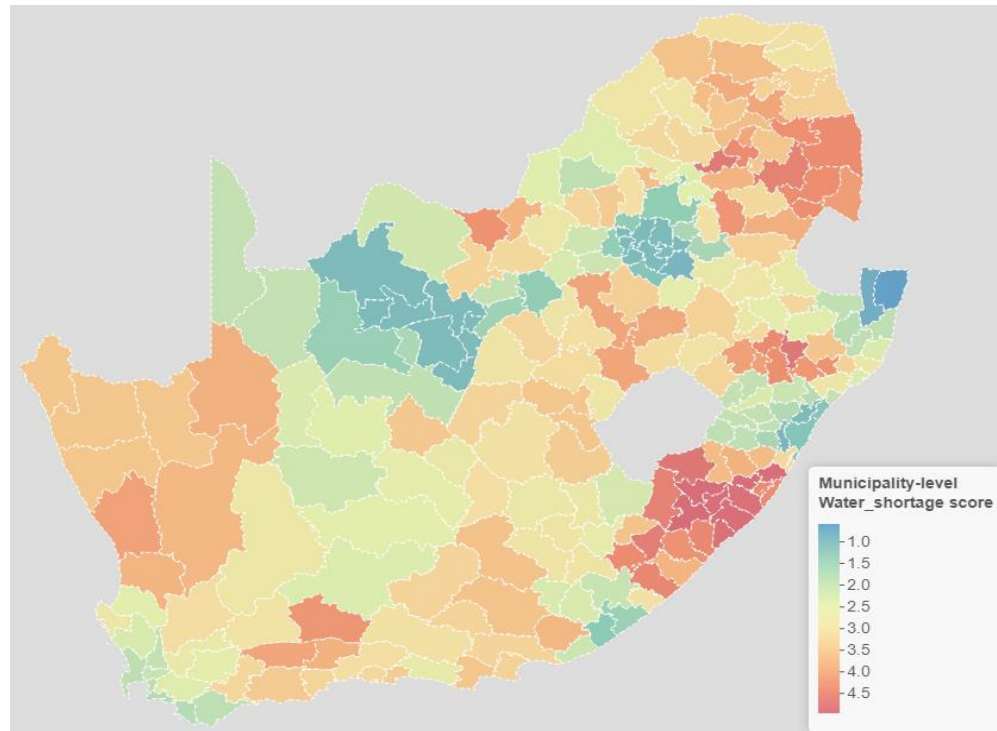




## Phase 1: Assessing vulnerabilities

# Are exposed activities vulnerable to water-shortage ?

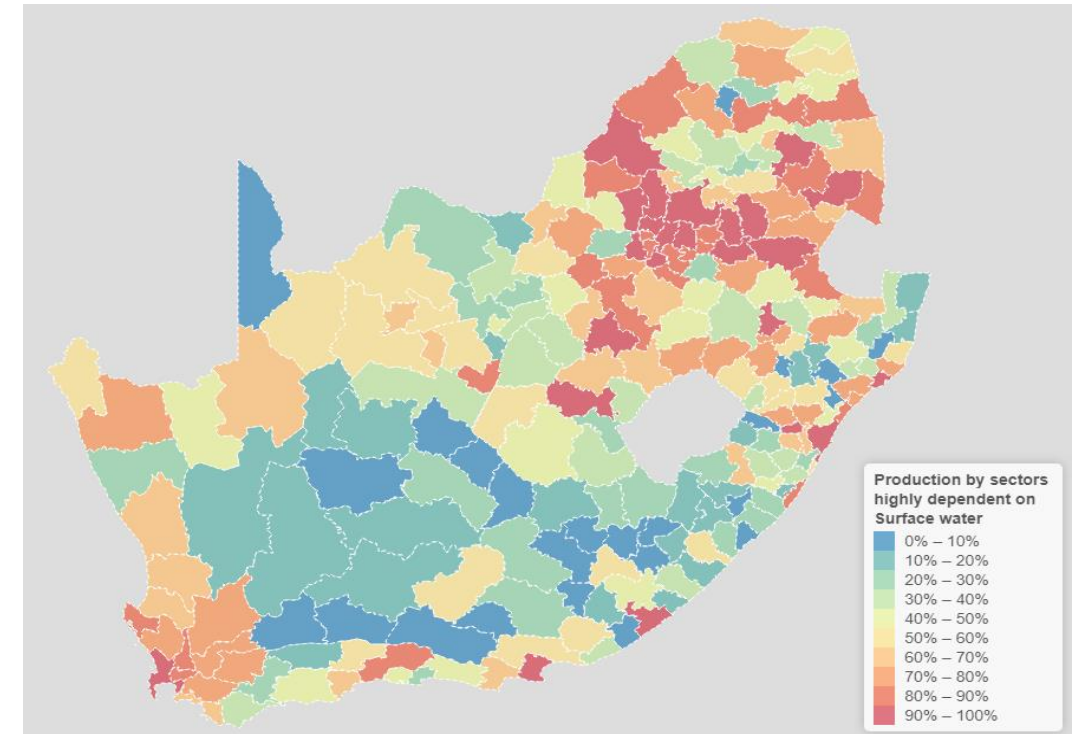
Water shortage risk



**Municipality-level surface water shortage index**

Based on Water Risk Filter South Africa

Economic dependency on water provision



**Output from water-dependent sectors**

Based on ENCORE tool and Quantec Easy Data



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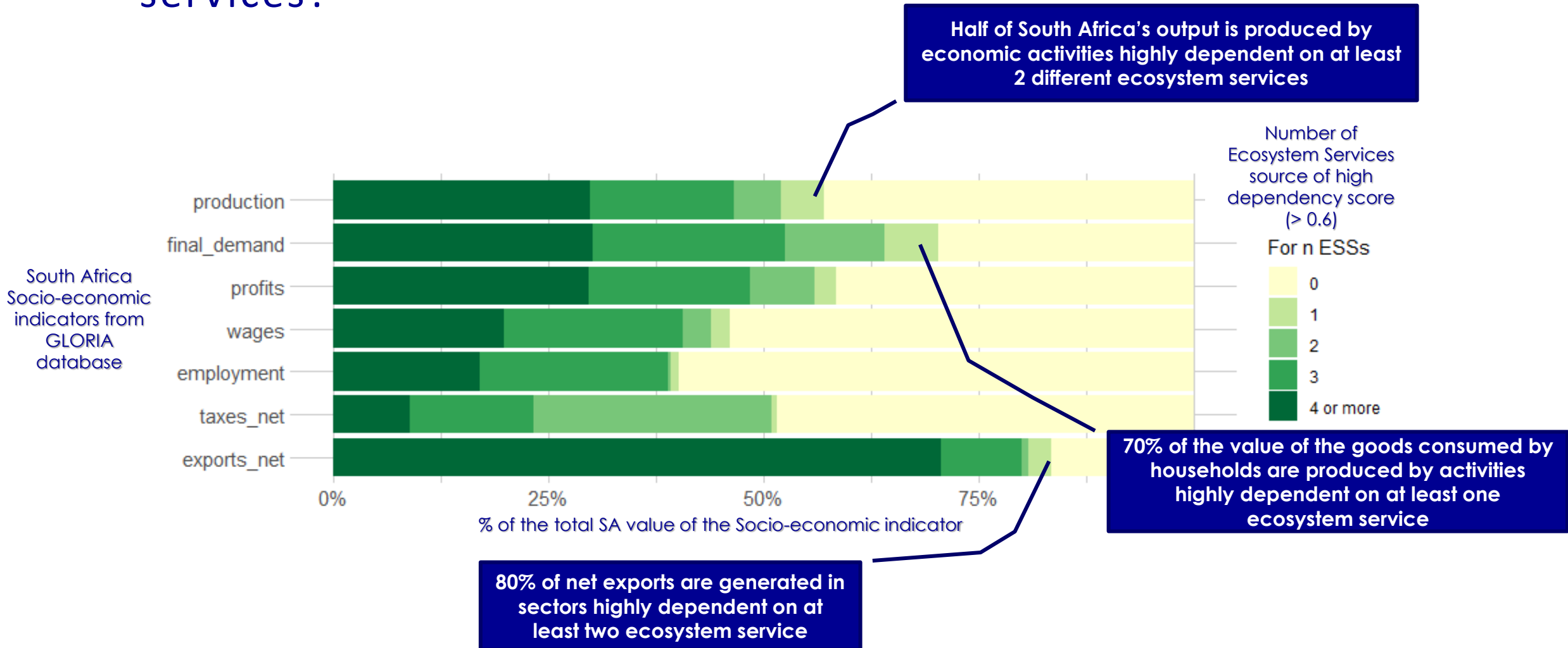
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## Phase 2: Assessing economic risk

### What are the socio-economic exposition to ecosystem services?

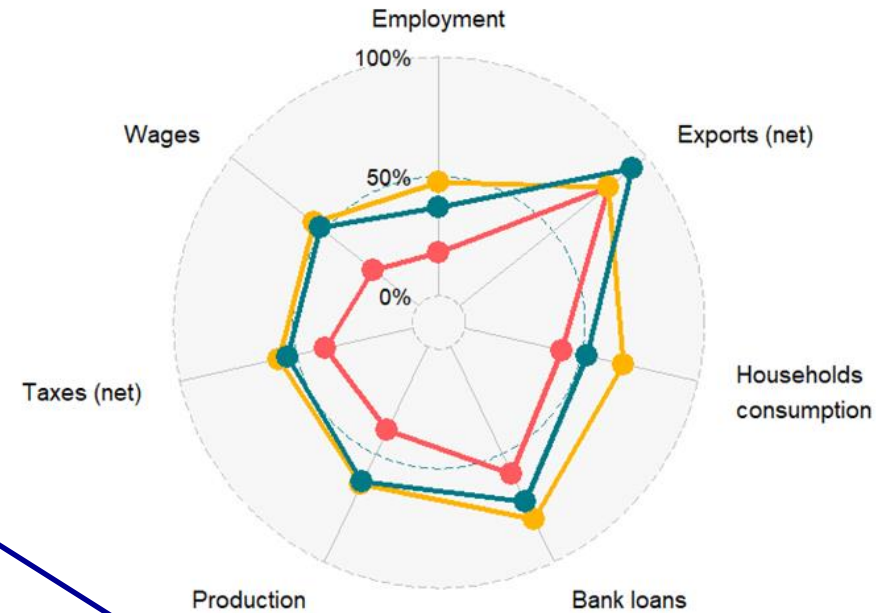
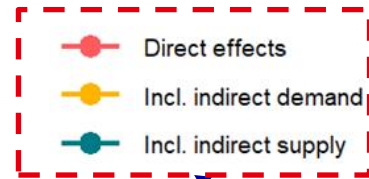


## Phase 2: Assessing economic risk

# What are the socio-economic exposure to water scarcity?

Based on direct dependencies to surface water:

- Assessing different socio-economic indicators
- Assessing direct and indirect consequences, both supply and demand effects



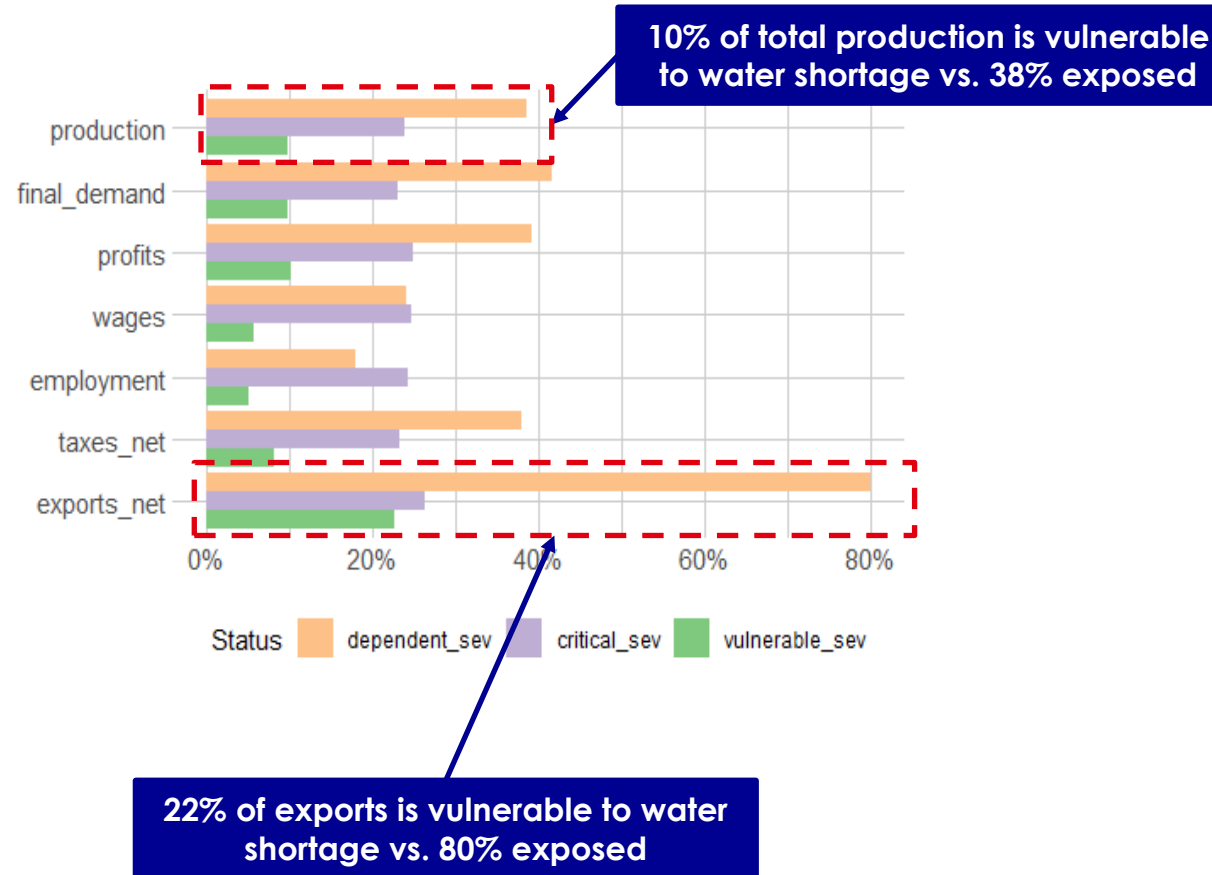
**We observe value chain effect both upstream and downstream**

## Phase 2: Assessing economic risks

### Are exposed socioeconomic variables vulnerable to water-shortage ?

Combining the previous analysis but for economic activities:

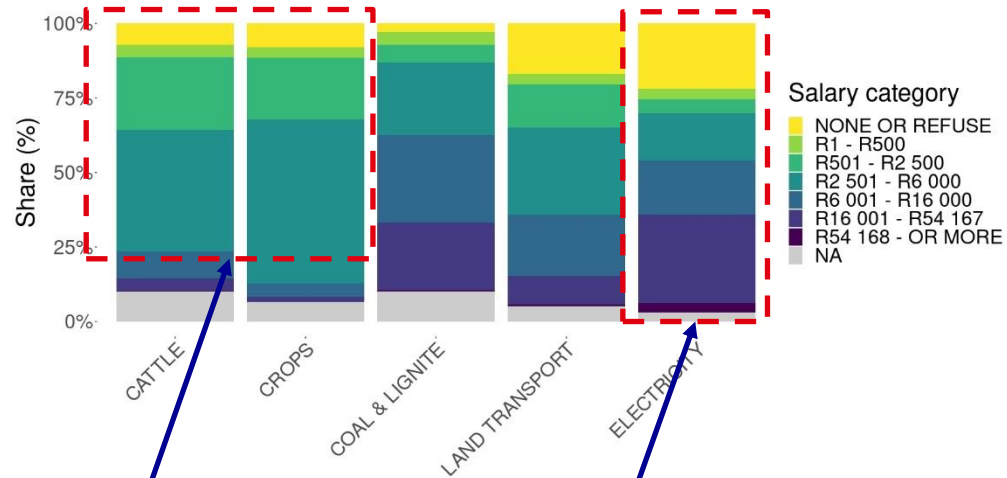
- highly dependent on water and
- located in municipalities with high risk of water stress





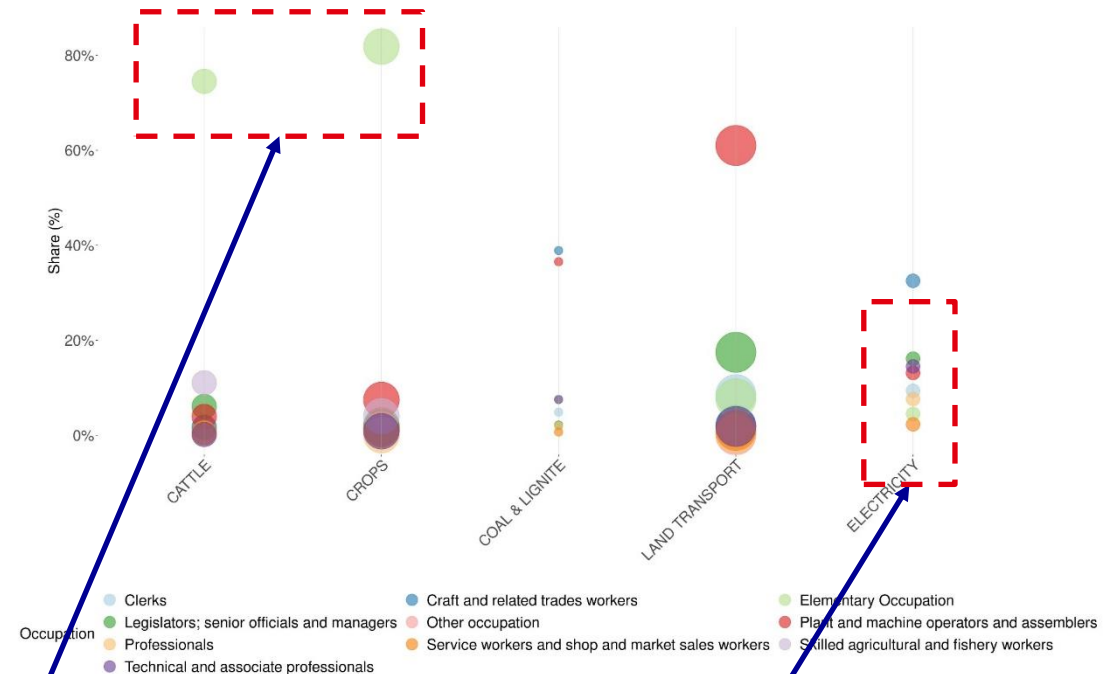
## Phase 2: Assessing social risk

# What are the socio-economic characteristics of exposed jobs?



60% of jobs in agriculture sector is low-wage employment

50% of jobs in electricity sectors are well-paid

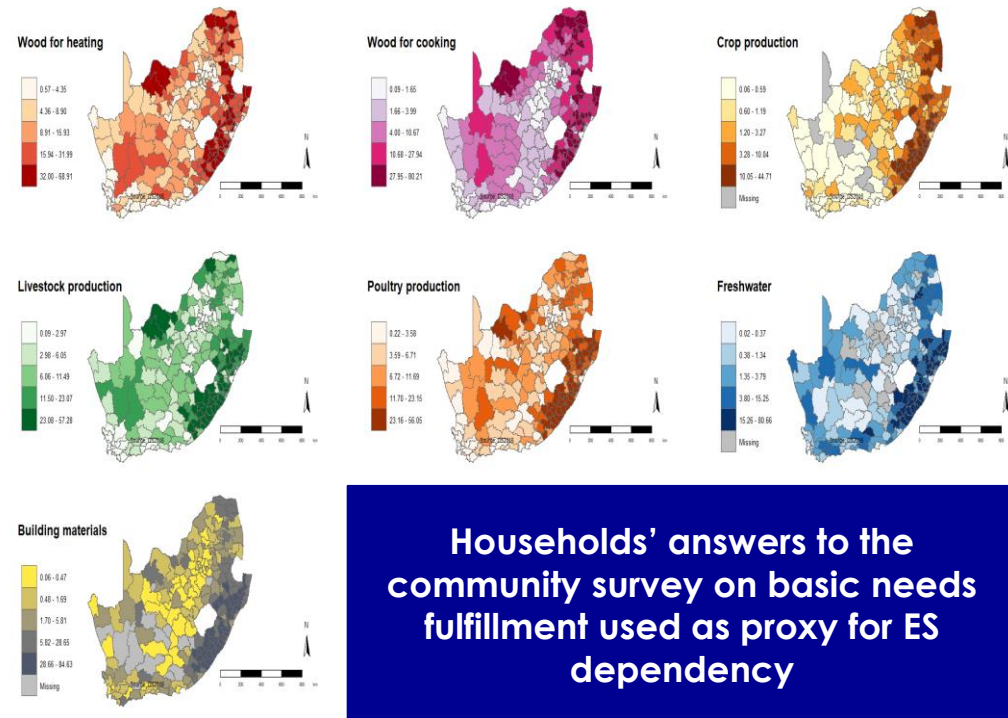


75% of jobs in Crop agriculture & Cattle raising sectors are very low skilled jobs

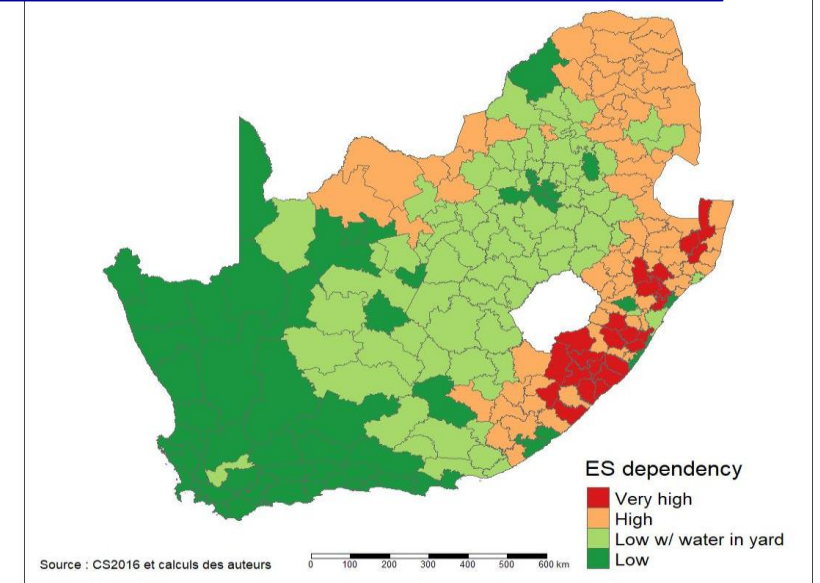
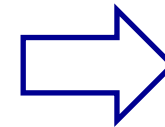
The electricity sector has a more diversified skilled labour structure

## Phase 2: Assessing social risk

Can we characterize the dependency of municipalities to ecosystem services to provide for basic needs?



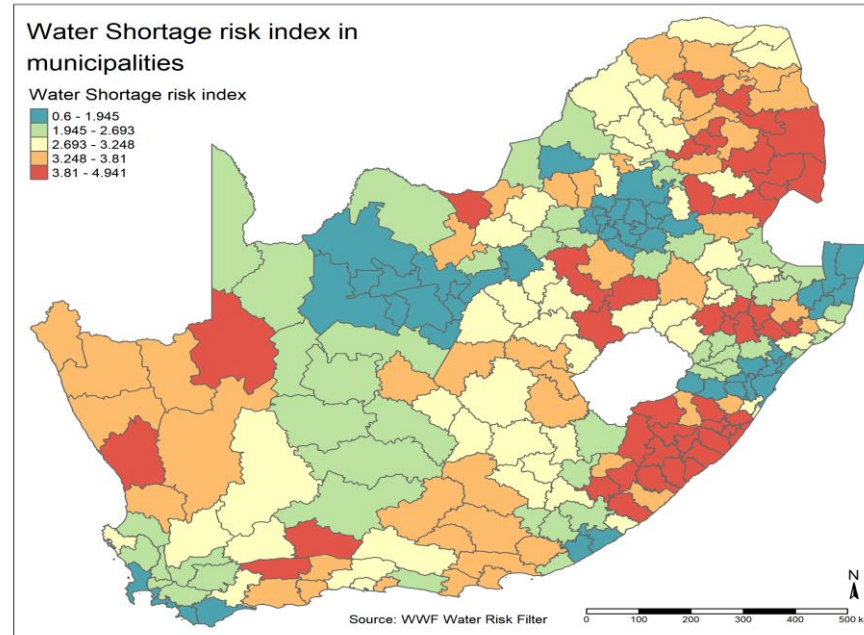
**Clustering algorithm to split municipalities according to their inhabitant level of dependency to ES**



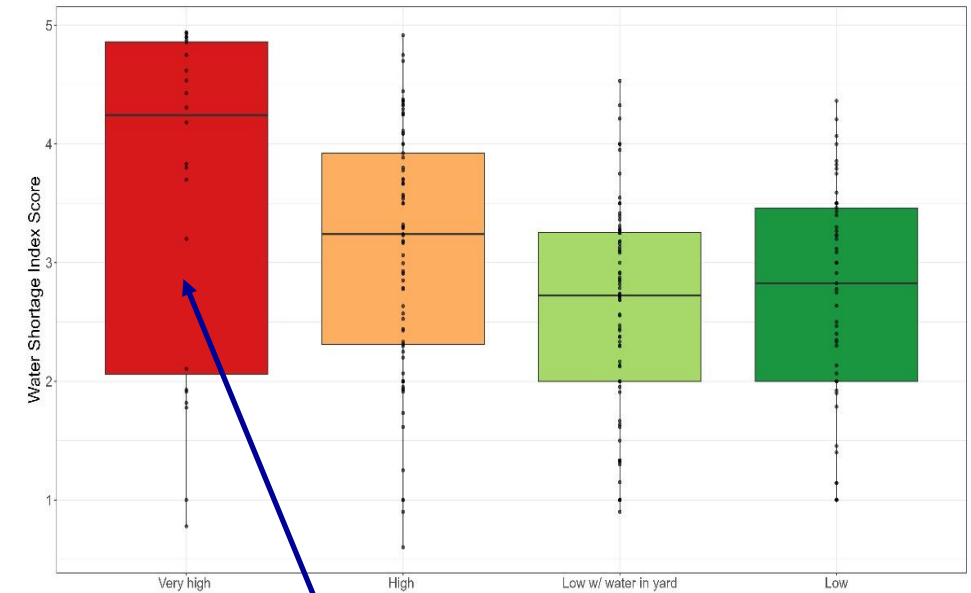
## Phase 2: Assessing social risk

# Can we identify social vulnerabilities related to water stress?

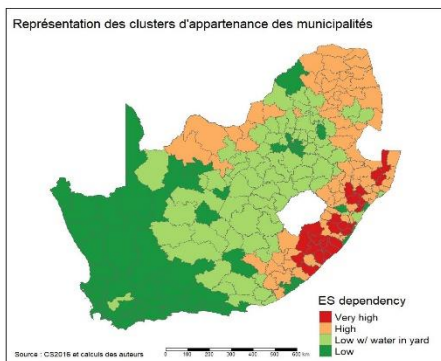
### Water Risk Filter at the municipal level



### Distribution of municipality by cluster of ES dependency along the water risk filter score



Very dependent municipality have a higher median Water Risk Filter score (i.e higher risk of water shortage)

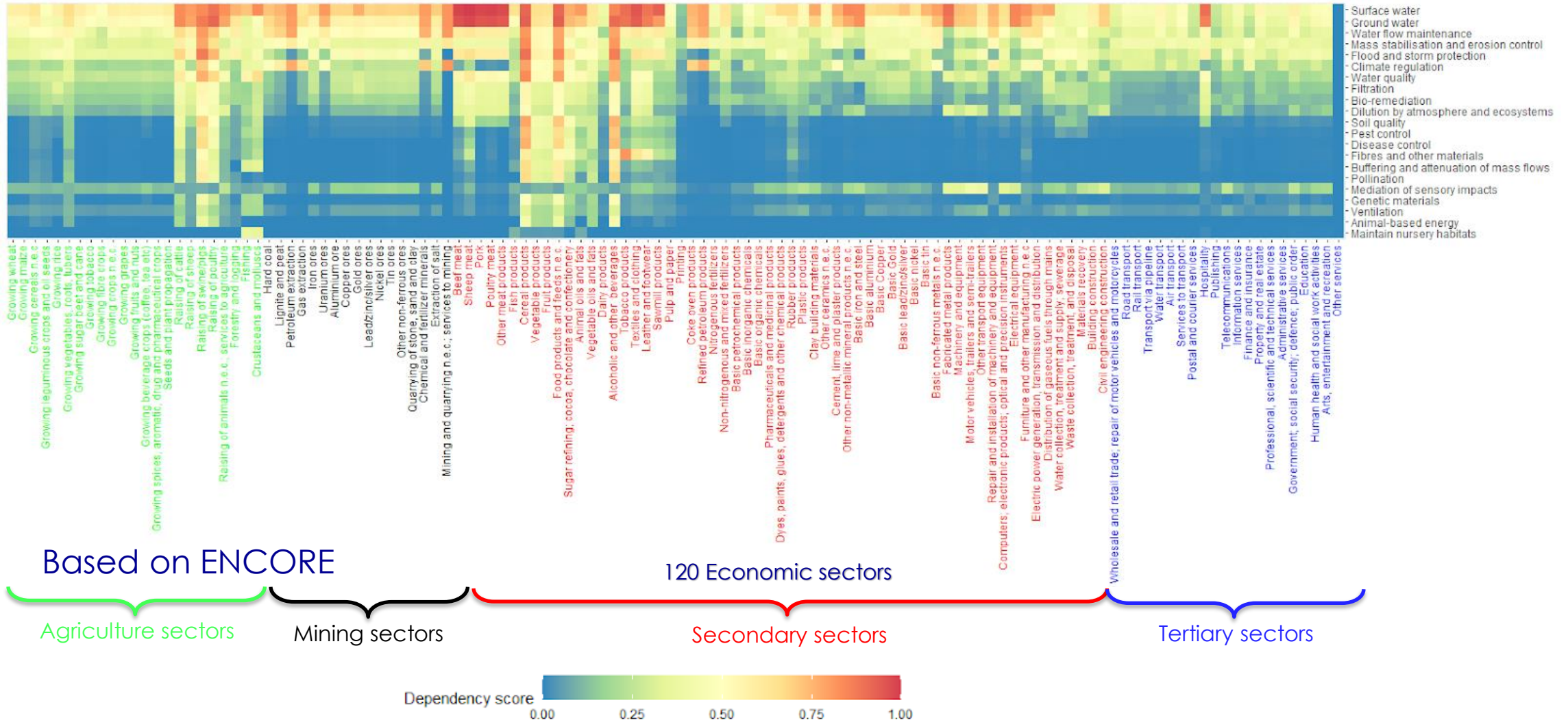




## Phase 1: Assessing exposition

# Which sectors are indirectly dependent to which ecosystem services?

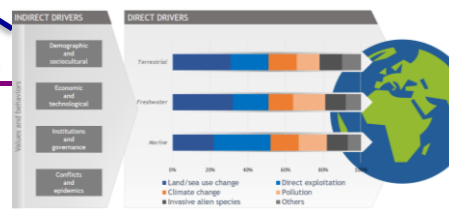
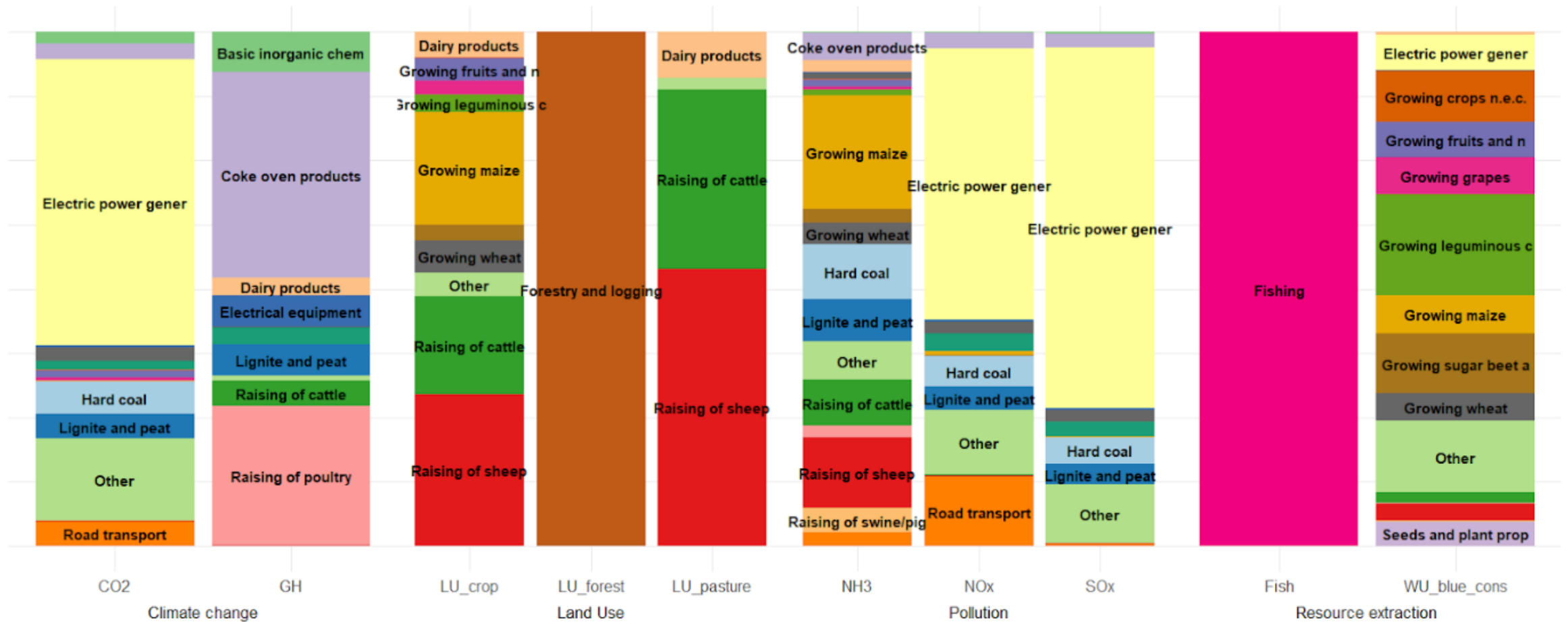
## 21 Ecosystem services





# Transition risks

Sectors' generation of biodiversity-relevant pressures (4 of 6 identified by IPBES 2019)



# What have we learned and how can we move forward?

- This work is the outcome of a transdisciplinary collaboration between AFD, SANBI, NT, SARB
- We started to create common language highlighting to economists and financial experts how biodiversity interact with economics and finance in double materiality perspective
- We presented physical risks but the same analysis applies to transition risks
- **This is only a first step but it already has lots of spin-offs:**
  - Portfolio analysis at institutional level
  - Country analysis
  - Scenario construction
  - Further interconnection with biophysical data

Thank you

## Any questions?

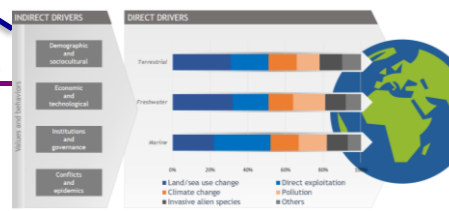
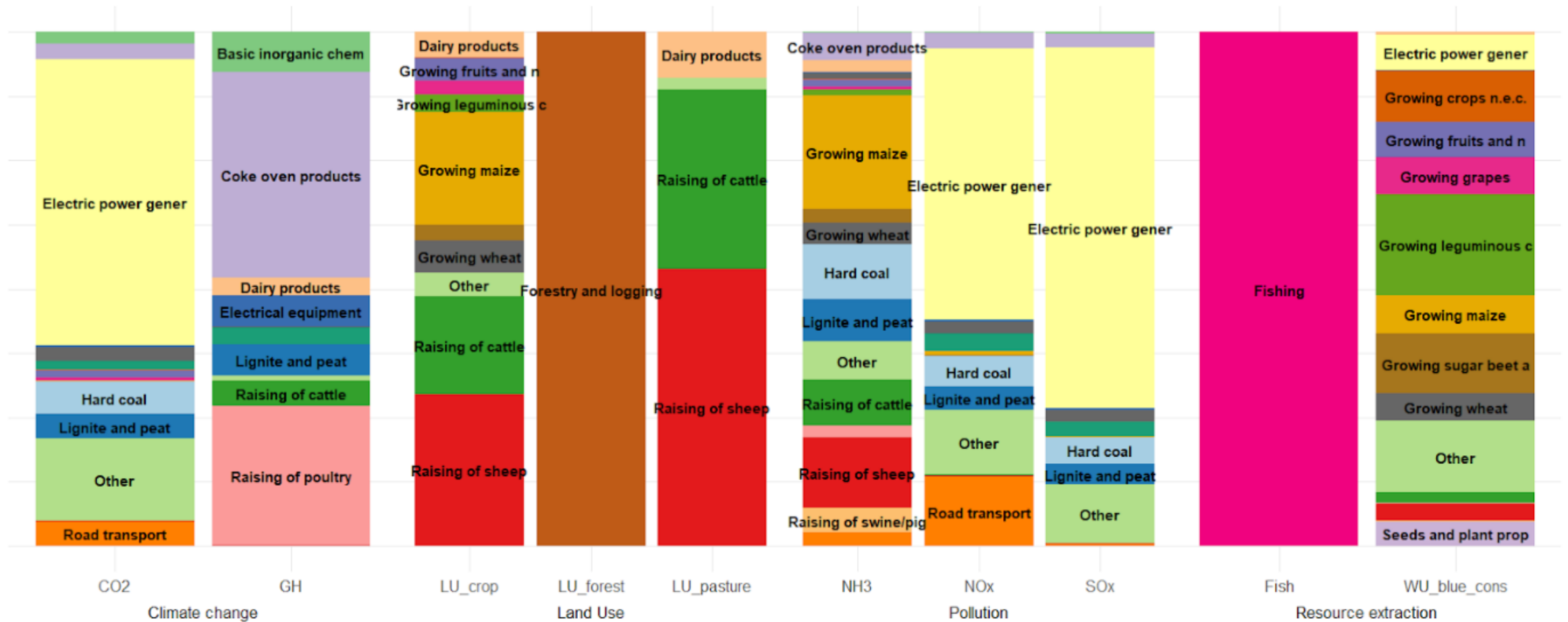
- To contact me: [godina@afd.fr](mailto:godina@afd.fr)

- **References:**

- Hadji-Lazaro, P., Calas, J., Godin, A., Sekese, P., & Skowno, A. (2023). Socio-economic and spatially-explicit assessment of Nature-related risks. *AFD Research Papers*, (302), 1-60.
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- David, A., Guilbert, N., Hamaguchi, N., Higashi, Y., Hino, H., Leibbrandt, M., & Shifa, M. (2018). Spatial poverty and inequality in South Africa: A municipality level analysis.

# Transition risks

Sectors' generation of biodiversity-relevant pressures (4 of 6 identified by IPBES 2019)

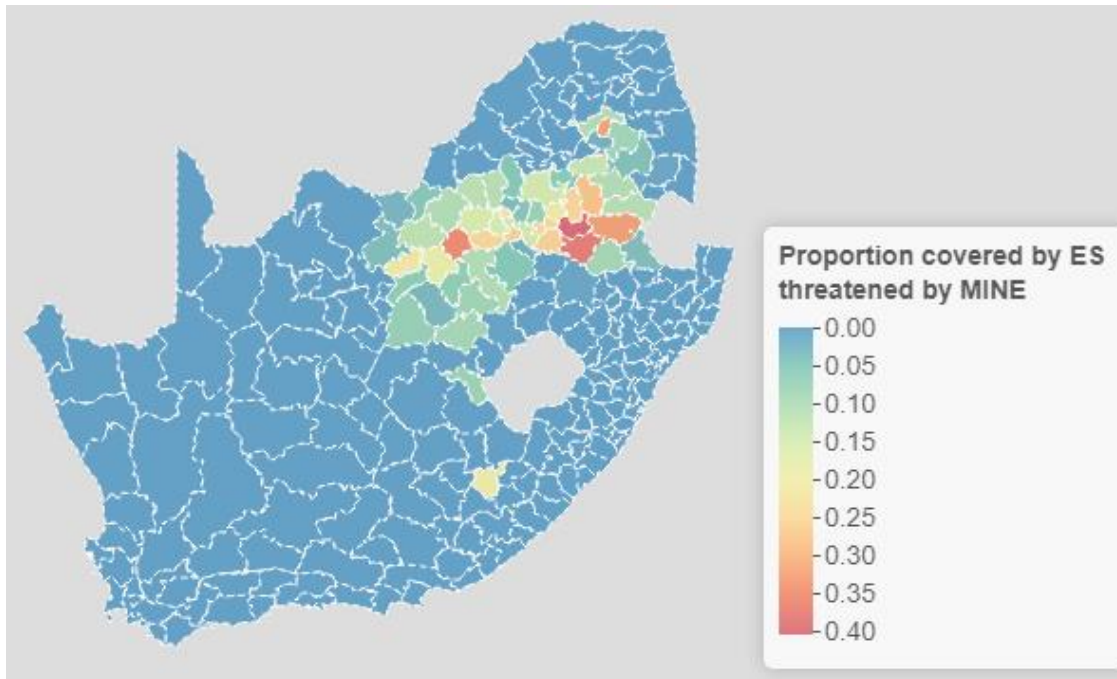




## Phase 2: Assessing economic risk

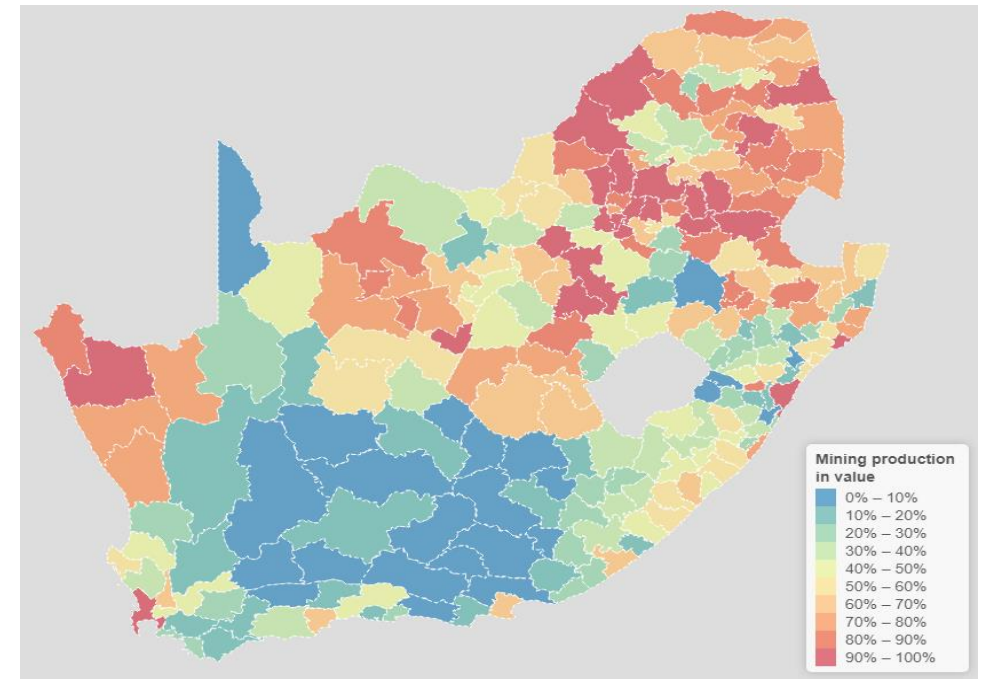
# Where are located mining activities that are threatening ecosystems?

### Ecosystems threatened by mining activities



Based on SANBI data

### Output level of mining activities



Based on Quantec Easy Data



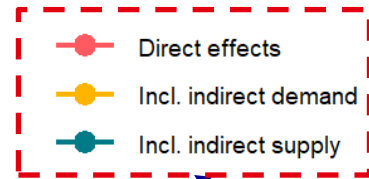
**47% of mining production locates in municipalities highly covered by mining-threatened ecosystems**

## Phase 2: Assessing economic risk

# What are the direct and indirect socio-economic exposure to a reduction of crop-related land-use?

Based on direct dependencies to surface water:

- Assessing different socio-economic indicators
- Assessing direct and indirect consequences, both supply and demand effects

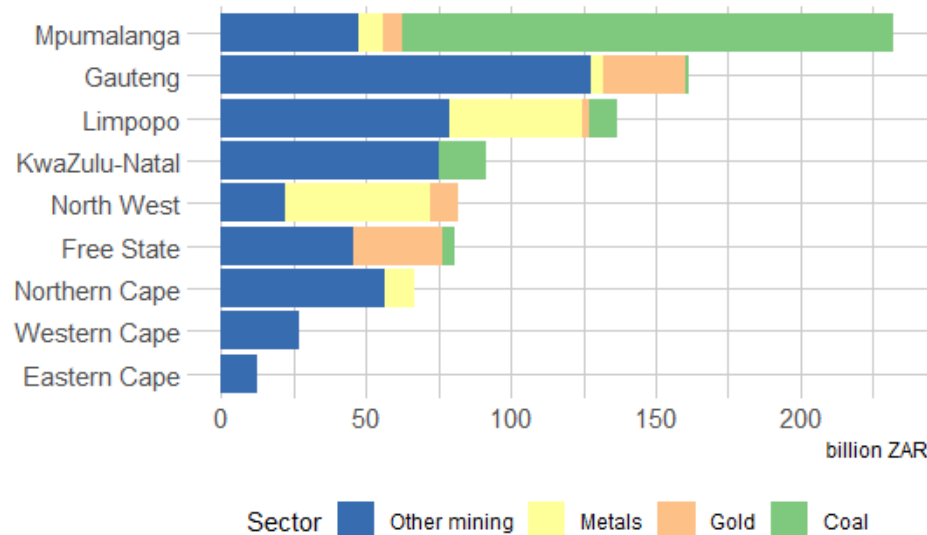


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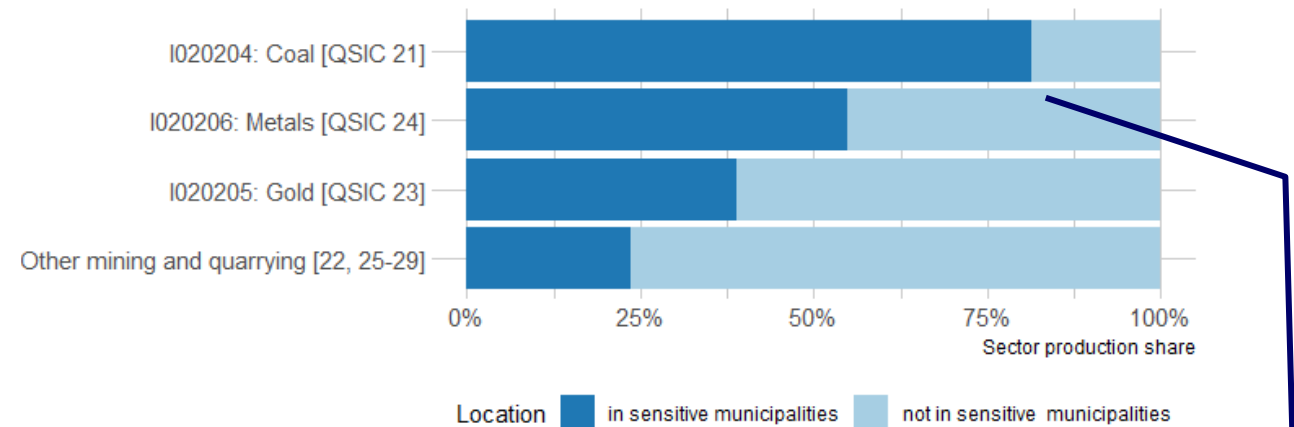
# Transition risks

Transition risks related to the protection of terrestrial ecosystems threatened by mining activities.

Because different types of mining activities are not evenly distributed across the country, ...



... different mining sectors are more or less vulnerable to transition to reduced threats on ecosystem.



**80% of coal mining activities and 55% of metal mining activities are located in sensitive municipalities.**