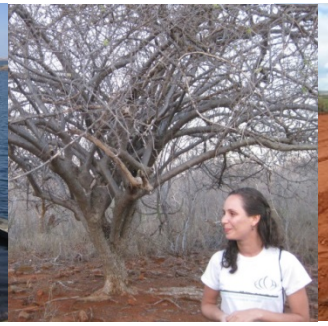
Wageningen, WACASA, 08-01-2020





Sustainable Land Management in Northeast-Brazil: insights from the INNOVATE project

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BMBF → FONA → SLM → projects

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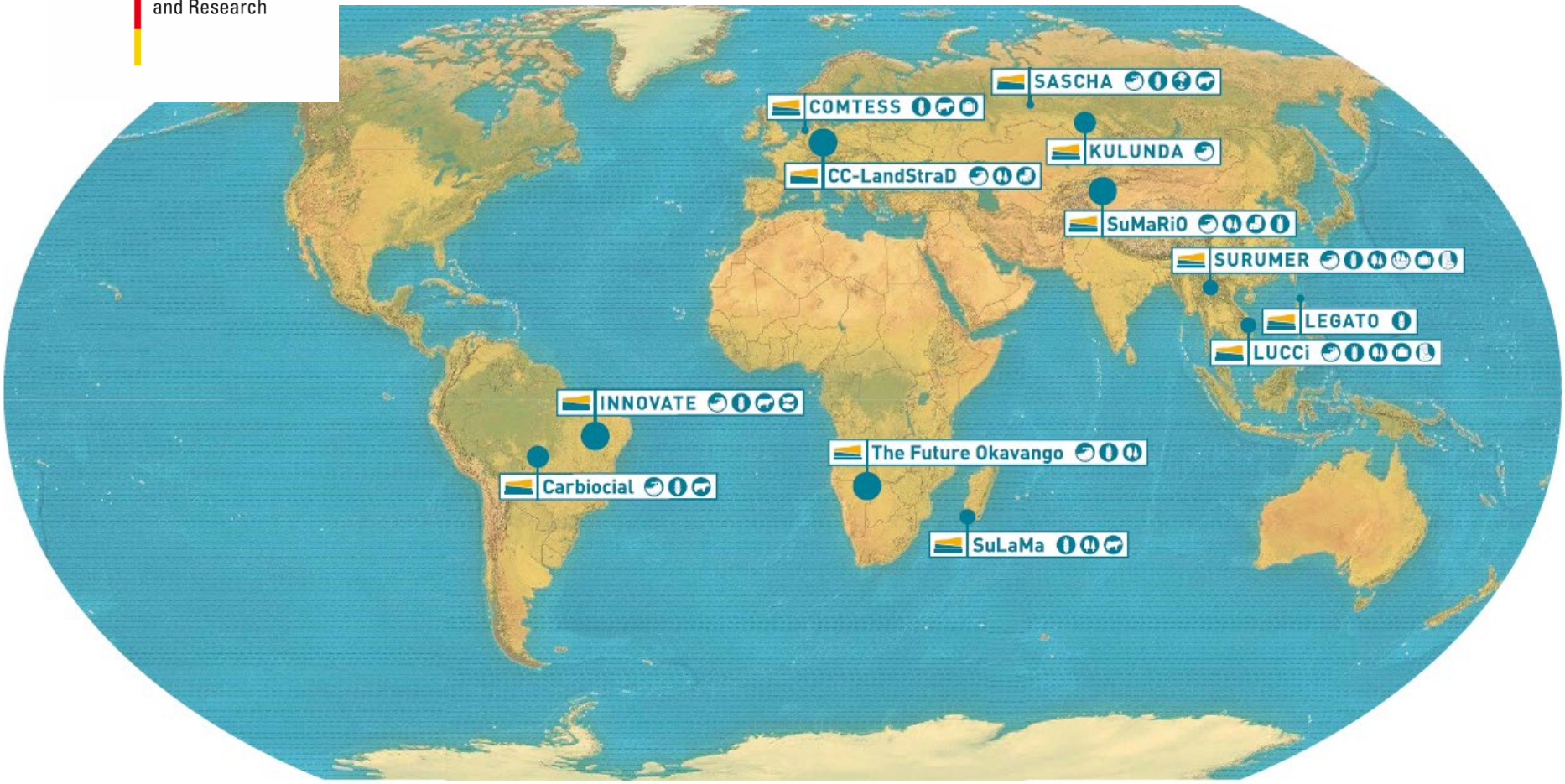
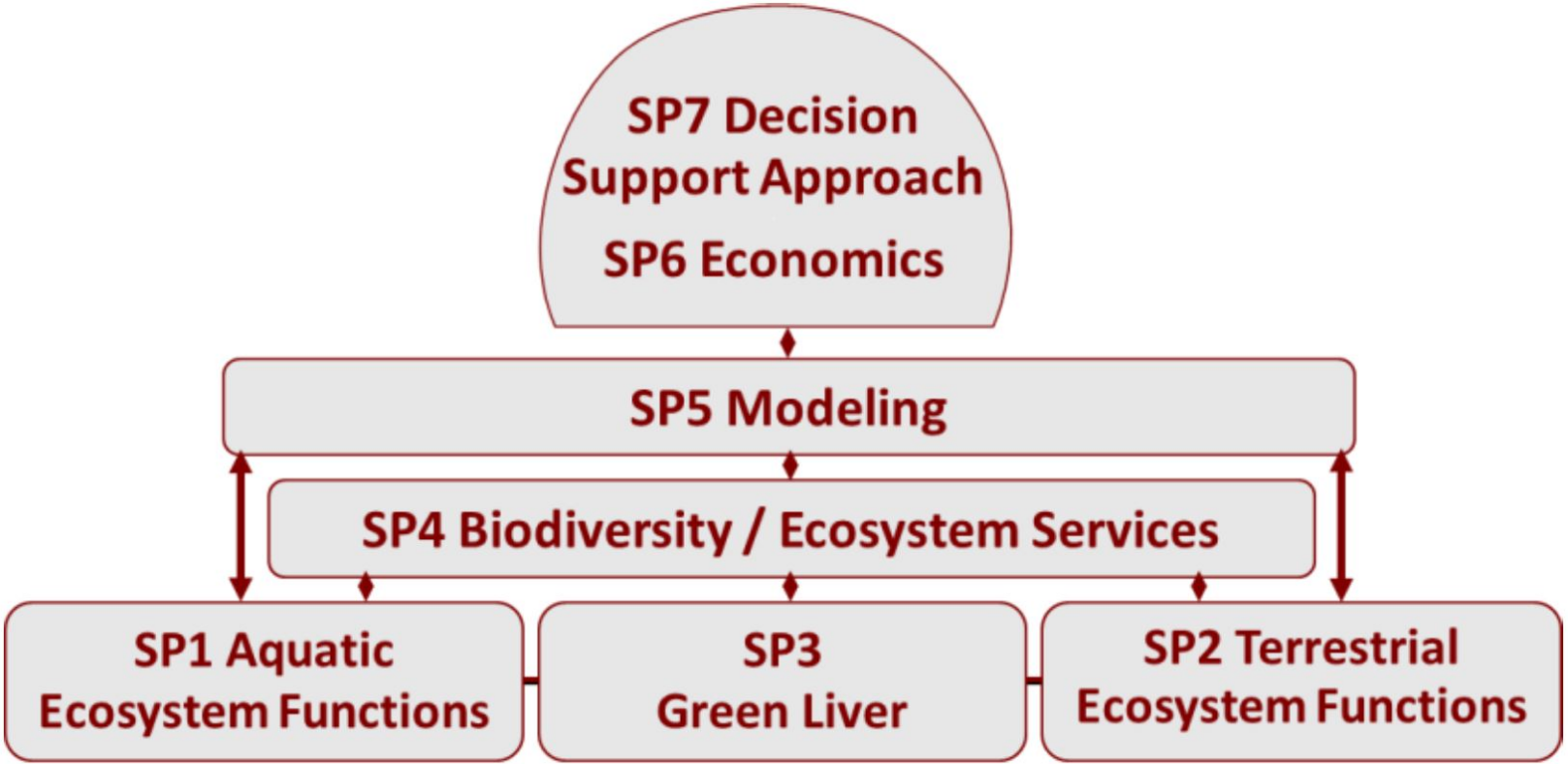
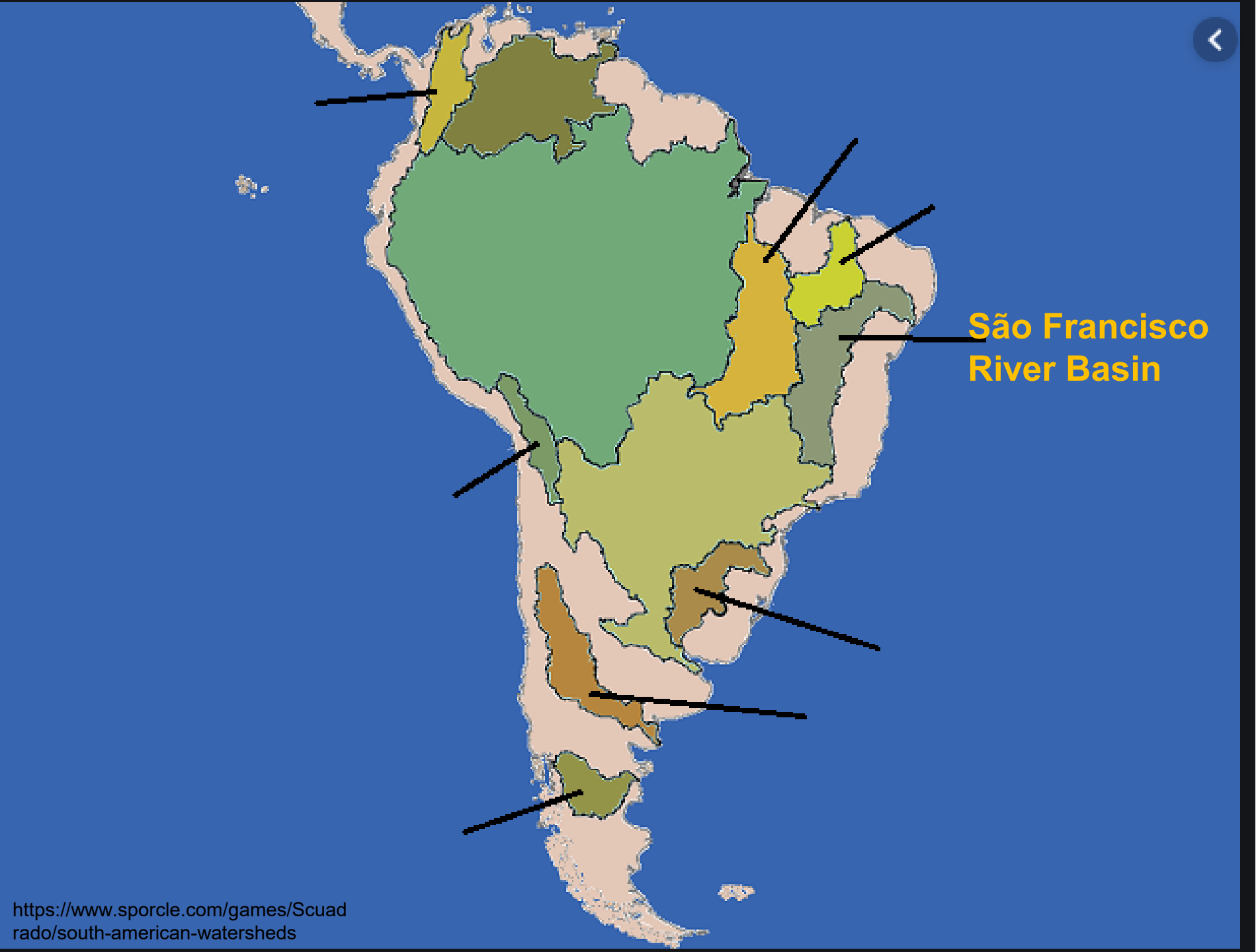
SUSTAINABLE LAND MANAGEMENT



Major scientific partners

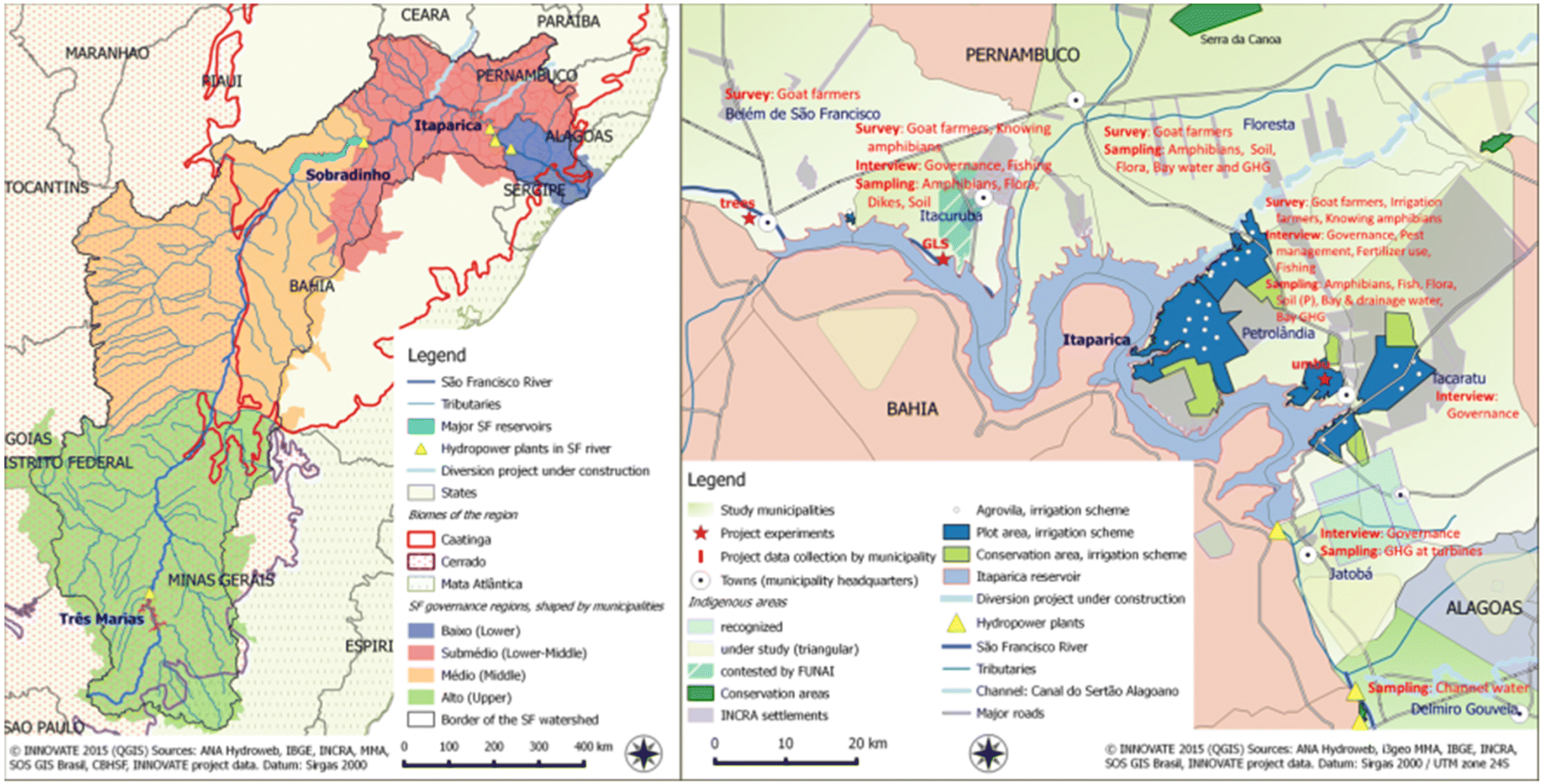
Seven sub-projects





https://www.sporcle.com/games/Scuadrado/south-american-watersheds

The study region



Picture source: [3]

Overall objectives of the project

Generating and bringing together knowledge on the dynamics of the aquatic and terrestrial ecosystems and adequate management options,

evaluating on macro, meso and local levels,

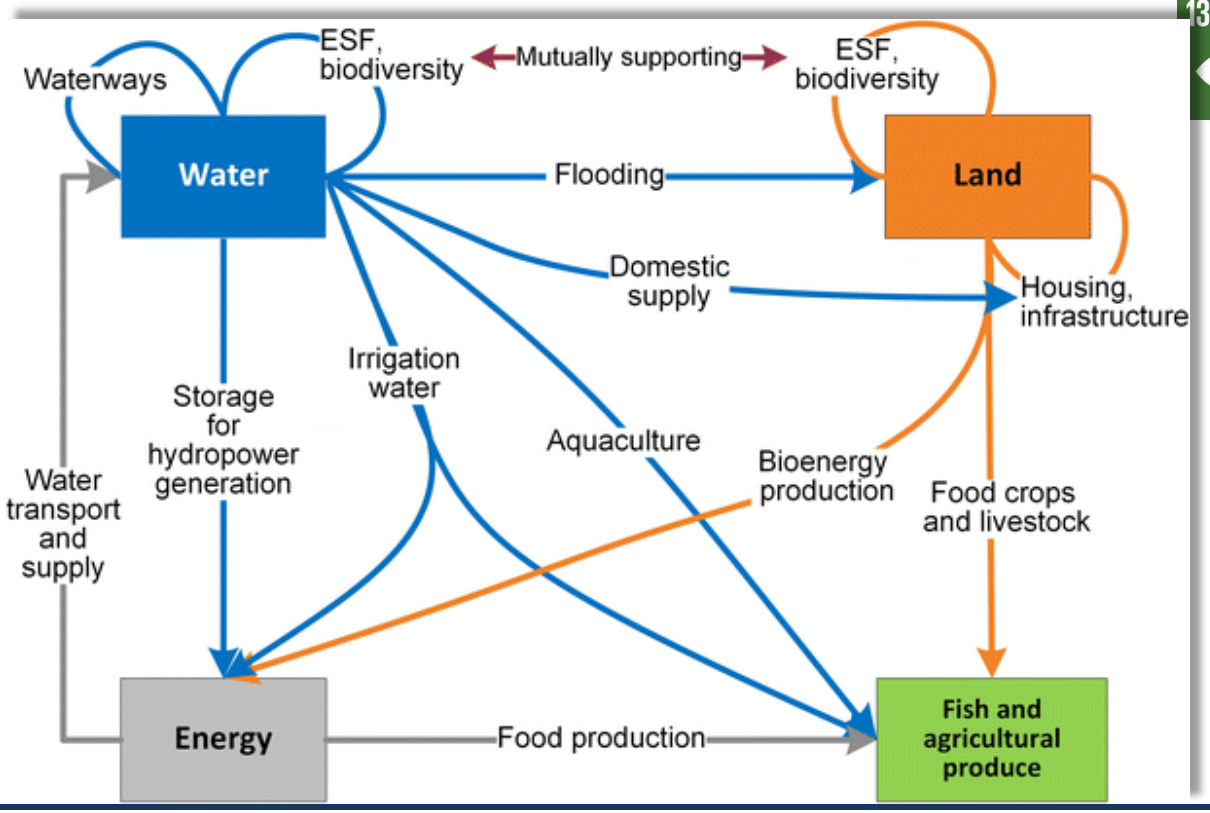
and using inter- and transdisciplinary approaches.

Water: a crucial resource for sustainable development in Northeast-Brazil

Water as a resource for sustainable development

UN SDGs

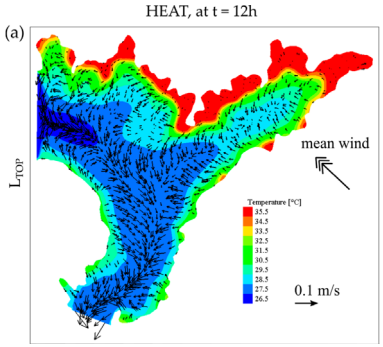
- Goal 6: Clean water and sanitation
- Other interrelated goals



Picture source: [1,2]

Methods – primarily water-related studies

- **Society-centered:** stakeholder analysis, interviews, surveys, workshops, participatory observation
- **Natural sciences monitoring:** water quality, aquatic biodiversity
- **Experimental prototyping:** water treatment scheme
- **Mathematical modelling:** hydrodynamics, hydro economics, eco-hydrology, nutrient emissions



Picture sources: [4,5,6]

A selective, panoramic view of the results

- **The different stakeholders must adjust to the novel collaborative governance system,** e.g., better accommodating the river basin committees, **endorsing a transparent and fair transition to sustainable water management.**
- **A timelier establishment of adequate communication and monitoring systems of megaprojects is required.**
- **Increasingly variable water availability:** a proactive management and attention in diverse planning is crucial.
- **Water quality management:** the water quantity-quality linkages must be considered.
- **Water level fluctuations** must be adjusted to mimic natural seasonal differences at most.

Sources: [2,3,7]

Scientific and other outputs

- Almost 100 peer-reviewed journal papers
- At least 21 BSc, 39 MSc and 26 PhD theses
- Several folders for stakeholders
- Videos about study results and the region
- A comprehensive guidance manual in Engl. and Port. [5]
- A WOCAT results manual from 12 collaborative projects [8]

https://www.innovate.tu-berlin.de/v_menue/materials_for_stakeholders/

https://www.facebook.com/innovate2012

Sources

[1] https://unstats.un.org/

[2] Siegmund-Schultze M, Köppel J, Sobral M (2018) Unraveling the water and land nexus through inter- and transdisciplinary research: sustainable land management in a semi-arid watershed in Brazil's Northeast. Regional Environmental Change, 18(7), 2005–2017. https://dx.doi.org/10.1007/s10113-018-1302-1.

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[4] https://www.facebook.com/innovate2012

[5] Siegmund-Schultze M (Ed.) (2017) Manual de Diretrizes – uma compilação de conteúdos extraídos de resultados científicos do projeto INNOVATE, relevantes para atores envolvidos nas questões em foco. Berlin: Universitätsverlag der TU Berlin. ISBN 978-3-7983-2895-2 (print), ISBN 978-3-7983-2896-9 (online). http://dx.doi.org/10.14279/depositonce-5735. (also available in English: .../depositonce-5732)

[6] Matta E, Selge F, Gunkel G, Hinkelmann R (2017) Three-dimensional modeling of water- and temperature-induced flows in the Icó-Mandantes Bay, Itaparica Reservoir, NE Brazil. Water, 9, 772 [online]. http://dx.doi.org/10.3390/w9100772

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Towards land degradation neutrality in vulnerable ecosystems: an inter- and transdisciplinary approach in the Brazilian Caatinga

Siegmund-Schultze, M; Cierjacks, A[2]; Almeida, JS[3]

[2]University of Applied Sciences, Dresden, Germany

[3]Federal University of Pernambuco, Recife, Brazil

Caatinga, a vulnerable ecosystem

- Semi-arid, dry forest ecosystem, high endemism rate
- 40% deforested
- Relatively high population density
- Land use directed towards returns at the short term

➢ **High vulnerability to climate change, high risk of degradation and subsequent desertification**

Land degradation neutrality

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and <u>strive to achieve a land degradation-neutral world</u>

Picture sources: [1,2]

Research question

(1) How to protect the ecosystem along with its functions and

(2) foster the resilience of the agricultural and other socio-ecological systems in the region?

- Analyze state and practices
- Formulate adaptation strategies

Methods in short

- **45 Caatinga study plots: 20x20m^2, heavy to no grazing**
- **12 coconut and 9 banana plots in smallholder irrigation schemes: 5x5m^2, central/edge**
- Land degradation was considered based on land cover, productivity of agroecosystems, above- and belowground carbon stocks, and plant diversity
- **Key person interviews, stakeholder workshops, conceptual modeling**

Species richness by land use types and intensities

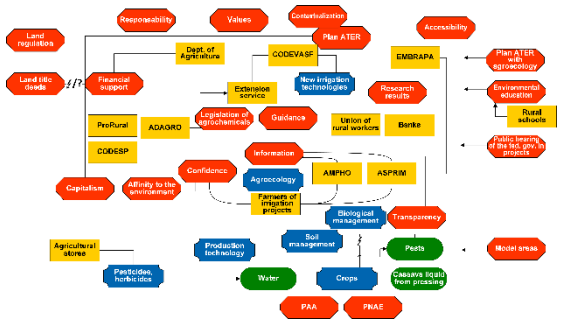
- ..graphs taken out as not yet published ☺

Picture source: unpublished, based on [3,4]

Barriers and opportunities for adaptation

Habitat conservation—biological pest control

- Land titles still missing,
- Agricultural advice should be independent,
- Model farms can help.



Nature conservation

- Local activists are at the forefront of effective governance,
- Pooling forces and agendas is vital,
- Use the momentum of ongoing societal efforts, such as commitment to the SDGs.

- ..graph taken out as not yet published ☺

Picture sources: [6], under review

Implications and outputs

- **Monitoring protocol set up, capacity building,**
- **A species list supported the documentary obligations for a protected area,**
- **Scientific papers and information material for stakeholders:** several folders, a comprehensive guidance manual [5], video documentation, and a comic.

Sources

[1] https://unstats.un.org/

[2] UNCCD (2016) Land in balance. The scientific conceptual framework for land degradation neutrality. Science-Policy Brief 02. United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany.

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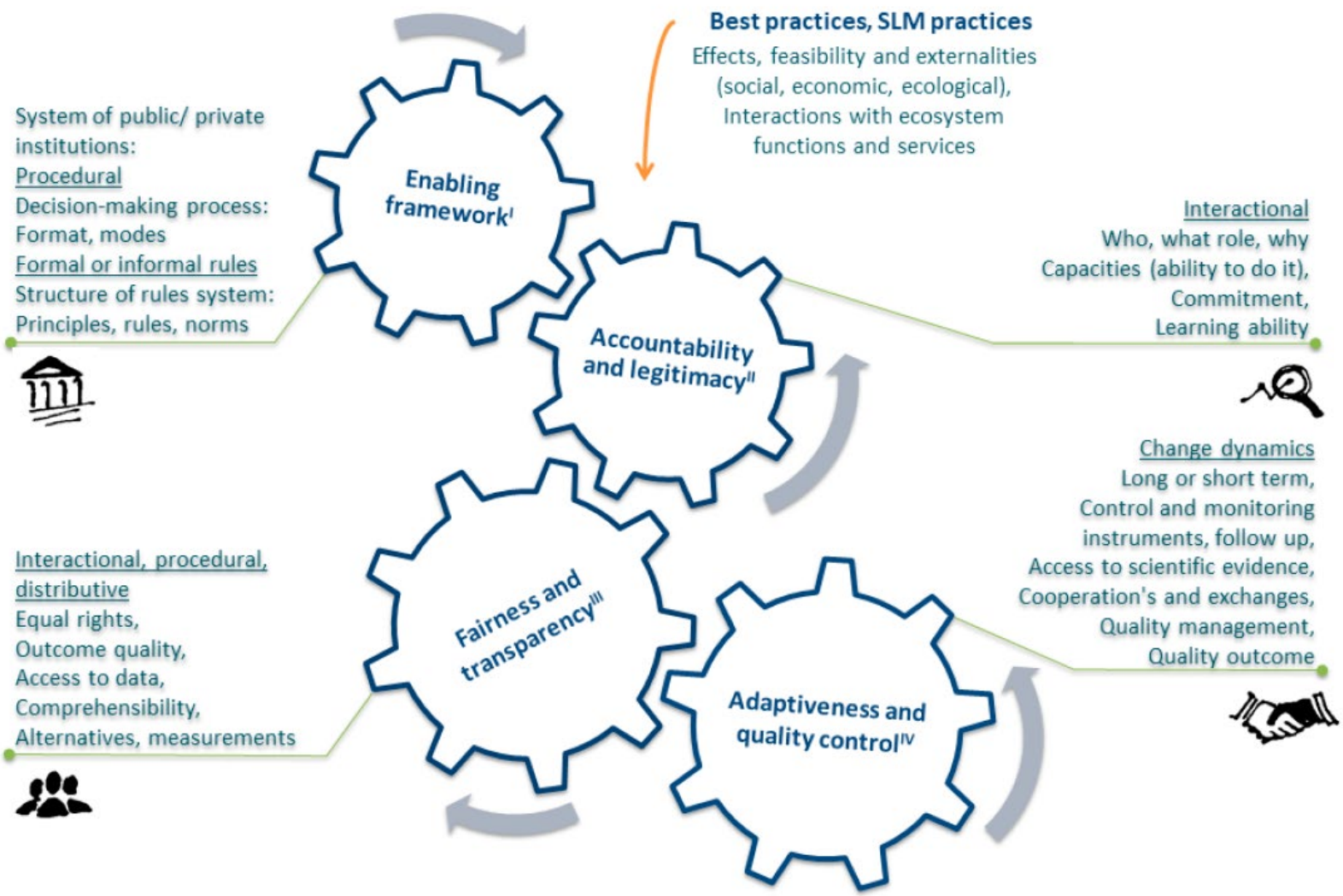
Good governance in decision-making processes for SLM



Source: Rodorff et al 2019 Sustainability, 11 (16), 4303 [online]