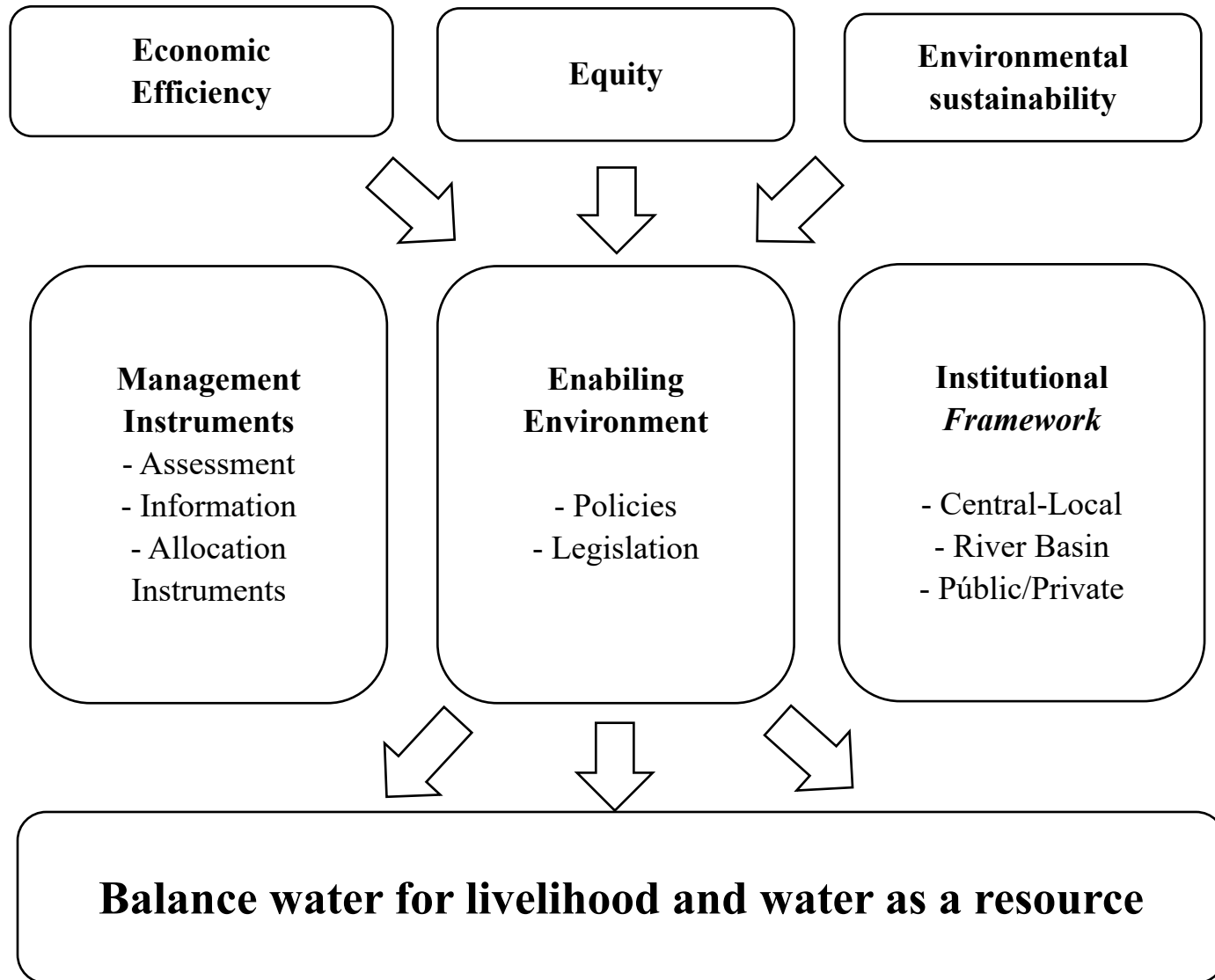




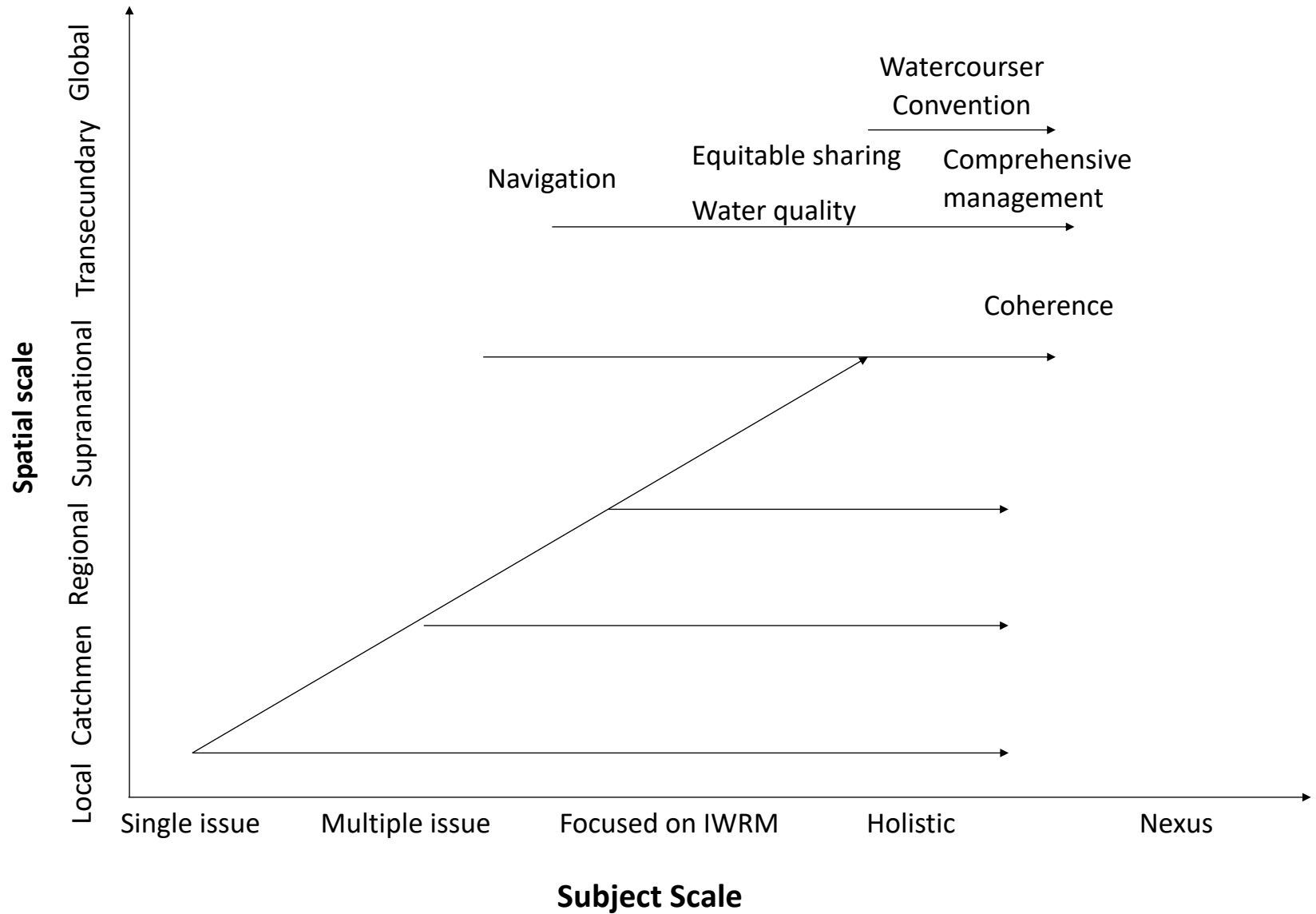
The diagnosis and design of complexity for water governance

Prof. Dra. Juliana Mariano Alves

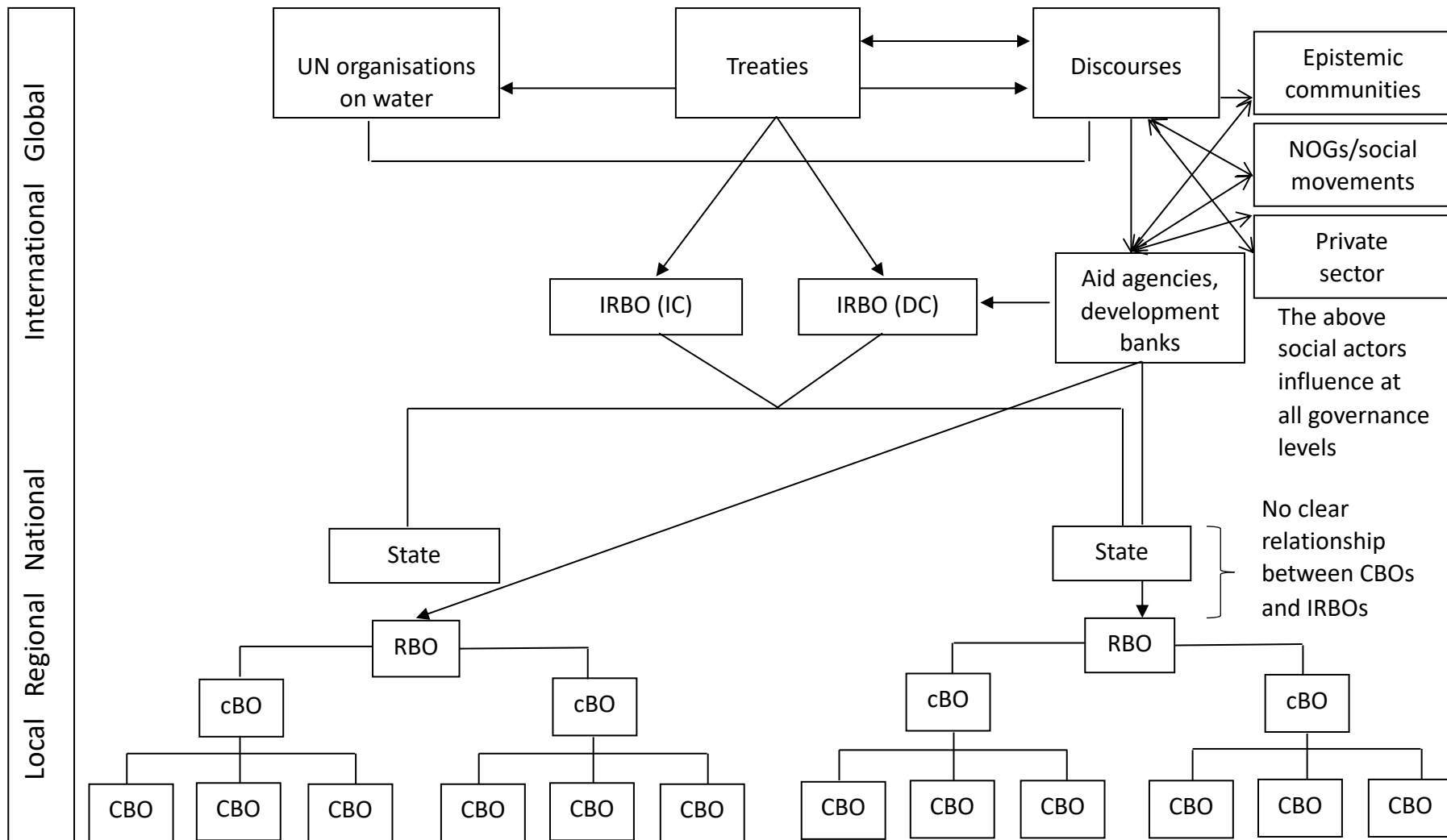
Integrated Water Resources Management - IWRM



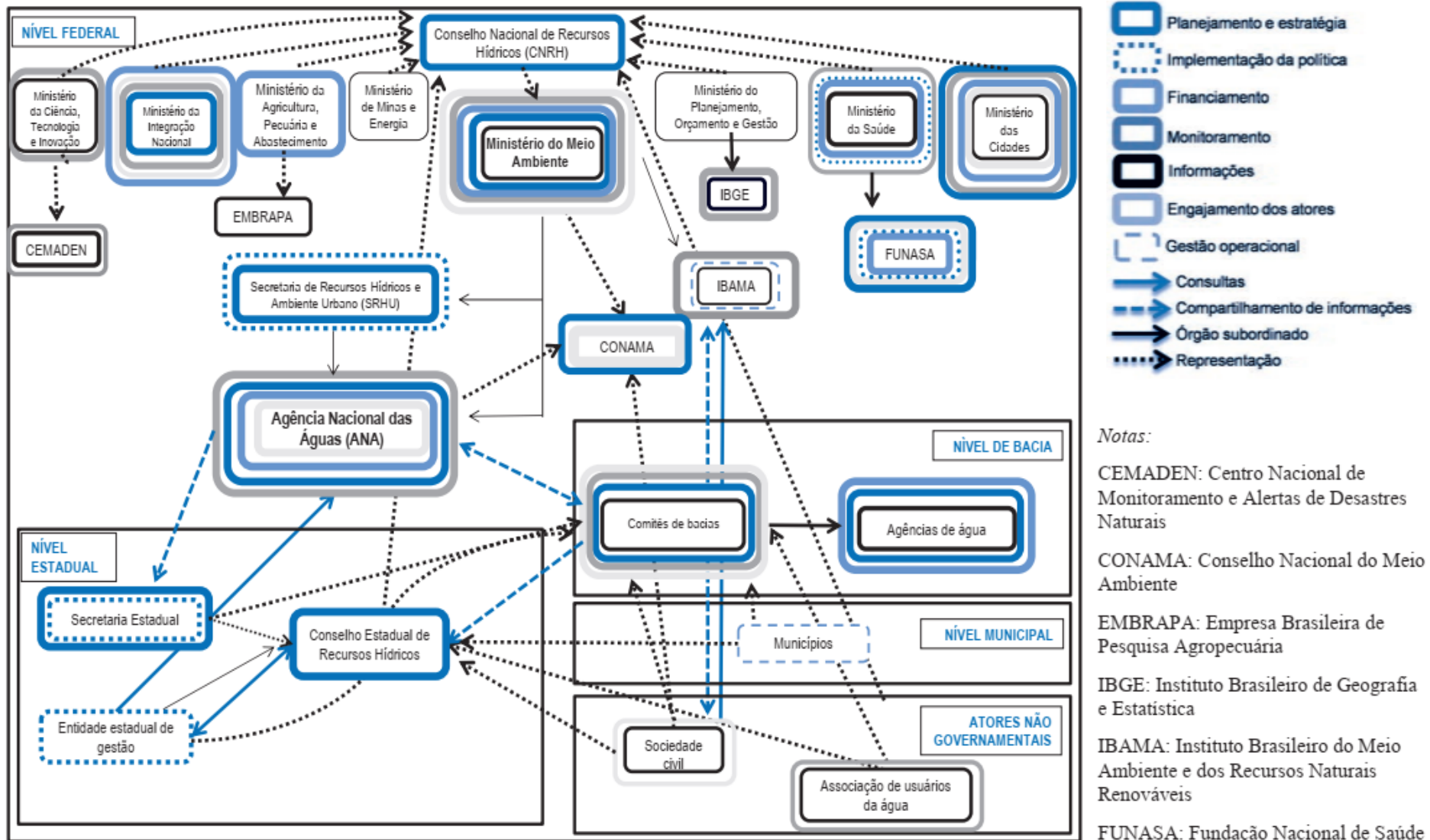
The evolution of river basin organizations on the spatial and subject scale over time



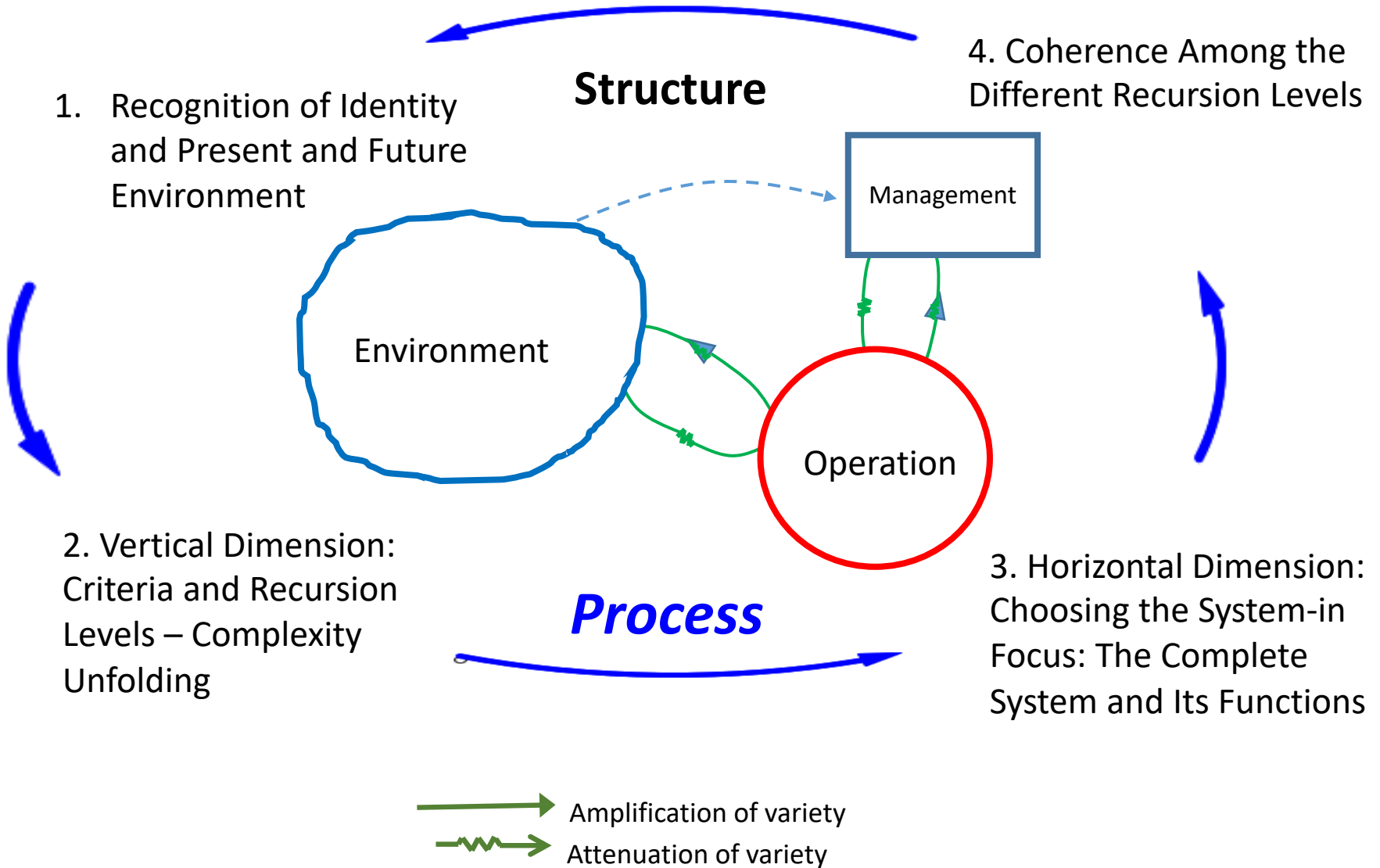
River basin organization - current framework for multiple levels



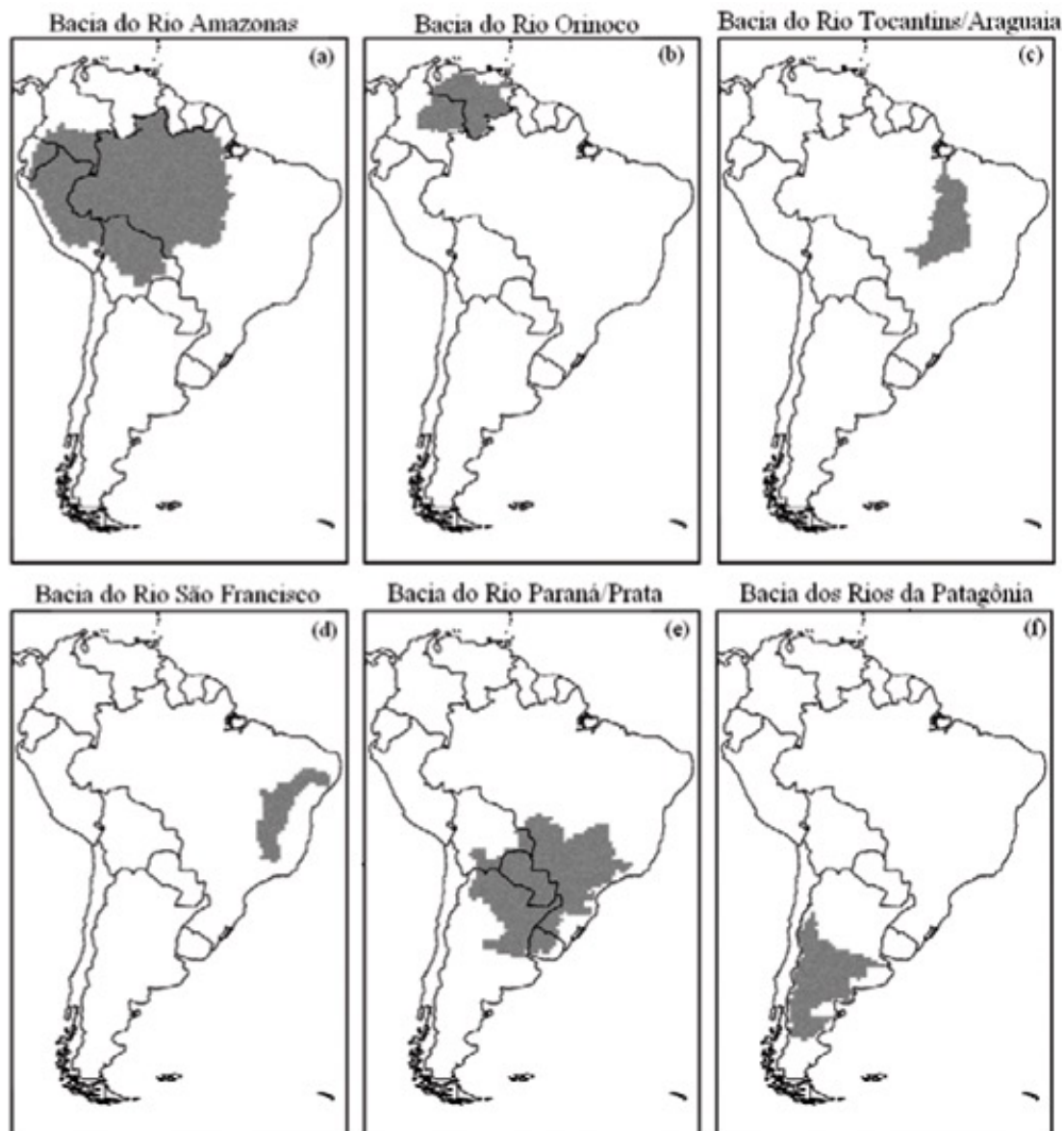
Mapping of the formal institutional framework for the governance of water resources in Brazil, initially introduced by Law No. 9,433/1997



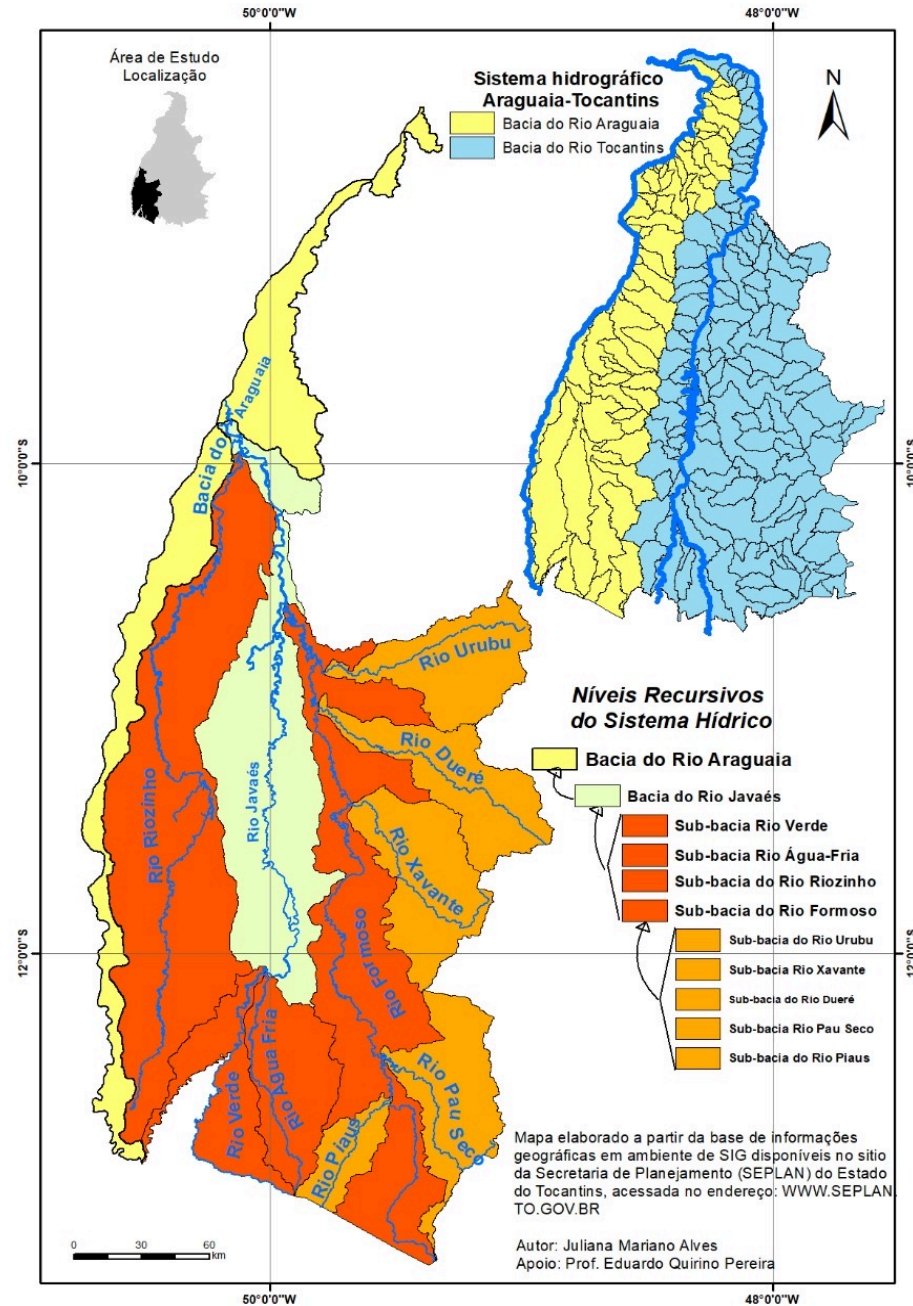
Systemic Diagnosis



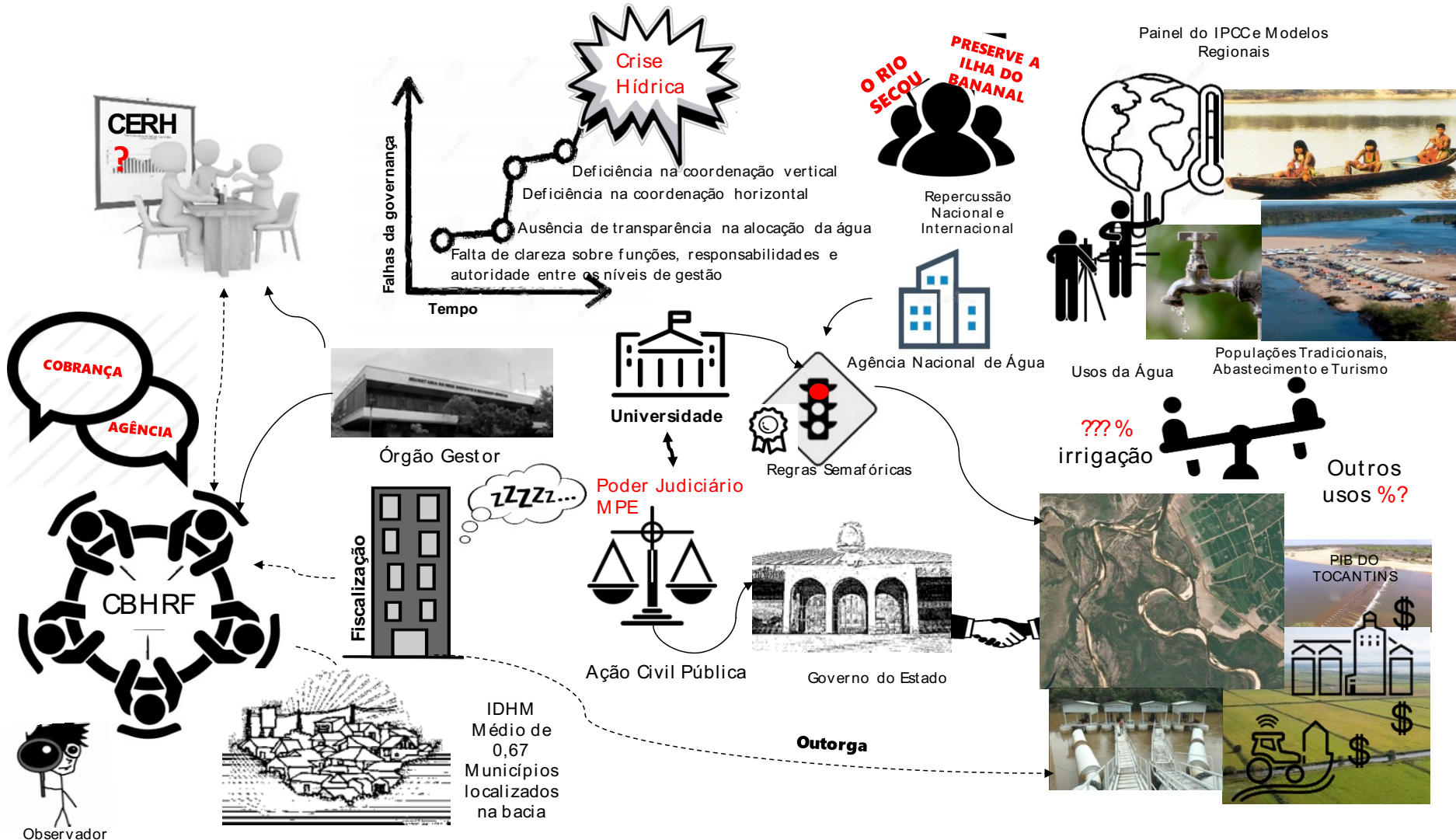
Masks of the main watersheds of South America. a) Amazon River Basin, b) Orinoco River Basin, c) Tocantins/Araguaia River Basin, d) São Francisco River Basin, e) Paraná/Prata River Basin, Patagonia River Basin



Araguaia/Tocantins Hydrographic System and Recursive Levels of the Water System



The water unavailability crisis in the Formoso River Basin



Rio Formoso Agriculture - Irrigation Project



Formoso River
Foto: Caoma MPTO (2019)



Water harvesting for irrigation
Photo: Caoma MPTO (2019)



Dam on the Formoso River/Tocantins
Photo: MPTO (2019)



Drought on the Xavante River/Tocantins
Foto: TV Anhanguera/TO (2018)

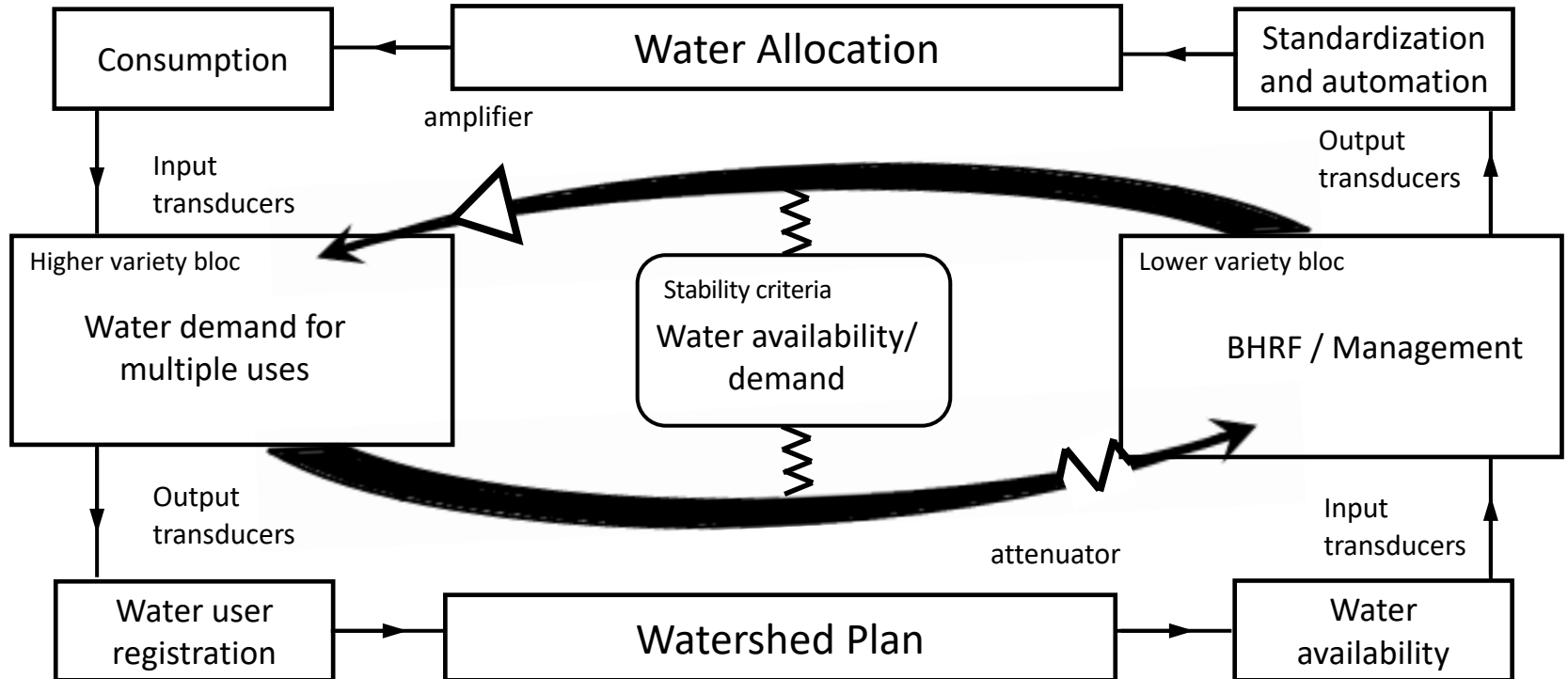
#TVAnhangueraTO



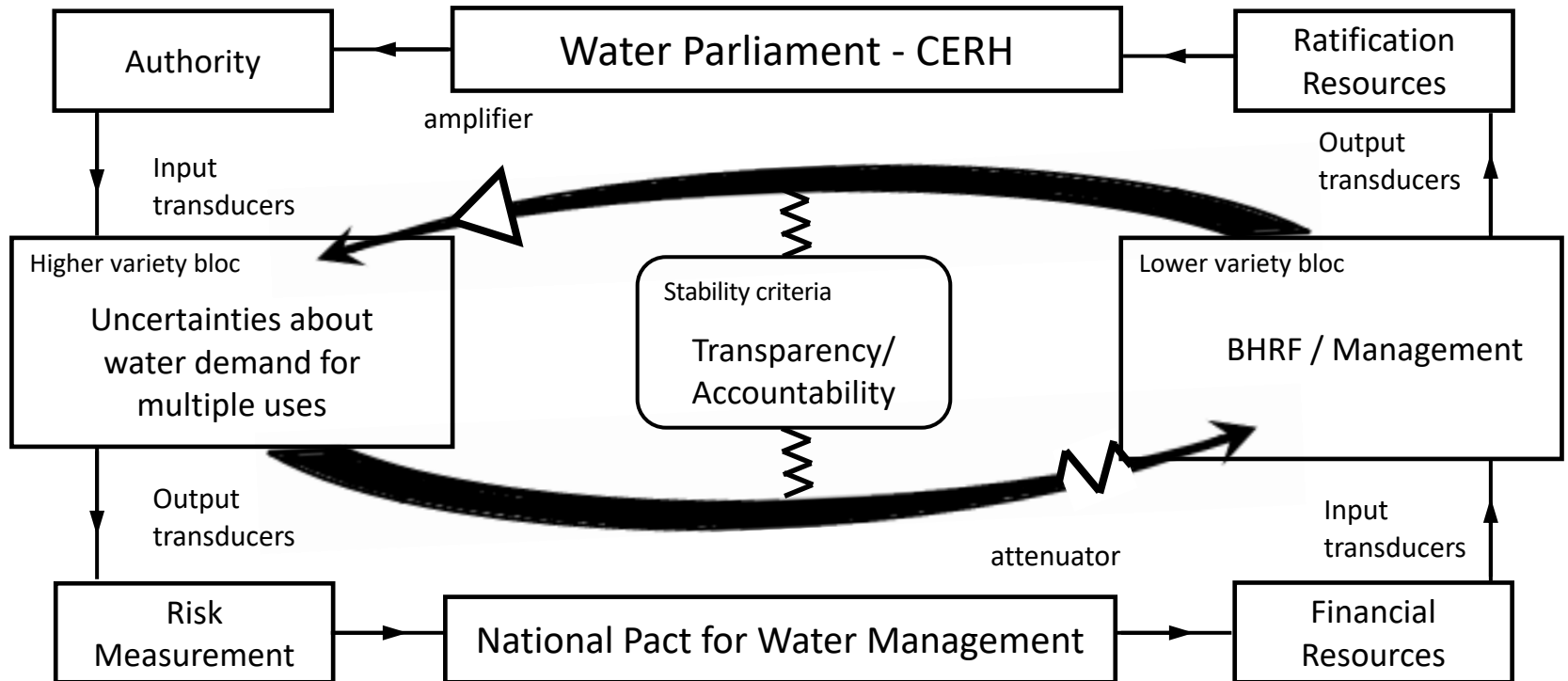
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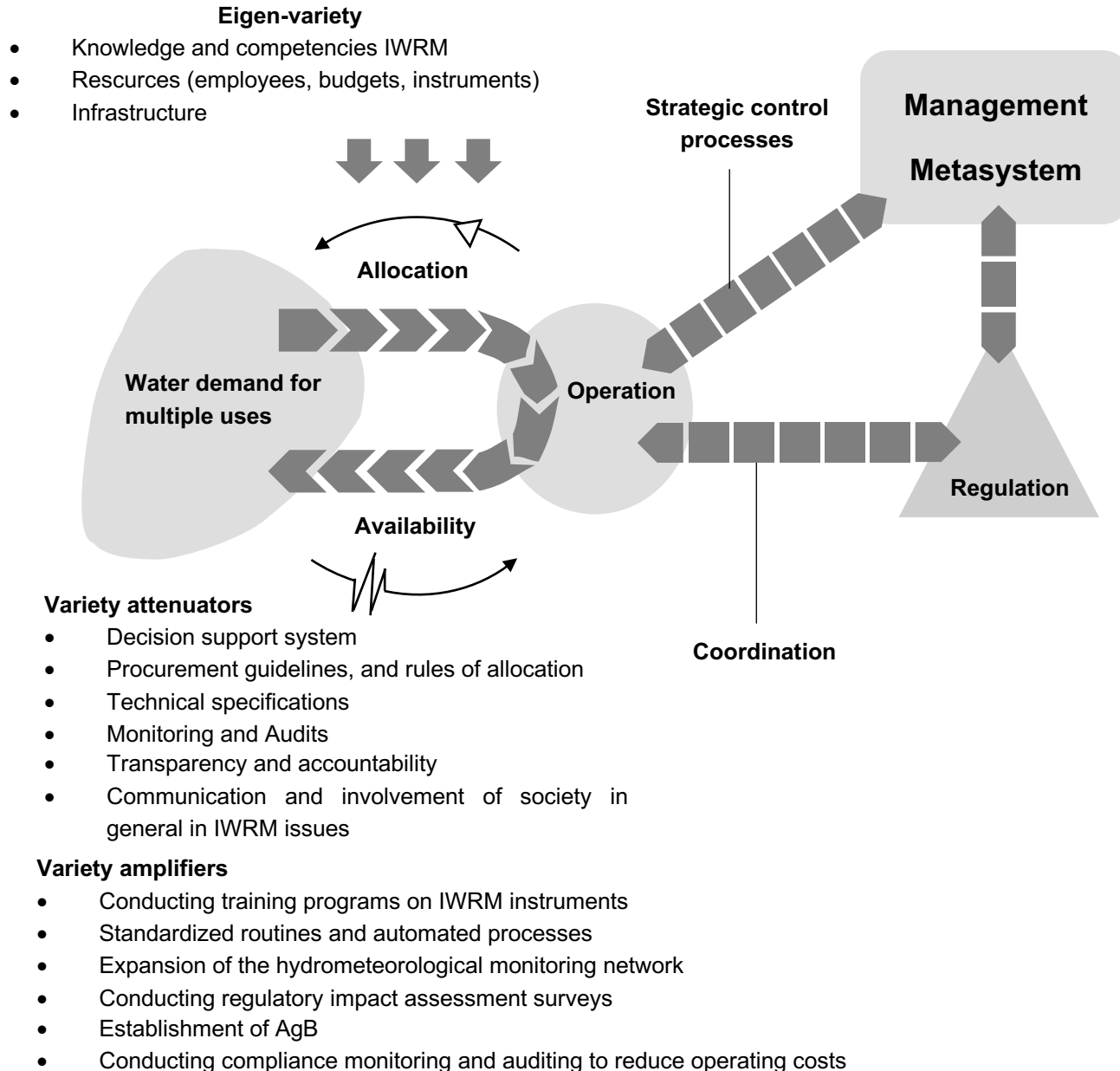
Homeostat for water demand and availability



Homeostat for transparency and accountability

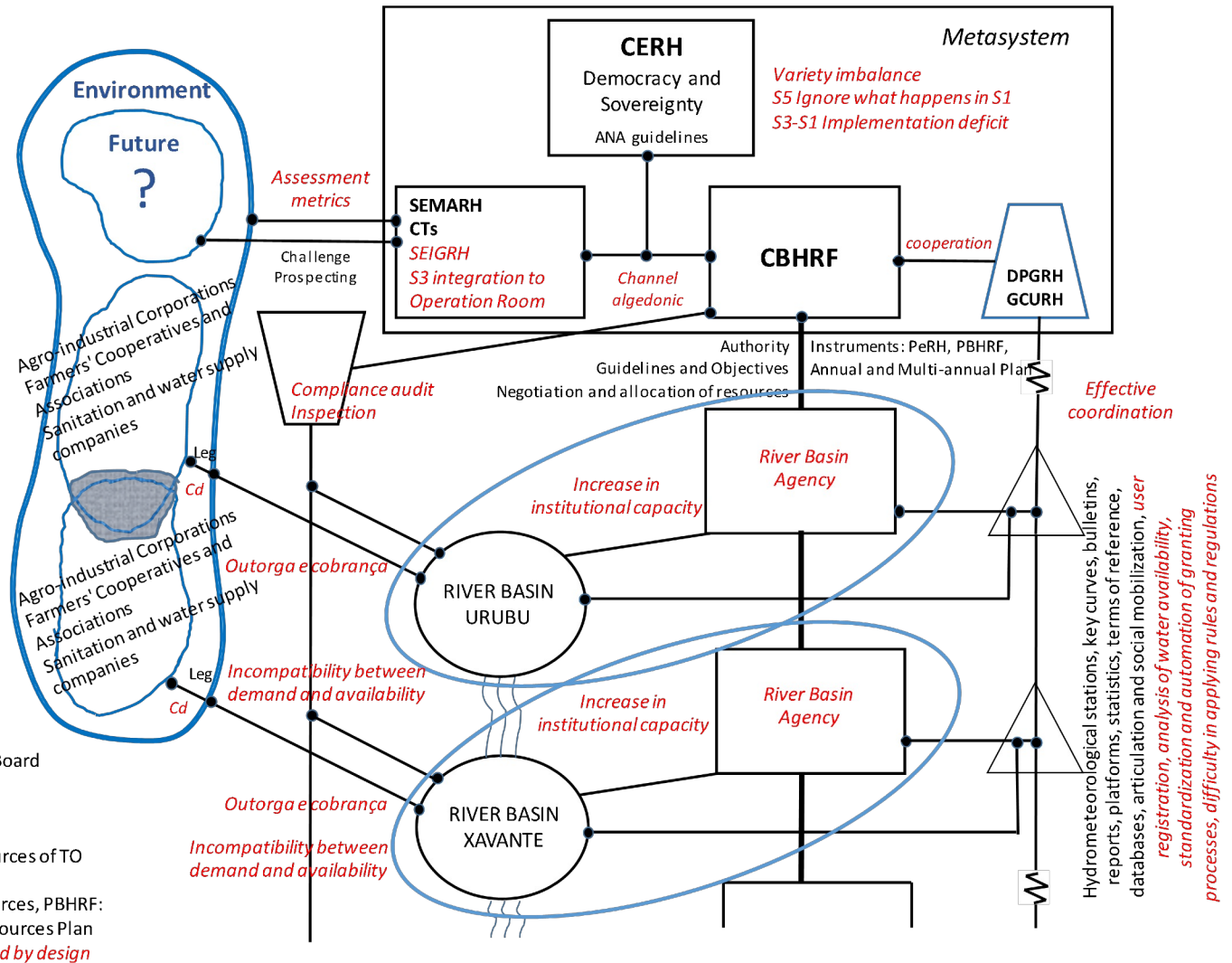


Design proposal for a Viable System Model in RBOs



DESIGN OF THE FORMOSO RIVER BASIN - R3-BHRF LEVEL

- Ecological System / Bananal Island
- Social System
- Political-Administrative System
- Economic-Financial System
- Educational System
- Health System
- Water and Environmental Legislation
- Market (Commodities)
- State Public Ministry
- Judicial Power
- Universities



Siglas:
 ANA: National Water and Sanitation Agency
 CBHRH: Formoso River Basin Committee
 CERH: State Water Resources Council
 CTs: Permanent Technical Chambers
 DPGR: Water Resources Planning and Management Board
 G CURH: Water Resources Use Control Management
 IWRM: Integrated Management of Water Resources
 Naturatins: Nature Institute of Tocantins
 SEMARH: Secretary of Environment and Water Resources of TO
 SEIRH: State Water Resources Information System
 Leg: Legislation of Water Resources, PBHRF:
 Rio Formoso Watershed Plan, PerH: State Water Resources Plan
Italics: new component or improvements incorporated by design

A living part of the Karajá tradition / Bananal Island
Photo: Emerson Silva/Government of Tocantins

