Bridging the Science-Knowledge-Policy Gap to Address Cumulative Impacts of Small Hydropower Projects in The Brazilian Amazon



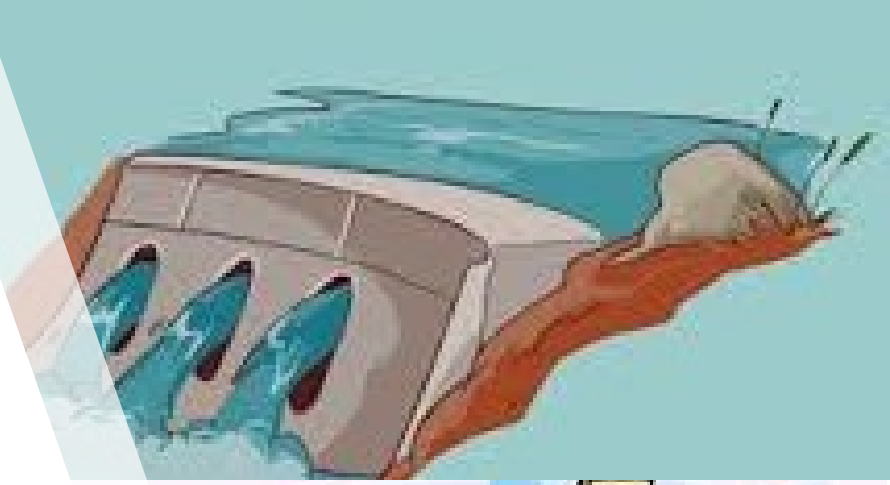
By: **Simone Athayde -** Center for Latin American Studies, University of Florida and **Evandro M. Moretto** – Institute of Energy and Environment, University of São Paulo.

Small Dams Working Group - Amazon Dams International Research Network (ADN)

Water Institute Symposium, February 25, 2020

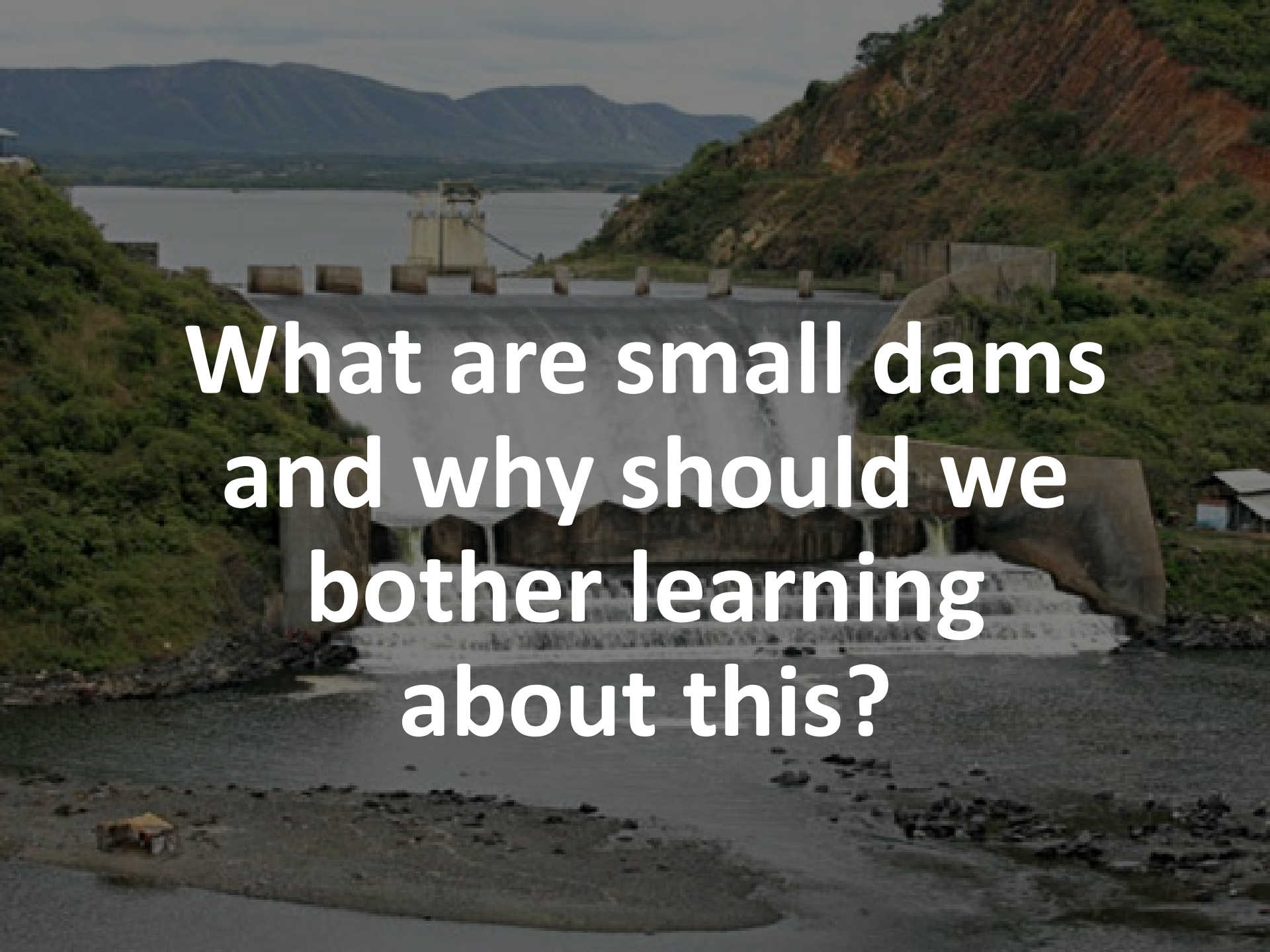
Presentation Outline

- Defining the problem: cumulative impacts of small dams



- Stakeholders, decision-making and policy instruments

- A way ahead: research agenda, science-policy interface and stakeholders' engagement


What are small dams and why should we bother learning about this?

SMALL HYDROPOWER PROJECTS (SHPs)

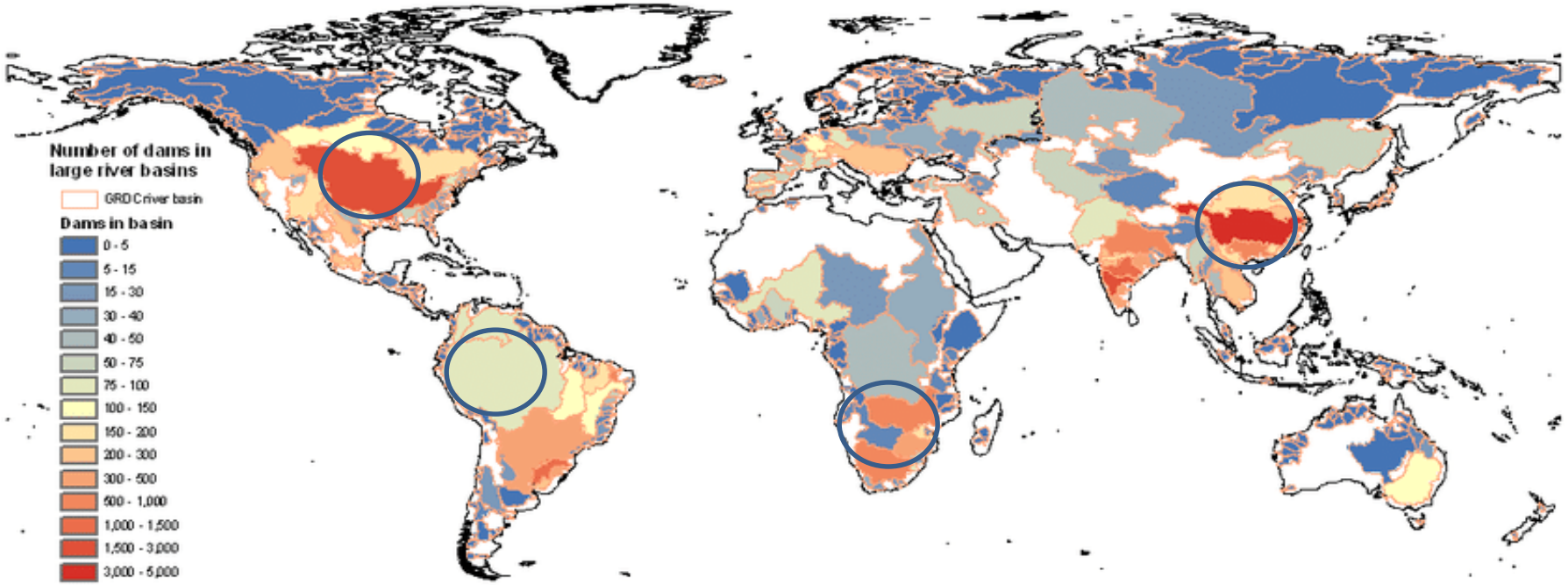
- International agencies: SHPs: up to 10 MW. Brazil: ANEEL (2015) over 5MW and under 30MW, reservoirs up to 13 km2.

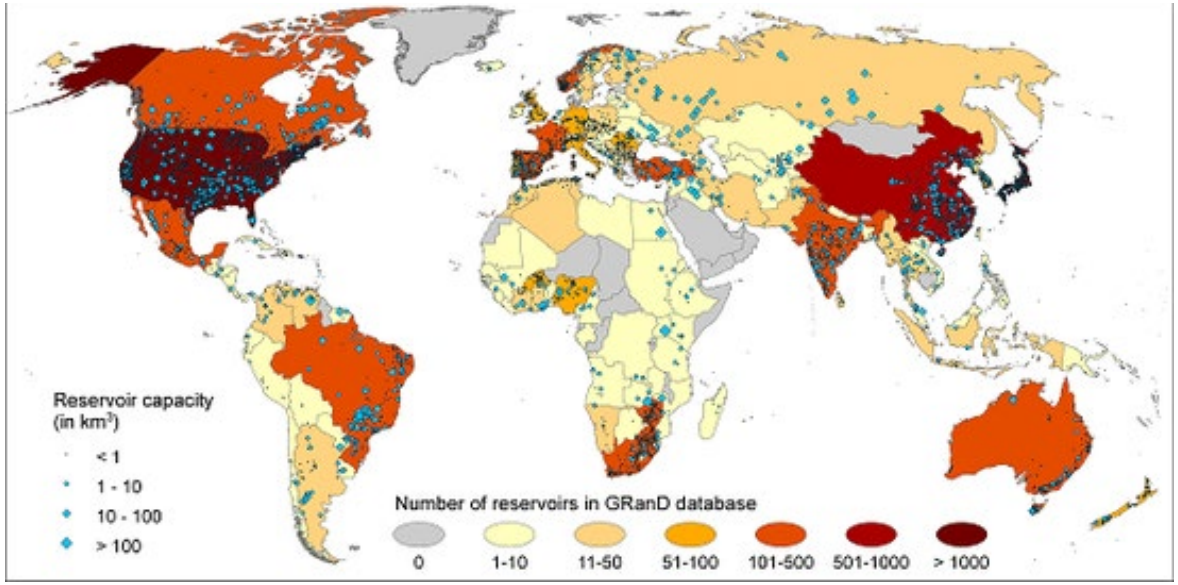
- Regulatory policies: more flexible in contrast to large dams. Economic/political incentives.

- 82,891 small hydroelectric projects (SHPs) operating in 150 countries (Couto and Olden 2018).

- Brazil: 1,124 SHPs and CGHs (micro dams). Regulatory incentives and policies – disorderly explosion of SHPs, 87 operating and 256 inventoried in the Amazon rivers.

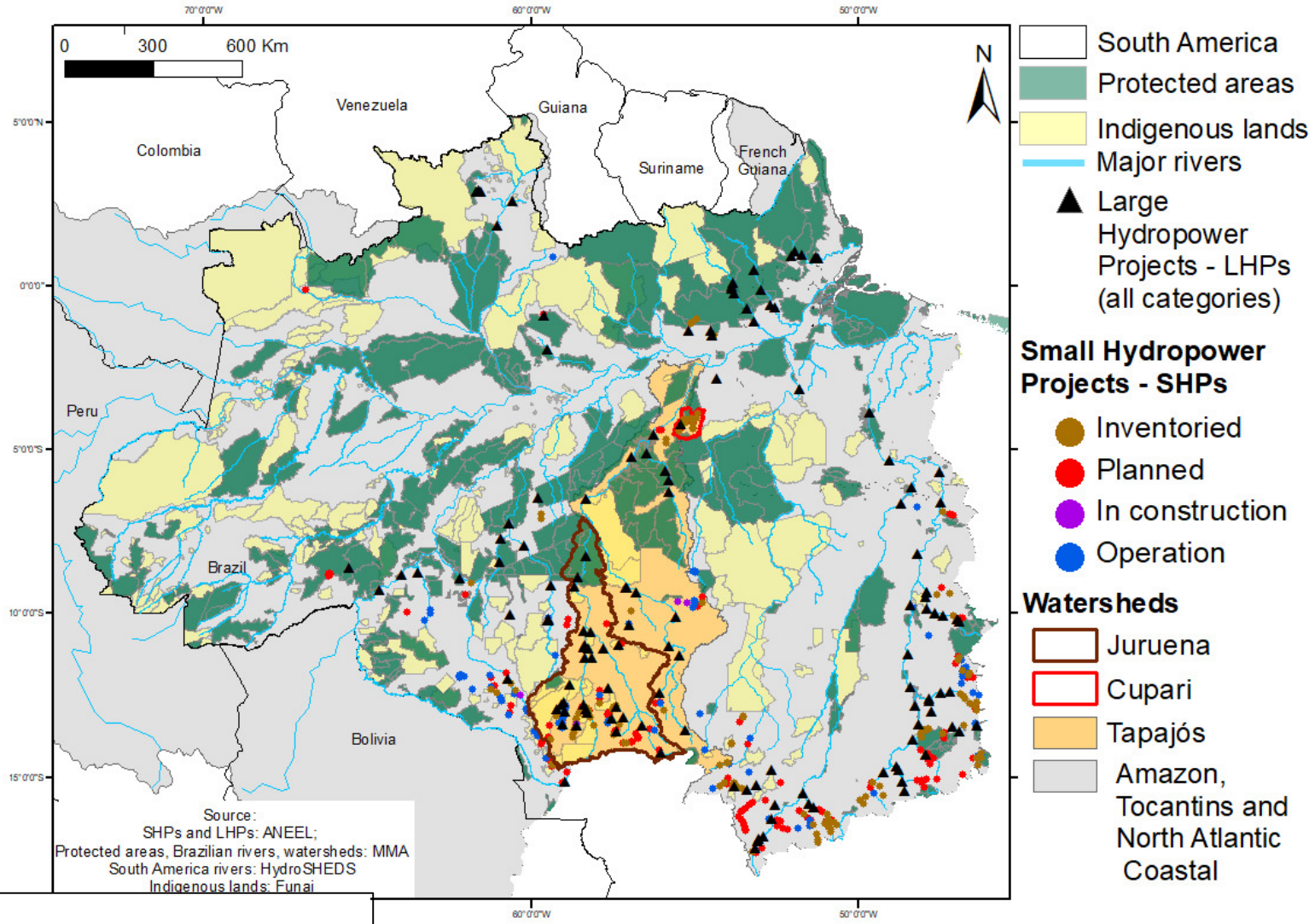
DAMMING THE WORLD

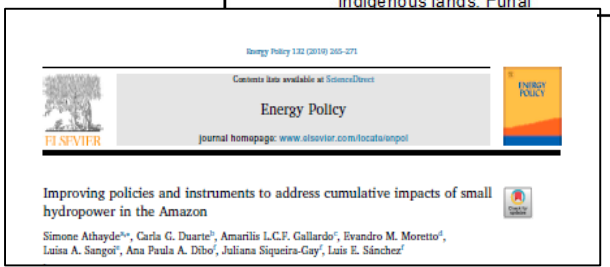




Up: Number of large dams in the world's large river basins. Source: Soesbergen (2013). Right: Reservoir capacity. Source: GRanD database 2011.

SHPs in the Amazon




Energy Policy 132 (2019) 265-271

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Improving policies and instruments to address cumulative impacts of small hydropower in the Amazon

Simone Athayde[a,*], Carla G. Duarte[b], Amarilis L.C.F. Gallardo[c], Evandro M. Moretto[d], Luisa A. Sangoi[e], Ana Paula A. Dibo[f], Juliana Siqueira-Gay[f], Luis E. Sánchez[f]

Athayde et al (2019), Energy Policy.
Policy paper on Cupari case-study

TO DAM OR NOT TO DAM?

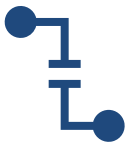
Social and environmental impacts

Socio-economic and cultural reproduction; threats to livelihoods

Fisheries, including biodiversity and economic losses

Cumulative and synergistic impacts, including water quality and quantity

Cascades of SHPs: ecological footprint per megawatt of electricity produced can be much larger than that of larger plants



Habitat fragmentation – loss of connectivity, watershed-scale implications

What are cumulative impacts?

Result from a specific action that is added to or associated with the effects of other projects, programs or actions of the past, present and future.

Additive

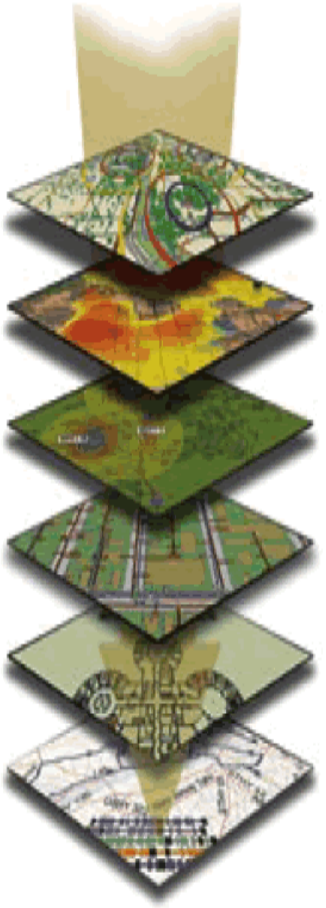
2+2=4

- Sum of impacts of the same nature. Ex: modification of the hydrological regime resulting from the construction of hydroelectric plants in cascade in a given hydrographic basin.

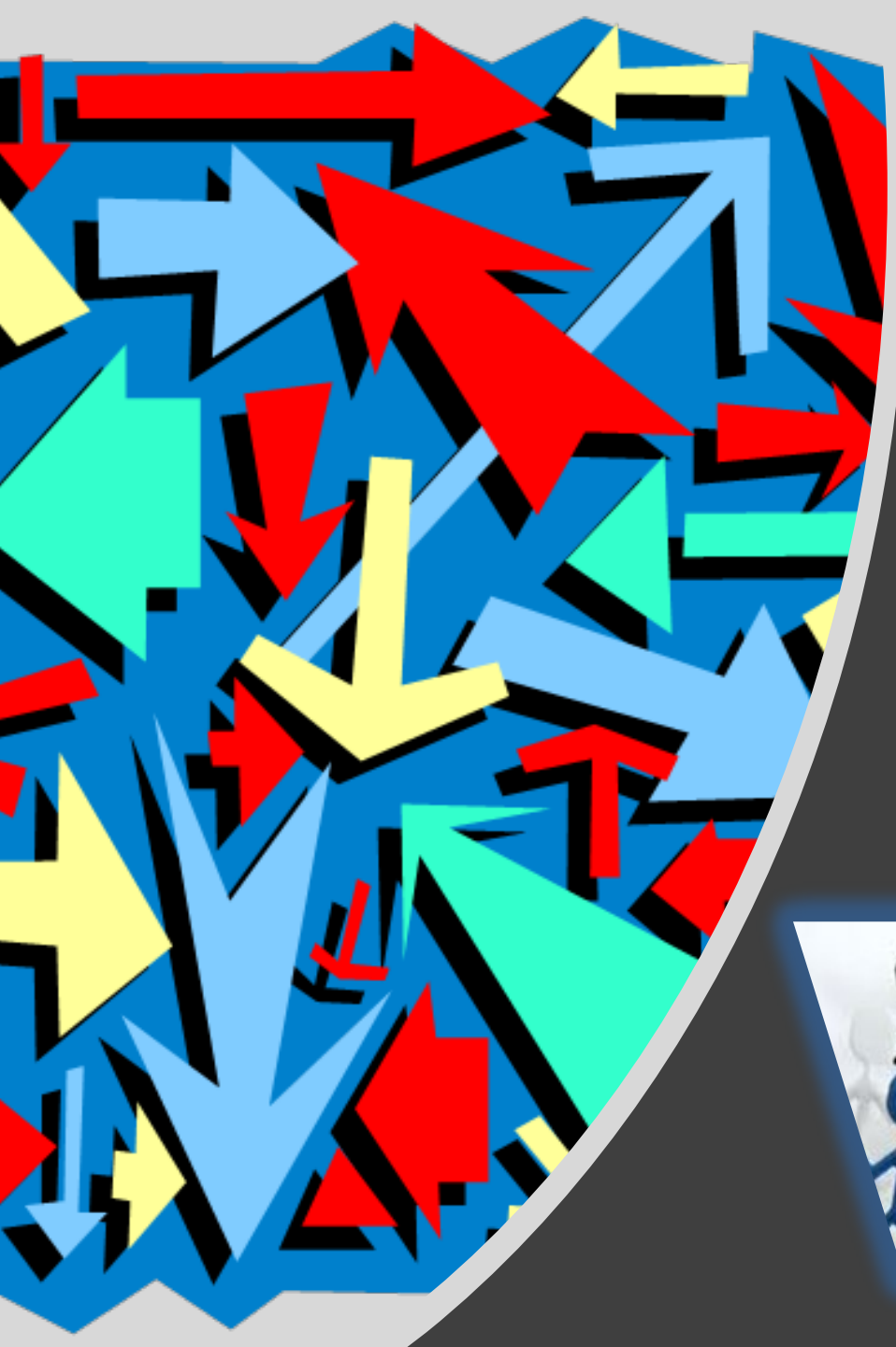
Synergistic

2+2=5

- Resulting from different actions: impacts of a different nature and with wider consequences and implications. Ex: combined impacts of hydrological transformations, increase in water temperature and contamination of rivers by agrochemicals.



Gallardo et al. 2017



Stakeholders and decision-making

We are stakeholders too!

I need to maximize profit!

Brazil needs energy to grow!

Ministério de Minas e Energia

BRASIL
UM PAÍS DE TODOS

I have such a hard and poorly paid job!

BNDES

I'm investing in the long-term

I love hot showers!

IBAMA
MMA

Hydropower is clean energy

I'm concerned with methane emissions and Climate change!

I want access to electricity

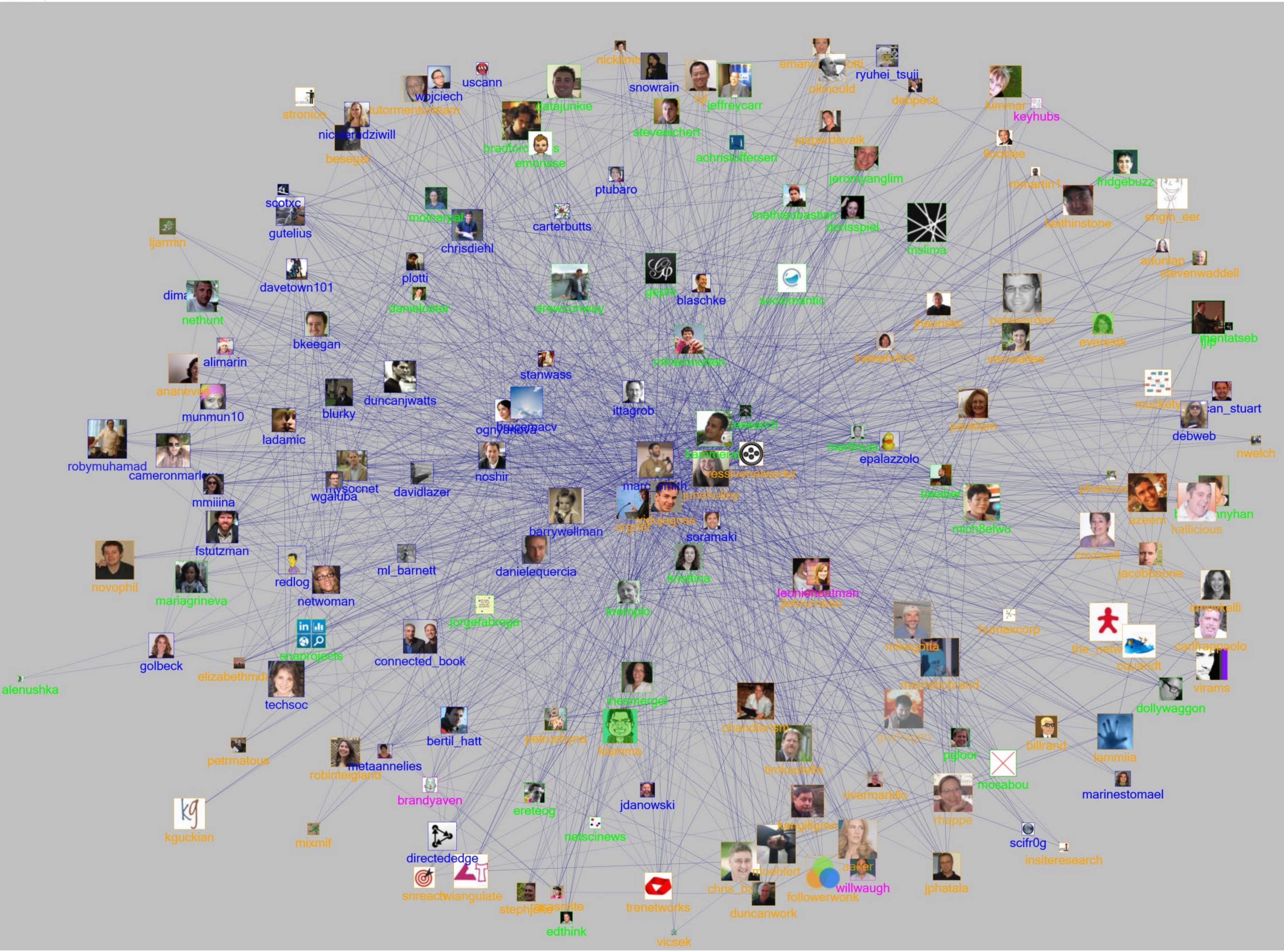
I don't want to be re-settled!

Water and energy are not commodities!

My concern is biodiversity loss!

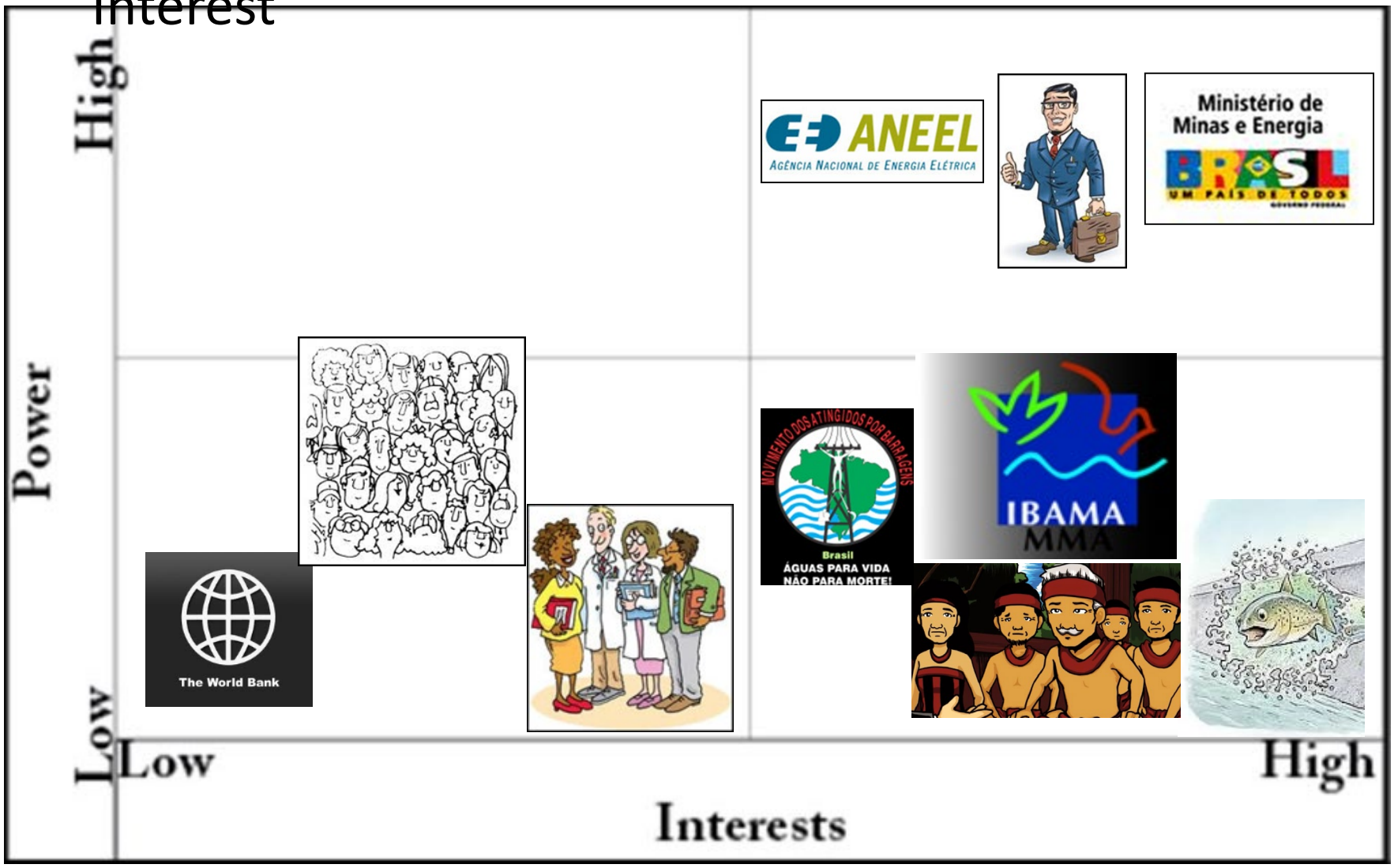
MOVIMENTO DOS ATINGIDOS POR BARRAGENS
Brasil
ÁGUAS PARA VIDA
NÃO PARA MORTE!

NodeXL Twitter Social Network Map



Created by NodeXL (http://nodexl.codeplex.com)

Preliminary Stakeholder Analysis Matrix of Power X Interest

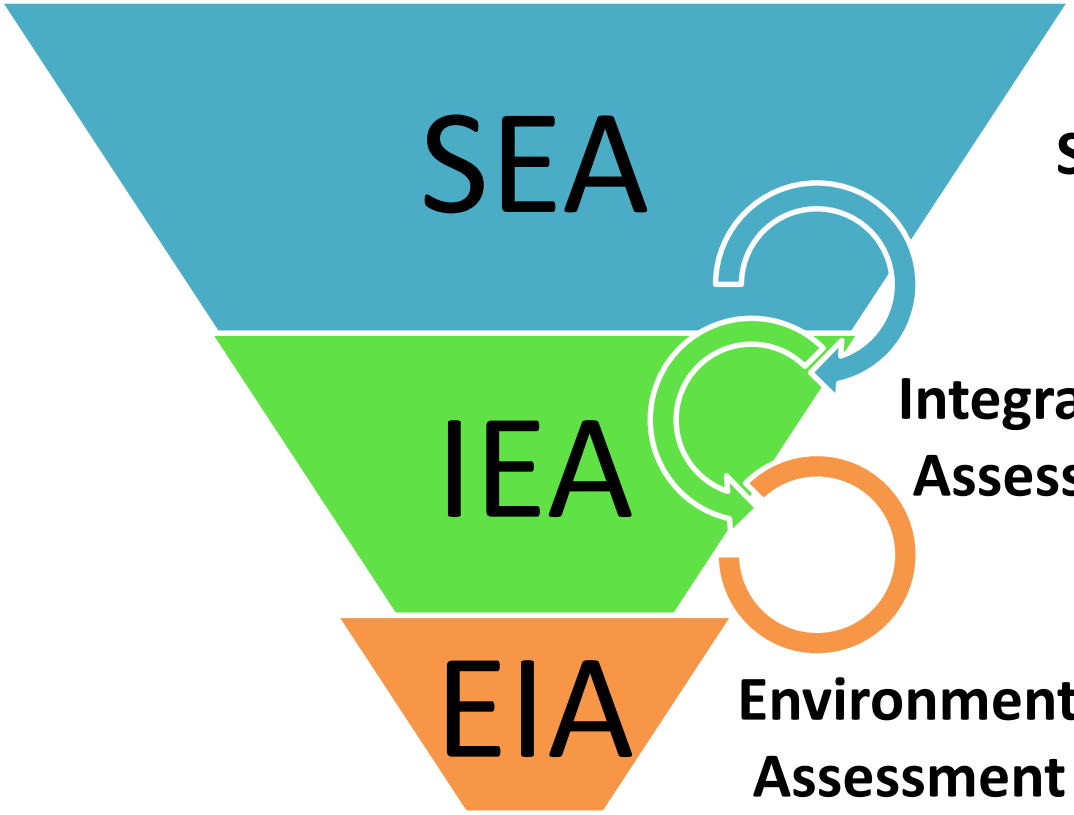


Each actor or stakeholder involved in the complex web of institutions, interests and politics that characterize dam's implementation has a perspective, an interest and a position.

Each stakeholder has different power levels, which affects her or his participation in the decision-making process in various ways.

The broken chain of communication hinders understanding, visibility, trust, increasing conflict and vulnerability by duplicating mistakes in the process.

Policy Instruments:
Environmental Impact Assessment and Licensing



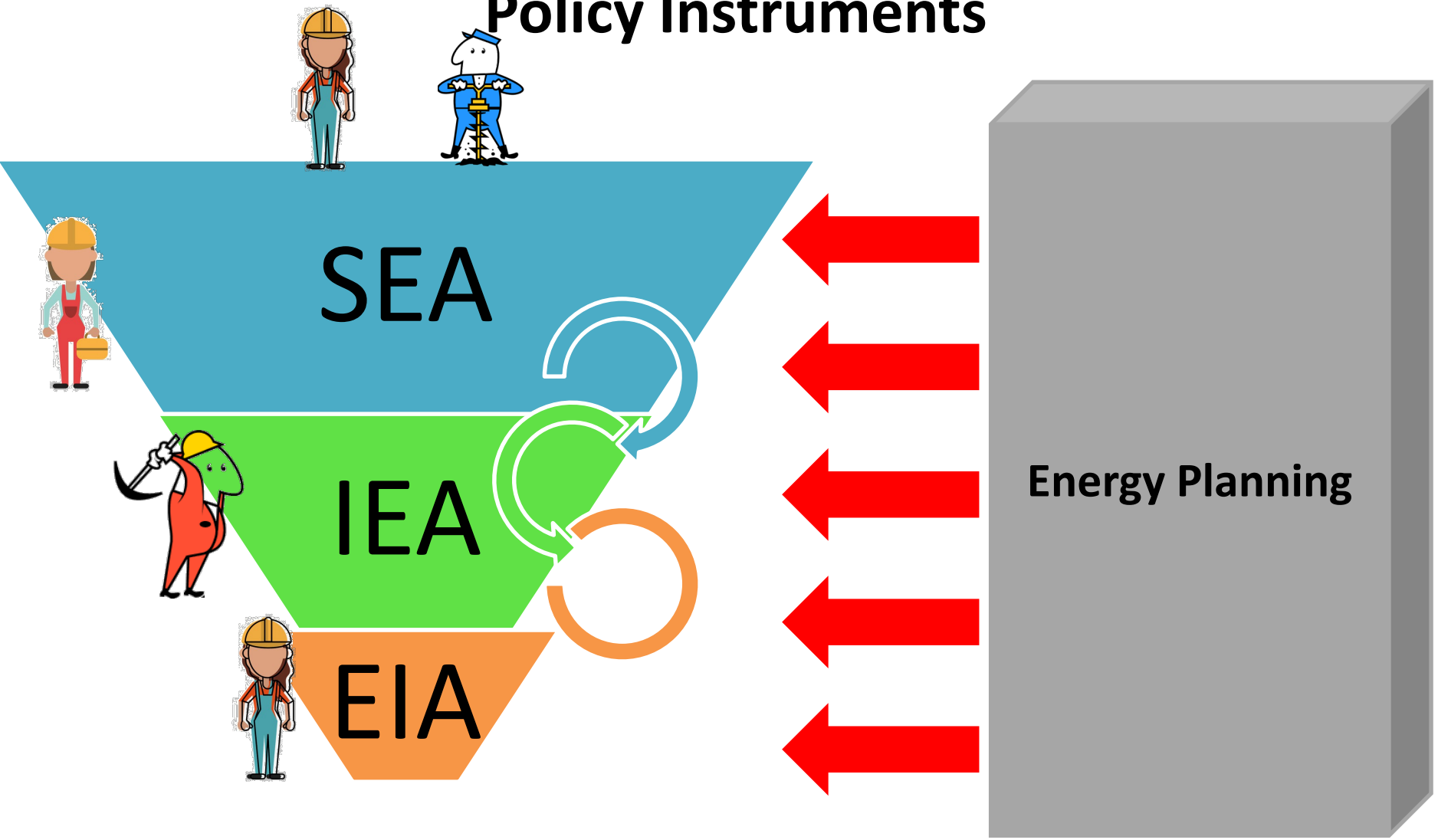
Strategic Environmental Assessment (region)

Integrated Environmental Assessment (watershed)

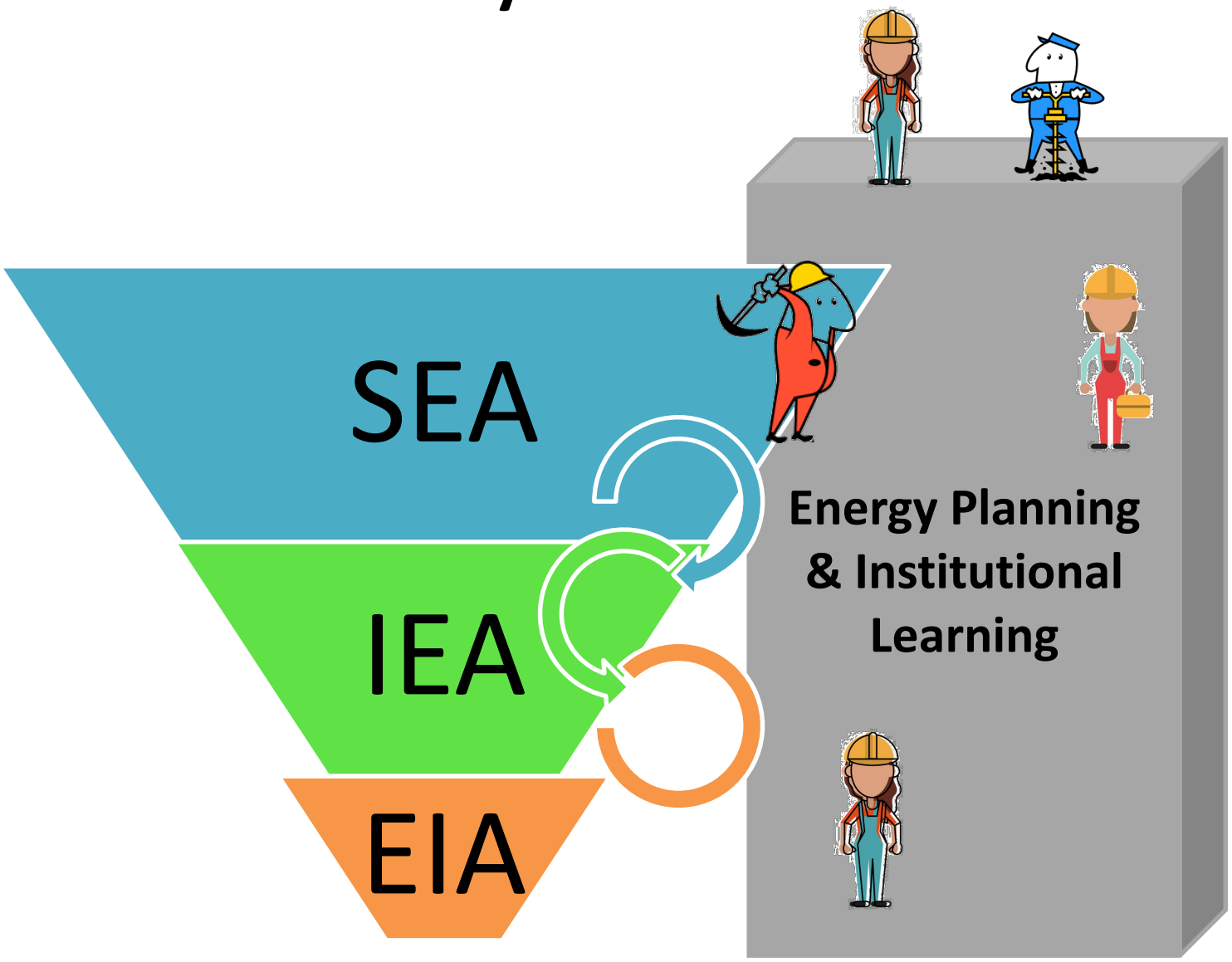
Environmental Impact Assessment (project)

Lack of integration (tiering), cosmetic/fragmented assessments, lack of independent evaluation, lack of adequate consultation of affected social groups, conflicts of interest, political decisions (rather than based on best science/knowledge available).

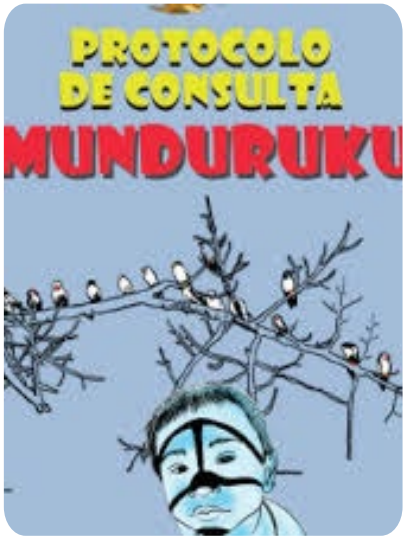
Environment X Energy Policy Instruments



Environment X Energy Policy Instruments

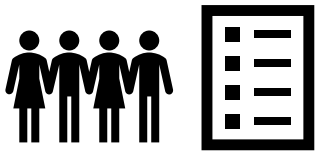


Engaged Science: Can it help?



- Universities/Scientists – bordering organizations – facilitating inter-sectoral and multi-stakeholder forums; adaptive management.
- Facilitating local empowerment through access to information and researchers, promoting social learning and exchange across watersheds.
- Support for relevant, independent inter- and trans-disciplinary research and science communication to inform decision making (multi-stakeholders).

Methods and tools throughout planning and impact assessment processes



Scoping and impact identification

Impact evaluation

Decision-making

Adaptive management and monitoring

Participatory SEA/IEA

Mapping actors and policies

Social network analysis

Interviews

Participatory mapping

Spatial analysis

Checklists

Secondary data

Baselines

Refinement of objectives and valued ecosystem components from previous phase

Expert opinion

Conceptual and quantitative models

Local consultation and validation

Load capacity analysis

Cumulative Impact Assessment

Access to independently generated information

Free, prior and informed consultation

Participatory decision-making (Management Councils and representative institutions)

Defining plans, programs and strategies

Participatory monitoring and evaluation

Citizen science

Periodic evaluation / Redirecting actions

Data and information access platforms

Next Steps

- ADN's Small Dams Working Group projects: Developing technical and policy solutions and instruments based on multi-stakeholders' dialogue and learning forums, as well as on the best science and knowledge available;
- Providing independent, high quality technical analysis to address risk and uncertainty in planning and management of small (and large) hydropower development in the Amazon.

THANK YOU!

simonea@ufl.edu

Acknowledgements:

- Dr. Bette Loiselle – Tropical Conservation and Development Program (TCD) and Amazon Dams Network
- Henrique Paiva de Paula – ANEEL
- Brazilian Public Prosecution Service – MPF
- Institute of Energy and Environment – IEE/USP
- Amazon Dams International Research Network/ Rede Internacional de Pesquisa em Barragens Amazonicas/ Red Internacional de Investigacion en Represas Amazonicas (aka Amazon Dams Network) – ADN/RBA/RIRA
- Coordination for the Improvement of Higher Education - CAPES/Brazil
- National Science Foundation - NSF

www.amazondamsnetwork.org