Mapping of Social-Ecological Systems

WP1, TRASSE project

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Justification:

- There is a need to get a holistic picture of the case studies and a simple representation of the social-ecological watershed-systems (**SEWS**), including the main problems and their causes, before we can plan for WP2 to WP4 research questions and methods;

- We need a first systematic analysis of actors, ecosystems and the interactions between them, **homogeneous across the 3 countries**.

Objective:

- Building **a first representation of SES** in our case studies, including:

    1. An overview (**boundaries, issues**),
    2. The **most important** ecosystems, **land uses**, and **ecosystem services** (ES),
    3. The most important internal and external **stakeholder types** (benefiting from ecosystem services or influencing them directly or indirectly),
    4. how stakeholders benefits from ecosystem services,
    5. how stakeholders influence ecosystems,
    6. how stakeholders interact among themselves.
    7. **How stakeholders, ecosystems and ES interact all-together**

- **Data**:
  - The data for this first analysis comes mostly our **own knowledge of the SES and existing secondary information**
  - But we can also look for additional data if needed, through **literature review and interviews** with key informants or (like in Mexico)

- **Expected results:**
  - Overview (Boundaries and issues)
  - **A diagram representing the SES as a detailed descriptions of boxes (*ecosystems*, *land uses*, *ecosystem services* and *stakeholders*) and arrows (*interactions* between the former).**
  - At a later stage, if there are diverging views of the SES among key informants, several SES representations may be proposed for controversial items to be highlighted

Methods:

1. **For now**: Build SES diagrams from our own knowledge – **Expert-based (representation of the) SEWS**
   - SES diagrams (**see next slides**) are actually **"mental models" of how we (researchers) see the SEWS**
   - We can do it in a small group (recommended) or individually

Methods:

2. **For a later stage if we want to go further – <u>Consensual (representation of the) SEWS</u>**: Build SES diagrams from **interviews** or **focus groups** (like in Mexico)
   - *Multiple experts or stakeholders may have different view of the SES*.
   - A challenge is to elicit such a mental model from an semi-structured discussion or from a focus group.
   - <u>See</u>: Jones, N.A., Ross, H., Lynam, T., Perez, P., Leitch, A. (2011) Mental models: an interdisciplinary synthesis of theory and methods. Ecology and Society 16. https://www.ecologyandsociety.org/vol16/iss1/art46/ES-2010-3802.pdf

3. **For a later stage if we want to go further – <u>Pluralist (representation of the) SEWS:</u>** Using Q methodology to understand different views on the SES
   - We build a generic simple SES representation from several interviews (**the "<u>consensus</u>" model**) but we recognize **that different stakeholders may give different weights to the problems or causal relationships in this model**
   - We develop a **list of statements** (for example **"X is the main source of water pollution"**, **"The solution to the water problems is to do Y"**, "A causes B", etc.). Those statements can be related to the links that are unclear or controversial in the broad SES diagram.
   - We ask people to answer "**Fully agree, Agree, Not agree nor disagree, Disagree, Fully disagree**".
   - We can then **cluster the answers and identify broad types of views on the SES**.
   - <u>See</u>: Barry, J., Proops, J. (1999) Seeking sustainability discourses with Q methodology. Ecological Economics 28, 337-345. (search Google Scholar to find the PDF)

WP1 –
Mapping of Social-Ecological Systemsthods:

AN EXAMPLE FOR GETTING STARTED

Hypothetical example (very simplified, just for illustration)

(1) SES overview

Boundaries: The SES is composed of **the ecosystems and the people in the watersheds surrounding the Piuray lake in Cusco, Peru** (as called the landscape or "**territorio**"). This lake provides 50% of the water used in the city of Cusco. We recognize connections with external actors (e.g. water utility, urban water users).

Issues:

- Managing the **tradeoffs** between **local development** (agricultural production, economic diversification), **water** level **conservation** and the **provision of water** quality **for Cusco**.
- Defining **economic and institutional arrangements** between **local actors and urban water utility.**
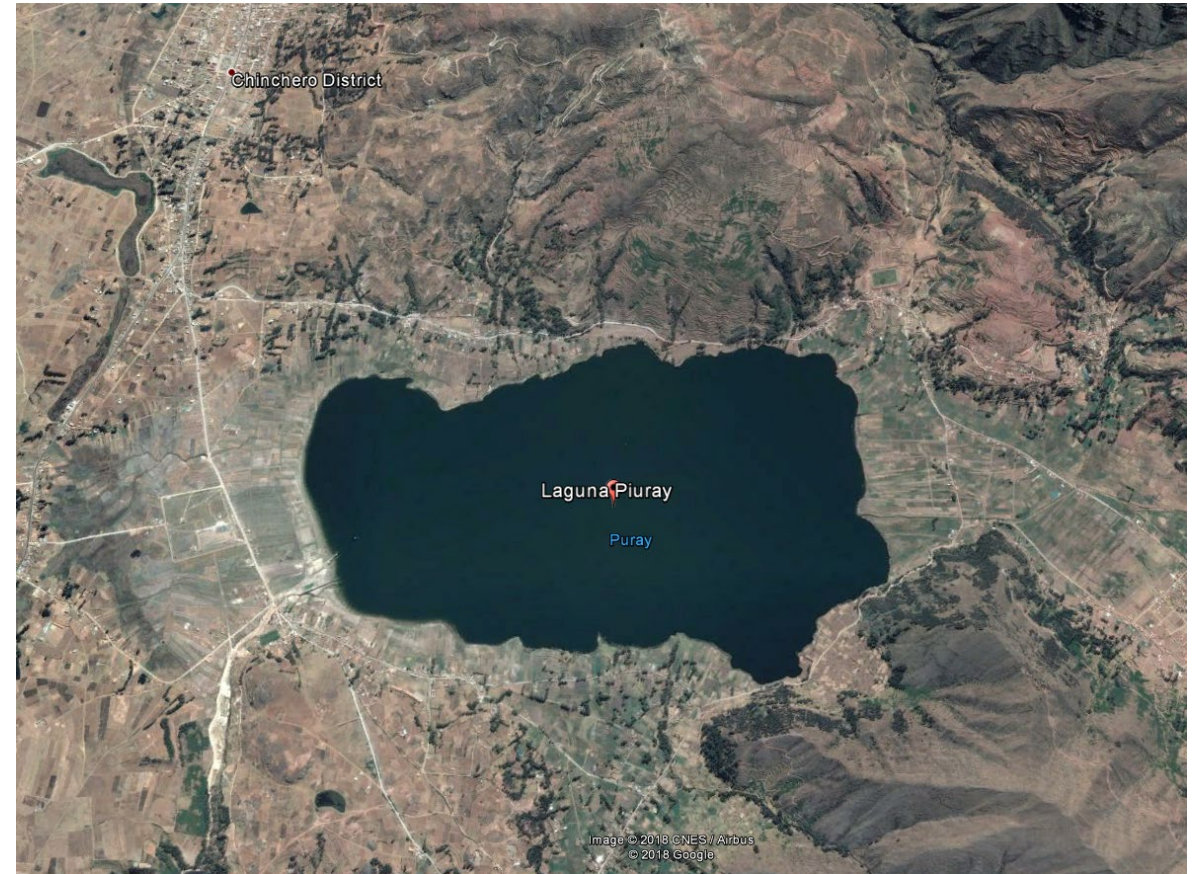
Hypothetical example

(2) SES most important ecosystems, land uses, and ecosystem services (ES)

Lake (describe ecosystems and issues)

Lake shore (describe why it is an important place)

Organic agriculture

Conventional agriculture

Exotic trees and forest plantations

Native trees and forest plantations

Crops (describe location, types, etc.)

Water quality (describe important parameters, etc.)

Water quantity and lake levels (describe main issues, etc.)

Scenic beauty (describe location, main assets, etc.)

Hypothetical example

(3) SES most important internal and external stakeholder types

Farmers (describe number, location, main production, etc.)

Villagers (describe number, location, main activities, etc.)

Tourists (describe number, location, main activities, etc.)

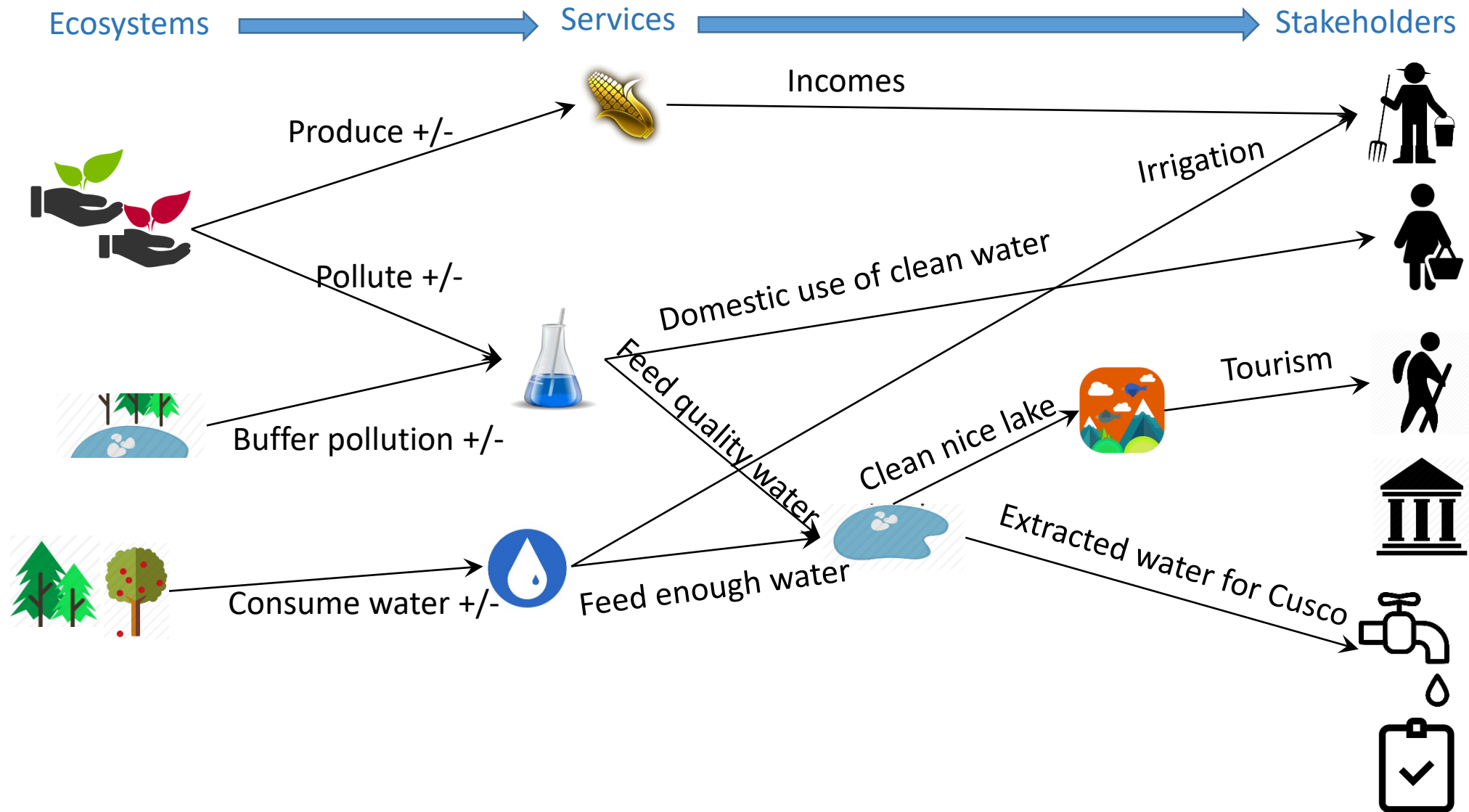**Local authorities and Municipality** (Chinchero, describe roles, activities, etc.)

Water utility (SEDACUSCO, describe roles, activities, etc.)

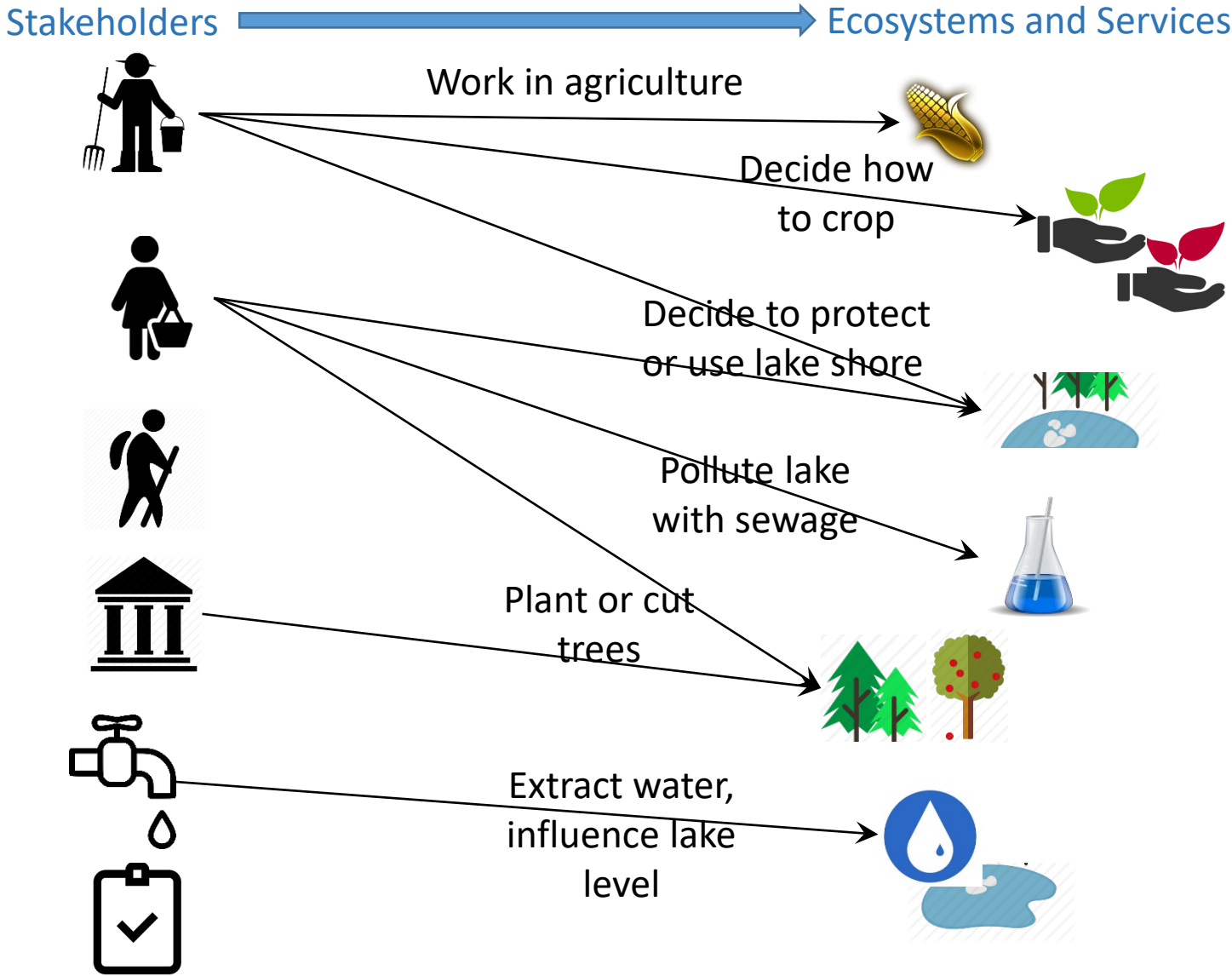**Water regulator** (SUNASS, describe roles, activities, etc.)

Hypothetical example

(4) how stakeholders benefit from ecosystems and their services (start with uni-directional arrows)


Ecosystems → Services → Stakeholders

- Produce +/-
- Incomes
- Pollute +/-
- Buffer pollution +/-
- Domestic use of clean water
- Irrigation
- Feed quality water
- Clean nice lake
- Tourism
- Consume water +/-
- Feed enough water
- Extracted water for Cusco

Hypothetical example

(5) how stakeholders influence ecosystems and services

Hypothetical example

(6) how stakeholders interact among themselves.
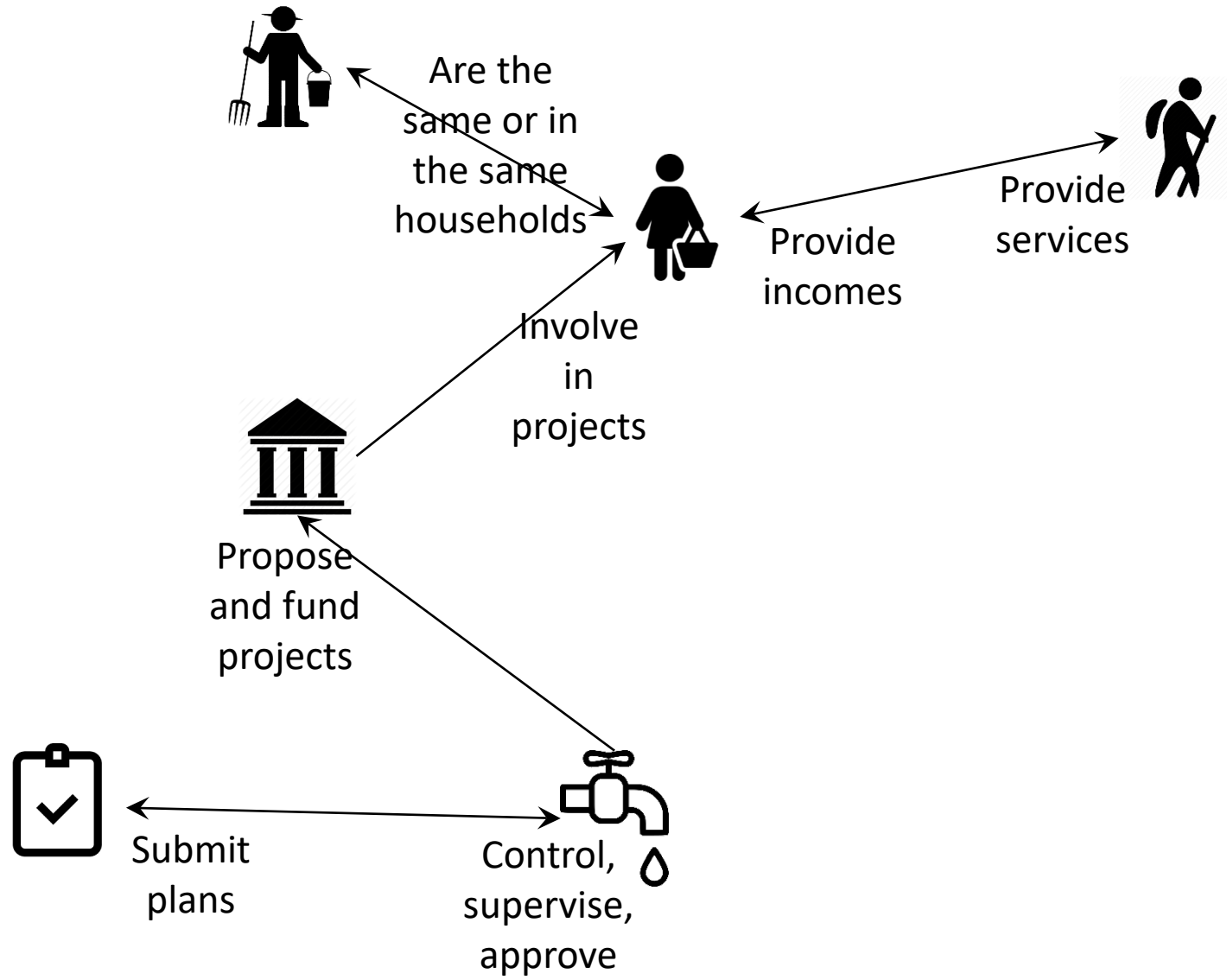
Hypothetical example:
# What do we do with all these pieces?

The previous simple diagrams are useful to brainstorm on the SES but **we miss the links between all those elements, including bi-directional links.**

To put everything together, it is easier to use a software, such as the **Visual Understanding Environment** (**VUE**) (Tufts University, http://vue.tufts.edu).

IMPORTANT: The examples in next slides does not necessarily include the same content as the diagrams in the previous slides.

Note that this Hypothetical example the representation is an "**Expert-based mental model**" of how I/you/we see the SES. Multiple experts or stakeholders may have different view of the SES. **If we identify that different stakeholders (e.g. farmers vs water company) see the SES and its problems differently, we may have different representations.**

Possible representation of the **hypothetical example** with **emphasis on ecosystems, ecosystem services and actors,** by types of interactions
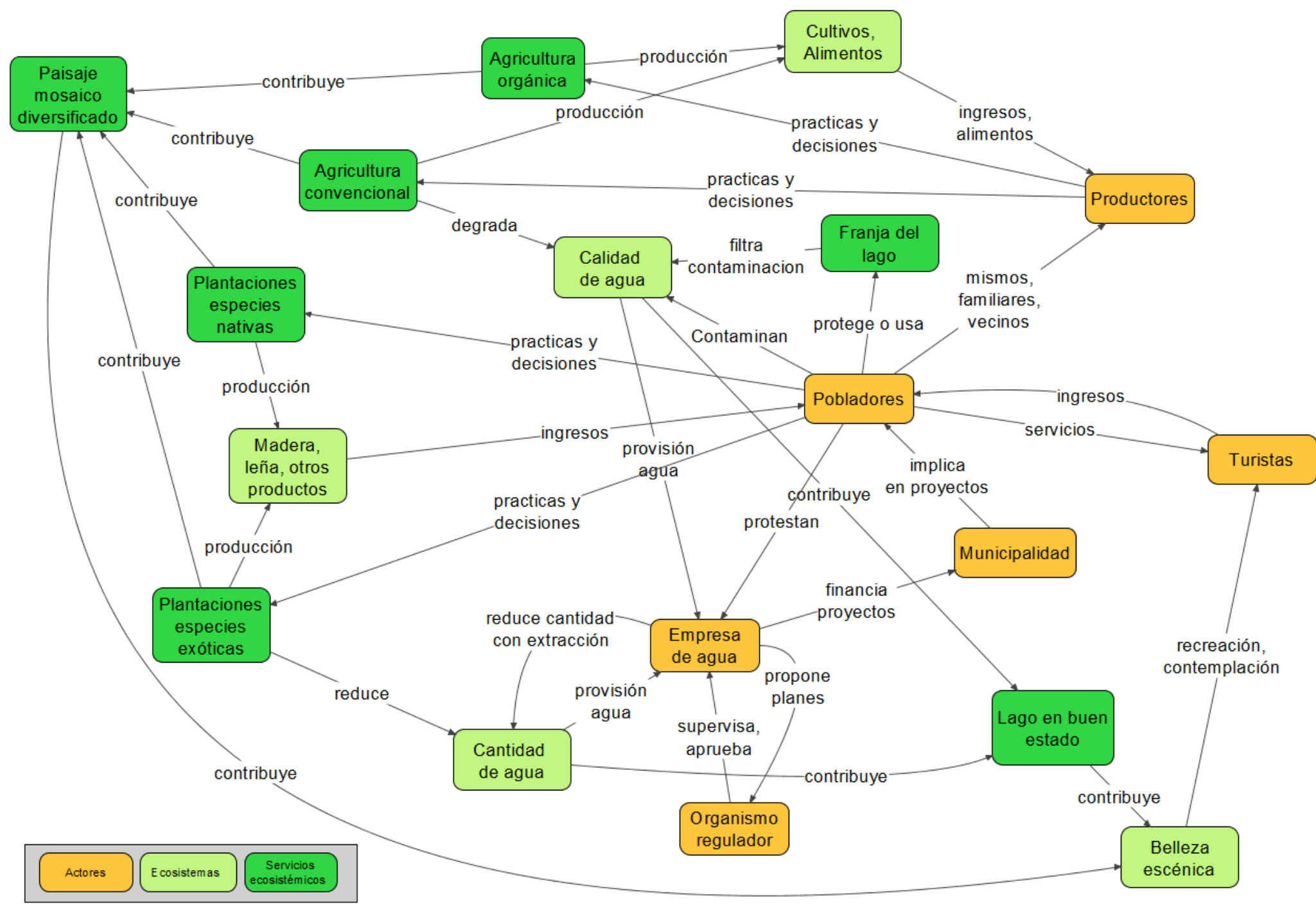
What now? BY THE END OF AUGUST!

1. **Do the same Expert-Based Social-Ecological Watershed System representation** for your case study and **for the present moment**

2. **Derive a small narrative (half a page or one page maximum)** describing the main issues and interactions.

    1. What key variables are interacting?

    2. Can you describe these variables and the type of interactions? (feed-backs, linear, regime shifts)

    3. Please, use this narrative to **fine tune the general RQ of TRASSE for your field site** (and make new ones emerge if necessary)

What now? BY THE END OF AUGUST!

3. **Repeat the exercise for a moment in the past** that created **a threshold situation** (park declaration, new land use, new roads etc)
   - ➤ What new interactions have emerged or disappared?
   - ➤ Why has this happened?

4. You can repeat this retrospective modelling **as many times** as you think relevant for your SEWS!

5. Documentar/Minuta del proceso de construcción para poder comparar procesos en position paper (Sophie)

Contact Bruno or me if you have any questions ;)