

# Chancay - Lambayeque Basin System

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## 1 Part I: Static Analysis - Collective action

The resource appropriated from the Chancay-Lambayeque Basin is water for irrigation. There are two groups of farmers. One group is located upstream the main canal of the system, and the second group downstream. Upstream users are freeriding from the canal: They do not pay for the infrastructure maintenance, and at the same time they appropriate water without any formal regulation. Downstream farmers are members of an irrigation association and follow their rules. The national water law supports these rules. The author reported many fights around water use, thus this case is considered as an unsuccessful instance of common-pool resource management.

### 1.1 The Commons Dilemma

The system presents rules and norms that set up an incentive structure that cause water appropriation dilemmas (when and how much to use water from an irrigation system). As a result, the systems present problems as water theft (water appropriation upstream the canal that is unregulated). Downstream users contribute to the maintenance of the hard infrastructure (irrigation canals and reservoirs), but downstream users do not. Hard infrastructure is under provided.

### 1.2 Biophysical Context (IAD)

- **Natural infrastructure:**

The Chancay-Lambayeque Basin is situated in a semi arid area with very little precipitation in northwest Peru. The valley is the most important irrigated area out of three areas of the basin with 118,523 ha. of irrigated land. The main river of the basin is the Chancay River and it has an extension of 5,309 Km<sup>2</sup>

- **Human-made infrastructure:** The main components of the hydrological infrastructure are Tinajones Project Hydrological System, the Taymi Canal, and the Tinajones Reservoir.

- **Additional Notes:**

The Peruvian Government built the Tinajones reservoir, recognizing the importance of agriculture in the basin and the need to build an irrigation system for its development. Later, the government, with farmers participation, built the Taymi canal to bring water from the Chancay River to farmlands that were located near the coast. Farmers

who were actively farming at that time were located downstream and to right side of the canal. Many years later, people from out of the region migrated to the region and found unused land near upstream the canal. They settled in without any legal permission.

### 1.3 Attributes of the Community (IAD)

Most of downstream farmers previously used to be workers of bigger farms that were expropriated during the land reform, and the land was redistributed to workers. In 1992, acknowledging the need for organized water management the farmers formed the Irrigation Association of Chancay- Lambayeque (JUCHL). In compliance with an Act that promoted private investment in the agricultural sector, the JUCHL was placed in charge of infrastructure maintenance, tariff charge, water allocation, among other duties.

Besides the group of farmers that are part of the irrigation association located downstream the canal, there is another group of farmers. These farmers do not participate in formal water governance systems and are located upstream along the canal, close to the first 30 km of the canal. This Upstream farmers arrived from the adjacent Andean region of Cajamarca (especially from Chota and Santa Cruz towns) to the basin, beginning in 1984 to work in agro-industrial companies, mostly related to the sugar industry.

Later on, they saw the opportunity of using water from the canal and decided to build their houses and farms upstream along the canal. Most of them are still working for sugar companies, but are also farming and trying different crops in these areas. Since the settlement of this community was actually spontaneous, improvised and not planned nor overseen by the government at its national or regional levels, it has experienced limited development and still faces serious problems associated with nutrition, education, and access to basic services, such as potable water and electric power.

### 1.4 Rules in Use (IAD)

#### 1. **Position Rules:**

Type of Farmers: There are two types of farmers. 1) Headenders (Upstream): Informal users, located upstream the canal, mainly maize growers. 2) Tailenders (Downstream) : Formal users, located downstream the canal, mainly growers of high water intensive crops as rice, sugar and cotton. There are by far more tailenders than headenders (aprox. 2800 vs. 1500) Water Managers: Irrigation Association formed by tailenders. The association was placed in charge of infrastructure maintenance, tariff charge, water allocation, among other duties.

2. **Boundary Rules:** There are no boundary rules, which was one of the main causes of the problem (and still is)

3. **Choice Rules:** Headenders have the legal right of appropriation because they have being using that water for more than 20 years (adverse possession: the law states that if they have been using water from a system for more than 5 years, then they acquire water rights of that system); however, they have to pay a tariff and comply with regulations. Tailenders may take water that is allocated and must not take more water than that. Each year, the government allocates a certain amount of water to

farmers. The law stipulates that water should go first for (in this order): A. Primary use (direct withdraws from rivers or canals for consumption or hygiene), B. Domestic use, C. Agricultural use, D: Fishery Industry use, E: Other productive sectors.

4. **Aggregation Rules:** Tailenders elect managers
5. **Information Rules:** Tailenders have to specify at the beginning of a farming season, the type of crops and size of the land that they intend to farm. Managers will later tell them how much water is available to bring to the gate and how much water they can allocate to them. Headenders should have the same practice, but in reality they do not participate in this information process.
6. **Scope Rules:** for tailenders who are managers, there is a maximum amount of water that they can bring to the gate. Every season, tailenders are assigned a maximum amount of water. Headenders are not monitored, the law says that they must register, pay for water and comply with their allocation; but in reality no one controls them.
7. **Payoffs Rules:** There is no sanction for headenders. For tailenders, if they do not pay water tariff managers will not deliver water to their gates. Managers hire people to control water delivery for each tailender. There is not a clear punishment for farmers (tailenders) that appropriate more water than their allotment.

## 1.5 Summary

Downstream farmers (tailenders) with the collaboration of governmental authorities organize themselves around an irrigation system. Their water appropriation and public infrastructure provisioning is regulated and controlled by them. Upstream farmers (headenders) do not participate in the water management, and they do not pay for the infrastructure maintenance. Apparently, the fact that 30kms of the canal was next to unoccupied land, combined with lack of boundary rules, and existence of rules that incentivize illegal occupation of land and water (adverse possession), created a scenario where immigrants had great incentives to settle in and free ride from an existent irrigation system.

## 2 Part II. Dynamic Analysis - Robustness

### 2.1 Shocks, Capacities, Vulnerabilities

- Possible Shocks to the Resource (Link 7): Climate Change: this region is highly vulnerable to climate change. Changes in precipitation are expected to increase water shortages in the Basin. Moreover, because of deforestation, the system has reduced its capacity to capture rainwater and at the same time, deforestation has made it is more vulnerable to floods
- Population Growth (Link 8): Growing System (Link 8): Normally, cases of upstream and downstream users shows downstream users as the most vulnerable ones. This is not the case in this system but because the chronological time of settling as farmers was from downstream to upstream. Then, upstream users are not as many to make the system collapse, but the number of upstream farmers is growing. Upstream users are around the larger part of the canal, and if the number of upstream farmers increases

considerably the system as is know at the moment of this research would not be able to be sustained.

## **2.2 Robustness Summary**

There are two main disturbances that may considerably affect the system: Climate change and population growth (specially upstream users). The region is vulnerable to extreme events and they do not have adequate infrastructure (neither physical, nor social) to overcome any of these events. On the other hand, the absence of boundary rules, monitoring and authorities to enforce rules may be a huge problem to face population growth upstream, thus higher water demand upstream and not enough incentives for downstream farmers to continue as active users in the system.