

Nazareno Gamutan Communal Irrigation System

Last Updated: November 2020

1 Part I: Static Analysis - Collective Action

The Nazareno-Gamutan system is a communal irrigation system that appropriates water for rice cultivation in Misamis Occidental Province, Philippines. It is composed of canals that deliver water from the Langaran River and the Dokaling Creek to roughly 1200 hectares of nearby farmlands within the municipality of Plaridel. There are an estimated 2500 rice farmers who appropriate water from the system. The communal Nazareno Gamutan Irrigation System (NGIS), owned by Nazareno Gamutan Agricultural Development, Inc., has over a century of successful operations behind it, attributed to good leadership and the collaborative spirit of the members. The data was extracted from a journal article by Ongkingko (1976) that details the Nazareno-Gamutan and Laoag-Vintar irrigation systems in the Philippines.

1.1 The Commons Dilemma

- **Potential over-appropriation / poor coordination of appropriation:**

There is not a risk of over-appropriation of water for irrigation within the Nazareno Gamutan Irrigation System (NGIS), as water is plentiful year round. In fact, the available water could cover a wider area than the current 1200 hectares of rice fields if not for the topographic difficulty of the region. Because the NGIS is the only system that draws water from the sources, no scheduling of delivery is necessary. However, there is the potential for poor coordination of appropriation given the system's close proximity to the sea, and therefore the threat of saltwater intrusion into the freshwater resource. Part of the volume of water that is appropriated is thus used to "wash out salt intrusion" (Ongkingco 1976, p. 383). It can be inferred that appropriation must be coordinated across the system, to avoid this salt intrusion.

- **Potential under-provisioning of public infrastructure:**

There is potential for under-provisioning of public infrastructure within the NGIS, largely due to the potential for flooding from tropical storms or extreme rainy seasons. After any major flooding event (such as a typhoon), the main dam across the Langaran River (which provides water for 1100 hectares of the system) must be rebuilt, along with any additional irrigation infrastructure or smaller dams that were affected. The NGIS largely relies on governmental agencies to provide financial and/or material resources after flooding events, but the manual labor is provided by the farmers. Rules must be in place that encourage farmers to provide labor instead of opting out

or free riding, as too few laborers would lead to under-provisioning across the entire system.

1.2 Biophysical Context (IAD)

- **Natural Infrastructure:**

The topography of the NGIS region is said to be “difficult” (Ongkingco 1976), likely due to the steep mountain ranges running approximately north to south throughout the entire archipelago of the Philippines. More specifically, the Malindang Mountain Range runs along the western border of Misamis Occidental Province, acting as a catchment for much of the region’s freshwater resources. Together, Langaran River and Dokaling Creek make up the natural infrastructure that carries freshwater for irrigation to the municipality of Plaridel (the location of the NGIS). Freshwater flows down from the mountain range into the river and creek and out to sea. Plaridel is along the northeast coast of Misamis Occidental Province, and thus is subject to saltwater intrusion. The prevailing winds in the Misamis Occidental Province are the northeast and southwest monsoons and the trades, and the tropical conditions lead to a predominately wet climate with a short dry period sometime between November and April. This frequent rainfall can lead to floods in some areas around the NGIS.

- **Hard Human-made Infrastructure:**

The NGIS is composed of two types of labor-intensive hard human-made infrastructure: canals and dams. There is a network of open earth canals that flow from the source (Langaran River or Dokaling Creek) to the rice fields by gravity. Some of the canals were constructed over a century ago, and all canals were excavated through rock by farmers. In 1962, the government installed a suspended metal flume across a wide region of the river which helped to expand the reach of the NGIS to the 1200 hectares that it covers. A large dam made of loose boulders and a concrete headgate divert the water from the Langaran River to 1100 hectares of rice fields, and a low concrete dam at Dokaling Creek irrigates an additional 100 hectares.

In addition, the rice fields can be considered a mix between natural and hard human-made infrastructure, as the farmers in the NGIS rely on cultivating rice under a submerged condition. To retain the 5-10 centimeters of water within the fields, dikes or levees are constructed to roughly 10-30 centimeters high along the boundaries.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure:**

In addition to its role as a public infrastructure provider for the NGIS, the Nazareno Gamutan Agricultural Development, Inc. (NGADI) association hosts a traditional slaughter and feast at the beginning of each crop season. This is an event not only for the farmers and members of NGADI, but also for the whole town and provincial officials “such as the governor, provincial agriculturalist, municipal and city majors and some officers of other irrigation associations” (Ongkingco 1976; p. 387). The slaughter is also said to play a role in leading to good yields in the next crop season. It is thus implied that there is significant cultural and social meaning in this traditional

slaughter and feast that occurs twice per year. Also, Ongkingco (1976) concludes that there is a strong collaborative spirit amongst the NGADI membership, which has been an important contributing factor to its 100+ years of successful operations. This collaborative spirit may be an indication of strong social infrastructure underlying the community of Plaridel that surrounds the NGIS.

- **Human Infrastructure:**

There is no specific mention of human infrastructure, such as formal education or local traditional knowledge, in the original case document.

1.4 Rules in Use (IAD)

Based on the study, the following specific rules in use, i.e., soft human-made infrastructure, are relevant for this case:

1. Position Rules:

- The Nazareno Gamutan Agricultural Development, Inc. (NGADI) is an association that provides the (soft and hard) public infrastructure for the NGIS. It was established in 1876 and incorporated in 1955.
- NGADI has many elected officers: one president, one vice president, 10 advisers, one secretary, one treasurer, one auditor, and 25 directors (one for each of the 25 districts of the NGIS). An additional officer is appointed rather than elected: the lawyer.
- Additionally, NGADI has many members who contribute to labor, repair, and maintenance of the NGIS.

2. Boundary Rules:

- Most of the elected officers of NGADI, including the president and advisers (who are explicitly called out in the case document), do not necessarily have to be farmers to hold their position. They are selected based on their leadership in the community and willingness to serve.
- The lawyer must be an employee of the Commission on Elections.
- The directors are nominated by the farmers within their district, based on their leadership ability (it is implied in the case document that this role is exclusively for men).
- Landowners within the 1200 hectares of the NGIS are members of the NGADI. If they do not live on their land or farm on it, they are still members and must adhere to the rules of membership (see Payoff Rules below). Directors will assign members to various labor, repair, and maintenance tasks for the hard human-made infrastructure within their district.

3. Choice Rules:

- Members of NGADI can choose between providing labor and maintenance to NGIS or paying a fee to the association (see Payoff Rules below).

- A farmer can choose how many crops to plant per year. Tradition has been for two crops a year, which coincides with the traditional slaughter and feast that accompanies each new cropping season.

4. **Aggregation Rules:**

- The voting schemes for electing the officials in NGADI are not specified in the case document.
- All officers of NGADI have weekly meetings to discuss activities of the association for the following week and any longer term goals or projects.
- If a farmer does not wish to pay a fee that the association claims that they owe, the lawyer will get involved and eventually take the case to court. This is a rare occasion.

5. **Payoff Rules:**

- The NGADI association runs on the pahina system, where farmers (i.e., members) must work in exchange for the benefits of the system. If they do not wish to work, they are required to pay a fee to the association, which is collected by the lawyer. If a farmer owns land in Plaridel but lives out of town, or is a resident in Plaridel but does not work their land, they must pay a fee to the association per hectare per season. If a farmer is absent from their work with the association on a given working day, they must pay a fee.
- A small fine is imposed on farmers if carabao (water buffalo) are found wallowing in the irrigation canals and ditches.
- Members can pay per hectare to have their fields rotavated, leveled, and readied for planting by the small tractor purchased by NGADI.
- The association will spend its funds each year on a variety of things: (1) to be disbursed to the president, vice president, secretary, treasurer, and lawyer; (2) to purchase cement and other materials used for repairs and maintenance of the NGIS; and (3) to purchase carabaos twice a year for a traditional slaughter and feast at the beginning of each cropping season.

6. **Scope Rules:**

- The headgate of the NGIS opens and closes in accordance with the two crops per year pattern utilized by the farmers. The rice fields receive a continuous flow of water to maintain a submerged condition during each growing season.
- Only carabaos can be used in the traditional slaughter ritual at the beginning of each cropping season, otherwise the fields will give a poor yield.
- There must be enough meat for everybody who attends the feast at the beginning of each cropping season, to ensure a good upcoming harvest.

7. **Information Rules:**

- Unaffiliated agronomists or agriculturists, extension agents, or salesmen (e.g., of fertilizers or chemical companies) frequently join the weekly NGADI officer meetings, to provide information and technical advice to the association on a variety of issues.

1.5 Summary

The Nazareno Gamutan Irrigation System (NGIS) is a communal system for irrigation for rice cultivation that is owned and managed by the Nazareno Gamutan Agricultural Development, Inc. (NGADI) association. The NGIS does not risk over-appropriation, as the water resources are abundant year round. Instead, there is some potential for poor coordination of appropriation and under-provisioning of public infrastructure, with the system being near to the sea and at risk of flooding during extreme weather events. The NGIS appears to be a successful case of collective action. The establishment of the NGADI association has helped solidify a clear set of rules-in-use, especially regarding the positions, boundaries, and payoffs associated with governing the system. The NGADI and community members' collaborative spirit has been attributed to the 100+ years of success of governing this system.

2 Part II. Dynamic Analysis - Robustness

Given the original case document, there is insufficient data to make any assessment on the temporal dynamics (resource and social conditions, etc.) of this system.

3 Part III. Case Contributors

Kelly Claborn, School of Human Evolution and Social Change, Arizona State University