

Tanowong Traditional Irrigation System

Last Updated: October 2020

1 Part I: Static Analysis - Collective action

This case covers the traditional terraced irrigation system of Tanowong people who live in the western portion of the Mountain Province in the Northern Luzon highlands of the Philippines. Due to the insufficient water supply to the existing Tanowong irrigation network, they started a major canal expansion project (hard human-made public infrastructure) to bring water from a new source (Bwasao Stream). This project was initiated by Tanowong people in 1954 and took two years to complete. Tanowong people organized collective action to provide the labor for the expansion project and were partially supported by the government. Tanowong people also faced the challenge of defending their newly acquired water source from the neighboring Agwa people. In the face of this challenge, they made an alliance with a neighbor community (Pedlisan), but up until the date of the research, the threat was still present. The key resources (natural infrastructure) in the system are private land (which is culturally relevant) and shared water streams and rivers (in the paper they emphasize the Bwasao Stream, but it is not necessarily the main water source).

1.1 The Commons Dilemma

- **The potential appropriation problem / poor coordination of appropriation**
The Tanowong community faced water scarcity resulting in the use of a new water source (Bwasao Stream). This led to appropriation conflicts with the neighboring Agawa people. Because there are not clear property rights rules of the Bwasao Stream, they have not found a solution yet on how to share it with the other community (Agawa) that is claiming shared rights.

- **The potential under provision of public infrastructure**

The villagers faced the daunting challenge of constructing a 25 kilometer canal in order to tap into Bwasao Stream. Because of the high cost of providing this large-scale public infrastructure, the villagers had to contribute a significant amount of voluntary labor work, which worked very well because of the dap-ay system (head of villages) and governmental support. However, because Agawa was claiming water rights of the stream after the new canal was built, the threat of underprovision is still present. Potential underprovision of soft public infrastructure was also overcome. To defend their water, Tanowong people faced the challenge of (1) making lobbies to the central government so that they would be given the exclusive formal use right of the Bwasao stream and (2) eliminating the threat from the Agawa people by helping

them build another physical infrastructure system. Tackling these challenges required a significant amount of voluntary labor work and collection of fees from the villagers.

1.2 Biophysical Context (IAD)

- **Natural infrastructure**

The irrigation system feeds terraced rice fields (private) located on a mountainous sloped terrain. The old water source could not meet the increasing demand for water, thus now they are using a new water source (Bwasao Stream). No other Natural Infrastructure characteristic is mentioned in the Research.

- **Hard human-made infrastructure**

The water from the old two streams is conveyed to the fields by a ditch approximately four kilometers long and on average about two and one-half feet wide and three feet deep. This ditch is repaired annually in late December by all the villagers. In addition, a new dam and 25-kilometer ditches from Bwasao to Tanowong were built by the Tanowong people.

1.3 Attributes of the Community (IAD)

Tanowong people occupy four villages: Tanowong (mother village), Kadatayan, Nadatngan, and Madongo. About 1,000 thousand people live in these villages. These four villages are homogeneous in terms of culture and sociopolitical regime. Although living in discrete villages, the people see themselves as one sociopolitical group separate and distinct from their neighbors. There is much coordination in the social, religious, and political life of the entire group (Bacdayan 1980, 173).

- **Social Infrastructure**

- Identifying resource users and public infrastructure providers: Water resource users are the Tanowong people. Public infrastructure providers in Tanowong include: (1) The Tanowong people who belong to locally institutionalized groups (dap-ay); (2) Government bureaucracy that offers financial support and authorizes permissions to the villagers and their natural resources; and (3) Congressman (local representative) who provides material support for constructing dam/ditch and political effort for making policy agenda.
- Description of dap-ay: The Tanowong are organized into different dap-ay groups. A dap-ay group consists of the families belonging to a particular dap-ay which in Tanowong would number up to thirty. There are four different groups of dap-ay in Tanowong (Bacdayan 1980, 173). Multiple instances of a social unit called dap-ay exist in each village and these organizations function as social, political, and religious centers of village life. Through dap-ay, various decisions regarding irrigation systems (e.g., labor allocation, fee collection, building a new physical infrastructure, etc.) are made and carried out. The irrigation system provides the entire political community with a central issue to focus on.

- Trust: While there is explicit competition among dap-ay, they coordinate their efforts for the welfare of the community as a whole. There is no known case of anyone being fined or punished for outright refusal to cooperate on the Bwasao project (building dam and ditch) (Bacdayan 1980, 184). Moreover, after the new project to bring water from the Bwasao Stream, because they received support from the government, a new consciousness and favorable attitude toward the normally remote national government arose.
- Enthusiasm/solidarity: As enormous as the Bwasao project (building dam and ditch) was realized to be, the Tanowong people took to it with great enthusiasm. The strong feeling of common purpose and solidarity generated among the Tanowong people by the Bwasao project still prevailed in 1972 (Bacdayan 1980, 184).

• Human Infrastructure

- Experience/skills: Through the new project to bring water from the Bwasao Stream, villagers gained a new dimension of experience and education in leadership, particularly in the skills of negotiation with other villages and in dealing with modern government bureaucracy (Bacdayan 1980, 184).
- Knowledge: Often each dap-ay is assigned responsibility for specific segments of regular projects like trail and irrigation repair. In such a case, members of each dap-ay know exactly where to go at the appointed day or days of work (Bacdayan 1980, 174). The Tanowong people were able to construct the dam in Bwasao and a ditch from it to their village even with no sophisticated surveying equipment. This remarkable engineering feat was made possible only through their indigenous knowledge from their detailed familiarity with the territory (Bacdayan 1980, 179). In the spring of 1972, the people of Tanowong and Pedlisan united in opposition to the owners of a paint manufacturing firm in Manila who wanted to gain concessions to tap for oleoresin in the pine forests. This opposition to the exploitation of the pine forest resources is due to the realization of the correlation between the density of trees and the amount of available water (Bacdayan 1980, 183).

1.4 Rules in Use (IAD)

1. Position Rules

There are three types of positions in this study: resource users, dap-ay, and water distributor.

- Resource users: Individual irrigation farmers. Those who need water, perhaps for the repair or expansion of their fields, must go alone to clean the ditches for the water to flow from the streams without obstruction (Bacdayan 1980, 176).
- Dap-ay: The dap-ay represent both resource users and public infrastructure providers. Through the dap-ay, villages are mobilized and grouped for communal action. The dap-ay serve as focal points of mobilization and accountability where decisions require implementation, such as the collection of material or money, the

procurement of labor for community trail and irrigation repairs, and the dissemination of information about other villages or municipal government (Bacdayan 1980, 174). A dap-ay divides the assessment of goods, money, or labor among its families and enforces their delivery (Bacdayan 1980, 175). The repair crew is composed of available labor in each family (Bacdayan 1980, 175). They organize themselves to negotiate with other communities and the government, but the author does not mention who was in charge of this.

- Water distributors: The water distributors are informally selected by the people on the basis of dependability, diligence, and fairness. Once the water is flowing, there are eight to twelve water distributors who take over the task of systematically distributing the water as fairly as possible. This practice is convenient and efficient and prevents conflict among the different owners, since they cannot accuse one another of stealing or of taking more than their share of water (Bacdayan 1980, 176).

2. Boundary Rules

- There are not clear rules of who can appropriate water in the system or about the physical boundaries of the system.

3. Choice Rules

- No formal rules stated

4. Aggregation Rules

- Community problems are discussed in individual dap-ay gatherings as well as village-wide meetings. While each dap-ay theoretically has an informal council of old men who make the decision, in actual fact, especially at present, every mature man participates in the deliberation of the council (Bacdayan 1980, 174).

5. Scope rules

- When typhoons have been especially destructive and ditches and stone retaining walls must be rebuilt, then men if possible should represent their families (Bacdayan 1980, 175).
- Unusually heavy damage to a segment, however, such as massive landslide, calls for labor from all the people (Bacdayan 1980, 179).
- In case of emergencies, the water distributors stand on call all day instead of their routinized work (Bacdayan 1980, 176).

6. Information Rules

- The water distributors have to go to the top of the mountain to overlook the terraces and exchange information of which part of the area will need water the most that evening (Bacdayan 1980, 176).

7. Payoff Rules

- Fines are collected from those who have not participated in repair work. Distributors are paid at the end of the harvest.

1.5 Summary

Tanowong people successfully coped with the commons dilemmas outlined in Sub-section 1.1. The dap-ay were instrumental for the success. The labor required for the provision of public infrastructure was all mobilized through these social organizations. Also, the high provision threshold of the 25-kilometer canal and high user dependence on the irrigated rice cultivation probably motivated strong commitment and united collective action from the villagers. However, there is still an unresolved dispute between Tanowong and Agawa villagers over rights of the Bwasao streamflow and how to use and maintain the hard human made infrastructure in place.

2 Part II. Dynamic Analysis - Robustness

2.1 Update on the Commons Dilemma

There has not been an update to the original discussion of the commons dilemma described by Bacdayan 1980.

2.2 Shocks, Capacities, Vulnerabilities

...to and of the Resource (link 7 to R):

- Link 7 to R (shock): There is no explicit information about external shock, but it is obvious that internal shock to water resources occurred in response to the Tanowong people's increasing water demand.
- Link 1 between R and RU (cultural significance of rice): Rice does not grow very well in this mountain area and its cultivation is time consuming. Sweet potatoes not only constitute a major portion of the diet, but they are also a more economical crop. Nevertheless, rice is considered to be the best food by the Tanowong people because of its cultural significance: their religious ceremonies are keyed to the rice cultivation, and the ownership of a rice terrace serves as a badge of citizenship and of continuity, rootage, or identity in the group. This cultural significance of the rice terrace is the background for the intense concern shown over the dwindling water supply (Bacdayan 1980, 178).

...to and of the Public Infrastructure (link 7 to PI):

- Link 5 between PI and Resource dynamics: Tanowong and Pedlisan are very similar culturally, closely situated, and traditionally friendly due to both intermarriages and shared territory. These two factors stimulate the development of their cooperation system as social capital (PI) to lead them to share water resources.
- Link 2 between PI (water rights) and PIP (government): In the course of treating the water conflict with Agawa, the Tanowong people became convinced of the necessity

of obtaining government (PIP) sanction for their irrigation system as a means of ensuring permanent control of the water source, resulting in a temporary water right (PI) certificate granted in 1972.

...to and of the Resource Users (link 8 to RU):

- Link 1 between R and RU (capacities): The Tanowong people (RU) recognized the water shortage for rice terraces and struck on the bold idea of tapping Bwasao (R) as a new source of water. The Tanowong people (RU) were familiar with Bwasao (R) because it lies within their hunting, mushrooming, and bamboo-gathering range, and directly on their path to where they go for trade and employment (Bacdayan 1980, 178).
- Link 6 between RU and PI (vulnerabilities): Control of water has been contentious between a number of villages.

...to and of the Public Infrastructure Providers (link 8 to PIP):

- Link 3 between PIP and PI (dap-ay): The traditional Tanowong social organization of irrigation focusing on the dap-ay (PIP) proved adequate for the construction and continuing maintenance and distribution of water from the Bwasao water works.
- Link 3 between PIP (congressman) and PI : Government (PIP) funding was provided for initial construction and later maintenance of the irrigation system (PI).
- Link 2 between PIP (government) and RU : The Bwasao irrigation expansion heightened the awareness of the Tanowong people (RU) of the national government (PIP) system as a source of financial, material, and technical aid. Earlier experience with the government was often negative. This positive development is of critical importance in furthering Tanowongs identification with and integration into the national political system (Bacdayan 1980, 184-5).
- Link 3 between PIP (government) and PI (communal forest): Close cooperations between Tanowong and Pedlisan succeeded in protecting their pine forests from a paint manufacturing firm. As a result there is a strong movement to have the surrounding forest areas declared a watershed or communal forest (PI) by the government (PIP), which would make them immune to outside exploitation for lumber or oleoresin (Bacdayan 1980, 183).

2.3 Robustness Summary

The cultural significance of the rice terrace is the background for the intense concern shown over the dwindling water supply (link 1 between R and RU). Close cooperation between Tanowong and Pedlisan is social capital that has played a critical role in preventing exogenous shocks to the system (link 5 between PI and Resource dynamics). Water resource users in Tanowong were concerned that conflict regarding the Bwasao irrigation system would disrupt the relationship between Tanowong and Agawa (link 6 between RU and PI).

In the course of treating the water conflict with Agawa, the Tanowong people became convinced of the necessity of obtaining government sanction for their irrigation system. In April 1972, Tanowong was notified that they had been granted a temporary water right certificate by the secretary of the Department of Agriculture and Natural Resources (link 2 between PIP and RU). Also, close cooperation between Tanowong and Pedlisan succeeded in protecting their pine forests from a paint manufacturing firm. As a result, there is a strong movement to have the surrounding forest areas declared a watershed or communal forest by the government, which would make them immune to outside exploitation for lumber or oleoresin (link 3 between PIP and PI). The Bwasao irrigation expansion heightened the awareness of the Tanowong people of the national government system as a source of financial, material, and technical aid. This positive development is of critical importance in furthering Tanowongs identification with and integration into the national political system (link 2 between PIP and RU).

3 Part III. Case Contributors

- Unknown analyst
- Cathy Rubiños, School of Sustainability, Arizona State University.
- Hoon C. Shin, School of Human Evolution and Social Change, Arizona State University.
- Kayla Tarr, School of Sustainability, Arizona State University.