

# Silag-Butir Irrigation System, Ilocos Sur, Philippines

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## 1 Static Analysis - Collective action

The Silag-Butir Irrigation system is situated between several adjoining barrios (Spanish word for neighborhoods) within the municipality of Santa Maria, in the province of Ilocos Sur. The key resource in the system is water for irrigation, as local farmers rely on constructed irrigation systems to sustain ricefields. The case examines a system of about 300 farmers, where public infrastructure for the appropriation of water for irrigation is provided by a subset of the resource users (farmers and locals elected by farmers). Farmers pay fees in the form of palay (rice prior husking) to the Silag-Butir Irrigation Association, and are expected to contribute to cleaning and repair activities as needed. The biophysical context is characterized by wet and dry monsoon seasons, and the main commons dilemma is water scarcity, which is solved by rotational water rights supervised by the Irrigation Association.

### 1.1 The Commons Dilemma

The commons dilemma arises mostly during dry times, when water scarcity is observed and managed by the Irrigation Association. Water is distributed continuously and accessible by all (even non-members of the Irrigation Association). When scarce, water is distributed on rotation based on a division of 4 districts. The main social dilemma is the potential for conflict with farmers who do not contribute to infrastructure maintenance and between the Irrigation association and local political actors.

**Potential over appropriation / poor coordination of appropriation:** The systems area is divided into 4 districts that each get exclusive use of water for 2-3 days at a time when water is scarce, depending on the water availability and water needs of each district. Thus, coordinating which districts are allowed access for how long may present a challenge if the biophysical context is difficult to monitor or predict, potentially resulting in sub-optimal distribution or over/under appropriation of water to certain districts at certain times. While no specific problems were highlighted with special members who get access to the resource for free, a control for abuse of these privileges is not clear. Thus, there could also be a potential for over appropriation of water to these members who do not contribute.

**Potential under-provisioning of public infrastructure:** Maintenance and calls for general assembly meetings are done on an as-needed basis. This may reduce transaction cost

of operating the public infrastructure, but there may be a potential for under-provisioning of public infrastructure due to irregular monitoring practices or upon unexpected events. This may become more acute in the case of extended dry seasons or changing precipitation intensities and frequencies due to climate change. Additionally, fines for water stealing, wasting, and allowing animals to use water are often reconsidered, lessened, or forgiven, which in aggregate could pose a potential risk of ineffective sanctioning. There is also the potential for conflict between local political officials and members of the association that may burden the social and human infrastructure of the Irrigation Association. For example, in 1970 the President of the association noted a lack of sufficient funds to cement the canal to the Mayor, who in turn-in told the President to resign due to incompetency of raising funds. Problems of property have also occurred but were settled outside of court.

## 1.2 Biophysical Context (IAD)

**Natural infrastructure:** The Silag Creek is the main water source. The creek is replenished by rain during the wet season, but rapidly dries up during the dry season. Springs are a secondary source during dry seasons but require the hiring of pumps to distribute water to ricelands. Topographical characteristics are not elaborated on in the source document, but elevation seems to be a relevant feature to the human-made infrastructure and to which districts experience water shortages first.

**Hard human-made infrastructure:** The gravity-based irrigation system constitutes a limited amount of stream reinforcement, a dam, and a mostly earthen canal system to draw water into agricultural spaces. There is a cement-grouted stone riprap dam at the point where the irrigation system begins to draw water from Silag Creek to the canal system. The main canal stretches about 3.5km and has two sub-canals that branch from it. About 50m of one side of the main canal is reinforced with cement-grouted stone, and there is a cement culvert crossing the barrio road. Farmers use bamboo tubes to connect to take-out points from the canal system to irrigate their land.

## 1.3 Attributes of the Community (IAD)

**Social Infrastructure:** The system is managed by the Silag-Butir Irrigation System Association, which is composed of a board of directors, a gatekeeper that manages streamflow, and regular members (i.e. farmers). Religious rituals are focused specifically on the irrigation system. As a precedent to the month-long cleaning and repair of the irrigation system, a Pamisa (mass) is held. These are Catholic-oriented, festive events where a pig, cow, or goat is butchered so that blood spills over the dam. The Paayo is a similar event during a different part of the year where an animals blood is spilled over an obstruction near the systems headgate. The obstruction is removed, and a farmer runs with the flow of water while pouring the blood along the canal. In both the Paayo and Pamisa, the animal offering is cooked and eaten by the system participants.

**Human Infrastructure:** Since all farmers or their representatives are expected to participate in the cleaning and repair of the irrigation system, it is implied that most members

of the system have general technical knowledge regarding the operational characteristics of the hard human-made infrastructure. Having operational knowledge about the irrigation system and the dynamics of producing agricultural outputs is likely relevant to leadership positions, and an attribute likely common to members of the system.

## 1.4 Rules in Use (IAD)

**Position Rules:** Leadership in the Silag-Butir Irrigation Association rests in the Board of Directors. This board is composed of the president, vice-president, secretary, and treasurer, which are all elected by association members, and six additional board members whom are appointed by the president. Leaders normally remain in position unless deposed due to significantly grievous mishaps or resignation due to too much farm work. There is also a gatekeeper whose task is to manage streamflow so that the canal is not obstructed, or the current isn't too strong. Other than these and regular association members there are 35 Special members, but the qualification for these positions is not clear.

**Boundary Rules:** Aside from Special members, elected and appointed board members along with association members who pay irrigation fees qualify to be part of the Silag-Butir Irrigation Association, and subsequently get access to use its irrigation infrastructure.

**Choice Rules:** Farmers can connect to the irrigation system at specific take-off points, with an average of 4 farmers per take-off point due to the number of farmers per take-off point. If unable to attend repair and maintenance events, farmers may send a representative, or ultimately pay a fine.

**Aggregation Rules:** Decisions regarding the rotation for water access is discussed during general assemblies and board meetings, which happen on an as-needed basis. It is not clear from the source provided what the conditions for agreement, consensus, or actionable decisions are during these assemblies. The board also announces the religious rituals that happen around system maintenance with a drummer, but these rituals normally happen around the same time of the year bi-annually.

**Scope rules:** Farmers are not allowed to construct ditches to divert water from the main canal. System area is divided into 4 districts that get exclusive use of water for 2-3 days at a time.

**Information Rules:** None specified. It is mentioned that association officials supervise system maintenance, but a schedule for this is not specified.

**Payoff Rules:** Association officials and the gatekeeper are exempt from the irrigation fee in light of not being paid otherwise for their services. Special members are all allowed to use the system without paying the irrigation fee. However, the reason for this privilege is unclear. In the event of a good harvest by the farmers, the board members receive a bonus of 10 bundles of palay. A farmer who is absent without sending a representative on maintenance days must pay a can of palay per absence, collectable during harvest and strictly enforced. Fines for offenses are often reduced if the association believes the farmer is humble or asks for reconsideration. If the farmer is believed to be arrogant, stubborn, or refuses to pay,

the association refers the case to the police or ultimately resorts to water deprivation, if necessary.

## 1.5 Summary

The ricefields in the four Philippine barrios of Pacang, Silag, Butir, and Cabaruan are sustained by water drawn into an irrigation system from the Silag Creek. The primary resource, water for irrigation, is appropriated by way of a dam and canal system that distributes water to the ricefields. The Silag-Butir Irrigation Association, made up of elected local farmers, manages the system semi-formally with fees from member farmers, fines for noncompliance, and supervision of maintenance activities carried out by farmers. During wet season when water is abundant, all members of the system (and nonmembers if abundant enough) have continuous access to flowing water. However, during times of scarcity it is necessary to provide water access on a rotation between four defined districts based on need and degree of shortage. Religious rituals are focused on the irrigation system and reinforce maintenance and repair activities, as well as communal participation by all members of the system. Challenges involving intrusion of local politicians have occurred in the past, but internal conflicts and non-compliance by resource users and infrastructure providers are routinely settled outside of court. While the success of the system is not entirely clear, the source document does not cite any significant challenges to the robustness of the system. Therefore, it is implied that the system is for the most part successful due to an established social infrastructure for conflict resolution and irrigation appropriation.

## 2 Case Contributors

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