

Nam Tan Irrigation Project

Last Updated: 11 November 2022

1 Part I: Static Analysis - Collective Action

The Nam Tan Irrigation Project dammed the river in the late 1960's and downstream rice agriculture in a 2000 hectare area of the Muong Phiang Valley shifted from an indigenous to bureaucratic irrigation system. Initial success of the Project was attributed to the adaptation of the "water headman," a traditional irrigation leadership role, in the formal structure of the Project. This section is based on the information provided in Coward (1980).

1.1 The Commons Dilemma

- **Potential Appropriation Problem or Poor Coordination of Appropriation**

The problem is poor coordination of water appropriation and distribution among the villages. The project attempts to solve the problem by adapting the traditional figure of the "water headman". Rice farmers, grouped into 21 water user's groups (WUG), elect and pay their own water headman. In its traditional role, the water headman leads maintenance and repair tasks on the irrigation infrastructure, creates accountability in the system, and arbitrates disputes over water allocation. After the project, the water headman's role expanded to act as a liaison between the water users and the project administration and as a water guard, protecting water users water from other appropriators near the supply channel. After experiencing coordination problems, the water headman became in charge of witnessing water rotations between blocks, to reassure the water users that the administration staff followed the schedule.

- **Potential Under-provisioning of Public Infrastructure**

This is not explicitly stated and does not seem to be an issue at the time of this initial project, though it forms a major part of the robustness analysis and the post-project period to present.

1.2 Biophysical Context (IAD)

- **Natural Infrastructure:**

Water flow and availability in the Nam Tan River is the shared natural infrastructure and varies with the rainy and dry season.

- **Hard Human-Made Infrastructure:**

- Public irrigation system boundaries can be delimited with regards to water production, distribution, and appropriation. The production resource is a concrete diversion dam on the Nam Tan River. Captured water then flows through a network of distribution resources (canals). The overall pattern of water distribution involves 3 different levels. First, two primary canals continuously convey water to a left-bank (1127 ha area) and right-bank (919 ha area) command area. The system provides supplementary irrigation for wet rice cultivation during the rainy season (approximately April-October), and water for a limited area of rice cultivation during the dry season. Second, each side is further divided into two subsections (blocks) and secondary canals deliver water to each block in fixed time rotations. On the left bank, water is delivered to a block for 6 days at a time. On the right bank, each block receives water for a 3-day period. Third, within the block receiving water, water is distributed simultaneously to all laterals. Gates on each watercourse allow the flow of water through the distribution system.
- Private infrastructure includes the farms owned by individual farmers in a command area of 2000 ha. The size of each holding is relatively equal, of approximately 3 ha. The Project allocated additional land to farmers and new settlers with less than 3 ha. There are no very large landowners in the area, resident or absentee.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure:**

900 farmers who live in 11 different villages. Pre-project, farmers in this system used small-scale, traditional community irrigation.

- **Human Infrastructure:** There is no information on human infrastructure in the original case study.

1.4 Rules in Use (IAD)

1. **Position Rules:** There are 3 sets of positions in this case:

- Project Administration and staff: Staff from the Lao Directorate of Agriculture were assigned by the Directorate to Nam Tan to serve as central administrative staff. The project also has an extension staff to work with farmers in the irrigation system, and an irrigation staff of engineers for operation and maintenance. The source does not mention any explicit position rules for these staff positions.
- The Farmer's Association (FA; Resource Users): The 900 farmers of the area are segmented in 21 small water users' groups (WUG). Each of these 21 group elects its own president, vice-president, secretary, treasurer, and other specialized officers, including a water headman.

2. **Boundary Rules**

- Administrative Staff are likely hired through federal hiring processes.

- Resource Users (and members of the Farmer’s Association) are farmers who own irrigable land within the command area.
- WUG members’ fields must be contiguous and, in most cases, receive their water from a common watercourse, irrespective of the village they belong to.

3. Choice Rules

- Project Administration must ensure timely delivery of water to the block whose turn has arrived. The staff typically does this by going to a specific turnout, closing the gate delivering water to a lateral and allow the water to enter a different lateral whose turn it is.
- WUGs must elect their officers and water headman, and must pay an irrigation fee to the Project Administration and the water headman.
- The water headman must be accountable to the WUGs, and act as a water guard and as a witness of the water rotation operations by the project administration.

4. **Aggregation Rules:** The source document does not specify any aggregation rules.

5. **Scope Rules:** Water users have the ability to review the water headman’s performance to consider his continuance or dismissal, and can also decide to not pay his fees, which are paid in kind (16kg of unmilled rice). The water headman is, therefore, dependent on the farmers and not the bureaucracy.

6. Information Rules

The source document does not specify any information rules.

7. **Payoff Rules** Water headmen who perform satisfactorily to their WUG are rewarded through direct compensation and re-election.

1.5 Summary

Before the implementation of the project, irrigation was organized in two major types. In one type, water users constructed small diversion dams on shallow streams, requiring the work of self-organized groups of 2 to 4 water users. In the other type, larger diversion dams were built to supply most of the farmers in each village. This required specialized roles such as the water headman (nai nam), who led annual construction and maintenance tasks and arbitrated water allocation-related disputes. Before the project, the water headman required little to no articulation with external authorities and the local irrigation systems were independent and self-contained. The Project reformed these traditional irrigation systems, centralized the operation of the irrigation infrastructure, and decided to maintain the traditional figure of the water headman, but with a different functions. After the project, the water headman served as a link between the administration of the project and the water users, and also as a water guard to supervise the allocation of water and prevent illegal appropriation.

2 Part II. Dynamic Analysis - Robustness

This update is based on the Nam Tan Rehabilitation Project, executed and funded by UNDP, UNCDF, the Netherlands in agreement with the Laotian government, and implemented February 1992 – June 1998. It was found that the Nam Tan Project described in Part I had not achieved its full potential because of subsequent failures to strengthen farmers' organizations, especially in effective water management and the marketing of produce (UNDP, 1999). Other external factors, such as the economic and demographic effects of the American-Vietnamese war, also played a role in the system's degradation. The rehabilitation effort was meant to increase the Province's capacity to produce rice to ensure food self-sufficiency and limit environmental degradation of hillslopes by shifting cultivation. This section is based on the information provided by the Report of the Final Evaluation" of the Nam Tan Irrigation Rehabilitation Project (1999) by UNDP and Lao PDR.

2.1 Update on the Commons Dilemma

Due to endogenous and exogenous drivers, the Project failed since its start in 1975. Land-holding decreased from 3 ha/family in 1975 to 1.8/family, due to increasing population. The Project grew to comprise 14 villages. 10% of perimeter families claimed to have no irrigation water whatsoever. A further 63% stated that the water they received was insufficient. Farmers in the area reported that illegal removal of irrigation water was as high as 51%. Shifting cultivation, which the project was designed to prevent, increased, and farmers were relying on subsistence agriculture. After the Second Indochina War in the 1960s and 1970s, a significant number of refugees were assisted in resettlement from Thailand by UNHCR and they relocated to villages in the irrigation command area. But in very few cases was irrigated land available to them; the average amount of land they could cultivate was about one-third of a hectare because it was difficult to clear and more difficult to weed the crop. The only alternative employment available to these families was on the land of farmers in the irrigated command area (UNDP, 1999).

2.2 Shocks, Capacities, Vulnerabilities

...to and of the Resource (link 7 to R): Hard human-made infrastructure of the Nam Tan Project, including its 7 weirs, decreased dry season flow in the Nam Phiang River. Six of the weirs blocked the flow of drains that flow into this river and the largest one of them blocks the flow of the Nam Phiang itself. This loss occurred in addition to loss of water from the Nam Tan, a major tributary of the Nam Phiang, whose bed is totally dry below the weir feeding the irrigation scheme.

...to and of the Public Infrastructure (Link 7 to PI): Rehabilitation of hard human-made infrastructure included restoration of water control structures in main and secondary canals. This resulted in changes to formal soft infrastructures such as the WUG constitution and management plans. New control structures increased complexity of the scheme's operation and maintenance because they allowed canal water levels to vary, which resulted in variable flow through the gates into tertiary canals as well.

...Between Resource and Resource Users (Link 1 between R and RU): The

Project's primary canal banks were damaged by buffaloes using them for drinking and bathing, despite WUG rules banning this practice. The canals were also used by village families for bathing, washing clothes, harvesting drinking water (UNDP, 1999), which posed health risks to resource users.

...to and of the Resource Users (link 8 to RU): After the American-Vietnamese War, the return and resettlement of refugees in the command area placed pressure on the existing system. Many resettled families were forced to live upland, outside the irrigation command area. Living in poverty without irrigation access, families harvested from the forest or worked for farmers in the irrigation command area. Government relaxation on slash and burn agriculture regulations resulted in less crop diversity. Farmers preferred to sow low-yield paddy crops with minimal use of fertilizers and pesticides. Reasons given for this included a subsistence farming mentality, lack of access to external markets to sell surplus, and lack of capacity to store or preserve alternative crops.

...to and of the Public Infrastructure Providers (link 8 to RU): After the American-Vietnamese war, extensive damage and international isolation constrained the country's monetary budget to rehabilitate the project, which fell into decay. In 1986, under the slogan "pean pang mai" (new economic thinking) a partial shift towards a market-based economy emerged. The country sought to rebuild its economy and strengthen food security through the agricultural sector. This has resulted in many projects funded by both bilateral and multilateral agencies, setting the grounds for the rehabilitation project.

...Between Resource Users and Public Infrastructure Providers (Link 2 between RU and PIP): Lack of long-term success was deemed to be due to poor organization of the Water User's Groups (WUG). WUG's were organized without regard of local social conditions (ie: villages). The Final Report of the Rehabilitation project concluded that farmers therefore had poor understanding of the complexity of the system and the need for preventive maintenance on canals and structures.

...Between Public Infrastructure and Public Infrastructure Providers (Link 3 between PI and PIP): Only 65% of water users paid their Irrigation Service Fee to the Administration, leading to insufficient funds to operate and maintain the hard infrastructure.

...Between Public Infrastructure and Resource Users (Link 6 between RU and PI): The weir on the Nam Tan was cleared of silt once a year and main canals were weeded 2x/year by labor brigades raised by the village chiefs. However, these tasks were inadequate in preventing major erosion damage to the canal slopes, which required routine maintenance. Equity issues arose as families that have no land in the irrigation command area but live in villages in this location are required to join the labor brigades clearing the weir and weeding canal embankments (UNDP, 1999).

2.3 Robustness Summary

The Nam Tan Rehabilitation Project was developed in 1999 to rehabilitate the Project which had been degraded due to endogenous and exogenous drivers. The Report stated that hard physical infrastructure was not providing water allocation it should, despite being well-designed. This was attributed to a lack of organization within each Water User's

Group. WUG's had been organized by contiguous farms adjacent to hard infrastructure, not based on existing social capital (ie: kin groups, villages). WUG's therefore lacked cohesion. WUG's also reportedly lacked awareness of larger system functioning and did not reliably pay maintenance fees to the Administration (UNDP, 1999).

3 Part III. Case Contributors

Claudia J. Geffner-Fuenmayor, School of Sustainability, Arizona State University

Amanda "Mandy" Kuhn, School of Life Sciences, Arizona State University

Jaishri Srinivasan, School of Sustainability, Arizona State University