

Nam Tan Irrigation Project

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1 Part I: Static Analysis - Collective Action

The Nam Tan watershed is located in the Sainyabuli Province of western Laos. 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 Phieng 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.

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. Rice farmers are grouped into 21 Water User's Groups (WUG) depending on farm locations. Each group chooses a "water headman" who acts as a link between their WUG and the external Project Administration. The water headman also serves as a water guard, protecting their WUG's water from other appropriators near the supply channel.

The water headman is an important leadership role in traditional irrigation systems in this region. Traditionally, the water headman maintains and repairs irrigation infrastructure, creates accountability in the system, and solves intra-community conflicts. In this contemporary adaptation, the water headman's role as a liaison between the water users and the bureaucracy.

- **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. The size of each holding is relatively equal. When the Project was initiated, existing water users were allocated farm holdings of 3 hectares each, new settlers were assigned plots of this size, and residents with > 3 ha were allocated additional farmland. Resident farmers holding more than 3 hectares did not have their additional land confiscated. There are no very large landowners in the area, resident or absentee.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure:**

The 2000 hectares of the command area serve nearly 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:** Staff from the Lao Directorate of Agriculture were assigned 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 Farmer's Association (Resource Users):** The Farmer's Association consists of the 900 farmers with land in the command area. The FA is organized congruently with the physical layout of the irrigation system: segmented into 21 small groups (12 on the left bank and 9 on the right bank). These small groups are composed of water users whose fields are contiguous and who (in most cases) receive their water from a common watercourse in the system. Each of the 21 groups has elected leadership (eg: president, VP, secretary treasurer, and water headman).

- The Water-User's Organization (WUG): These officers include the usual president, vice-president, secretary and treasurer, as well as other specialized officers, including a water headman.
 - The water headman is an adaptation of a leadership role found in this area of Laos prior to the present irrigation development activities. Positions, including water headman, are elected, but water headman is the only paid role.

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.
- Water User's Group members are grouped based on farms' physical locations relative to irrigation infrastructure. WUG officers (including water headman) are elected by each WUG.

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.
- Water User's Group members must elect officers and a water headman. They must pay a fee to the Project Administration and the water headman.
- Water headmen must act as a link between their Water-User's Group and the project Administration. They also must act as a water guard, protecting the WUG's delivery from other water users who are near to the supply channel. They must be on hand when the water is rotated as witness to the fact that the central administration was doing its part to operate the system as scheduled.

4. **Aggregation Rules:** Project Administration determine the design of public hard human-made infrastructure, grouping of each WUG, and dam operation.

5. **Scope Rules:** Water headmen are elected by the user groups they are intended to serve. The water users have the ability to review his performance to consider his continuance or dismissal. The water headman is dependent on the water users and not the bureaucracy for the payment of his fees which is in kind - about 16 kilos of unmilled rice for each hectare of land served. (farmers also pay fee to the administration) (they can choose not to pay water headmen reward fee)

6. **Information Rules** There is no information on information rules in the original case study.

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

1.5 Summary

The pre-project organization was of 2 major types. First, in villages that irrigated their fields by constructing very small diversion dams on shallow streams, such small dams requiring the labor of perhaps 2-4 water users, no village leadership role for irrigation existed. Leadership resided in each of the small work groups. In villages that constructed one large diversion dam to serve nearly all farmers in the village, specialized roles for administering irrigation activities were present. These villages selected an individual to act as water headman (nai nam). This role was separate from the role of village headman (nai ban). In some instances, the water chief was assisted by a group who acted as a water committee or council (Coward, 1980). In pre-project organization, the water headman role required little or no articulation with external authorities. The village irrigation systems which they administered were self-contained, local systems, not dependent upon or linked with entities outside the village. After the project was implemented, the focus of the water headman was on ensuring that water is delivered to members of his group during their scheduled period. Poor coordination of appropriation and illegal exploitation of the resource resulted in tensions between the water-users and the project administration. Subsequently, it was decided to expand the role of water headman to act as interface between the water-users and the project staff.

2 Part II. Dynamic Analysis - Robustness

This update is based on the Nam Tan Rehabilitation Project, 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). 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.

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 Indochina (Vietnam) 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.

...Between Resource Users and Public Infrastructure Providers (Link 2 between RU and PIP): Lack of long-term success was due to poor organization of the Water User's Groups (WUG). WUG's were organized without regard of local social conditions (ie: villages). 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

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