

Water User Associations in the Kaset Samakee Irrigation System, Thailand

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1 Part I: Static Analysis - Collective action

- The Kaset Samakee WUA, located in Zone 1, includes about 837 farm households cultivating roughly 690 hectares through 24 chaeks, each served by a common farm turn-out managed by a common irrigator.
- The resource system is a gravity-fed canal network.
- The resource unit is irrigation water, delivered on a rotation.
- Actors include farmers (Kaset Samakee members), the Royal Irrigation Department (RID), WUA president/committee, and common irrigators (RID-paid farmers who coordinate daily distribution and ditch maintenance in each chaek).
- Institutionally, RID designs and operates the schedule and staffing; the WUA provides local organization; common irrigators link rules to practice at field level. Because Kaset Samakee farmers lack alternative water sources, dependence on project water is high, producing comparatively stronger participation in maintenance and adherence to rotations.
- Practical incentives and sanctions operate through control of water delivery (e.g., withholding service for non-maintenance), making water itself the key enforcement lever.
- This static snapshot establishes the actors, infrastructure, and rule environment that enable collective action at Kaset Samakee.

1.1 The Commons Dilemma

- The common dilemma arises from sharing and maintaining irrigation water in a system facing seasonal scarcity and conveyance losses. As water flows through zones and chaeks, upstream overuse and poor maintenance threaten downstream supply. Canal and ditch maintenance are collective duties, and non-cooperation disrupts delivery for all.
- Kaset Samakee farmers, fully dependent on project water, face high costs if other's fault. RID and the WUA enforce cooperation by linking water access to maintenance, making water both the shared resource and the enforcement tool. Sustaining the system therefore depends on coordination and compliance among all users.

1.2 Biophysical Context (IAD)

Natural infrastructure:

- Water source in the Lam Pra Plerng River and Dam catchment area, supplying irrigation water to a project area of about 12,000 hectares.
- Topography, gently sloping terrain that allows gravity-fed water flow without pumping.

- Climate, tropical monsoon climate with distinct wet and dry seasons, causing seasonal water availability (annual rainfall averaging 1,100–1,200 mm)
- Soils, sandy and highly permeable soils that increase seepage and conveyance losses.
- Hydrology, seasonal rainfall runoff stored in the reservoir and distributed through natural slope gradients.

Hard human-made infrastructure:

- Dam and reservoir, constructed by the Royal Irrigation Department (RID) to store and regulate irrigation water.
- Canal network, engineered main, lateral, and distributary canals for water conveyance.
- Zones and chaeks, administrative and physical divisions of the irrigation area; each chaek has a common farm turn-out for controlled water release (Zone 1, 24 chaeks and 14 common irrigators).
- Control structures e.g., canal gates, outlets, and regulators to manage flow and timing.
- Farm-level infrastructure e.g., earthen ditches, bunds, and field channels maintained collectively by farmers.

1.3 Attributes of the Community (IAD)

Social Infrastructure:

- The Kaset Samakee Water User Association (WUA) located in Zone 1, consists of about 837 farm households.
- Each chaek is represented by a common irrigator, who coordinates local water distribution and maintenance for approximately 25–35 farmers.
- Members share strong social ties and cooperate regularly in ditch cleaning and rotation compliance because they are fully dependent on project water.
- Participation and trust are reinforced through shared dependence, proximity, and the visible benefits of maintenance and coordination.
- Collective action is encouraged through mutual accountability and social pressure within small chaek groups.

Human Infrastructure:

- Leadership, the WUA has an elected president and committee, but real day-to-day coordination is handled by common irrigators and RID field staff (zone men).
- With knowledge and skills, farmers have practical experience with irrigation scheduling, canal maintenance, and rotational sharing learned through long-term contact with RID officers.
- Communication and extension, stronger interaction occurs in areas closer to RID headquarters, giving Kaset Samakee farmers better access to technical guidance.
- Local capacity, dependence on irrigation water fosters problem-solving capacity and willingness to participate in RID-led maintenance and improvement activities.

1.4 Rules in Use (IAD)

Position Rules:

- The Royal Irrigation Department (RID) holds formal authority over the design, operation, and scheduling of the Lam Pra Plerng irrigation system.
- The Water User Association (WUA) functions under RID's supervision, with an elected president and committee who represent farmers in administrative matters.
- Common irrigators, paid by RID, are responsible for arranging water distribution and maintenance schedules within each chaek.
- Farmers (WUA members) are the primary users of irrigation water and are collectively responsible for maintaining farm ditches and following the rotational schedule.
- Zonemen (RID field staff) act as intermediaries between the RID and local farmers, overseeing compliance and supporting common irrigators in managing daily operations.

Boundary Rules:

- Membership in the Kaset Samakee Water User Association is limited to farmers whose fields lie within the designated command area (chaeks) of the Lam Pra Plerng irrigation system.
- Members are expected to participate in canal and ditch maintenance and to follow the rotational water schedule set by the RID.
- In practice, non-members may still receive water, but preferential access and participation benefits are intended for registered members.
- RID and WUA officials can withhold water from those who fail to join maintenance work or violate rules, creating a functional though informal boundary of cooperation.

Choice Rules:

- Farmers must follow the rotational water schedule established by the Royal Irrigation Department (RID) for each zone and chaek.
- They must participate in ditch cleaning and maintenance to keep water flowing efficiently through the canal network.
- The common irrigator in each chaek has the authority to open or close the farm turn-out and allocate water according to the approved rotation plan.
- Non-compliance with maintenance or rotation rules can result in temporary suspension of water delivery by RID or WUA leaders.
- Farmers collectively decide local arrangements for cleaning, minor repairs, and coordination under the guidance of the common irrigator.

Aggregation Rules:

- The WUA president and committee, elected by members, coordinate with RID officials but have limited decision-making power beyond administrative duties.

- Within the WUA, committee decisions are aggregated only during the annual meeting; no rule authorizes more frequent deliberation, so operational decisions default to informal coordination among farmers and RID staff.
- In practice, decision aggregation follows a top-down structure, with RID directives implemented through local cooperation rather than collective rulemaking by farmers.

Scope rules:

- The primary objectives of the Kaset Samakee Water User Association are to ensure equitable water distribution, efficient canal maintenance, and timely water delivery for all farmers within the project area.
- The WUA is also intended to serve as a channel for agricultural extension, helping farmers adopt improved irrigation and farming practices promoted by the Royal Irrigation Department (RID).
- Rules define the expected outcomes of cooperation—such as maintaining functioning canals, adhering to rotational schedules, and preventing water waste or conflict between zones and chaeks.
- The scope of authority includes local maintenance and coordination, while policy and technical control remain with RID at the project level.

Information Rules:

- Information and instructions about water scheduling, maintenance, and rotation plans are communicated from the Royal Irrigation Department (RID) to farmers through zonemen and common irrigators.
- The WUA president and committee relay updates from RID and organize meetings to share information with members.
- Communication is strongest in areas close to RID headquarters (such as Kaset Samakee) and weaker in distant zones.
- Annual large meetings provide general guidance but are often ineffective for farmer-level coordination; small-group discussions at the chaek level are more effective for sharing detailed instructions.
- Practical knowledge also spreads informally through daily interaction among farmers and common irrigators, complementing official channels.

Payoff Rules:

- Farmers who comply with maintenance duties and rotation schedules receive reliable water delivery and continued access to irrigation services.
- Non-compliance such as refusing to help clean ditches or violating water schedules can lead to temporary withholding of water by the Royal Irrigation Department (RID) or WUA leaders.
- Membership benefits include preferential access to water, better coordination with RID staff, and eligibility for extension support or small-scale improvements.

- The main enforcement mechanism is control over water itself, rather than financial penalties, making water both a reward for cooperation and a sanction for defection.
- This system of incentives and sanctions helps sustain participation and maintain the overall efficiency of the irrigation network.

1.5 Summary

The Kaset Samakee irrigation system in Northeast Thailand shows how strong collective action can emerge when farmers depend heavily on a single engineered water source. Built and centrally managed by the Royal Irrigation Department (RID), the gravity-fed canal network delivers water through chaeks coordinated by common irrigators, RID-appointed farmers who, more than the formal Water User Association, provide the practical leadership that sustains daily operations. Because farmers in this area have no reliable alternative to project water, compliance with rotational schedules and ditch maintenance is high, and water itself becomes the primary enforcement tool: those who do not cooperate simply lose access. This dependence-driven cooperation makes Kaset Samakee one of the system's most functional units, while exposing a core vulnerability: its resilience ultimately depends on the continued capacity of RID rather than on the farmer-led institutions intended to govern it.

2 Part II. Dynamic Analysis – Robustness

Persistence and Adaptation of the Commons Dilemma:

The original dilemma of sharing and maintaining irrigation water continues under conditions of seasonal scarcity and canal losses. Collective action has improved in Kaset Samakee through RID-supervised water rotation and enforced maintenance, but dependence on a single water source still makes the system fragile when delivery fails.

Shocks:

- Environmental, for example, variable monsoon rainfall and prolonged dry-season shortages reduce reservoir inflow and increase competition among zones.
- Physical shock, sandy soils and canal seepage cause water losses that accumulate with distance from the dam.
- Administrative shock, WUAs were formed after water delivery began, limiting early rule learning.
- Operational shock, delayed maintenance or RID staffing changes disrupt rotation timing and create localized shortages.

Capacities

- Physical capacity, gravity flow through natural slopes allows operation without pumps.
- Institutional capacity, RID possesses technical staff, authority to schedule rotations, and power to withhold water for rule enforcement.

- Social capacity, Chaek-level cooperation led by common irrigators keeps local distribution functional; strong member dependence sustains participation.

Vulnerabilities

- Environmental dependence, all farmers rely on one dam and canal system; drought immediately affects yields.
- Institutional rigidity, WUAs have little autonomy! Decision-making remains centralized in RID.
- Communication limits, information weakens with distance from RID headquarters.
- Maintenance fatigue, if RID enforcement or incentives lapse, ditch cleaning declines and water loss accelerates

Link 7 (Exogenous natural or environmental drivers) → RS and PI:

- The environmental conditions (monsoon variability, prolonged dry seasons, and sandy, highly permeable soils) directly affect both the resource system (RS) and the public infrastructure (PI).
- For the Resource System (RS), fluctuations in rainfall and reservoir inflow determine the volume and reliability of irrigation water available to farmers. During weak monsoons or extended dry spells, the overall water supply declines, while seepage through porous soils further reduces flow reaching downstream chaeks.
- For the Public Infrastructure (PI), these same environmental stresses cause canal erosion, siltation, and leakage, which increase maintenance demands and reduce conveyance efficiency. Over time, droughts and soil instability accelerate the physical deterioration of ditches and canal banks, requiring more frequent RID and farmer-led repairs to sustain water delivery.

Link 8 (Exogenous administrative and policy drivers) → PIP and RU:

- Administrative and policy factors originating outside the local irrigation system significantly shape the behavior and performance of both Public Infrastructure Providers (PIP) and Resource Users (RU).
- For PIP, the Royal Irrigation Department (RID) retains centralized control over project management, scheduling, and staffing. The late formation of Water User Associations (WUAs) limited early institutional learning and delayed the development of local decision-making capacity. Changes in RID personnel, budgets, or priorities directly influence the ability of zone men and common irrigators to maintain water delivery schedules and provide field-level support.
- For RU, farmer's water access depends heavily on RID's administrative efficiency and their proximity to the dam. When RID enforcement or coordination weakens, some farmers neglect maintenance duties or violate rotation schedules, which increases inequity and water loss downstream. Administrative and policy drivers therefore act as top-down pressures,

shaping both the capacity of providers to manage the system and the incentives for users to cooperate within it.

3 Part III. Case Contributors

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