

Char Hazar (Charhajar) Irrigation System, Damauli village, Tanahu district, Nepal

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1 Part I: Static Analysis - Collective action

Char Hazar (Charhajar) is one of the Farmer-Managed Irrigation Systems (FMIS) situated in Damauli Village in Tanahu District, about 65 km east of Pokhara city of Nepal. The primary water source for Char Hazar is Sange Khola, which is a tributary of the Madi River. The intake for the system is about 10 km from Damauli headquarters, and the tail of the command area is about 6 km from Damauli. The appropriation of water for irrigation is a collective action effort in the Char Hazar irrigation system. The irrigation system that diverts water from Sange Khola to the nearby farmland is the subject of this study. It comprises a main canal and seven branch canals.

At the intake for Char Hazar, farmers have constructed a brush dam across Sange Khola that needs to be repaired every year. The brush dam is approximately 1.5 km downstream from the Department of Irrigation, Hydrology, and Meteorology (DIHM) Sange Patyani System (an irrigation system) head works. The command area extends for about 3.5 kilometers and is bounded by the Sange Khola. The minimum discharge of the river is about 200 to 250 I/s. In addition to the river water, the main canal of Char Hazar also receives leakage and drainage water from the Sange Patyani main canal. Currently, there is sufficient water for late paddy and wheat cultivation, but not enough to irrigate the entire command area for early paddy. Better management could make sufficient water available for early paddy.

Char Hazar is an FMIS, and FMIS is managed by the farmers themselves, but appropriate assistance both for physical and management improvement is provided by the government from time to time when natural calamities require resources beyond the capacity of the farmers through the newly established District Irrigation Offices (Department of Irrigation, 1988). Char Hazar is a small irrigation system that serves 215 people with homogeneous topography and a gross command area of about 200 ha. The command area extends from northwest to southeast and lies just below the DIHM-operated Sange Patyani Irrigation System. It is a water-abundant system, and irrigation organizations do not need to provide uniform water distribution.

1.1 The Commons Dilemma

Farmers' farming practices have not improved, and agricultural services are inadequate. Agricultural extension services are available, but farmers complain about the lack of services. The agricultural cooperative appears to be ineffective. The common dilemma can happen

in three parts of the system: the maintenance of the system's hard infrastructure, water allocation, and organizational activities. The Sange River, the primary source for Char Hazar, does not have a high discharge of water regularly. Therefore, brush dam and intake are constructed to divert flood water to the farms. Following high floods, such dams and intakes are washed away, or the dams are broken by farmers themselves to avoid unnecessary flood water in their farms. The diversion dam and intake are rebuilt once the river flow has stabilized. The diversion dam and intakes must be frequently repaired during rice cultivation. A high labor reciprocity among farmers is needed in the reconstruction of the brush dams.

Since the canals run through level plains, they do not present many problems in conveyance, and not much attention to maintenance is required. Once every five or six years, when the canal becomes dysfunctional because of too much leakage caused by burrowing crabs, the alignment of a certain portion of the canal may be changed. The maintenance of canals takes place through the collective action of the farmers.

In organizational structure, previously, the jimawal (Jimmuwal) was a hereditary position confined to a certain family, and age was not a consideration. For example, a 9-year-old boy was once appointed Jimawal by the farmers after the death of his father, who was the previous Jimawal. Currently, Jimawals are elected annually by the farmers. Some farmers stated that the farmer organization is not as effective as it has been in the past. It was reported that in the past, farmers would spend up to 29 days working together to clean the main canal. Now farmers clean for only two days. The following may be reasons for the organizational degeneration:

- Farmers feel they do not need to work hard because of the supply of leakage and seepage water coming from the Sange Patyani main canal.
- Authority relationships have changed, and leaders who have little knowledge and command have been elected each year.
- Young men are leaving the area to search for new jobs or higher education.
- Politics have polarized the irrigation group.
- Landowners are away from the farm.

Water acquisition is usually a collective effort, i.e., the community pools its resources to do this either in the form of cash, kind, or labor. The allocation principle is also decided collectively by the irrigator's community. The distribution of water according to the criteria prescribed by the irrigator's community is an effort to distribute the community resource for individual use. Limits are placed on the extent to which individuals are allowed to use these resources. Farmers determine their cropping calendar by the calendar date or by the date of water release in the system. Farmers rotate varieties to maintain the productivity of the soil, but no priority is attached to the order of the crop rotation.

All farmers receive enough water to grow late paddy, but not all farmers are able to grow crops during the early paddy and winter wheat seasons. Winter cropping is practical only at the head of the system. Those farmers at the head of the system who could grow wheat but do not may choose to do so for the following reasons: loan terms for crop production, lack of manpower, the threat of hailstorms, and low financial returns.

1.2 Biophysical Context (IAD)

1.2.1 Natural infrastructure (NI):

The Char Hazar irrigation system is located in Damauli village in the Tanahu district, about 65 kilometers east of Pokhara city in Nepal. The primary water source for Char Hazar is Sange Khola, which is a tributary of the Madi River. The command area is 200 hectares. Charhazar is among the River Valley irrigation systems that rely on river flow for irrigation, and farmers construct intakes and dams to divert the water needed for irrigation. The intake and dam are constructed in such a way that they can trap water as well as fertile humus, which is carried by the first flood in the river. The quantity of water in the river depends on the size and condition of the watershed as well as on the quantity of rainfall.

After significant flooding, the intake and dam are swept away, or farmers break the dams to prevent flooding on their lands. Once the river flows have stabilized, the intake and diversion dam are rebuilt. The diversion dam and intakes in small river systems must frequently be fixed during rice farming. There are instances where the farmers have organized on five to fifteen separate occasions for the maintenance of the intake and diversion dam during rice farming.

Water is delivered to the farm through gravity flow. when water distribution is the prime objective based upon water share. The main canal and field and farm channels are necessary to assure that each beneficiary gets his share.

1.2.2 Hard human-made infrastructure:

Although the age of the system is 100 years, there are no permanent structures and no regulating structures in Char Hazar. The dam at the intake is also a temporary structure. The Char Hazar Irrigation System has the following hard human-made infrastructures:

- **Intake:** Annually, a river diversion dam consisting of boulders, stones, and branches is constructed by the farmers. The nature of the intake and the timing of its construction are determined by the type and size of the river. The materials used for temporary intake and diversion construction are stones, brush, and wood.
- **Canal:** The Char Hazar main canal runs parallel at a lower elevation to the main canal of the DIHM Sange Patyani irrigation system. The Char Hazar main canal is about 2.5 km long, with a capacity of about 1200 l/s. The canal banks are in good shape. However, some leakage does occur due to construction defects. Seven branch canals divert water from the main canal. The majority of the branch earthen canals lead to farms from north to south.
- **Cross Drainage:** Between 1.6 km and 2.5 km, there are two small drains crossing the main canal. Cross drainage has both advantages and disadvantages for farmers. Before the monsoon starts or when only a mild monsoon prevails. The flow of water from the cross drainage is used to supplement the water in the canal. During heavy rains, the cross-drainage presents a big problem. Sometimes, a portion of the canal gets washed away. Getting water across the crossing drainage is frequently difficult.

Farmers put in a lot of effort to build cross drains (natural drains) to direct water to other parts of the command area.

- **Farms:** The total gross command area of Char Hazar is about 200 ha, in which farmers have ownership of farms with different areas. The landlords usually rent their land to poor farmers in the village.

1.3 Attributes of the Community (IAD)

1.3.1 Social Infrastructure:

Irrigation management activities in the Char Hazar irrigation system can be categorized as: 1) activities related to water use; 2) activities related to the physical system, or control structure activities; and 3) organizational activities. Water use activities relate to the application of water for agricultural purposes. Acquisition, allocation, distribution, and drainage considerations are involved. Control structure activities include the design, construction, operation, and maintenance of the system for the conveyance of water. Organizational activities encompass decision-making, resource mobilization, communication, and conflict management.

The irrigation organization at the central level usually comprises a general assembly of beneficiaries and a committee consisting of members elected to carry out the decisions made by the general body. There is also a cultivation committee for farmers growing winter crops. Only winter crop cultivators participate in this committee's meetings.

The committee is "formal" in the sense that the irrigators recognize them as having the authority to enforce the organization's decisions. However, the committee is not recognized by law or registered with any government agency. Committee members are usually chosen for one year at a time and are accountable to the general assembly.

Despite its formal structure, the committee consists of a chairman, secretary, treasurer, and other members who handle general tasks. The committee in Char Hazar has two members (jimmuwals or Jimawals) who are land revenue collectors at the village level and are usually a socially influential person or the formal head of the village. Each one is responsible for managing 100 ha of land, and he is paid Rs 25 as remuneration. The scope rules of this document show the committee's responsibility.

Brahmin, Kumale, and Darai castes are predominant in the Char Hazar farmer-managed system. Most of the landowners are Brahmins, while other castes often rent land from the Brahmins. Absentee landlords, owners-cum-tenants, and landless farmers and laborers are present. It appears that most of the farmland is rented. Land fragmentation among family members has reduced large landholdings (up to 15 ha) to smaller plots (1 ha). Most land is rented on a one-year contract to avoid the provisions of Nepal's Tenancy Act. Over 50 percent of the land within the system is owned by absentee landlords.

1.3.2 Human Infrastructure:

In the Char Hazar Irrigation System, two Jimawals are assigned to manage the system. They are responsible for informing the members about meetings, keeping membership records, and

planning the schedule for desilting and maintenance. Currently, they are elected annually by the farmers. Each year, during the time of seedbed preparation, a general meeting is called at Barahabot (a place at the center of the command area). At the meeting, the following issues are usually discussed:

- the schedule for desilting the canal and constructing the brush dam at the intake
- Who will do the desilting—the farmers, wage laborers, or contractors?
- the settlement of accounts

1.4 Rules in Use (IAD)

1. **Position rules:** There are two Jimmuwals as members of the main committee. 215 villagers composed of Brahim, Kumale, and Darai castes. Most of the landowners are Brahmins (absentee landlords), while other castes often rent land from the Brahmins. Laborers, as a working force, are also assigned for regular repair or emergency repair. A Jimawal gets Rs. 25 in annual remuneration.
2. **Boundary rules:** Jimmuwal is a hereditary position and can be a government agent, usually a socially influential person, or the formal head of the village. Beneficiaries are defined as village residents. Brahmins are the landowners and are mostly absentee landlords, while Kumale and Darai castes often rent land from the Brahmins. The laborers are residents of the village designated by Jimmuwal for the maintenance of irrigation infrastructure.
3. **Choice Rules:** Jimmuwals are land revenue collectors at the village level and are assigned to manage the irrigation system. Along with the landholding and water share records, there are usually well-kept records of attendance at maintenance and repair work. They also assign a number of workers for the maintenance of canals, intakes, and dams. The number of laborers required depends on whether the task involves regular repair or emergency repair, requiring twice the work force. Villagers, beneficiaries, and laborers are responsible for reconstructing or repairing the dam as well as maintaining canals. The main canal is divided into three sections: Barahabol, Agrakhe, and Bahatar Dam. Cleaning of the canal starts at the tail. All the beneficiaries start working here, but farmers having up to five maato muri (0.6 ha) are required to clean the main canal only up to Barahabot or pay 75 paisa (USD 0.03) per maato muri. This section is only one-third the length of the main canal. Farmers having up to ten maato muri then continue cleaning the canal up to Agrakhe, and farmers having 15 maato muri clean up to Bahatar dam. Farmers who irrigate more than 15 mamo muri must work their way up from the tail to the main intake. When it is time to construct the brush diversion dam, all the beneficiaries must provide additional contributions. Beneficiaries irrigating 5 to 10 maato muri must contribute two days of voluntary labor for the repair of the diversion dam. Those with 10 to 15 maato muri contribute 3 to 4 days of labor, and those with 15 to 30 maato muri can contribute either labor or cash. Farmers who have more than 30 mato muri, on the other hand, are required to contribute labor. When it is time to construct the brush dam, everybody must contribute voluntary labor without any exceptions.

4. **Aggregative Rules:** On the basis of records, defaulters are required to pay fines for failing to contribute labor. Landowners decided to rent the land on one-year or long-term contracts. Cultivation committee members (farmers) decide on growing winter crops. Farmers and sharecroppers, in the absence of landlords, participate in the cleaning and maintenance of canals. The farmers at the tailend outlet start the canal cleaning. When they reach the next outlet toward the head of the system, all the farmers on that outlet join in cleaning and repairing the canal up to the next outlet.
5. **Scope Rules:** The committee is accountable to the general body of irrigators. It is responsible for keeping accounts, distributing water in accordance with the directives of the assembly, implementing decisions made during the general meeting, and resolving conflicts.
6. **Information Rules:** The system has up-to-date records of the water share each member is entitled to and records of the contribution to be made by each member for system maintenance and operation, along with annual income and expenditure in the system. A report on the resources that were mobilized and the individuals who contributed to the effort during the past year is prepared by the committee of the organization and reviewed at the general assembly each year.
7. **Payoff Rules:** The maintenance group decides the form of punishment for defaulters. If a farmer does not pay the fine or the cash contribution, the members may go to his house and get some of his utensils equal to the value of the fine. If this cannot be done, paddy equal to the value of the fine is taken from his farm. This sanction seems prevalent in Char Hazar. In addition, while cleaning the canals through labor reciprocity, in the last reach before the turnout, all the farmers on the field channel should be working together. The sanctions for nonattendance (Rs. 10 for heavy work and Rs. 5 for lighter, routine work) are enforced.

1.5 Summary

The Char Hazar Irrigation System is about 100 years old and located on relatively flat land that receives a significant amount of flood water, which adds fertile soil to the command area. In addition to that water from the Madi River, the system also captures a great deal of leakage water from the DIHM system. The water, however, is a good source for irrigation. But it depends on the reconstruction of the canal in the DIHM system. Any reconstruction limits the availability of water in the Char Hazar Irrigation System. The system has two Jimmuwals, who are members of the main committee and manage the irrigation system overall and lead the maintenance of the canals and reconstruction of the intakes and dams. The beneficiaries are all contributing members of the irrigation system maintenance team and make collective decisions. The landlords (mostly absentees) own about 50 percent of the land, and they rent it to other beneficiaries in a year-based contract.

2 Part II: Dynamic Analysis - Robustness

Given the source material, there is not enough information to make any judgments about the temporal dynamics of this specific common-pool resource (resource and social conditions, etc.). The authors of this case study have not yet been able to find any specific updates.

3 Case Contributors

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