Chawk 16000L Dhabi Minor Irrigation System

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1 Part I: Static Analysis - Collective Action

The crop land and irrigation system of this case is in the Dhabi Kalan village in Haryana, India. Haryana is in Northern India, northwest of New Delhi. The original case spans from 1964 to 1970 and catalogues an action situation involving approximately 1,600 farmers from three different castes. The water access and supply disproportionately varies among the farmers. Vander Velde (1980) raises the concern that the dominant caste benefits more than the lower castes. Reidinger (1980) argues that water supply uncertainty is the main concern. The irrigation system is the key commons dilemma in this case.

1.1 The Commons Dilemma

- **Potential over-appropriation / poor coordination of appropriation:**

  The potential appropriation problem was water quantity and access via irrigation. In terms of getting water distributed, the irrigation system was successful for the benefit of nearby crop land. The availability of water is dependent on canal irrigation and the distribution to different parts of the Dhabi Minor area. Within the village, the closer a crop is to the canal the more reliably it will be irrigated and productive regardless of the year, season, or month.The water supply delivered only suits a small percentage of the chak (cultivable area within the command area) farmer's needs. In terms of land ownership, the appropriation problem has not been overcome and has actually resulted in very exploitative leases for farmers who do not own land and that are not in the Jat caste.

- **Potential under-provisioning of public infrastructure:**

  Haryana first received Bhakra System Irrigation water in 1952. Water supplies were gradually increased as the Bhakra Dam and irrigation channel networks were built. During the agricultural year 1961-62, the irrigation system was able to supply water to a large portion of the barani (dry crop tract) in the Hissar District with regular perennial irrigation. The irrigation system was designed to service a larger area than the water supplies could support. Due to the over-zealous design, annual water deliveries stooped to levels as low as 56-percent of what was promised and designated. Water allowances were predetermined and fixed regardless of environmental variation, location, and differences.

1.2 Biophysical Context (IAD)

- **Natural Infrastructure:**

  Water resources are scarce in this case. The average rainfall is 16 inches with annual, seasonal, and monthly variation. Typically, the majority of the rainfall occurs during the July-August monsoon season when the evapotranspiration rates are close to maximum. The Bagar (indiginous terms for the sandy portion of western and southern Haryana) has alluvial soil that is very sandy and highly permeable. Groundwater is deep in the ground (100+ feet), hard to reach, and is often too brackish for any types of use. Perennial canals are also used to supply the irrigation system. Crops that need irrigated water are at different elevations and often are not serviced due to the gravity-flow irrigation system. There is a 670-foot contour in the village's land with crops that are infrequently irrigated due to the gravity flow irrigation system.

- **Hard Human-made Infrastructure:**

  The Bhakra-Nangal Irrigation System Project is the main hard human-made infrastructure in this case. Unlined channels that traverse the sandy and highly permeable soils of the Haryana Bagar comprise the system. Unfortunately, these channels have significant rates of water loss through seepage and have decreased water velocity as water travels to areas that are further away from water outlets. Therefore, the closer the land is to the canal, the more reliably it is irrigated regardless of the season, year, or month. Unfortunately, the amount of water to each crop is severely limited; only one-third of the land in the canal service area is actually irrigated (Reidinger, 1980).

1.3 Attributes of the Community (IAD)

- **Social Infrastructure:**

  The community has three main distinct castes called Jat, Kumhar, and Harijan. In terms of the social hierarchy, the Jat are the dominant caste and make up half of the population in the case study area. Jat households own over three-quarters of the agricultural land in Dhabi Kalan and 83

- **Human Infrastructure:**

  The main goal of the Bhakra system, like many other irrigation projects of British India, was to provide agricultural security from drought as opposed to supporting maximum total production. Jat landowners want to maximize their control and ownership over irrigable land and fight over additional water rights. These feuds and faction fights are the main source of conflict within the Jat caste. Many Kumhars and Harijan families piece together bits of agricultural land from a few Jat landowners via batai (sharecropping). In response to water scarcity, entire village communities occasionally temporarily emigrate to wetter, more agriculturally prosperous districts to the north and east in Punjab and Uttar Pradesh.

1.4 Rules in Use (IAD)

Based on the study, the following specific rules in use, i.e., soft human-made infrastructure, are relevant for this case:

1. **Position Rules:**

    - The social hierarchy is based on what caste a person is in. From the highest to the lowest in terms of social hierarchy the castes are organized as follows: Jat, Kumhar, then Harijan. The Jat comprise half of the village population.

2. **Boundary Rules:**

    - People are born into the caste they live their lives in.

3. **Choice Rules:**

    - To ensure crop productivity, farmers strive to lease land that is adjacent to the irrigation system and has irrigation year-round. Due to the high demand for these areas, land owners lease the land with the more exploitative terms of tenure by Harijan and Kumhar farmers. These unfair leases are the price that most Harijan and the majority of low-caste farmers must put up with to have a source of livelihood.

4. **Aggregation Rules:**

    - The Jat caste owns 61-percent of the CCA in large blocks throughout the village area.

5. **Scope Rules:**

    - Public policy and laws regarding fair land ownership are poorly designed and not actually enforced. There are no real limits on landholdings or rent, thus the unequal balance of social power and economic wealth in the village society remains Jat dominated.

6. **Information Rules:**

    - The closer land is to the irrigation system, the more likely it is to be farmed and productive. If land is deemed non-irrigable, then it is viewed as not worth the effort to farm. This is particularly the case if the land holding was very large and distant from the canal or poorly served by the irrigation system.

7. **Payoff Rules:** There are 4 distinct kinds of sharecropping leases in Dhabi Kalan:

    - Tisra batai: two-thirds of the produce is kept by the farmer and one-third goes to the land owner. Typically, all of the crop inputs such as seed, fertilizer, animal power, and labor are supplied by the farmer, who also decides on the crop type.
    - Paanjaa batai: three-fifths of the produce goes to the farmer and two-fifths goes to the land owner. Typically all of the crop inputs are provided by the farmer who also decides on the crop type. Paanjaa leases are the least common sharecrop type.
    - Aadh batai: the crop is shared half and half between the farmer and the land owner and the crop inputs are also supplied equally. The crop type is mutually agreed upon. Aadh leases are the most common lease.

- Tijiya hissa: one-third of the crop goes to the farmer and two-thirds goes to the land owner. Typically the land owner supplies seed, fertilizer, and animal power. The farmer supplies the labor and decides which crop to grow.

Leases are usually on a yearly basis. This arrangement is set up so that the farmer cannot legally claim permanent occupancy of and ultimately proprietary rights over a portion of the owner's land. Leases are verbally agreed upon so it is more difficult to prove continuous cultivation for six or more years to leverage the Security of Land Tenures Act of 1953. If a farmer can prove they have six or more years of cultivation, they complete the first step towards a permanent occupancy claim on the cultivated land.

1.5 Summary

Landless, low-caste farmers are forced to lease land from the social elite, Jat caste, to have a source of livelihood. The Jat own 61-percent of the irrigated farmland and have a monopoly on the community's wealth and power. Some ecological characteristics of the land impact the irrigation system's ability to provide water to crops that are uphill. Farmers have some say in the crop type and some farm input supply sharing depending on the sharecropping type of lease they are able to get. Unfortunately, due to the high demand for leasing reliably irrigated land, many farmers' only choice is to enter exploitative agreements with the higher caste.

2 Part II. Dynamic Analysis - Robustness

2.1 Update on the Commons Dilemma

The irrigation system has been changed in terms of its management and distribution of water. Since the original case, water rationing, warabandi, has been attempted as a form of protective agriculture to prevent famine, crop failure, social unrest, and to secure colonial rule (Narain, 2008). The needs of the farmers are still not met because the canal does not distribute enough water to sustain all of the crops. The Irrigation Department manages the irrigation now as opposed to the system being dominated by the socially elite based on their caste.

2.2 Shocks, Capacities, Vulnerabilities

...to and of the Resource (link 7 to R):

The canal water is rationed via warabandi as a way to provide water in proportion to their CCA. Warabandi aims to prevent providing the entire water supply needed to only some of the farms close to the canal. The water resource is meant to be thinly distributed to all of the crop land to aid in famine and crop failure prevention.

...to and of the Public Infrastructure (link 7 to PI):

The irrigation system is the same as the original system. The water scarcity in the region limits the effectiveness of the irrigation system because there is not enough water to effectively support farmers' livelihoods.

...to and of the Public Infrastructure Providers (link 8 to PIP):

The Irrigation Department does not manage water supply to match the demand. The Irrigation Department wants to keep the irrigation system costs down as much as possible because the system does not produce much revenue. Due to the low economic importance of the irrigation system, there are very few regulation devices or control structures used to control the water levels between the intake and outlet of the canal system to the farmers.

...to and of the Resource Users (link 8 to RU):

Irrigation has been limited to one crop on a particular piece of land per year. Farmers have to choose their crop type with extreme caution because they only get to grow one resource. If the crop fails, the farmer has no livelihood source. The goals of a farmer for their land differ from the way the irrigation system is managed.

2.3 Robustness Summary

The system is extremely vulnerable to water demands and the lack of supply to meet these demands. Farmers cannot overcome the main external constraint of water scarcity. The institutional failure has led to stark limitations on farmers because the limited water resources cannot sustain more than one crop per farmer. The Irrigation Department does not exhibit design principles 4 and 5, that relate to monitoring and sanctions. The irrigation system is not a source of significant income, thus is of low interest to the Irrigation Department. The system would be more robust if it matched water supplies with the water requirements for each crop type.

3 Part III. Case Contributors

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