

Forest in Almora district, India (1)

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1 Part I: Static Analysis - Collective action

The community forests discussed in this case study are called panchayat forests. They are managed by local institutions called van panchayats. The forests and van panchayats all lie in the middle Himalayan ranges in Almora district, India. Almora is one of the eight mountainous districts that together comprise the Uttarkhand in Uttar Pradesh. The analysis focuses on the effects of institutional rules on fodder and fuelwood use in community forests. Village 1 is one of six villages located in the Almora district.

The key resource is fodder from the community-managed forests. Village 1 is one of the cases of sustainable resource use (p. 275) the forest is in excellent, or excellent to good condition (p. 270).

The original CPR report may be found at <https://seslibrary.asu.edu/seslibrary/case/178/cpr>. Coupled Infrastructure Systems framework is explained in more detail in Anderies (2014) <http://link.springer.com/article/10.1007/s11538-014-0030-z>

1.1 The Commons Dilemma

- The potential appropriation problem / poor coordination of appropriation

Four major factors help village 1 overcome the potential over appropriation problem. First, institutional rules created by the panchayat state how much fodder can be withdrawn from the resource. Villagers who designed rules have attempted to match regeneration levels and withdrawal levels by assessing fodder growth during the year, fixing extraction levels below the annual regeneration, and metering extraction using simple measures (p. 272). Secondly, village 1 took great pains to monitor. Violations of allocation rules occurred routinely. For example, villagers illegally entered the panchayat forests, cut grass and leaf fodder from trees, grazed their animals, collected twigs and branches, and in some instances even felled trees (p. 274). To detect all these rule violations, all behavior must be monitored a prohibitively expensive proposition (p. 274). After recognizing that monitoring all behavior of all resource users is very costly and impossible, panchayat officials elected/appointed forest guards. In doing so, what they have to do is to solve the problem of monitoring the monitor. They employed two methods to solve this issue: linking the monitors performance

to the rewards he received; and monitoring the monitor by closing the loop between monitors and users (p. 275). Thirdly, villagers have created rules for sanctioning rule breakers. The panchayats employ a variety of mechanisms to increase the effectiveness of the sanctions they imposed. They ask offenders to render written or public apologies, confiscate cutting implements such as scythes, strip villagers of use rights, impose fines, report villagers to government officials, and sometimes, seek redress in courts. The sanctions depend on a number of factors: the severity of and nature of the offense, the economic status of the offender, and so on (p. 278). Lastly, the panchayat acts as arbiters over disagreements that arise when it imposes sanction on rule breakers, interprets institutional rules, and resolves disputes over the creation of rules (p. 280). Especially, the words of the panchayat in courts carry greater weight than those of ordinary villagers since it is based on the Van Panchayat Act and has a number of villagers who will support the interpretation of events presented by the panchayat (p. 280).

- The potential under provision of public infrastructure

According to Anderies et al. (2004), public infrastructure combines two forms of human-made capital: physical capital including any engineered works, such as dikes, irrigation canals, etc; and social capital including the rules actually used by those governing, managing, and using the system and those factors that reduce the transaction costs associated with the monitoring and enforcement of these rules. This paper does not report which physical capital have been made by villagers. But they created social capital that means the rules-in-use for withdrawing resources, monitoring the monitor, and sanctioning rule breakers. In order to prevent the potential under provision of social capital, they elected regularly the panchayat officials who must meet three to six every year and can select forest guards.

1.2 Biophysical Context (IAD)

- **Natural infrastructure**

Village 1 lies in the middle Himalayan ranges in Almora district, India. Almora is one of the eight mountainous districts that together comprise the Uttarkhand in Uttar Pradesh. Natural infrastructure in village 1 is the community-managed forests that provide resource users with fodder as a main resource from the forests. The community forest is too large and dispersed to monitor all behavior (p. 274). To overcome this weakness arising from natural infrastructure, villagers created the rules-in-use for selecting their forest guards and encouraging them to monitor rule infractions by linking their performance to their salary. Village 1 is one of the villages whose forest is in excellent, or excellent to good condition (p. 270). There are no reports that the natural infrastructure helps to have clearly defined boundaries and generates asymmetries of power and information.

- **Hard human-made infrastructure**

There is no explicit information about hard human-made infrastructure such as roads and fields of seedlings.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure**

Village 1 has 37 households, 220 livestock, 14 ha panchayat forest, and 55 ha other pastures (p. 271). In terms of the web of relationships among agents, the Van Panchayat Act prescribes the process of forming van panchayats and imposes certain duties on village forest councils. Officials must be elected regularly to the van panchayat. The elected officials must meet three to six times every year (p. 270). Forest guards, selected by the panchayat officials form among the villagers, monitor (and enforce) the panchayats decisions (p. 272). Resource users have equal rights without regard to their contributions in maintaining the resource. They mainly buy or sell rights to bundles of fodder rather than rights to use the forest for the entire year (pp. 271-2).

- **Human Infrastructure**

The provisions of the Van Panchayat Act were simple and facilitated collective action by villagers. It is certain that the act facilitated the efforts by residents to create local institutions that would permit to use and manage a significant proportion of local forests (p. 270).

1.4 Rules in Use (IAD)

Position Rules

- Panchayat officials: To create the van panchayat, panchayat officials must be elected regularly by villagers (resource users) (p. 270).
- Forest guards: They are selected by the panchayat officials and monitor/enforce the panchayats decisions (p. 272).

Boundary Rules

- Resource boundary: According to the Van Panchayat Act, villagers must demarcate the boundaries of the panchayat forest (p 270).
- Resource users boundary: They must be residents of the village where the forest is located (p. 271).

Choice Rules

- Resource users: They mainly buy or sell rights to bundles of fodder rather than rights to use the forest for the entire year (p. 272). They can elect their panchayat officials who can design the rules and select forest guards (p. 270; 272). All resource users cannot make animals graze in the forest for most of the year. Villagers can harvest fodder only for 2-12 weeks. When cutting leaves from trees for fodder, villagers must leave behind at least two thirds of the leaf cover on the tree (p. 271). Resource users can cut grass from the forest only for a specified number of days in the year. Passes entitle holders to cut a specified number of fodder bundles from the forest. All users are provided with a rope that they must use to make a bundle out of the grass they have cut. All villagers can extract only specified levels and equal amounts of fodder (p. 272). Villagers must protect forests from illegal tree felling, fires, encroachments, and cultivation (p. 270). They must demarcate the boundaries of the panchayat forest. In addition, 20 percent of the area of the forest must be closed to grazing every year (p. 270).

- Panchayat officials: The elected panchayat officials must design soft human-made public infrastructure and meet three to six times every year (p. 270). In order to assess regeneration level, panchayat officials visit forest compartments prior to opening them to the villagers. The officials make an eyeball estimate of the total amount of fodder bundles available and then open the forest for limited grazing or grass harvesting. The total number of animals that can graze or bundles of grass that can be extracted depends on the initial estimates made by the panchayat officials (p. 270). The panchayat could easily sanction the guard since the panchayat controlled the purse strings. In some cases, the panchayat paid the guard a lower salary when high levels of rule violations occurred. In others, panchayats dismissed the guards and refused to pay them a salary if they found rule violation levels to be very high. Panchayat officials would resume the guards salary and reinstate him or her only when he or she promised to improve his or her performance. Thus, officials created institutional incentives for the guards to monitor users assiduously (pp. 275-6).
- Forest guards: They must monitor/ enforce the panchayats decision (p. 270). They can discover and report them for the panchayat (p. 274). The guards, who are assigned different compartments of the forests, are monitored by the panchayat officials (p. 275).

Aggregation Rules

The community forests are managed by local institutions called van panchayats literally, councils of five individuals who are responsible for making collective choices about the rules to be used in a particular forest.

Scope rules

- Appropriation rules: All users are provided with a rope that they must use to make a bundle out of the grass they have cut. All villagers can extract only specified levels and equal amounts of fodder (p. 272). All resource users cannot make animals graze in the forest for most of the year. Villagers can harvest fodder only for 2-12 weeks. When cutting leaves from trees for fodder, villagers must leave behind at least two thirds of the leaf cover on the tree (p. 271).
- Provision rules: Panchayat officials elected by resource users must design soft human-made public infrastructure.

Information Rules

- Panchayat officials: They visit forest compartment to make an eyeball estimate of the total amount of fodder bundles available and then open the forest for limited grazing or grass harvesting (p. 272).
- Forest guards: They could discover and report rule infractions for the panchayat (p. 274).

Payoff Rules

- Benefits: All users are provided with a rope that they must use to make a bundle out of the grass they have cut. All villagers can extract only specified levels and equal amounts of fodder (p. 272).
- Costs: If users break the rules for appropriation, panchayat officials ask them to render written or public apologies, confiscate cutting implements such as scythes, strip villagers of use rights, impose fines, report villagers to government officials, and sometimes, seek redress in courts (p. 278).

1.5 Summary

Resource

The key resource is fodder from the community-managed forests whose quality is in excellent, or excellent to good condition (p. 270).

Resource users

They must be residents of the village where the forest is located. In the exceptional case, the family of an individual who aided in creating the panchayat forest is allotted rights to harvest benefits from the resource (p. 271). They mainly buy or sell rights to bundles of fodder rather than rights to use the forest for the entire year (p. 272). They can elect their panchayat officials who can design the rules and select forest guards (p. 270; 272). All users are provided with a rope that they must use to make a bundle out of the grass they have cut. All villagers can extract only specified levels and equal amounts of fodder (p. 272).

Public infrastructure providers

1) Panchayat officials: The elected panchayat officials must design soft human-made public infrastructure and meet three to six times every year (p. 270). The officials make an eyeball estimate of the total amount of fodder bundles available and then open the forest for limited grazing or grass harvesting (p. 270). Panchayat officials can select forest guards and resume the guards salary and reinstate him or her only when he or she promised to improve his or her performance. Thus, officials created institutional incentives for the guards to monitor users assiduously (pp. 275-6).

2) Forest guards: They must monitor/ enforce the panchayats decision (p. 270). They can discover and report them for the panchayat (p. 274). The guards, who are assigned different compartments of the forests, are monitored by the panchayat officials (p. 275).

Public infrastructure

1) Natural infrastructure: Natural infrastructure in village 1 is the community-managed forests that provide resource users with fodder as a main resource from the forests. The community forest is too large and dispersed to monitor all behavior (p. 274). To overcome this weakness arising from natural infrastructure, villagers created the rules-in-use for selecting their forest guards and encouraging them to monitor rule infractions by linking their performance to their salary.

2) Hard human-made public infrastructure: There is no explicit information about hard human-made infrastructure such as roads and fields of seedlings.

3) Soft human-made public infrastructure: See 1.4 Rules in use (IAD)

2 Part II. Dynamic Analysis - Robustness

This update to the Forest in Almora district, India (1) case was made in 2015 by Hoon C. Shin at Arizona State University. In-text parenthesis indicate corresponding links in the system representation (Robustness diagram) on the SES library.

2.1 Update on the Commons Dilemma

2.2 Shocks, Capacities, Vulnerabilities

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

There are no explicit mentions of biophysical disruptions (Arrow 7) such as floods, earthquakes, landslides, and climate change that impact the resource.

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

There are no explicit mentions of biophysical disruptions (Arrow 7) such as floods, earthquakes, landslides, and climate change that impact the public infrastructure.

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

One of major socioeconomic changes (Arrow 8) in village 1 is the establishment of the Van Panchayat Act of 1931. From the 1840s, the British government asserted its absolute rights over all land and forests. The Imperial Forest Department protected state forests from trespassing, unauthorized tree felling, grazing, and firing. In response to the states control over forests by limiting villager access and use rights to the resource, villagers protested incessantly against encroachments by the state on their traditional rights in the forests. As a result, the Forest Grievances Committee, set up in 1921, recommended the government to reclassify forests into class 1 and class 2 forests. And the Van Panchayat Act of 1931 permitted resource users to create community-managed forests from the class 1 forest controlled by the Revenue Department.

The Van Panchayat Act prescribes the process of forming van panchayats and imposes certain duties on village forest councils. This means that the Van Panchayat Act contributed to changing public infrastructure provider from central government to self-governing community. The panchayat officials are elected by villagers to design soft human-made public infrastructure, e.g. a variety of the rules-in-use described above, and enforce it.

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

The Van Panchayat Act described above facilitated collective action by villagers for some reasons. First, the Act requires villagers to create boundary rules. Villagers must demarcate the boundaries of the panchayat forest (p 270). In order to become legitimate resource users, they basically must be residents of the village where the forest is located (p. 271). Secondly, resource users can elect their panchayat officials who can design the rules and select forest guards (p. 270; 272). Lastly, villagers do not use trigger strategies to force individuals to reduce their levels of rule violations. Trigger strategies defection by one individual triggers defection by all by themselves can create cooperation only as threats, not after an individual has initiated defection. Instead of trigger strategies, resource users create the van panchayat (local institution) so that panchayat officials attempted to improve the efficiency of monitoring, increased the hours spent on monitoring, and tried to innovated graded sanctions (p. 276).

2.3 Robustness Summary

In this case study there is no explicit information about ecological shocks to resource and public infrastructure. But the Van Panchayat Act of 1931, which was a major socioeconomic change from outside of village 1, played a role in facilitating collective action of

both resource users and public infrastructure providers. The Act permitted resource users to create community-managed forests and their self-governing institutions including the van panchayat and a variety of rules-in-use. Consequently, the forest in village 1 is in excellent, or excellent to good condition (p. 270).