

# Munglori “Turf” (forest territory) Management, India

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## 1 Part I: Static Analysis - Collective action

Munglori (also spelled as Munglauri) is a small village 12 km north of the town of Mussoorie in the Dehradun district of Uttarakhand, India. The village is situated on the windward side of the Himalayan piedmont and is watered by Monsoonal rains, supporting an oak woodland ecosystem. Residents of Munglori and nearby villages rely on oak biomass, particularly Oak branches of 2-3 years, with leaves and branches for fuel and fodder. The need for sustainable harvesting of these branches and forest management results in a common pool resource dilemma. This case study focuses on how informal group-based territorial organization, here referred to as turf, is used to define inter- and intra-village access and harvesting rights to these woodlands. The system dynamics operate at two main scales: *Inter*-village, where villages interact within each other to draw boundaries for natural resource appropriation; and *intra*-village, where informal rules and social controls are stable and successfully manage the commons dilemma. This work mostly focuses on the latter domain. The biophysical context of the forest (remoteness; biodiversity) and attributes of the community (small, isolated population; accepted social norms; subsistence lifestyles) lead to the successful management of the common pool resource (Moench, 1988).

This analysis follows up on a case that was developed for the original Common-Pool Resource (CPR) database by Edella Schlager and Shui Yan Tang at Indiana University in the 1980s (CSID 2013). The original CPR report may found in the CPR tab under Institutional Analysis.

### 1.1 The Commons Dilemma

The commons dilemma arises from the potential over appropriation of Oak branches for fodder and fuel from the forests surrounding Munglori and neighboring villages. The dilemma is successfully alleviated by informal inter- and intra-village appropriation rules.

- **Potential over appropriation / Poor coordination of appropriation:** The entire turf system is focused on managing access to, and by extension appropriation of, oak biomass (i.e. leaves and wood). All households within a village are broadly

allowed open access to that villages turf, and members of one village are expected not to harvest biomass from a neighboring villages turf. These rules are generally adhered to, especially in close proximity to the villages themselves. Individuals occasionally harvest from another villages turf, but only in isolated, higher-elevation areas where monitoring is difficult, and the regenerative capacity of the resource base is greater. This suggests that villagers are more concerned with maintaining successional dynamics rather than sustaining aggregate biomass volume. As a result, low-level violation of turf restrictions does occur but are accepted and rarely lead to outright conflict.

Small wooden huts known as **chans** that serve as stopovers in seasonal migration routes are dispersed within the villages turf; access to oak in the vicinity of these chans is more restricted. Each household owns 2-4 chans and will only harvest biomass from around their chans during the few times a year when labor is insufficient for more typical collection in the wider turf. As above, these restrictions are informal, and their adherence is seen more as a matter of etiquette and convenience, so overharvesting the areas around ones own chan, as well as use of other households chans, are possible.

- **Potential under-provisioning of public infrastructure:** A villages turf is defined in practice by a set of boundaries between social units that have been mapped onto physical markers on the landscape, and thus serves as a form of soft public infrastructure. Although the **use rights** are clearly defined and limited to the social units associated with the turf, the turf system is informal and ultimately arises from **de facto** land-use practices. The system thus has the potential to be under-provisioned due to a lack of village-based social boundaries and punishments for their violation.

However, there may be three potentials for under-provision of infrastructure that are more pressing:

1. There is a lack of coordination and undefined rules and boundaries at the inter-village level where grassland burns sometimes affect forested areas of other villages.
2. Potential conflict and mismanagement as the State Forest Management comes to play a greater part in light of the long-term sustainability of the resource system. Moench (1988) describes the potential for disruption of the current de facto system by introduction of institutionalized management practices with the neglect and omission of the role of the villagers in forest management planning and research.
3. is unclear what public infrastructure is present or planned-for in light of the potential (and apparently insidiously gradual) intrusion of market economies. Moench (1986) outlines the potential of illegal felling (commercial extraction of timber) after the ban for the Garwal Himalayan region at-large.

## 1.2 Biophysical Context (IAD)

**Natural infrastructure:** The primary resource units are oak leaves and branches are fodder and fuel that are sourced from local grasslands and oak forests and support subsistence lifestyles of residents in Munglari. Fodder is consumed by herds of cattle, caprines, and draught animals, which in turn produce manure for fertilizer for rain-fed agricultural

fields. Fodder consists of grass and oak leaves. Wood is the villagers primary fuel source, and small twigs left from fodder collection make up half of the local fuel supply. Under this arrangement, fodder, fertilizer, and fuel are interrelated and forest health significantly impacts village welfare (Moench, 1988).

Moench (1988) mentions that there are few parts of the forest that have good regenerative growth, and the rest have marginal depletion (the nibble effect in Moench, 1986). Differential resource dynamics on different aspects of the slopes may lead to appropriation issues (Moench, 1987: see Fig.7). Both source articles suggest that although this system is significantly more sustainable than during British rules and prior the Chipko Movement, the possibility remains that the biomass needs of the villagers may lead to degradation of the forest ecosystem. Hence, there may be a short-term stability along with a long-term sustainability challenge.

The natural topography of the region serves as clear boundaries. High ridges and crests separate the turfs of different villages. Effects due to the aspects of the slopes (i.e. south-facing, east-west facing, north-facing, and altitude) affect the convenience of access, regeneration, and canopy dynamics which result in either peripheral degradation (nibble effect), the density effect (increase in unit oaks/area), or the replacement affect (intermixing of new plant species upon slight opening in canopy).

The forests are managed by the national Forest Department, but the state employs few officials in the region. Villages recognize informal governance arrangements around turf although the local tenure norms are not officially recognized by the state. Each village holds claim over tracts of forest, and within each division village families manage personal turf that is not clearly delineated. Although this system is not recognized by the state, villages in the region recognize each others turf ownership. The state does grant concessions to villagers to allow the consumption of forest resources (Moench, 1988).

**Human-made infrastructure (Hard):** In Munglari, there is little evidence of physical, public infrastructure that impacts turf management. In fact, a lack of infrastructure, like roads, supports the informal turf management system that is in place. Munglari is separated from major roads and external markets by the Aglar River to its south, and the village is a two hour walk to the nearest road (Moench and Bandyopadhyay, 1986). In terms of the governance challenge, the biophysical context mitigates the commons dilemma by delineating clear physical boundaries and facilitating the adoption of easily-enforced position and boundary rules (discussed in Section 1.4).

### 1.3 Attributes of the Community (IAD)

**Social infrastructure:** Each social unit (village) in the region (Munglari included) manages its own piece of forest that is delineated by clear, natural features (i.e. steep slopes, mountainous ridge lines, watersheds, etc.) onto which social boundaries are mapped. The cultural norms that tie specific natural features to specific social boundaries constitutes a set of regionally-shared social infrastructure. Thus, there is an intra-village social structure nested in an inter-village social structure. Most households are Rajput (35 of the 45), a relatively high caste, and the rest are scheduled castes. However, implications of this are

not explained in the sources.

**Human infrastructure:** The residents of Munglori and neighboring villages – agropastoralists depending on a mix of rain-fed agricultural and local transhumance – use traditional and experiential knowledge of the local oak woodland agroecosystems, in particular successional dynamics and the optimal biomass properties for fodder and fuel use (see sections 1.1 - 1.2)

## 1.4 Rules in Use (IAD)

The rules in use are provided by the village agropastoralists themselves. Based on the case study, the following specific, yet largely informal, rules dictate the function of the Munglori turf management system:

- **Position rules:** Villagers are resource users, resource managers, and infrastructure providers. Villagers are operationally equivalent in this context, and there are no special positions for management, monitoring, or punishment. Villagers have a position as members of their village (intra-village), but also as occupants of the Munglori region (inter-village), each position having its own rules and behavioral dynamics.
- **Boundary rules:** Participants are divided into a nested hierarchy of households (pertaining to each chan that holds fodder reserves), members of the village, and member of the Munglori region.
- **Choice rules:** All members of a village have access rights to that village's turf, with the exception of the immediate vicinity around chans. Although villagers may technically consume all resources within their village's forest, individuals typically avoid using resources from grassland and forest adjacent to another household's chan. Between villages, there are clearly defined and understood boundaries based on geographical features that bound areas of access.
- **Aggregation rules:** Although all villagers enjoy equal access rules, convenience as well as local norms (courtesy, informal social control, potential retaliation) dictate that individuals do not make decisions impacting the grassland and forest near other village's chans.
- **Information rules:** Information is informally shared within a relatively close-knit community, which makes information sharing concerning resource use and social sanctioning relatively straightforward. Knowledge of each village's turf as well as ownership of chans within a given area of forest direct individual decisions.
- **Payoff rules:** No formal payoff rules specified. Using resources from another village's forest, however, may result in physical violence. There is also a potential for retaliation if someone were to use resources near another family's chan. Inter-village lopping offenses are tolerated for the most part due to the significantly less than ideal quality of the resources in the areas where this normally occurs, and difficulty in monitoring and sanctioning in these specific areas.

- **Scope rules:** For fuel harvest, villagers may only lop branches from trees and must not cut entire trees. Lopped tracts of forest are managed for fuel while unlopped forest is protected (Moench, 88). Ridges and spurs of land delimit areas of access that are exclusive to each village, but harvesting areas are hazily defined within each village as the turf rules are more implicitly based on courtesy, convenience, and local social control.

## 1.5 Summary

In Munglori and other nearby villages, turf management is an informal system governed by traditional norms and rules. Participation in the system is limited to villagers, and these villagers play the roles of resource user, resource manager, and infrastructure provider. Munglori is a remote village, and its geographical placement plays a significant role in supporting this management system. Agricultural out-buildings, known as chans, are units of private property. Accepted norms around the exclusive use of resources near personal chans is an example of soft, public infrastructure that guides the management of the common pool resource.

Overexploitation of woodland resources and under-provisioning of social boundaries lead to a common pool resource dilemma and the potential for environmental degradation. The Munglori case is an example of a successful solution to the commons dilemma. The biophysical context of Mungloris geographical boundary and remote location paired with the attributes of the small community and its social norms facilitate successful management of the common pool resource.

## 2 Part II. Dynamic Analysis - Robustness

### 2.1 Shocks, Capacities, Vulnerabilities

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